

PD-ABJ-755

01/13/89

THE ASIAN VEGETABLE RESEARCH AND DEVELOPMENT CENTER  
SHANHUA, TAIWAN, R.O.C.

PROJECT ACTIVITIES COMPLETION REPORT

of the

AFRICA VITAMIN A GARDENING PROJECT

November, 1989

AID Grant No. DAN-0045-G-IC-6038-00

Office of Nutrition

Bureau of Science and Technology

Agency for International Development

Washington, DC, USA

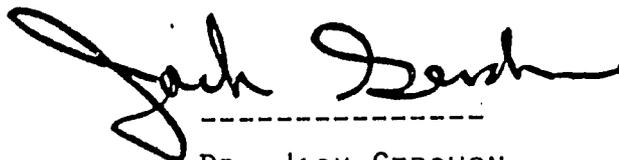
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NOVEMBER, 1989

A handwritten signature in black ink, appearing to read "Jack Gershon". The signature is written in a cursive style with a large initial "J". Below the signature is a horizontal dashed line.

DR. JACK GERSHON  
CHIEF OF PARTY  
AFRICA VITAMIN A GARDENING PROJECT

## List of Abbreviations

ADO	AGRICULTURAL DEVELOPMENT OFFICE
AID/W	AGENCY FOR INTERNATIONAL DEVELOPMENT/WASHINGTON DC
AVRDC	ASIAN VEGETABLE RESEARCH AND DEVELOPMENT CENTER
CARE	COOPERATIVE FOR AMERICAN RELIEF EVERYWHERE
CGIAR	CONSULTATIVE GROUP IN INTERNATIONAL AGRICULTURAL RESEARCH
CGNET	COMMUNICATIONS NETWORK OF THE CGIAR
COLA	COST OF LIVING ALLOWANCE
COP	CHIEF OF PARTY
CWS	CHURCH WORLD SERVICE
DOAE	DEPARTMENT OF AGRICULTURAL EXTENSION
FAO	FOOD AND AGRICULTURAL ORGANIZATION OF THE U.N.
F/FLS	FARMING/FAMILY LIVING SYSTEMS IN THAILAND
GLV	GREEN LEAFY VEGETABLE
GON	GOVERNMENT OF NIGER
HKI	HELEN KELLER INTERNATIONAL
IBPGR	INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES
ICRISAT	INTERNATIONAL CROPS RESEARCH INSTITUTE FOR THE SEMI-ARID TROPICS
IIE	INTERNATIONAL INSTITUTE OF EDUCATION
IITA	INTERNATIONAL INSTITUTE FOR TROPICAL AGRICULTURE
IPDR	INSTITUT PRATIQUE DU DEVELOPPEMENT RURAL(NIGER)
ISRA-CDH	INSTITUT SENEGALAIS DE RECHERCHES AGRICOLES-CENTRE POUR LE DEVELOPPEMENT DE L'HORTICULTURE (SENEGAL)
JICA	JAPANESE INTERNATIONAL COOPERATION AGENCY
LDC	LESS-DEVELOPED COUNTRY
LWR	LUTHERAN WORLD RELIEF
MOA	MINISTRY OF AGRICULTURE
MOF	MINISTRY OF FINANCE
MOFA	MINISTRY OF FOREIGN AFFAIRS
MOU	MEMORANDUM OF UNDERSTANDING
NAAR	NATIONAL APPLIED AGRONOMIC RESEARCH PROJECT(NIGER)
NGO	NON-GOVERNMENT ORGANIZATION
NIB	NIGERIA INTERNATIONAL BANK (NIAMEY)
ORANA	OFFICE DE RECHERCHES SUR L'ALIMENTATION ET LA NUTRITION AFRICAINE (SENEGAL)
PCV	PEACE CORPS VOLUNTEER
PVO	PRIVATE VOLUNTARY ORGANIZATION
REDSO/WCA	REGIONAL DEVELOPMENT SERVICES OFFICE/ WEST AND CENTRAL AFRICA (COTE D'IVOIRE)
S&T/N	BUREAU OF SCIENCE AND TECHNOLOGY/OFFICE OF NUTRITION
TVA	VALUE ADDED TAX (NIGER)
UNICEF	UNITED NATIONS CHILDREN'S EDUCATION FUND
WHO	WORLD HEALTH ORGANIZATION

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# PROJECT ACTIVITIES COMPLETION REPORT

## 1 INTRODUCTION

### 1.1 Prolegomenon

#### Background

A number of the activities covered in this report were affected by an incident that took place in Niger. Therefore, the report begins with this "prolegomenon" section, describing the incident that, over time, negatively affected "Projet Horticole Vitamine A" ("the Project"), and led to its premature ending.

The incident (referred to hereafter as the "Diallo affair") concerns some extraordinary and fraudulent actions on the part of Mr. Hama Diallo, Assistant Project Officer in the Agricultural Development Office, USAID/Niger, and son of a former Niger Ambassador to the US. Diallo's actions eventually involved the Project, its staff, the Project grantee-- the Asian Vegetable Research and Development Center (AVRDC), USAID/Niger, and lawyers in Niger, Taiwan and the US.

Diallo fraudulently obtained about \$15,000 from Project funds. He then created a false Mission project ("Projet Horticole Vitamine A, AVRDC/USAID-Niger"), and used the funds to buy vehicles and equipment from Niger merchants tax- and duty-free, which he then intended to sell to individuals. He was found out, arrested, charged and jailed, and the vehicles and equipment were impounded by the Government of Niger as legal evidence in its prosecution of Diallo.

Diallo's fraudulent dealings involving the Project began in late 1987 and were discovered in July 1988. Due to name similarities between the Project and Diallo's false project, Niger merchants then sued the Project for damages and AVRDC made defensive counter claims. The lawsuits started in August 1988, and were still going on at the Project's expiration in November 1989. The Project began its activities in Niger in July 1987, and ended them in August 1989. Thus, it was affected by the Diallo affair during most of its time in Niger.

#### How Project funds were diverted

Diallo initially gained access to Project funds during the Project's startup in Niger in September 1987. At that time the Project was notified by the Government of Niger (GON) that a new value added tax (TVA) had been instituted in Niger, and the Project would not be exonerated from it. Diallo, assigned by the Mission to give courtesy startup advice to the Project, requested Project funds he said would be used as a temporary stopgap, to be placed at GON agencies and other organizations as deposits until the Project was exonerated from TVA. The monies would then be

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refunded to the Project. He produced, what was later to be found, false or falsified receipts and submitted them to the Project for reimbursement.

Most of the \$15,000 was obtained from Project staff between October-December, 1987, purportedly to help a staff member get Project sea- and air-shipments, and Project vehicles, cleared through Niger Customs so that activities could start. The remainder of the money was obtained in early 1988.

### How knowledge of the affair surfaced

In July of 1988 USAID/Niger found out from some Niger merchants that someone was buying a large number of cars from them for a Mission project. The merchants reported they were not being paid, and the Mission began an investigation. The Project's Chief of Party (COP) was notified by the Mission that some out of the ordinary vehicle purchases were being made under a false Mission project that sounds like the Project. The Mission asked the COP to say nothing to anyone while it carried out its investigation.

During the same time period an officer from the Inspector General's Regional Office, Dakar, joined the investigation. He was given full cooperation by the Project staff, and made a report to his Dakar superiors. Shortly afterwards USAID/Niger gave the COP some documents to support a COP report on the situation to the Office of Nutrition, Bureau of Science and Technology (S&T/N), Agency for International Development, Washington, DC (AID/W), the Project's granting agency. The report was made to S&T/N in late July 1988, followed by a report to the Project grantee, AVRDC, in early August 1988. The Inspector General's Office, AID/W, made an official report which, as of this writing, has not been released to the general public.

### Resulting actions that affected the Project

The merchants who sold the vehicles and equipment to Diallo (impounded by the Niger police as evidence) filed a US\$1,000,000 suit in Niger court against the Project (which the merchants thought to be Diallo's false project) to recover their losses in selling Diallo about 25 vehicles, plus other equipment (tractors, air conditioners).

AID/W allowed \$10,000 of Project funds to be used against the claim of the merchants in a Civil Court case, and a Niger lawyer was retained by AVRDC. The lawyer told the COP that he had Diallo arrested and jailed eight years before on a similar charge when Diallo worked for CARE International. At the time of that arrest it was found that Diallo had earlier been arrested, but not charged, in the same type of fraudulent action when he worked for a Niger textile firm, SONITEX.

AID/W eventually approved the use of an additional \$2,100 in Project funds to complete the Project's defense against the merchants' claim in Niger Civil Court. That case was still going on at the end of November 1989, and it has taken much time, effort and money from substantive Project activities.

The Project staff member who was duped out of Project funds by Diallo, was also duped out of some personal funds. The staff member filed a personal lawsuit against Diallo in Niger Penal Court.

In April of 1989 the staff member was charged by a Niger judge with complicity in the Diallo affair. To avoid possible arrest and conviction, the staff member fled Niger, returned to the US, hired a lawyer, and has since made claims against AVRDC for various damages. AVRDC retained the services of an international lawyer in Taipei to respond to the claims.

In April 1989 AID/W, though the Diallo affair still not resolved, nevertheless agreed to extend the Project if a revised Project workplan and budget was submitted to AID by June, 1989. The workplan was drafted, but the AVRDC Board of Directors, after reviewing the ongoing (and in some cases, increasing) legal problems, decided to let the Project expire at the end of its first phase, on August 31, 1989. AVRDC and AID/W agreed on the expiration. The Project was later extended by AID/W, without additional funds, to November 30, 1989, to complete Project close-down and report writing.

#### Present situation

As of this writing none of the cases have been settled. The Niger courts have given the impounded vehicles and equipment back to the merchants. Diallo hired a Niger lawyer, who obtained a temporary release for him pending the hearing of the cases. The Niger Minister of Justice, in a letter to the District Attorney's Office, recommended charges of complicity against the Project staff member be declared "non-lieu", and Diallo be sentenced to a suitable term under Niger's recidivism laws. The recommendation is to be reviewed by the Niger courts. With the expiration of the Project, all Project staff members employed by AVRDC have lost their jobs.

The Diallo affair has impinged on Project progress from a time shortly after the Project began in Niger, to its expiration. The completion of Project activities have been greatly affected by the affair. The reader is asked to view what follows in that light.

# PROJECT ACTIVITIES COMPLETION REPORT

## 1.2 Purpose of Report

The AVRDC/Africa Collaborative Vitamin A Gardening Project, called "Projet Horticole Vitamine A" in Niger, was a project linking nutrition to agriculture by promoting gardening as a way to alleviate vitamin A deficiency problems in a part of Africa. The Project's goal was to promote increased levels of production and consumption of vitamin A crops in the Sahel region of West Africa by engaging in a related series of activities: needs assessments, adaptive research, networking with PVOs and NGOs in the Sahel, and by conducting regional workshops and training programs.

This report covers the progress of the Project, from its inception on August 31, 1986, to its expiration on November 30, 1989. A second phase was planned, but the Project was allowed to expire after its first phase due to the legal problems in which the Project became embroiled as a result of the Diallo affair.

## 1.3 Organization of Report

The report is organized in a diachronic manner. The first section presents the reader with the Project background, i.e, how the Project came to be, how it was implemented, and mechanisms for periodic evaluation.

Following is a second section on the completion status of the main Project activities: assessments, networking and collaboration, adaptive research, workshops, training programs, and required reporting.

A third section reports on lessons learned in managing and administering the Project, and in carrying out its major activities. This section attempts to analyze Project experiences and suggest constructive measures that can be incorporated into future projects, and negative situations to be avoided. This section will be described in terms of its value to future AID/W and/or AVRDC projects.

A final section describes issues not resolved when the Project expired. This section should provide some insight on other lessons that could have been learned had the Project continued to a normal conclusion.

## 1.4 Background

### 1.4.1 Concept and strategy

Xerophthalmia is the leading cause of preventable blindness of children in less-developed countries (LDCs). Also known as nutritional blindness, it is caused by an insufficient

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## PROJECT ACTIVITIES COMPLETION REPORT

intake of vitamin A in the diet. Xerophthalmia is frequently accompanied by malnutrition and infection, and is associated with high mortality. The World Health Organization (WHO) estimates that vitamin A deficiency is a public health problem in 73 countries, and is especially severe in some regions, such as in Sahelian West Africa.

AVRDC has since 1981 developed small home gardens, school gardens and income-generation gardens. These gardens, including a vitamin A home garden, have been shown to produce significant amounts of beta carotene (vitamin A precursor) on a daily basis by growing culturally acceptable vegetables (and a few fruits) for family consumption. Promoting the production and consumption of these types of gardens in Sahelian countries would complement other nutrition intervention measures such as capsule distribution and food fortification, and could be a long-term, sustainable solution to the xerophthalmia problem.

Under funding from S&T/N, AID/W, AVRDC initiated a collaborative vitamin A gardening project in Sahelian West Africa. The strategy was to promote increased levels of production and consumption of vitamin A garden crops in four Sahelian countries, through the following activities:

- A. Conduct needs assessments to find out existing gardening knowledge, progress and problems.
- B. Network and collaborate with private voluntary, and non-government, organizations (PVOs and NGOs) working on problems of vitamin A.
- C. Carry out adaptive gardening research based on the needs assessments.
- D. Conduct regional workshops and training programs for Africans from PVOs, NGOs and national programs, to exchange existing knowledge and disseminate new knowledge gathered from the networking & collaboration, and from the adaptive research.
- E. Periodically provide in-country follow-up advice and assistance to graduates of the training program.

### 1.4.2 Project goal and summary of activities

The Project's goal was to increase levels of production and consumption of vitamin A crops in four countries of the Sahel region of West Africa (Burkina Faso, Mali, Mauritania, and Niger) by promoting gardening of vitamin A (and other) nutritious crops.



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The goal was to be attained by the Project engaging in a set of related goal-oriented activities. The Project's first activity was to conduct regional assessments to find out where vitamin A problems exist in the four target countries, what is presently being done through home gardening, what kinds of successes and constraints Sahelian gardeners have, what are the consumption constraints, and what are the felt needs of farm families in terms of knowledge and inputs for better gardening.

During the original assessment period Project staff also initiated a regional network with PVOs, NGOs, and government organizations engaged in gardening and/or vitamin A related projects, to find out their gardening problems and successes, let them know what the Project hopes to achieve, and start an information exchange so that the various organizations could share their experiences and, for those interested, could start collaborative activities with the Project.

During its lifetime the Project conducted needs assessments, established a collaborative network, conducted adaptive vitamin A gardening research, and conducted one regional workshop and one training program.

Activities were reported to AVRDC and S&T/N via informal reports to the Project Officer in S&T/N, trip reports, quarterly budget estimates and fiscal statements and other required reports under the terms of the AID grant to AVRDC. Among them were: workshop and training program summaries, annual Project summary reports, listings of cooperating country nationals, an internal evaluation report, and this Project Activities Completion Report. In addition, there were a number of reports generated concerning the Diallo affair.

### 1.4.3 Project implementation history

#### YEAR ONE

Site Selection. Two Africa site selection trips were organized by AID/W to locate a collaborating institution at which to house the Project. The site visit teams consisted of staff from AID/W Africa (REDSO/WCA), and AVRDC. The first visit, in August 1986, was made to international agricultural research centers in Niger and Nigeria: International Crops Research Institute for the Semi-Arid Tropics's (ICRISAT)-Sahelian Center in Niger; and International Institute for Tropical Agriculture (IITA) in Nigeria. ICRISAT could not host the project because it was just beginning to build its new facility. IITA was planning to close its sub-centers in the Sahel and could not offer a location in the right climate zone.

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A second site visit was made by a similar AVRDC/AID team in January, 1987. This trip covered institutions in Senegal, Burkina Faso, and Niger. Some suitable sites were found in Senegal, but USAID/Dakar could not give courtesy startup assistance and requested the project try another country. The team did not see any acceptable sites in Burkina Faso. One suitable site was shown to the team by USAID/Niger: the Institut Pratique du Developpement Rural (IPDR), a GON agricultural training center 28 km from Niamey. This location met site criteria and IPDR agreed to be the Project's collaborating institution. USAID/Niger agreed to the project being in Niger. IPDR was then selected, and S&T/N requested the Mission give the Project a limited amount of courtesy startup assistance and advice.

Staffing. International staff were recruited, hired, and brought to AVRDC for orientation. IPDR recommended local staff, most of whom were hired.

Workshops/Training programs. During Year One AVRDC and the Project staff planned workshop topics & formats, and developed a curriculum outline for the training programs.

Memorandum of Understanding (MOU). A draft MOU was prepared by AVRDC in January 1987, and given to IPDR for their inputs and approval. A final draft was accepted by all parties in June 1987. The COP was requested by USAID/Niger to come to Niger in July 1987 to hand-carry the MOU to GON Ministries for signature. Final GON approvals and signatures were not completed during this first year, but enough signatures were obtained to allow USAID/Niger to give a go-ahead to the Project to begin its startup activities.

The main constraint holding up MOU signatures was the new Niger value-added tax (TVA) on all imported equipment and supplies, and on local purchases. The TVA ranged from 17-45% of the purchase price of an item. This one GON action held up Project's sea- and air-shipments, and release of its vehicles from Niger Customs (this also became the 'door' by which Diallo was able to gain access to Project funds).

Reporting. The following are the reports made during Year One:

- A. Trip reports to AVRDC with copies to S&T/N.
- B. Informal letter exchanges between the COP and the Project Officer at S&T/N.
- C. Workplan and schedule of activities; to S&T/N.

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D. Quarterly budget estimates and statements of expenses from previous quarters; to AVRDC and AID/W.

E. Annual Report, Year One, summarizing project progress and constraints, and containing a list of cooperating country nationals; to AVRDC and AID/W.

Thailand sub-project. In 1983, under funding from S&T/N and AID/W's Asia Bureau, AVRDC instituted a gardening project in Thailand, in collaboration with Kasetsart University, Bangkok. This was the Farming/Family Living Systems Project in Thailand (F/FLS), and consisted of transferring AVRDC's gardening technologies to Thailand for in-country testing, modification, and extension. This project ran from 1983-86.

When the Africa vitamin A activities began, AID/W offered Missions an opportunity to buy in. USAID/Thailand bought in by providing approximately \$48,000 to continue the gardening activities for another three years, with a modified vitamin A focus.

The 1983-86 activities involved in-country gardening research, pilot village gardens at Bangpae, 100 km southwest of Bangkok, and the development of a manual (in Thai) for planning, implementing, evaluating and extending home and school gardens in Thailand. In Year One of the modified activity, the COP and Kasetsart University counterparts developed plans to (1) move the activities to the northeast of Thailand, where there is vitamin A deficiency, (2) establish home and school garden pilot projects, and (3) plan workshops to train agricultural development officer and extension agents in the use of the gardening manual.

### YEAR TWO

Shipments. Sea- and air-shipments were prepared and sent to Niger from the US and Taiwan. Vehicle purchase waivers were obtained from AID/W and two Japanese vehicles were ordered in Niamey, Niger.

Staffing. Expat staff took up their posts in Niger, and local Project staff were hired in Niger and at AVRDC (an Administrative Assistant/translator).

Assessments. Preliminary assessments were started, gathering information on rainy season gardening, on research needs of the Project, and on nutrition and food consumption practices in two of the four target countries, Burkina Faso and Niger.

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Collaboration/networking. The Project established itself at IPDR and began initial collaboration, consisting of exchange of staff and information with IPDR. Through IPDR the Project began to network with other GON appendages, e.g., Niger's Ministries of Agriculture (MOA) and Foreign Affairs (MOFA).

An important collaboration was established with USAID/Niger. They granted courtesy startup assistance, and encouraged the COP to link up with horticultural segment of the Mission's National Applied Agronomic Research Project (NAAR), a project connected to Niger's national agricultural program.

Additional networking began between the Project regional PVOs, NGOs and other organizations, for example: Helen Keller International (HKI), Peace Corps/Niger, Institut Senegalais de Recherches Agricoles-Centre pour le Developpement de l'Horticulture (ISRA-CDH), Dakar, and Office de Recherches sur l'Alimentation et la Nutrition Africaine (ORANA), Dakar.

Research. Observation trials were conducted at IPDR during the dry season on vitamin A crops that are culturally acceptable in the region, e.g., local green leafy vegetables (GLVs), hot and sweet pepper, tomato, carrot, sweet potato, squash, and legumes whose leaves are consumed.

Rainy season trials were planned, to include: (a) variety trials and observation trials, (b) intercropping demonstration plots, (c) propagation of orange-flesh sweet potato, and (d) climatic experiments on various AVRDC crop management techniques and practices. Research details were reported to AVRDC and AID/W in the Project's ANNUAL REPORT, YEAR TWO, OCTOBER 1, 1987 TO SEPTEMBER 30, 1988.

Workshops. The Project conducted its first vitamin A gardening workshop in Niamey, Niger, July 17-21, 1988. The objective of the workshop was to exchange information and increase collaboration among PVOs, NGOs and governments working in vitamin A gardening activities in Sahelian West Africa. In attendance were 43 participants from the Project's target countries of Burkina Faso, Mali, Mauritania, and Niger.

The workshop met its goal of helping to initiate a strong regional network among PVOs and NGOs engaged in gardening. Appendix A contains a detailed report on the workshop, including names, organizations, and addresses of participants, and a summary of an evaluation of the workshop.

Training. Organizations/individuals were contacted, and letters were sent out to PVOs and NGOs, announcing the Project's first training program, to be held in early 1989. The program was designed to train Africans from mainly PVOs and NGOs who are actively engaged in vitamin A gardening activities. The program, given in French, was to be 50 days in length, with classroom and fieldwork offered, and with subsequent follow-up assistance in

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the home country by Project staff after the training scholars' graduation. The Project's Training Officer and Resident Scientist made trips to the four target countries to recruit trainees, consultants and other resource persons, and to gather teaching materials.

Thailand sub-project. During year two, Project counterparts at Kasetsart University, and the Thai Department of Agricultural Extension (DOAE), expanded activities into the northeast. The major activity during the year was conducting training workshops for provincial agricultural officers. The officers learned how to use the how-to-do-it gardening manual developed during the 1983-86 activities, and modified for vitamin A gardening in 1987. The officers, in turn, trained extension agents who work directly with farm families and schools. Approximately 2000 manuals were published, with approximately 700 used to train agricultural officers in 1987. About 600 of them were additionally put into use in the northeast by the end of 1988.

Reporting. The following are the reports made during Year Two:

- A. Trip reports to AVRDC with copies to S&T/N.
- B. Monthly progress reports to USAID/Niger.
- C. Informal exchange of letters between the COP and the Project Officer at S&T/N.
- D. Workplan and schedule of activities; to S&T/N.
- E. Projected yearly budget; to S&T/N.
- F. Quarterly budget estimates and statements of expenses from previous quarters; to AVRDC and AID/W.
- G. ANNUAL REPORT, YEAR TWO, summarizing project progress and constraints, and containing a list of cooperating country nationals; to AVRDC and AID/W
- H. Copies of the Thai gardening manual; to S&T/N, AVRDC, and AID/W Asia Bureau.
- I. Internal evaluation, requested by S&T/N; included in the Year Two annual report.
- J. Reports on the Diallo affair and on the Project's related legal problems in Niger; to S&T/N, AVRDC, and AID/W Contracts Office.

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## YEAR THREE

Assessments. Ongoing Project assessments continued, to verify and justify changes in the Project's schedule of activities and workplan, and to allow the Project's activities to better reflect the needs of people in the target countries. For example, the Project was designed to focus on production and consumption of vitamin A crops. The assessments have shown that one of the main felt needs of gardeners is to grow gardens first for income generation, and second as a source of food. The Project has modified its research, workshop and training, and networking activities accordingly.

Workshop. The Project's second workshop, planned for summer of 1989, was postponed, due to problems in Niger pertaining to the Diallo affair.

Training. A 50-day training program on vegetable gardening and nutrition was conducted at IPDR from January 4 - February 23, 1989. Sixteen Africans from the four target countries attended the training course.

The purpose of the training was to improve trainees' technical and extension skills in gardening, through classroom work and hands-on fieldwork, and to give them a basic understanding of nutrition concepts. The training was designed to give trainees enough information so that they can return to their home countries and train others on the importance of growing and consuming foods rich in vitamin A potential.

An integral part of the training was to have been follow-up visits to training graduates' work sites during the next few years, following their training for the purpose of backstopping their individual vitamin A gardening activities. Unfortunately the effects of the Diallo affair curtailed follow-up activities, and only one trip was made to Mali and Burkina Faso.

Appendix B contains a detailed report of the training program, including the training schedule, a description of activities during the program, what trainees will do upon their return home after graduation, and a listing of trainees' names, addresses and organizations.

Thailand sub-project. The Project counterpart staff at Kasetsart University continued to conduct workshops in the northeast, training provincial agricultural officers in the use of the gardening manual. The Kasetsart staff also modified the activities to shift focus to school gardens, to reflect shifts of interest in the Thai government, and to mirror new policies of the King's Project, part of which is to initiate school gardens along the Thai-Laos border.

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Reporting. The following are the reports made during Year Three:

- A. Trip reports to AVRDC with copies to S&T/N.
- B. Informal letter exchange between the COP and the Project Officer at S&T/N.
- C. Quarterly budget estimates and statements of expenses from previous quarters, and final fiscal statement; to AVRDC and AID/W.
- D. Project Activities Completion Report (this document) summarizing three years' Project activities. The format for the report was recommended by USAID/Niger, and includes a copy of the inventory list of equipment and supplies transferred to IPDR and AVRDC at completion of Project activities (Appendix C).
- E. Copies of a second printing of the Thai gardening manual; to S&T/N and AVRDC.
- F. A continuation of the reports on the Diallo affair and on the Project's related legal situation in Niger; to S&T/N, AVRDC, and AID/W Contracts Office.

### 1.4.4 Project evaluation history

The Project grant called for two independent Project evaluations, one mid-point and one final evaluation, to be arranged by S&T/N. The evaluations were to be conducted by an agriculturist and a nutritionist from REDSO/WCA, Dakar. These two people were familiar with the Project, having been part of the site selection team when the Project first began.

At the beginning of Year Two, S&T/N said the REDSO/WCA team would not be available because the agriculture person left AID, and the nutrition person was on extended sick leave. To compensate for the independent evaluation S&T/N requested the COP conduct an internal evaluation. This was done, and it became an integral part of the Year Two annual report.

During Years Two and Three, three events foreshadowed the planning and implementation of a Project independent evaluation by S&T/N. One, the Director of S&T/N became seriously ill and eventually passed away, leaving a long gap in some of that Office's activities. Second was the Diallo affair, that led to the Project being suspended in December 1988. Third, the Project Officer at S&T/N took early retirement in July 1988, leaving a communications gap between S&T/N and the COP. Before his retirement the Project Officer requested the COP give some

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thought to the design and scope of work for the independent evaluation, including performance indicators. This was done, but the three above-mentioned activities kept anything further from taking place.

### 2 PROJECT STATUS SUMMARY

#### 2.1 Assessments

Technical packages, such as the Project's adaptive research scheme, workshop themes, and training program curricula, seldom 'fit' as planned. Some mechanism was needed when the Project began, to obtain information on what presently existed that may affect a project's inputs, outputs, and goals. The mechanism used by the Project was the assessment.

In the original design of the Project, the assessment was to be a one-time thing, to gather baseline data and give some direction to the Project's main activities. However, due to the changing nature of the social, cultural economic and physical climate in the Sahelian countries, Project staff found that by making the assessment an ongoing activity, it would serve to give constant feedback throughout the life of the Project. That way adjustments could be made in Project activities in response to changes that may affect Project outputs. The following are a few examples of the type of information produced in the ongoing assessment:

A. Dietary surveys showed that many local GLVs are consumed in the region. Many indigenous GLVs were subsequently added to the Project's adaptive research. It even resulted in a small FAO/University of Niamey project on local GLVs, in which Project staff participated.

B. Sahelian West Africa is vast, but the Project was small. The ongoing assessments helped the Project focus its activities in areas where positive impact seemed likely, e.g., where the Project discovered the greatest felt need for gardening, and where wells were being dug by NGOs to provide a dependable water supply for families or for commercial gardening.

C. The felt needs of gardeners was for gardening to be a source of income, not necessarily a source of food. The Project modified its workplan accordingly.

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D. The assessments suggested the original 3-4 month training program would be too long. It was changed to a 50-day program, plus in-country follow-up visits by Project staff as training program graduates began their in-country vitamin A gardening activities.

E. Assessment trips set the stage for the theme and format of the Project's first regional workshop.

F. Assessment trips resulted in better networking with PVOs and NGOs, and collaboration with African horticultural and nutrition organizations such as ISRA-CDH and ORANA.

### 2.2 Networking and collaboration

Sahelian West Africa is a large region for any project to adequately cover. One way to obtain reasonable coverage is to link up with other organizations doing the same or similar work, and exchange information and/or collaborate on vitamin A gardening. This was the Project's strategy in organizing a network. After two years of Project activities in the region (e.g., gardening research, conducting a regional workshop and an international training program), the Project networked and collaborated with a number of organizations, for example:

USAIDs in Sahelian West Africa, especially USAID/Niger

IEPGR/Niger

Peace Corps

UN Food and Agricultural Organization (FAO)

UNICEF

HKI International

ICRISAT-Sahelian Center

ISRA-CDH

ORANA

AFRICARE

CARE International

World Health Organization (WHO)

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Lutheran World Relief (LWR)

Japanese International Cooperation Agency (JICA)

Save the Children

A description of the specific types of collaboration is given in the Project's Year One and Year Two Annual Reports, previously submitted to AVRDC and AID/W.

### 2.3 Adaptive research

The Project's research was planned to (1) transfer appropriate technologies from Taiwan to Niger, (2) find out during the assessments the constraints of Sahelian gardeners, and (3) put these together and conduct observation trials at IPDR. The results would then be fed into the Project's workshops, training programs, and its Sahelian network.

The Project's Resident Scientist collected some of AVRDC's technologies during her orientation period at AVRDC. Few of the technologies proved to be appropriate for the hot, dry conditions of the Sahel, but some of them showed promise, e.g., improved varieties of tomato, pepper and sweet potato, and some crop management procedures. These may have proven themselves in the Sahelian climate if the research was allowed to continue for a few more years.

Problems and constraints to gardening in the region were noted during assessment regional assessment trips by Project staff, and included in observation trial experiments.

The observation trials were conducted, over a two-year period, on culturally acceptable vitamin A gardening crops in the region. Trials were conducted during both rainy- and dry-seasons.

As mentioned, much of the research was based on assessment information, e.g., constraints Sahelian gardeners have in growing successful gardens. Experiments on mulching, plant spacing, better variety or improved planting material, shading, windbreaks, appropriate pest and disease management, and post-harvest handling, produced useful information for further gardening research at the Project's site. The information was also passed on to organizations in the Project's network, such as Peace Corps volunteers who have village gardening projects.

The results of the Project's adaptive gardening research were incorporated into its first workshop and training program. Feedback from participants was positive in both of these activities, as they picked up pointers, techniques and methods that could be immediately applied to their vitamin A gardening efforts.

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A more detailed description of the Project's research results is in the Project's Year Two annual report. During the beginning of Year Three (Oct-Dec 1988) gardening research was interrupted as the Resident Scientist worked on preparing demonstration plots, and trainee's individual project plots, in preparation for the Project's first training program, starting in January 1989. The training ran until March 1989, after which the Resident Scientist became involved in some legal matters concerning the Diallo affair, and she abruptly left Niger in April 1989. No further research was undertaken in Year Three.

### 2.4 Workshops

The Project was supposed to run one workshop during each of its three years in Niger. Due to delays in finding a project site, and in project startup once a site was found in Niger, the Project began one year later than anticipated.

The Project's first workshop was held in Niamey, Niger, July 17-21, 1988--the Project's first real year of activities in the Sahel. The theme of the workshop was vitamin A gardening. Approximately 45 people attended from about six countries. The objective of the workshop was to increase collaboration among professionals working in the fields of health/nutrition and gardening/agriculture in order to increase levels of production and consumption of vegetables and fruits rich in vitamin A.

According to participants, the workshop was a success. It resulted in a meaningful exchange of information on vitamin A gardening, and it allowed the Project to strengthen its ties with regional PVOs and NGOs. A complete description and report of the workshop is in Appendix A. Subsequent workshops were planned for July 1989 and 1990, but Project problems cascading from the Diallo affair negated those plans.

### 2.5 Training Programs

The Project planned two 100-day training programs, training about 20 Africans in each program. The programs were to be patterned after AVRDC's successful six-month vegetable crops training programs held in Taiwan. The students were to be comprised of Africans actively working in gardening and vitamin A related activities in Sahelian PVOs and NGOs.

A training curriculum was drafted based on the AVRDC course, plus FAO's FOOD, NUTRITION and AGRICULTURE series that teaches human nutrition to agricultural students in Asia and Africa.

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During meetings with PVO and NGO representatives, and during recruitment trips to identify prospective candidates for the first training program, Project staff found that these organizations could not release their African staff for six months unless the Project provided support for training and the person's full salary while away. Most of the candidates also did not want to be away from their families for so long a period.

To overcome this problem the Project modified its workplan to have three training programs. Each one was to be 50 days in length, at IPDR, with follow up assistance in-country by Project staff once the graduate trainees returned home to put into practice what they learned in their training.

One training program was conducted at IPDR, from January 4-February 23, 1989, training 16 Africans from Burkina Faso, Mali, Mauritania and Niger. The Project's Resident Scientist made one training program follow-up trip to Mali and Burkina Faso in April 1989. No other trips were taken after AID/W and AVRDC mutually agreed to let Project activities in Niger expire on August 31, 1989.

A detailed report on the January-February 1989 training program is given in Appendix B. The Resident Scientist has promised to submit a trip report to AVRDC on her follow-up trips to Mali and Burkina Faso.

### 2.6 Reporting

As per requirements in the Reporting Procedures section of the AID/W grant to AVRDC, the Project has submitted yearly reports to S&T/N, including a listing of cooperating country nationals. In addition, quarterly fiscal statements were sent to AID/W and monthly informal letters were exchanged between the Project COP and S&T/N. Specific reporting activities on a year by year basis are described in section 1.43 (Project implementation history).

A final inventory was made of residual non-consumable property valued over \$500, titled to the Project and acquired under the Project grant from AID/W (the grant requests the values be over \$1000, but USAID/Niger said that was changed to \$500). In addition, a complete inventory of equipment and supplies transferred to the Project's host institution, IPDR, was also made. The list of items costing in excess of \$500, and a copy of the original inventory transfer document to IPDR, are presented in Appendix C.

AID/W Contracts Office has additionally requested the COP keep it informed of the Project's legal situation vis-a-vis the Niger merchants/AVRDC lawsuit in Niger Civil Court resulting from the Diallo affair. The COP has kept Dr. Jay Bergman, AID/W

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Contracts Office, fully informed. The lawsuit was still going on as of November 30, 1989. AVRDC will continue to keep Dr. Bergman informed after the COP leaves AVRDC.

As per additional reporting procedures to AID/W the following three statements are offered:

- No final patent report required.
- No final copyright report required.
- No final royalty report required.

With the submission of this Project Activities Completion Report, and a final fiscal report from the AVRDC Comptroller, all report requirements under the grant provisions will have been met.

### 2.7 Project extension

In a December 2, 1988 FAX to AVRDC, the AID/W Contracts Office acknowledged that additional time and funds would be necessary to complete the Project in Niger. In the FAX AID/W requested AVRDC provide the following:

- A. A revised program description, including goal and/or objective of the Project, progress to date, anticipated future activities, implementation plan (how, when, and by whom the activities will be undertaken, and how those activities will contribute to achievement of the project goal and/or objective), revised completion date, and indicators of success in achieving the goal and/or objective.
- B. A revised budget corresponding to the revised program description, including actual costs (by budget line item), and a detailed breakdown and explanation of estimated costs for completion of the Project through the revised completion date.

In January 1989 the COP returned to Niger and began to write drafts of the revised program description and budget. AVRDC required that the documents be approved by their administrative staff before being submitted to AID/W.

Between January - April 1989 the COP wrote a number of drafts of the program description and budget. Each draft was reviewed by Project staff in Niger who would be responsible for doing the work. Their comments and suggestions were worked into subsequent drafts.

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After five drafts were completed, the Project staff felt that they could complete the Project outputs in the time allowed, and with the resources being requested. The fifth draft was then expressed to AVRDC for inputs and approval.

In March 1989 the COP returned to AVRDC via AID/W. While at AID the COP met with the AID Contracts Office, briefing that office on the status of the revised program description and budget. The COP was told that the documents must be in AID's hands by June 1 in order to meet AID/W's deadline for obligating funds for grant extensions.

When the COP returned to AVRDC he told the AVRDC administration of AID's deadline date, and urged AVRDC to complete and submit the documents to AID/W in time. AVRDC responded by saying the documents would not be submitted to AID/W because AVRDC decided to submit to AID/W a new proposal for work in Africa.

On May 16, 1989 the COP was notified that the AVRDC Board of Directors decided to terminate the Niger project in the present form. The Board suggested AVRDC consider extension in a completely revised form, at a different site, possibly in a different country, with entirely different activities.

The revised program description and budget was never submitted to AID/W. An additional \$800,000 to \$1,000,000 probably would have been available from AID/W to complete the Project activities.

### 2.8 Thailand sub-project

The present status reflects the activity's funding situation, plus changes taking place in Thailand in terms of home gardening. There appears to be a shift from home gardens to school gardens. This is partly due to a similar shift in emphasis in a subject area of the King's Project.

The King of Thailand has a number of altruistic activities in the nation, under the heading of the "King's Project." Many are designed to help the rural poor move toward a better quality of life. One of these activities has been home gardening, which the King's Project has supported for the past five years. Recently there has been a shift in support toward school gardens, especially at schools along the Thai/Laos border, run by the Thai Border Patrol, and schools in the northeast, where vitamin A deficiency is prevalent.

The Kasetsart University counterpart staff would like the vitamin A gardening activities to continue in the northeast. Being aware of the new emphasis in the King's Project, and being a possible source of funds to continue the vitamin A activities, the counterpart staff started a school garden pilot project at the Wat Ban Nondoo School, Bua Yai, Nakhon Ratchasima Province.

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This new activity consists of a large school garden tended by the schoolchildren and supervised by the Ban Nandoo staff. The school garden serves three functions:

- A. To provide nutritious vegetables for childrens' school lunches.
- B. To provide money to buy eggs and meat to add to the school lunches, by selling some of the vegetables at the local market.
- C. To provide kang kong (Impomea aquatica) to feed fish in a pond adjacent to the school garden. The fish serve as another protein source for school lunches.

The school garden is being monitored and evaluated by Kasetsart counterparts in the fields of horticulture, economics, and nutrition. Appendix D summarizes the activities and an evaluation workshop held in Thailand in November 1989.

### 3 LESSONS LEARNED

#### 3.1 Memorandum of Understanding

The MOU was drafted based on samples of host country contracts provided by USAID/Niger. A first draft was given to IPDR in January 1987, for their inputs and approval. Additional drafts were given to S&T/N, to USAID/Niger, and to REDSO/WCA for their comments and inputs.

IPDR took six months to negotiate some terms of the MOU before they agreed on a final version. The Project began in August 1986. In July 1987 the signatures from the GON were still not obtained. At that time USAID/Niger cabled AVRDC and suggested an AVRDC person come to Niger and walk the MOU through various GON agencies for signature. This was done by the COP and enough signatures were obtained in August 1987 for IPDR to allow AVRDC to start the project--one year late. AVRDC never knew that the MOU would take so long to finalize. In the future the MOU process should be completed, with all signatures, before expat staff arrive in-country, and before local staff are hired and a project is allowed to begin.

Other lessons learned:

- A. The new TVA in Niger was not known by AVRDC when the MOU was drafted and finalized. Therefore the Project was not exonerated from it. This caused major problems with getting sea- and air- shipments into Niger, in the release of other equipment from customs, and in purchases made on behalf of

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the Project. This proved to be costly to the Project in having to pay TVA (as much as 30% on vehicles purchased), and it opened a window of opportunity for Hama Diallo to be able to take money from the project under the guise of having to use it as deposit in order to help get equipment and supplies released while TVA exoneration negotiations were going on. A modified MOU was finally approved in June 1989, exonerating the Project from TVA. Some but not all the TVA money was returned to the Project.

B. The Niger Ministry of Foreign Affairs (MOFA) would not sign the original draft of the MOU because it included exoneration expat staff from various duties and taxes. The final version did not include customs, duties, and purchase-tax exoneration for Project expats stationed in Niger (but did include a no-income tax statement). This caused some personal hardships that, in the future, could be avoided by including the right statement in the MOU--one that also exonerates expats from such surcharges.

C. In the MOU wording the host institution, IPDR, was supposed to provide international standards housing for three expats. IPDR kept putting off the COP when a villa inspection was requested. When expat staff arrived, and IPDR finally showed the housing, it turned out to be far below international standards (e.g., no hot water, no air conditioners). The result was that Project expats had to find housing in Niamey. This proved to be expensive for them, and also expensive for the Project inasmuch as Project vehicles had to be used for transporting Project staff from Niamey to Kollo (28 km) each day, and the Project was obliged to provide some amenities. In the future no MOU should be finalized and signed until all line items are approved by all parties.

D. The MOU contained nothing on required salary & fringe for local staff. AVRDC/Taiwan levels were used, assuming these would be more than adequate for Niger--a country with a far lower per capita income than that of Taiwan. It was much later that the Project found out that the GON has specific salary & fringe, termination plan, etc. For Nigeriens working on AID-funded projects. The Project paid this but it was not a part of the original grant budget.

In the future any project coming into Niger (that is not a Mission project) should first find out GON salary & fringe requirements for Nigeriens to be employed on a particular project.

E. Include in the MOU a statement saying that AVRDC does not take third party responsibility.

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F. Have an AVRDC attorney review the MOU.

G. Obtain from the USAID Mission and/or the Embassy in a host country written employment regulations that cover situations when an AID-funded project hires local staff. Also obtain information on any new employment laws that will be enacted which may affect a project, and that would be wise to address early, when drafting an MOU.

### 3.2 In-Country project startup

#### 3.2.1 Staffing, salary and fringe benefits

##### 3.2.1.1 International staff

International staff were hired based on AVRDC's salary and fringe standards for scientists in its outreach programs in Asia. After the Project started in Niger, expat staff found that both salary and fringe benefits were inadequate for the Sahelian region of West Africa, and particularly Niamey. For example, expat contractors working on USAID/Niger Mission projects receive cost of living allowance (COLA), 25% of base salary as hardship bonus/post differential, and housing and utilities allowance averaging \$1500/month. Under AVRDC standards there was no COLA, no hardship bonus, and a \$200/month housing allowance. This proved to be a financial strain for the Project expats based in Niger.

As experience was gained, and with the approval of AVRDC and AID/W, the housing allowance was increased to \$300/month and the expats stationed in Niger were given standard AID COLAs. Over time this still proved to be a hardship.

The budget for the Project's proposed extension was to include a salary and fringe package similar to that received by expat contractors working on Mission projects in Niger. Unfortunately the Project was not extended.

The major lessons learned:

A. Before agreeing to the outputs expected by AID/W, and the budgetary inputs they offer to provide for producing those outputs, AVRDC should check on overall in-country costs.

When the Project was first conceived, S&T/N visited AVRDC and said that they wanted AVRDC to conduct assessments, do adaptive gardening research, network with PVOs and NGOs in Sahelian West Africa, conduct three international workshops, and two international training programs for Africans from the region. S&T/N also wanted a team of expats and Africans

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to be stationed in one country in the region to implement the outputs. S&T/N said that US\$ one million was available to produce these outputs over a three-year period.

After the Project started in Niger, AVRDC found out that the money provided was not near enough to support the staff and complete all the outputs. For example, the Project was to be three years long, with 2-3 expats stationed in Niger producing the outputs, plus the COP stationed at AVRDC/Taiwan and travelling to Niger periodically. Budget estimates for salary and fringe packages for USAID/Niger long-term contractors, it was later found, average about \$150,000/family/year. If that figure was used in Niger it would have exceeded the total grant budget for the three-year period, leaving little or nothing for conducting workshops and training programs.

B. Once a country and site are selected, information should be obtained by AVRDC on cost of living, the average salary and fringe package other US expats receive, average housing and utilities costs expats presently pay, services that must be contracted for (if not a Mission project), costs for personal needs and household security, and types of health services available to a project staff, and their costs.

AVRDC had no idea what these costs were in Niger. Once staff were hired and took up their posts, personal financial problems developed because their salary and fringe packages were far below the levels needed, and far below the levels other US expats receive in the Niamey area.

C. While stationed in Niger, one Project expat had to medivac his child to the US. This was the first medivac experience AVRDC had under its International Institute of Education (IIE)/Van Breda insurance policy for expat employees. As AVRDC learned, Van Breda medivac ("SOS-ACCESS") pays only one-way airfare. The result was the Project had to pay return airfare (USA-Niger) for the child and his mother. This was not part of the original budget. Some form of medivac is required in Niger for all US expats coming to the country. Therefore, if AVRDC's medivac policy does not cover return flights, then this should be considered in future budgets.

An additional medical requirement of USAID/Niger is that, in order for US expats to be able to take advantage of US Embassy medical facilities, the expat must have had a complete physical within six months of arrival, and bring a copy of the physical for Embassy records. This was not known by AVRDC, and some expat staff could not take advantage of Embassy medical services.

In the future, AVRDC should find out (or AID/W should

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tell them) the medical and medivac requirements for international staff in a country.

D. Living in Sahelian West Africa can expose a person to a myriad of bacteria, pests, parasites, and other agents that may lead to sustained health problems. Therefore, periodic, western standards, medical exams should be available to expat staff and families during a project, and a final medical exam should be taken after return to one's country of residence.

AVRDC has no such policy for expat project staff, and it was not included in budget estimates. When the Project's Training Officer contracted parasites and had to be medicated in Niger, and examined and medicated while on home leave, the Project absorbed these costs.

AVRDC should include this benefit in its appointment letters to expat project staff and, of course, it should be reflected in budgeting.

E. The \$1000/person allowed expat staff for shipping personal belongings (\$500 each way) was inadequate, especially for a landlocked country like Niger, where one must trans-ship through a neighboring country that has a seaport. In the future, AVRDC should consult what is allowable to families working in the same country who are on AID-funded contracts, and include these same costs in the budget.

### 3.2.1.2 Nigerien staff

Here too, local staff salaries were based on similar positions at AVRDC. Since Taiwan has a larger per capita income than does Niger (\$4,000, versus \$350--in 1986), the AVRDC figures should have been sufficient. However, because the Project was not a USAID/Niger project, and was not subject to their management assistance and information, Project staff had no idea of arrangements made between USAID and GON for hiring of Nigeriens working on USAID-related projects. The result was that, after local staff were hired, problems developed as to benefits they expected to receive. Even though the Project was AVRDC's, and funded under an AID/W grant, the GON saw AID/W and USAID/Niger as being one and the same, and the Project as a part of both. The Project subsequently had to pay greater than expected amounts as a result of GON rules. For example:

A. There is to be a certain salary level for a person (based on the type of work and level of a person's education).

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B. Each person is to get overtime pay, daily transportation money to get to work, and money for medicines for one's self and her/his family.

C. Approximately 17% of a person's base salary is to be provided by the Project for social security.

D. There is no limit (within reason) on sick leave, including illness in a worker's family that will require the worker's presence.

E. A person will not have to work during the gise (12:30 - 3:30 PM), and will get Friday afternoons off to attend the mosque.

F. At the end of the Project all local staff will receive time off to look for a job, additional transportation money for same, and one extra month of salary and fringe benefits.

G. An employee will receive an additional 17% of a month's base salary, for each year employed, as part of a GON "termination plan" at the close of the Project.

H. All national holidays will be observed by the Project, either previously scheduled holidays or if the Head of State declares a day as such.

I. Clothing for work, rest periods, time off for daily prayers, and time off to take family members to home villages, are additional benefits under GON policy.

The total amount proved to be more than that paid to similar persons at AVRDC, and more than was budgeted for in the original grant. The extension budget would have included the correct levels.

### Lessons learned:

A. Do not assume that a budget based on Taiwan salary levels will be adequate for Niger.

B. Get printed descriptions of what is expected in terms of hiring Nigeriens when an international organization starts a project in Niger.

C. Get copies of Niger's laws that cover hiring (and firing) of Nigeriens by expats; either as project staff or household staff.

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D. Retain services of a knowledgeable Nigerien (a lawyer) to advise on changes in Niger's laws that may affect local employees of a project.

E. Draw up a contract, including a job description, for each worker, signed by all parties, and renewed on an annual basis.

### 3.2.2 Housing

One of the terms of the MOU was that IPDR would provide two villas for Niger-based Project expats, and one guest facility for the COP when he came to Niger. The housing was to be up to international standards.

IPDR promised that the villas would be ready for the arrival of the two Niger-based expats, but were not ready when these people arrived and they had to stay at a Niamey hotel. When the villas were finally seen by Project staff, it was found that they were far from being up to international standards. For example, there were no air conditioners, no hot water facilities, the toilets, stoves and refrigerators had all been removed, and the villas needed extensive repairs and cleaning--for which IPDR requested the Project underwrite such costs.

IPDR also said that only one villa would now be available because the other one was given to the IPDR Nigerien scientist the Project was asked to take on as part of the MOU negotiations (this was really the villa he had been occupying all the time, while he worked for IPDR).

When the COP saw the guest facility he found that it was in the same condition as the villas (i.e., no hot water, no air conditioner, no toilet, no locks on the doors or windows, and little in the way of furniture).

The result of all this is that the two Niger-based US expats had to rent more expensive villas in Niamey. This became a financial hardship for them because the \$300/month housing allowance granted by AVRDC proved to be inadequate.

It proved to be also costly for the Project because the expats, instead of living at IPDR, now lived in Niamey and drove the Project vehicles back and forth (28km each way) to get to work each day. The Project also had to absorb additional costs of the COP staying in a Niamey hotel instead of the IPDR guest facility.

#### Lessons learned:

A. Make sure all MOU arrangements are verified as being what is promised, or do not initiate the project.

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B. The COP found that USAID/Niger projects take care of renting housing for project expats, and the Mission's Management Office has printed requirements of what a villa should contain before the Mission will rent it. Any future AVRDC project in Niger should get copies of these requirements to use as guidelines when making housing arrangements for expat staff, or hire a local consultant to arrange for housing.

C. When figuring the original project budget, find out the average costs for housing in the city/country where a project is starting, plus the average amount paid each month to contractors on Mission projects in that country, and what services this payment covers. This information should be used as a guideline when calculating the salary & fringe part of a project budget.

D. Include in the travel part of a budget one month of hotel & meals for in-country based expats. The Niger experience has shown that there are often delays in obtaining housing, and also in getting it up to international standards.

E. Local landlords who rent "international standards" housing to expats will often expect the tenants to provide capital improvements when taking possession and/or when their lease expires. It is recommended that a lease be first reviewed by an attorney before signing.

F. Personal housing, if the responsibility of a project, can be a sustained drain on staff time. It might be best if expat staff are first given one month of room & meals at a hotel while they make their own housing arrangements; and then give them a flat amount per month for "housing" (which may or may not include utilities, gardeners and security staff), with the responsibility for same being theirs.

Project staff surveyed monthly allowances given to: (1) the country representative of an NGO, (2) a US expat working on a Mission project, and (3) a scientist from ICRISAT-Sahelian Center. The average was \$1,500/month--\$1,200/month more than Project expats received.

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### 3.2.3 USAID/Niger

When Niger was selected as the country in which the Project would be based, and USAID/Niger approved, the Director of S&T/N asked USAID/Niger if they would give courtesy startup assistance to the Project. The Mission agreed but said they could not provide management or financial support to the Project.

Limited assistance was given to the Project by Mr. Hama Diallo, Assistant Project Officer, Agricultural Development Office (ADO), USAID/Niger. Diallo, a Nigerien and son of former Niger Ambassador to the US, was designated to give information and advice to Project staff that would help in startup. For example, Diallo was able to advise staff on where to purchase services, equipment and supplies, and how to progress through the GON bureaucracy in terms of getting the Project's shipments into Niger.

Project startup became problematic, what with delays in getting the MOU finalized and, once finalized, dealing with the additional problems of the new Niger TVA. As a result, Project staff extended startup assistance requests to the Mission beyond what was expected. Eventually the Mission said that Project was becoming a burden to the Mission, and Project staff were requested to stay away from the Mission and take care of their own startup problems. The Mission added that they would still give advice if the Project's "back was against the wall."

Project staff were requested to reduce visits to the Mission to a bare minimum, handle startup problems by themselves, and go only to Diallo if Mission assistance is needed. This was adhered to, except for personal assistance Diallo gave to the Resident Scientist outside of Mission hours. The latter was not known by the COP until the Hama Diallo scandal broke.

#### Lessons learned:

A. If AVRDC takes on projects in Africa, it might be best to accept those projects that are Mission-funded rather than centrally-funded projects. That way the Mission would be partially responsible for in-country management, information, and project staff support.

B. If AVRDC accepts an AID/W centrally-funded grant to start a project in an African less-developed country (LDC), AVRDC should look for a consulting firm in that LDC that can provide the startup assistance the Project needed in Niger, but which could not be provided by USAID/Niger. The costs of such assistance should be added to the original budget.

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C. If a Mission does grant some small courtesy startup assistance to a centrally-funded project, under no circumstances should funds be given to a Mission employee to use for such assistance.

D. It would be best if the manager of any AID/W centrally funded project be based in the LDC to be assisted.

E. The fact that the Project was not exonerated from TVA turned out to be the window that Hama Diallo used to divert Project funds for his personal use. If AVRDC had known about TVA from the beginning, Project exoneration could have been a part of the MOU, and the 'window' would not have been available to Diallo.

Before Project startup, copies of the MOU were given to the USAID/Niger, for their feedback and for feedback from REDSO/WCA. However, since neither of these organizations were responsible for the Project, TVA information may have been overlooked. That may have been the reason AVRDC did not receive word about TVA until it was too late.

F. Though USAID/Niger could not offer too much in the way of assistance, they did indicate to the COP ways that the Project, over time, could strengthen itself, link with Mission projects (e.g., the Mission's NAAR project), and begin to form a closer tie with the Mission. This linkage was started with the Director of the Mission's ADO, and could have made a contribution to the horticulture segment of the NAAR project. In turn, the Director said that there were other Mission funding sources, such as counterpart funds, that may be available to the Project for conducting research that would be more specific to NAAR (and add staff to the Project for perhaps conducting regional trials on AVRDC's mandate crops).

If AVRDC does start another AID/W centrally-funded project in Sahelian West Africa, it might be a good idea to keep in touch with the Mission ADO, and look for the same linkages that seemed likely in Niger had the Project continued.

G. USAID/Niger could only give minimal assistance to the Project because the Mission was understaffed and overworked with their own projects and other USA-Niger activities. Nevertheless, the assistance they did give to the Project was extremely valuable. There is no doubt that, had Diallo been 'straight' instead of what he turned out to be, the Project would still exist and a beneficial linkage would have been formed between the Project and the Mission. For

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example, the NAAR project has a horticultural component to which the Project could have made an early and important contribution.

If AVRDC starts a future project in an African country where there is a USAID Mission, early linkage with both the ADO and the Management Office is recommended.

### 3.2.4 Collaboration with other institutions

The original idea of S&T/N was that the Project should network with NGOs and PVOs in the region that are working on gardening and/or related vitamin A activities. S&T/N suggested the Project not get overly involved with national programs or government extension systems unless these groups had the infrastructure to be able to transfer improved gardening techniques.

The idea of S&T/N was followed by the Project. It proved to work fairly well as the Project found many NGOs in the area that were doing gardening and promotion of vitamin A foods.

#### Lessons learned:

A. There are a number of PVOs and NGOs that are partially funded by AID/W. These are stable organizations with good management, and a fair guarantee that they will be in place for a while. AVRDC would do well to network with these types of organizations in Africa.

B. Networking with Peace Corps Volunteers (PCVs) proved to be an excellent, synergistic, relationship. The Project was able to provide technical assistance, advice, and (sometimes) planting material. The PCVs, in return, gave information to the Project on village gardening practices, and feedback on the results of AVRDC planting material given to volunteers for use in their villages. They also took an active part in the Project's first international vitamin A gardening workshop.

C. There are many church-sponsored, church-related organizations in Sahelian West Africa. Some of these organizations such as Church World Service (CWS) and Lutheran World Relief (LWR), are involved in gardening projects. The Project successfully networked with these organizations. AVRDC would do well to do the same. Some staff members of these organizations have MS degrees in agriculture and they would be excellent cooperators to do in-country testing of AVRDC's mandate crops.

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D. AVRDC followed AID's suggestion in not forming initial linkages with national programs until the Project proved itself and was then able to devote the time to such linkages. This was a two-edged sword. It left the Project free to interact only with FVOs and NGOs; but doors to national programs were not opened.

AVRDC's style is to work through national programs. It views any eventual activity involving a nation and AVRDC's mandate crops as best done through the country's national program. The lesson learned in this aspect is: do what the sponsor wants, but modify activities to fit the policy of one's organization. It was good to network with NGOs but, from the standpoint of AVRDC's style of outreach, it would have been better if more networking was done with national programs. This would have been resolved if the Project was extended.

E. AVRDC's expertise is in vegetable research for the hot, humid tropics. Sahelian West Africa is semi-arid tropics--with different climate, soils and different pest and disease problems. AVRDC could do well to link with sister organizations in climate zones where greater local expertise is available. For example, ISRA-CDH, in Dakar, has conducted vegetable research for the semi-arid tropics for a number of years, and made some very useful suggestions to the Project.

F. The Project was placed in Niger's Ministry of Agriculture (MOA), through its subsidiary, IPDR. In networking, the Project could link up with PVOs, NGOs and other organizations that were also under the MOA umbrella. However, if the Project wanted to link up with an organization that was, say, under the Ministry of Health (MOH), it had to be done through the MOA.

If AVRDC will have future projects that are interdisciplinary, it might be wise to get some approval document at the beginning of activities or, better yet, include in the MOU an agreement by the host government to allow an interdisciplinary project to interact with organizations working in other disciplines.

### 3.3 Assessments

The assessment, as a tool for gathering ongoing information (often ever-changing in Sahelian West Africa) that can affect a project's major activities, is a good idea.

Normally the assessment is a one-time activity, carried out to gather baseline data and/or allow a project to make early decisions and plans. However, Project staff saw that an ongoing

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assessment could provide constant feedback on changes occurring in the region that might affect Project activities. It also allowed the Project to observe the effects of new techniques or ideas it introduced into activities. The ongoing assessment is a recommended mechanism for building a valuable information feedback loop into a project.

Also recommended is this activity be put into a project's original workplan and budget so that suitable time and resources will be made available. Because the ongoing assessment was an idea that evolved during the Project's tenure, it caused some minor funding problems that could have been avoided had they been planned for early and budgeted in the original grant.

### 3.4 Adaptive Research

The Project conducted its adaptive research for about 15 months; not long enough to produce a comprehensive discussion on what lessons were learned. However, the research that was conducted can suggest fruitful avenues for subsequent research that could have produced a more comprehensive "lessons learned" section, had the Project continued.

Some lessons learned and to be learned:

- A. Learn more about the agronomic features and horticultural practices for indigenous green-leafy vegetables (GLVs). They comprise much of the daily intake of provitamin A in the diets of Sahelians.
- B. Show the host institution, IPDR, more appropriate ways to collect and analyze data. IPDR teaches Africans how to grow vegetables, but teach little regarding farming research methods, experimental design, data collection and analysis, and how vegetable research can increase production, reduce costs to the grower, and bring more produce to the market or to the family table.
- C. Collaborate more with ISRA-CDH on vegetable gardening research in the semi-arid tropics, and feed this information back to AVRDC, whose strengths in vegetable research are in the hot, humid tropics. The results could benefit all parties. ISRA-CDH has in the past used some of AVRDC's planting material in its improved variety research and development. As such, they are aware of AVRDC and are willing to cooperate in AVRDC activities in the Sahel.

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- D. Place more emphasis on post-harvest care of garden crops. In the Sahel they sun-dry GLVs, which can destroy much of the beta carotene (vitamin A precursor). Shade-drying can preserve much of this nutrient.
- E. Add a second full-time horticulturist to the Project, to conduct regional trials on AVRDC mandate crops. AVRDC has too few cooperators in the region to provide reliable data.
- F. Work the research results into national programs instead of concentrating only on FVOs and NGOs.
- G. Provide a salary and fringe package that will enable a project to hire seasoned, PhD-level horticulturalists, who also have Africa experience.
- H. Try to accept projects that are at least five years in length, so that adequate time will be available to produce valid and reliable research data.
- I. Have the AVRDC soil scientist and crop management specialist join in preliminary assessment trips.
- J. Have the AVRDC physiologist assess the first year of research and make recommendations on overcoming water stress and evapotranspiration problems.
- K. Add an agricultural economist to the AVRDC staff, and have that person consult periodically with project staff and/or be part of the preliminary assessment.

### 3.5 Workshops

The Project's first workshop, originally scheduled to be held at IPDR--the Project's host institution, was instead held at the Hotel Terminus, Niamey, July 17-21, 1988. Conducting a workshop in a second language, in a new part of the world, produced some useful information for AVRDC to consider when running similar activities again in Africa.

#### Lessons learned:

- A. Logistic problems at IPDR (e.g., housing, food, adequate facilities for meetings) caused Project staff to look elsewhere for a workshop venue. The Hotel Terminus proved to be a very good place. The hotel has been run by the same French family for three generations, and they are professionals. They were able to provide: rooms for all participants, plus one for the Project staff to use as a

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workshop office; a large meeting room for the workshop; morning and afternoon coffee/tea breaks, and international standard lunches; and they catered the opening and closing receptions. They are highly recommended. AVRDC might check out similar arrangements when conducting workshops in other parts of Africa.

B. Recruiting workshop participants from regional FVOs and NGOs that are working on gardening and related vitamin A activities, proved to be very good. FVOs who attended also contributed significantly to the presentations and the discussions. Though AVRDC prefers to work with national programs, it should not pass up networking with FVOs and NGOs in Africa, especially to be cooperators for conducting regional research on AVRDC's mandate crops.

C. Travel arrangements for people from Mali and Mauritania proved to be problematic. They had to go to Dakar first for Niger visas (with an overnight stay), and some showed up late to the workshop. In the future it would be best to schedule their arrivals a day or two earlier.

D. Many of the participants came to Niger on Air Afrique flights. This airline now has new management, but when the workshop took place Air Afrique flights were often cancelled or delayed for long periods of time. As a result, some of the participants showed up two days late. In the future it might be best to consider other airlines (e.g., Sabena, UTA) if the new Air Afrique management has not corrected its scheduling problems.

E. French was the workshop language. When anyone tried to use English they were mildly chastised by participants. The workshop announcement said the workshop language would be French, but some participants knew English better. In the future, the workshop language should be repeated in all correspondence between the workshop coordinator and prospective participants, so as to avoid problems. This is especially so in Francophone Africa, where other international languages are viewed by some Africans as unacceptable.

F. Speech topics could have been screened more carefully, and further in advance, to avoid repetition of the same subjects.

G. A number of organizations involved in vitamin A capsule distribution and gardening did, at times, seem to dominate the discussions with the value of capsule distribution over

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other methods of vitamin A intervention. This could happen again and should be suitably handled in a workshop on gardening.

H. Travel reimbursements to participants should have been made in a more standard, easy to prepare fashion. In the future these could be prepared in advance for expedient distribution to participants upon arrival. Too much time and trouble seemed to be taken up in variable costs incurred by participants during their travel to Niger.

I. The tour of the Project's research gardens could be done earlier in the day to avoid the heat, and with a division of attendees into sub-groups to permit effective exchange of information and response to specialized questions.

J. Discussion periods could be scheduled in the afternoons, which would permit attention to individual topics of interest.

K. An abstract of a participant's speech should be sent in early enough so that a workshop program could be printed in advance. Typed or neatly written speeches could also be handed in by each participant preceding speeches. This would facilitate a later job of preparing summaries of speeches.

L. A stenographer taped all speeches and discussions. This proved to be too difficult to transcribe later for purposes of producing a workshop proceedings. As a replacement, the workshop coordinator wrote a report of the workshop highlights (Appendix A). In the future, if a stenographer is used, only the question and answer period should be recorded, and typed speeches given beforehand to the workshop coordinator for subsequent publishing in a proceedings.

M. Participants could hand out descriptions of their organizations for general distribution, or these could be requested in advance along with the filled-out participants forms.

N. A number of extra staff should be hired for the workshop week, as well as the weeks preceding and following the workshop. Experience in this first workshop suggested that extra people are needed, for example: one person to be responsible for seeing to it that participants receive their plane tickets, are picked up at the airport and brought to the hotel; a second person to handle all money disbursements to participants, to the hotel, and for other services,



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equipment and supplies; and a person to handle daily logistics (scheduling of speeches, production of daily schedule, handouts to participants, and liaison with hotel on timing and number of people to be fed/housed).

O. More evening social activities could be planned. A number were planned and implemented, but in a quiet city like Niamey, it might be advisable to plan something for every night of the workshop week. Rental or purchase of a video player is recommended. Niamey has a number of shops where video cassettes can be rented.

### 3.6 Training Programs

The Project conducted one international training program, held at IPDR, from January 4 - February 23, 1989. It was attended by 16 Africans from FVOs, NGOs and one national program. A complete description of the training program is given in Appendix B.

#### Lessons learned:

A. The facilities at IPDR proved to be marginal by Western standards, but adequate for the region. Trainees complained about the food and the dormitories to some extent. However, the major complaint concerned a lack of recreation during evenings and weekends. The Project addressed this by providing sports equipment to the participants, plus extra money (over and above a generous monthly stipend) to travel to Niamey on the weekends.

B. Training program schedules had to be made to conform with IPDR's schedule, i.e., no activities between 1230 and 1530 hours. This type of schedule is fairly normal in countries of Sahelian West Africa.

C. Standard forms (questionnaires) could have been prepared well ahead of time to gauge the trainees' technical levels upon arrival (and serve as an additional tool to evaluate progress at the end of the training)

D. Trainees could be required to complete weekly brief summaries of what was learned during the week.

E. Reconsider whether Mauritania, with its small number of NGOs and high expense of recruiting, follow-up, and trainee travel costs, should be included in the training program.

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- F. Require resource persons to submit written objectives and an outline of material covered.
- G. Make arrangements with a caterer who is flexible enough to provide a diet satisfactory to a broad range of West Africans; or make sure the host institution can offer this flexibility.
- H. Offer one organized recreational trip each weekend to keep up trainee morale.
- I. Include in a trainee application a signed agreement that the applicant understands and accepts the amount of per diem offered. During the training program there were a number of 'gripe' sessions where trainees tried to get more money out of the Project for personal needs.
- J. Utilize (if possible) more host institution resource persons.
- K. Have opening and closing receptions at a Niamey hotel (Hotel Terminus in Niamey is recommended).
- L. Follow-up trips by staff to a trainee's home country, to observe and assist the trainee in applying what was learned in the training program, was a receptive idea. Each trainee wrote a plan of action (see Appendix B, Attachment 2) describing the plan. Had the Project continued this probably would have proven to be a good adjunct to the more formal part of the training program at IPDR.

### 3.7 Reporting

As per the Project grant to AVRDC, quarterly fiscal reports had to be submitted to AID/W by the AVRDC Comptroller. The following steps became the procedure:

- A. Documented statements of expenses, plus cash on-hand and cash in the Project's Niamey bank account, were sent to AVRDC from Niger for each ending quarter.
- B. A budget estimate for the next quarter's expenses was prepared by the COP, summarized with totals for each budget line item in the Project grant, and both submitted to the AVRDC Comptroller.
- C. The AVRDC Comptroller then sent a letter to AID/W with information in A, and requested the amount in B be transferred from the grant to AVRDC's Citibank/NY account.



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D. Once AVRDC received notice from AID/W that money had been transferred to its Citibank/NY account, AVRDC then requested Citibank/NY to wire the necessary funds to the Project account at a Niamey bank (originally Citibank/Niamey; which was sold to Nigeria International Bank (NIB), and became a Citibank affiliate).

Step A generally took 2-4 weeks after the end of a quarter, to put together the information and get it to AVRDC. Producing the Comptroller's fiscal statement for the previous quarter, and request for the next quarter's funds, took an additional 2-4 weeks to prepare and be received at AID/W.

After AID/W received C, it generally took 4-6 weeks to process and transfer requested funds to AVRDC's Citibank/NY account. AVRDC then had to be notified by Citibank/NY that the funds were in AVRDC's account (this generally took one week). Then AVRDC went through step D, to transfer the funds to Niger (this step took from one week to one month).

All in all, the funds needed by the Project staff in Niger for a particular quarter generally did not reach Niger until the next quarter. It resulted in constant quarterly shortfalls, and harried requests to AVRDC to loan funds to the Project from its core budget. This condition was never overcome.

In the future, all this should be resolved during the planning stage of any project. In the case of the Project, the full fiscal reporting process was not known until the second year of the Project's activities. Permanent arrangements should be made with the grantor or the grantee to provide a field project with necessary funds when they are needed.

It might be good if AVRDC works backwards in its fiscal report planning. It could look at what information is necessary, when it is to be submitted, how it is best done, how long it will take to do, from where fiscal information is to be sent, and to whom it is to be received for processing. If all this was known when the Project began it would have self-suggested the need for a full-time Project accountant. An accountant was hired in April 1988.

### 3.8 Project management

Managing a project in West Africa, from Taiwan, is not advisable. It proved to be difficult to do. In the future a full-time project manager should be placed in-country. This person should be fully oriented in AVRDC's procedures for hiring staff (local and expat), purchasing equipment and supplies, accounting procedures, reporting, and other administrative, technical, and management aspects that may be unique or unknown by those who will be implementing a project. If no

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appropriate-for-the-LDC procedures exist (as was the case with the Project) they should be jointly drafted by those involved, monitored to see how they work, modified or adjusted as needed, and adopted as standard operating procedures for that country or that region of Africa.

### Lessons learned:

- A. All forms used to adequately manage and report a project, and procedures for their use, should be provided by AVRDC to the in-country manager. A 'dry run' in the use of these forms is recommended during project staff orientation at AVRDC.
- B. Include in the original budget adequate staff to perform project activities in Sahelian West Africa. This should include (besides the in-country project manager) a full-time accountant, secretary, driver, horticulturist with West Africa experience, workshop coordinator, training officer and training assistant (if these activities are part of the project), competent local counterpart scientist, field assistants, field gardiens, and field laborers.
- C. The budget should also include payment for services of a local consulting firm to assist in project startup e.g., expedite shipments, get official requests through government 'red tape,' advise on local purchases and in recruiting local staff, find suitable housing for international staff, and expedite repatriation shipments and housing close down at the end of the project.
- D. Include salary and fringe benefit levels that are up to USAID Mission contractor standards for both international and domestic staff.
- E. Engage a lawyer on a retainer, to do such things as: go over the MOU before signatures are solicited; advise on legal matters pertaining to project interaction with the host government, host institution, other organizations, and with employees; re-check the project proposal and make updated recommendations as needed; and check over all local contracts (e.g., housing, employment agreements, lease or rental of equipment) before signature.
- F. If project is AID/W centrally-funded, there may be as much as a full quarter's delay before quarterly funds are received in-country. If this will be the case, then arrangements should be made with the parent organization to provide contingency funds until AID/W quarterly funds arrive.

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G. Allow at least one year in the beginning to locate a project site, draft and approve an MOU with a host institution, recruit, hire and orient expat staff, order and ship equipment and supplies, arrange for expat housing, and hire and train local staff.

AID/W gave AVRDC a grant for three years, which proved to be two years short of what was needed for the Project to produce required outputs in Sahelian West Africa (it should be noted that AID/W agreed to extend the Project to complete its outputs, but the Diallo affair caused a premature end to the Project).

H. Include in a project's budget travel funds for AVRDC techno-administrators to visit a project site for planning purposes, and to take part in research, workshops and training programs.

I. If a project is an AID/W centrally-funded project, the AID/W Project Officer should visit the project once each year, e.g., during external evaluations, during regional or international workshops, and observe training programs and/or their follow up activities. This was not done with the Project, and its Officer at S&T/N felt 'out of contact.'

### 3.9 Project extension

Despite the problems brought on by the Diallo affair, AID/W was still willing to continue the Project grant because it began to produce its promised outputs, albeit late, in a very difficult part of the world, where AID/W understandably has some difficulty documenting its successes.

Project staff did their best to produce enough of the required outputs so that AID/W would extend the Project to complete the work. AID/W, despite all the problems brought on by the Diallo affair, was still willing to extend the Project. However, the apparent legal problems that developed from the Diallo affair proved to be too problematic for AVRDC to be eager to continue the Project in its present form.

#### Lessons learned:

A. West Africa is a difficult place in which to accomplish anything concerning agricultural development. AID/W has had a certain amount of experience in the region and it was not put off by the Project being a year behind schedule in producing outputs. The outputs were being produced, and despite the Diallo affair AID/W was willing to extend the Project. AID/W deserves credit for

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the confidence it had in AVRDC and the Project. AVRDC should keep this in mind and not hesitate to pursue future AID/W grants.

B. AVRDC was not accustomed to the events that took place during the Diallo affair, or the effects of those events on the Project. For an employee of the granting organization to dupe a Project employee out of Project funds is not something AVRDC is used to. For a Project employee to eventually be charged with complicity is unheard of at AVRDC. And the eventual legal problems in which AVRDC became subjected as a result of the Diallo affair, was all too much. In the future, if AVRDC has projects in Africa, it might be wise to assume some people may not be honest, question everything, and constantly monitor everyone's activities--especially when project funds are involved.

The project accountant should be the only person to disburse project funds, and under no circumstances should funds be disbursed without signatures. Receipts for the disbursed funds should be submitted the same day to the project. The project manager should verify receipts for large purchases (e.g., more than \$500) by visiting the company or organization that received the funds.

C. No matter how careful AID/W and AVRDC might have been, a final lesson learned is: even a lower echelon USAID Mission local hire can bring a project to its knees. Missions should more carefully screen nationals before hiring them for positions of responsibility. The Mission should also periodically monitor activities of local hires who make purchases for projects.

### 3.10 Other

#### 3.10.1 Working in a landlocked country

Niger does not have a seaport. Project shipments sent to Niger from the US and Taiwan had to either go via air cargo or, if sent by sea, be trans-shipped through Nigeria, Benin or Togo.

This proved to be extremely expensive and time consuming. Air cargo to Africa from the US or Taiwan turned out to be much more than was budgeted for this purpose. Sea shipments sent through a neighboring seaport country had additional costs attached by those countries. Much Project time was spent on waiting for trans-shipments and on filling out what seemed to be an endless amount of forms.

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If possible, future AVRDC should avoid locating projects in a landlocked country, or budget for them accordingly.

### 3.10.2 Conducting a project in a second language

AVRDC is an international center where English is used as its common language, and Mandarin Chinese, the official language of Taiwan, as a second language.

When AID/W requested AVRDC conduct the Project's activities in Sahelian West Africa, this meant working in French. AVRDC had to then prepare itself to work in a language other than the two it presently uses. The next three years produced some lessons learned:

A. It took more time than anticipated to find prospective staff members fluent in French, with Africa experience, and who would work for AVRDC salary and fringe levels. These people generally command higher salary & fringe packages than AVRDC's present policy allows.

The first Project horticulturist, who participated in the second site visit trip to Africa, returned to AVRDC and decided to leave the Project. One reason given was that he met a former classmate, during the Niger part of the site visit, who was working on a Mission project and who was getting three times the AVRDC horticulturist's salary.

The second horticulturist, hired at a slightly higher salary, spent one month in Niger and then sent a letter to the AVRDC Director General saying he wanted a 30-40% increase in salary, plus increased housing benefits. The request was not granted and he subsequently left the Project.

A third horticulturist, fluent in French, but with no Africa experience, was interviewed by the Project's AID/W Officer, and by the COP. The person's interview went well but she was initially rejected because she did not have any Africa experience. Subsequent letters from her advisor and her department chairman at Cornell (where she just completed her MS degree) recommended AVRDC hire her without Africa experience because she is very mature. The fact that no other suitable candidates responded to AVRDC's position announcements caused AVRDC to reconsider and they offered her the position. She accepted the position at AVRDC salary and fringe levels. Her lack of Africa exposure, plus a demonstrated lack of maturity that surfaced over time in Niger, proved to be a drawback.

In the future, AVRDC should find out average salary and fringe levels in the country for experienced senior persons, and include these in a proposal's budget. AID/W could

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provide AVRDC with average costs for experienced expats, fluent in the national language, who are working on Mission contracts in the country.

B. All written material for workshops and training programs had to be translated into French. This took more time and was more costly than anticipated.

C. All Project communications with the host country, and the Project's target countries, had to be in French. Letters, announcements, etc., drafted in English had to be translated into French before being sent out. This process resulted in more time used up than expected. A full-time Project translator in Niger may have been a help. AVRDC should consider this when staffing for future outreach projects.

D. Copies of important Project documents sent to AVRDC had to be translated into English for AVRDC staff; while AVRDC communications to Niger often had to be first translated into French. This necessitated hiring a French/English translator at AVRDC.

All in all, working in French taxed the Project's resources. AVRDC should benefit from this and think twice about working in a country that does not use English or Mandarin Chinese as its official or second language.

### 3.10.3 Communications

AVRDC has excellent communications facilities (phone, cable, telex, FAX and, recently E-mail through the CGIAR network). Niger does not. The amount budgeted for communications in Niger was inadequate. The following are examples of some of the lessons learned:

A. Niger does not have a "printed matter" level of mail. Everything goes out first class, and is most expensive.

B. Phone calls from Niger go via satellite, and can be expensive. A call to Taiwan must go through a second- or third-party country, which may necessitate a 2-3 satellite jump.

C. Long-distance calls within Niger also go by satellite and are more expensive than one would anticipate.

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D. The Project, not being a Mission project, had to use commercial telex services in Niger. These proved to be very costly and inconvenient, necessitating 60 km round trips to Niamey to send a telex.

The telex lines from Niger are also not dependable. A telex to Taiwan often had to be sent out at least five times before it was completed, with the Project paying for the telex time used on the first four unsuccessful transmissions.

E. FAX service is available in only a few commercial establishments in Niger. The communication lines are not dependable, and can go off in the middle of a transmission. The Project had to pay high commercial rates, plus TVA, on each FAX.

F. Though AVRDC has excellent facilities, the costs of sending messages from Taiwan to Niger was very high, mostly because of poor reception or power failures in Niger. AVRDC should consider the use of a laptop PC, with modem, to send its own messages in the late evening (when lines are more free) over long distance phone lines. This would be much cheaper and more convenient. Now that AVRDC is part of the CGIAR electronic mail network (CGNET), it could certainly be done.

G. AVRDC could also consider including a FAX and/or telex machine in a project's in-country budget.

### 3.10.4 In-country Project bank account

When the Project began in Niger a Project bank account was opened at Citibank/Niamey. In discussions with bank officials the COP found that US dollars transferred from AVRDC's Citibank/NY account could be wired to Citibank/Niamey, and vice versa. Also, at the end of the Project there would be no problem in transferring remaining US dollar funds in Citibank/Niamey back to Citibank/NY.

During the Project's time in Niger Citibank/Niamey sold out to Nigeria International Bank (NIB). A few months before the Project ended the COP requested NIB close the account and return the remaining Project funds to the AVRDC account at Citibank/NY. NIB said that there are certain procedures that NIB must now follow according to GON regulations. The procedures involved the COP sign six copies of a form provided by NIB (DEMANDE D'AUTORISATION D'ECHANGE), and submitting them to NIB for processing through GON ministries (MOF, MOFA). The COP signed the forms in August 1989 and returned them to an NIB official for

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processing. When the funds and final bank statement were not received at AVRDC by October 1989 a follow-up telex was sent to NIB. There was still no reply from NIB in November 1989. Without the transfer of funds and a final statement the AVRDC Comptroller cannot send a final Project fiscal report to AID/W.

### Lesson learned:

The next time AVRDC opens a project bank account in a country like Niger, inquiry should be made as to the exact closing down procedures for a project's bank account, and how long the procedures will take before the funds are transferred back to an AVRDC account in a New York bank. After this information is known AVRDC can then better plan the closing down of its in-country bank account. Then the Comptroller can get bank statements, and transfer of funds notices, and provide AID/W with on-time final fiscal reports.

### 3.11 Thailand sub-project

The gardening activities funded by S&T/N and AID/W's Asia Bureau, during 1983-86, were designed, in part, to build up the institutional capabilities of Kasetsart University to be able to take the lead in home gardening research, monitoring, evaluating and extension in not only Thailand, but in other S.E. Asian countries that might need such assistance. That is why, instead of a final report, a how-to-do-it manual was produced.

The preparation and production of the manual served as a vehicle for Kasetsart University scientists to be able to collaborate and cooperate in an activity of common interest. The Thailand sub-project, though small, nevertheless helped to support collaboration between horticulturists, agronomists, agricultural economists, and nutritionists. The success of the manual is evidence that the collaboration was fruitful.

The 1986-89 activity was from the start one where AVRDC would provide ideas and assist in monitoring and evaluation suggestions, while the Kasetsart counterparts would take the lead in implementation and evaluation. This has worked out very well, as the Kasetsart University people took the lead in conducting training workshops to teach use of the manual to extension officers. The staff also recognized the shift in emphasis from home- to school-gardens, and responded in a professional manner by linking with appropriate Thai organizations.

The lesson learned is that a good counterpart team, such as the sub-project's Kasetsart University counterparts, can take on something and sustain it. The funding is ending, but the activity is going to be sustained by a motivated group of Thai

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scientists. "Sustainability" is something we all want to see take place when a project is first discussed, but how to attain it is often fuzzy or elusive. The Thailand sub-project is one instance where sustainability has a high probability of being achieved.

### 4 ISSUES NOT RESOLVED

#### 4.1 Memorandum of Understanding

In early 1988 a modified MOU was drafted, amending it to exonerate the Project from TVA. The draft was given to IFDR for approval. They took six months to respond, saying the request to exonerate the Project will be approved, but an additional request to exonerate Project expats from TVA would not be approved.

In late 1988 another draft was submitted to IFDR, minus the section exonerating the Project's expat staff. IFDR said it would take care of obtaining all the necessary GON signatures. In June, 1989, they notified the COP that most of the signatures had been obtained, but they were giving up the signature process after the Project notified IPDR that AID/W and AVRDC have jointly decided to allow the Project to expire on August 31, 1989.

The TVA problem was never resolved. The Project did obtain a letter from the GON, giving the Project temporary exoneration as of January, 1989. Purchases made after that date were exonerated when a copy of the letter was produced and the purchase approved for exoneration by MOF. However, because a permanent exoneration was never granted, the Project could not go back to merchants and get a TVA rebate on purchases made before January 1989 (e.g., 24% TVA paid on the two Project vehicles, and TVA paid on sea- and air-shipments).

#### 4.2 Salary and fringe benefits for staff

As mentioned earlier, Project expats stationed in Niger were given salary and fringe benefits based on AVRDC policy. This included a housing subsidy of \$300/month (not AVRDC policy, but approved by the Director General).

When the expats complained about the high cost of living in Niger, the COP asked for advice from AID/W. The AID/W Contracts Office approved the use of Project funds to grant a COLA to the expats. The COLA was based on AID standards for Niger.

The housing allowance and COLA still proved to be not enough to cover Niamey's high cost of living. The COP then found out the average salary and fringe package given to USAID/Niger contractors, to AID-funded NGO expats, and to ICRISAT-Sahelian Center staff. A basic salary and fringe package of

\$1500/month/family was then averaged from this information. This figure was put into the Project extension budget requested by AID/W. However, the Project was allowed to expire rather than be extended, and the salary and fringe shortfall was never fully resolved.

The Project's expat Training Officer, now back in the US, is requesting an additional \$500/month, retroactive to January 1989, to cover additional housing costs incurred in Niger. The COP has recommended AVRDC pay the amount requested pending AVRDC approval and availability of Project funds.

#### 4.3 Resident Project Director

In December 1988, as a result of the Diallo affair, AID/W notified AVRDC that the Project would be under suspension until various remedial measures were to be taken. One measure was the placement of a full-time Project director in Niger.

When the Project grant was first discussed in 1986 between the S&T/N Director and the AVRDC administration, it was decided that the COP would be stationed in Taiwan and spend half time in Niger. This was the situation during the life of the Project. It was during the COP's time in Taiwan that Diallo was able to gain access to Project funds and divert them for his own use.

The COP agreed to move to Niger, and submitted a draft to AVRDC and AID/W of costs for another expat to be stationed in Niger (based on the revised salary and fringe package mentioned in section 4.2). AID/W concurred, saying the figures were within those set for their contractors in Niger. These figures were then added to the draft budget of the Project extension documents requested by AID/W. These documents were never sent to AID/W because the Project was allowed to expire. A permanent Project director was never placed in Niger for the same reason.

#### 4.4 Collaboration with health organizations in Niger

The Project was put under the IPDR organizational umbrella. International projects and organizations are generally made a part of the Ministry of their Niger host or collaborating organization. Since IPDR is a part of MOA, the Project became a part of MOA. As such, and by Niger custom, any and all interactions with organizations in other GON ministries must go through the ministry in which a project is hosted. For the Project, this meant that IPDR had to know of, handle, and approve any interactions between the Project and organizations connected to other ministries (e.g., MOH), or with the ministries themselves.

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The Project was interdisciplinary, that is, its activities cover both agriculture and health & nutrition. When Project staff first began its assessment activities the staff naturally went to organizations under MOH to gather existing data on vitamin A deficiency in the region. These organizations were reluctant to cooperate until Project staff promised to show them a letter from the Niger MOH approving the interaction. For example, a WHO medical doctor, stationed in an MOH office, could not officially give Niger vitamin A information to the COP.

In January 1988 the COP told the IPDR Director about the problem. The IPDR Director said that a letter, signed by both the MOA and the MOH, was needed, and he would take care of it.

In June 1988 the IPDR Director was asked the status of the letter. He said he was being transferred and the next director would have to take care of it. When the new director came to IPDR the COP told him the problem and requested the letter. In December of 1988 he was reminded that the letter was not in the COP's hands and it is hampering the Project's assessment and networking activities. He said a number of approvals and signatures are needed, and it takes time.

The letter was never obtained, and the problem was never resolved. In the future AVRDC should be made aware of such official arrangements before any MOU is drafted, and the arrangement should then be included in the MOU.

### 4.5 Relationship with USAID/Niger

Three negative situations existed that probably could have been resolved had the Project been allowed to continue:

A. The Project, not being a Mission project, was not able to readily interact with the Mission's agricultural and health/nutritional offices, and their projects.

B. AVRDC was not able to utilize the Project's presence in Niger to conduct regional research trials on its mandate crops.

C. AVRDC was not able to interact on a meaningful level with Niger's USAID-funded national agricultural research projects. For example, USAID's NAAR Project (part of the national program) contains a horticultural component, which was to begin in 1990-91. The ADO Director suggested the Project provide NAAR with some of its ongoing data so that the NAAR horticultural component would not have to repeat some of the research on vegetables.

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The ADO Director and the COP began to plan ways to address these three problems. The ADO told the COP of a "counterpart funding" arrangement that the Mission has, to fund promising activities. The discussion centered around using Mission counterpart funds to add another horticulturist to the Project, to work full-time on researching AVRDC's mandate crops in Niger, and also help to strengthen the horticultural component of the NAAR Project. The result could have: (a) brought the Project closer to the Mission; (b) allowed AVRDC's mandate crops to be researched in the region; and (c) opened a door for the Project to assist in a major project of the GON national program.

The expiration of the Project negated the actions that could have accomplished much in alleviating the negative situations described in A-C, above.

### 4.6 Training program follow-up

The Project's Resident Scientist made one training program follow-up trip to Mali and Burkina Faso in April 1989. This person collected notes during the trip but, due to problems concerning the Diallo affair, the person left the Project prematurely and did not submit a report to AVRDC on the follow-up trip. A report was subsequently promised to AVRDC, but was not received by November 27, 1989--the printing date for the Activities Completion Report.

This was the only follow-up trip taken before the Project activities ended in August 1989. It subsequently leaves a gap in the Project's training program report (see Appendix B).

## APPENDICES

### Appendix A: Summary Report of Workshop

- Attachment 1: List of workshop participants
- Attachment 2: Workshop evaluation

### Appendix B: Summary Report of Training Program

- Attachment 1: Schedule of activities
- Attachment 2: Trainees' plans of action
- Attachment 3: List of trainees

### Appendix C: Project Inventory

- Attachment 1: Items of value >\$500; turned over to AVRDC
- Attachment 2: Items of value >\$500; turned over to IPDR
- Attachment 3: Total inventory turned over to IPDR

### Appendix D: Thailand sub-project report

- Attachment 1: Summary of activities, 11/1987 - 5/1988
- Attachment 2: Description of Khon Kaen evaluation workshop

APPENDIX A  
SUMMARY REPORT OF WORKSHOP

Report on Workshop "Jardins de Vitamine A,"  
Conducted by the Vitamin A Gardening Project in Africa of  
The Asian Vegetable Research and Development Center,  
July 17-21, 1988, Hotel Terminus, Niamey, Niger

The Vitamin A Gardening Project in Africa of the Asian Vegetable Research and Development Center conducted the workshop "Jardins de Vitamine A" under funding by the United States Agency for International Development. The objective of the workshop was to increase collaboration among professionals working in the fields of health/nutrition and gardening/agriculture in order to serve the ultimate goal of the Vitamin A Gardening Project to increase the production and consumption of vegetables and fruit rich in vitamin A in the Sahel. By bringing together representatives of government agencies, non-governmental organizations, and research institutions located throughout the Sahel, the Vitamin A Gardening Project hoped to enable the exchange of useful technical information and innovative ideas among workshop participants, and to emphasize the interaction of the sectors of health/nutrition and gardening/agriculture in addressing the problem of vitamin A deficiency in the Sahel.

Forty-three people representing over a dozen different nationalities participated in the workshop (see attached list of participants). These participants were all currently working on gardening or nutrition projects in Burkina Faso, Mali, Mauritania, and Niger. They included researchers, government officials in the fields of health and agriculture, and representatives of governmental and non-governmental organizations involved in agricultural and nutritional development work.

The workshop took place in the Hotel Terminus in Niamey, Niger. The majority of participants were housed at the hotel and daily meetings were held in the hotel's conference room. Facilities of the conference room included slide and overhead projectors and a blackboard. The lower level of the room served as the location for the mid-day coffee break. A stenographer was on hand to note proceedings. Meetings were chaired by Douglas L. Robertson, Training Officer of the Vitamin A Gardening Project, with the assistance of Anne D. Turner, the project horticulturalist. During the course of the workshop, presentations were given by twenty-nine participants. Each presentation consisted of a short speech pertinent to the issue of vitamin A deficiency and of approximately 20 minutes duration. Presentations were followed by 15-minute question and answer periods during which all participants had the opportunity to clarify points of interest with the speaker. The presentations, a schedule for which is attached to this report, are summarized in the following pages. Summaries of portions of the question and answer period are also included when questions required very specific answers but not when questions of theory were discussed.

Apart from the third day of the workshop, which featured a field trip to the Vitamin A Gardening Project's research station in Kollo, days two through five consisted of 8:00 a.m.-1:00 p.m. meetings followed by lunch. Communal lunches were held in the hotel restaurant, during which time participants could discuss the topics of the day in an informal setting.

The first day of the workshop, July 17, included an introductory evening meeting at which the moderator described the workshop goal and the agenda for the days to follow. The moderator answered questions on workshop procedures and logistical arrangements to be made for participants. The introductory meeting was followed by a welcome banquet on the terrace of the Hotel Terminus.

The field trip to Kollo was led by Anne D. Turner, project horticulturalist. It included a visit to a vegetable cooking demonstration at a maternity clinic as well as a trip to the project research station. The cooking demonstration consisted of a Nigerian nurse explaining to mothers the importance of including leafy greens in their diets and in the diets of their children, and showing them the preparation of traditional sauces including leafy green vegetables from the project's gardens. The trip to the project research station featured a map-guided tour of the research plots and a description by the project horticulturalist of varietal tests and testing of cultural gardening techniques performed to date, as well as providing participants with information on procuring vegetable varieties that were of particular interest to them.

Major topics of the participants' presentations--which are summarized in the following--included the problems of abiotic and biotic factors on gardens and some recommended solutions, nutritional education, village-level nutritional and gardening "animation" (lively presentations by extension workers), community gardens, the importance of women in gardening, plant variety considerations, fruit tree production, and vitamin A capsule distribution. Some presentations, rather than focusing on a particular issue, described the participant's own program or organization and its work pertinent to nutrition or agriculture.

In general, the workshop followed its goal of serving as an opportunity for exchanging ideas and techniques without an attempt to come to final conclusions on specific issues. A few major issues were raised in the course of the workshop, however, that were specifically discussed during the final meeting. These issues included: the role of vitamin A capsule distribution in combating vitamin A deficiency; the relationship among non-governmental organizations, government agents, and villagers in village gardening projects; and the extent to which marketing of produce could be encouraged without detriment to the nutrition of producers.

There was much disagreement on the role of vitamin A capsule distribution in combating vitamin A deficiency. Some people proposed such distribution as a permanent adjunct to vegetable production, while others offered it as a short term solution only. Most people agreed on the importance of encouraging vegetable production in aiding vitamin A levels and the question was raised whether vitamin capsule distribution should be done at all since it was only a short term solution that detracted from work that could be done on vegetables. Proponents of the inclusion of vitamin A capsule distribution supported capsules for the humanitarian reason of the number of lives saved due to distribution, and argued that relying only on natural sources of vitamin A would not be sufficient in many cases of immediate severe deficiencies. Opponents of distribution found this approach short-sighted. Most participants voiced a view somewhere in the middle of these perspectives, favoring a combination of the two approaches: increased vegetable production complemented by capsule distribution at least in cases of extreme immediate need.

Another issue that raised much discussion was the relationship among PVOs/NGOs, government agents, and villagers in village gardening projects. One government official raised the point that both the lack of continuity of some village workers such as Peace Corps volunteers, staying for only two years, combined with a lack of villager training in how to run projects by themselves doomed the benefits of projects to be short term only. A Peace Corps volunteer responded that the Africa Food Systems Initiative of Peace Corps was trying to address this very problem of continuity, making longer term projects with an overlap of volunteers. In general, participants agreed that villager involvement in all the different aspects of gardening projects introduced---from materials and seeds procurement to marketing---was necessary to insure long term success of any project.

As for the relationship between government agents and workers from NGOs/PVOs, the two parties represented at the workshop differed as to where the blame rested for an unsatisfactory relationship. Both groups agreed that a good relationship between the two parties was necessary to insure gardening project success. Some government representatives felt that officials were not sufficiently consulted by PVOs/NGOs in the course of their village activities. PVO/NGO representatives questioned whether this lack of consultation were not due to lack of effort on the part of the government officials, and recognized that these officials were often over extended in their daily responsibilities.

A final issue of disagreement at the workshop, which remained unresolved, was to what extent marketing of produce could be encouraged without detriment to the nutrition of producers. Some participants felt that emphasis of production should be not on consumption of produce but on

marketing, since this was a major concern of most growers. Proponents of emphasizing marketing maintained that effort to focus only on encouraging consumption could not succeed since they would not appeal to growers' primary interest to sell their goods. Others, especially nutritionists, recognized the interest of villagers in income generation, but questioned the wisdom of focusing on marketing in a situation where many villagers' vitamin A levels would not benefit as a result.

Following the final afternoon meeting on July 21st, the workshop closed with a farewell banquet in the evening at the Hotel Terminus.

For the Vitamin A Gardening Project, the workshop proved invaluable in expanding its network of collaboration with highly qualified professionals in the fields of nutrition and agriculture. Contacts made during the workshop ultimately yielded a number of very appropriate training program participants in the following year's training of gardening extension agents. Acquaintances met in the course of the workshop proved extremely helpful during future gardening assessment trips throughout the Sahel.

The following pages summarize the presentations of workshop participants. The purpose of the workshop was not to draw any final conclusions but rather to bring about the exchange of information and ideas among representatives from the fields of health and agriculture. As such, the workshop succeeded in its aim. The ultimate results of the professional collaborations begun as a result of the workshop could only be evaluated over time. An evaluation form given for the workshop for which slightly over one-third of participants responded showed that participants overall reacted quite favorably to the workshop (see attached sample evaluation form and summary of results).



M. Yaou Garba, Directeur National du Programme Conjoint d'Appui a la Nutrition, Ministere de la Sante Publique et des Affaires Sociales, Niger - "Prevalence of Vitamin A Deficiency in Three Zones of the Programme Conjoint d'Appui a la Nutrition"

M. Garba described his organization, the Programme Conjoint d'Appui a la Nutrition, listing its goals and describing surveys that had been performed on xerophthalmia and night blindness in the Niger arrondissements of Tchintabaraden, Ouallam, and Goure. He described nutritional work being done in these areas as a result of the surveys. He recognized the financial support to Niger of the Italian government as well as the technical assistance of international organizations such as WHO and UNICEF in supporting these surveys and work.

M. Garba noted that the socio-economic situation in Niger was extremely precarious, as witnessed by the effects of the drought of 1984. The strategy he described of addressing this problem included: involvement of villagers in the development of their own communities; improving the nutritional status of nursing mothers and children in program impact areas through an integrated development approach; promoting the participation of women in formulating, putting into action, and overseeing development programs; supporting and reinforcing community level extension services; developing a coherent alimentary and nutritional program for Niger.

M. Garba related survey results of night blindness among children as being 4.2% in Ouallam, 2.4% in Tchintabaraden, and 1.2% in Goure. He noted that night blindness generally affected children as soon as they stopped nursing. M. Garba described the specific actions that had been taken to address the vitamin A deficiency problem identified. The actions included distribution of vitamin A capsules, training health agents in the problem, providing villagers with nutritional education and encouraging their efforts in dry season gardening, fruit tree planting, and small-scale livestock production. While M. Garba acknowledged that much remained to be accomplished, he indicated being greatly encouraged to date by the interest and initiative of villagers.

Questions to M. Garba consisted of clarifications of the methodology and findings of the vitamin A deficiency surveys carried out in the target areas of the project and of obtaining more specifics on the procedures used for vitamin A capsule distribution.

M. Aliou Mamadou Sall, Chef de Service National de la nutrition, Ministere de la Sante de des Affaires Sociales, Mauritanie - "Combating Vitamin A Deficiency and Xerophthalmia in Mauritania"

M. Sall described short term and long term strategies in his country for combating vitamin A deficiency and xerophthalmia. Short term strategies included, as a first phase: vitamin A

capsule distribution targeted for children from 0 - 5 and mothers having recently delivered; increasing peoples' awareness to the problems of vitamin A deficiency and to the availability of capsules by means of traditional oral and written communication as well as radio, television, and songs. A second phase of short term strategy involved training health agents in diagnosis and treatment of vitamin A deficiency, as well as training other, non-health agents (ASC) to recognize signs of vitamin A deficiency and xerophthalmia so that they might refer cases on to health centers.

Long term strategy included, as a first phase: integrated projects designed to enable year-round availability of vitamin A rich foods through improved and increased production methods as well as improved processing and conservation; increasing awareness to vitamin A rich foods of both animal and vegetable origin since many such foods, including olive oil and fish are already available but under-used; taking a survey of available vitamin A rich foods including traditional foods not yet analyzed; improving cooking methods to avoid heat destruction of vitamin A; developing vitamin A rich forage plants to improve vitamin A levels in livestock (M. Sall mentioned having heard of one such promising forage plant). A second phase of long term strategy involved including a module on vitamin A deficiency in the nutritional education of schools of health.

M. Sall closed by saying that these strategies of combating vitamin A deficiency were being overseen by the national government and involved both the assistance of NGOs and regional health services. M. Sall stated that a decrease in the instances of xerophthalmia was already apparent since the adoption of methods to combat vitamin A deficiency.

Questions to M. Sall included inquiry as to how to avoid heat destruction of vitamin A in preparing foods, how the existence of vitamin A deficiency in Mauritania had been determined, what the specific identity was for the vitamin A forage plant he mentioned, whether he could name one good method of vitamin A vegetable conservation, how the timing of vitamin A capsule distribution is determined, and whether any method existed to minimize the amount of vitamin A lost in drying of vegetables.

On avoiding heat destruction of vitamin A, M. Sall responded that in the case of Baobab leaves cooked in sauces, an alternative to cooking and losing vitamin A from the leaves was to use uncooked leaves, and that for other vegetables, such as oseille de Guinee, from which a drink was prepared in Mauritania, it was possible to use uncooked forms of the vegetable in food preparation.

On determination of vitamin A deficiency in Mauritania, M. Sall responded that studies had been performed by World Vision International and that other NGOs as well, such as the Volontaires de Progres, and the Medecins Sans

Frontieres had helped in diagnostic efforts. He said that blood samples had been sent to the Institut Pasteur to confirm vitamin A deficiency, and that their current campaign against vitamin A deficiency was supported by organizations such as UNICEF and the WHO.

On the vitamin A rich forrage plant, M. Sall was not able to provide the name, but knew that it resembled a peanut plant and grew close to the sea. He added that although Mauritania had a long coastline and could thus take advantage of the plant's known habitat, it remained to be seen as to whether it could also thrive in non-coastal areas.

As far as methods of vegetable conservation, M. Sall indicated that the major one with which he was familiar was drying. He noted, when later questioned on the destruction of vitamin A through sun rays that this problem had been addressed by shading the drying vegetables from direct contact with sun rays but that it still needed to be shown exactly how much vitamin A was saved by this strategy.

For determining the timing of vitamin A capsule distribution, M. Sall responded that on the health cards of children ages 0-5 the recommended 6 month intervals of capsule allocation were indicated and that it was noted on the card each time the child received a capsule.

Ms. Marianne Bailey, Volunteer, U.S. Peace Corps, Mali - "Efforts to Improve Production and Consumption of Vitamin A through Community Gardens and Nutrition Centers"

Ms. Bailey described her project and discussed the obstacles she encountered to establishing women's community gardens and in encouraging proper nutrition practices. Ms. Bailey works with a group of women to encourage their cooperation in a community garden, teach them about nutrition, and offer technical assistance. In the area of fruit tree production she is assisted by a forestry volunteer who is located nearby.

Ms. Bailey noted that the close proximity of the town of Segou to her village insures a good market for vegetables and that villagers are quite interested in gardening. The major problems she noted in gardening were: a lack of understanding of the nutritional merit of vegetables often coupled with a preference to sell rather than consume vegetables; a periodic surplus of vegetables on the market due to simultaneous planting by all growers and resulting in high losses and waste; and various obstacles to gardening. Obstacles to gardening she has observed included: damage to gardens by animals; a division of labor where men are responsible for erecting fences, but are little interested

in women's gardens; and the lack of availability of seeds.

Ms. Bailey described her efforts to encourage cooperation of women in working a community garden and noted that despite obstacles she had been encouraged by the motivation of the women. She related efforts to teach proper nutrition and to encourage the addition of green leafy vegetables to the infants' food these women prepared. She told of plans to establish shaded drying structures for drying mangos, since such conservation had already been successful elsewhere in her region. Ms. Bailey noted that seed availability was a major constraint to gardening and that handouts of seeds was not a viable solution. Ms. Bailey noted that women had begun planting vegetables that were not eaten by animals, that this year they would try to use neem leaves to combat termites, and that she hoped to succeed in teaching women proper seed raising and storage methods. She voiced optimism in the potential to bring about a long gardening season---all the way to the beginning of the rainy season---were current gardening constraints adequately surmounted and were gardens grown in conjunction with fruit trees.

Ms. Bailey was questioned on the purpose of the leafy greens which she encouraged women to grow and she responded that the women used them in their sauces, including the food given to infants, and in other things.

M. Hassane Tankary, Agent Technique d'arboriculture, Institut National de Recherches Agronomiques du Niger (INRAN) -  
"Report on the Research of Fruit Trees in Niger"

M. Tankary announced his presentation to be a brief description of the history of the Gabagoura fruit tree station, the goals and objectives of the station, its research activities, and the connection between research and extension work for the outside population.

The Experimental Station of Gabagoura, located at 13 km to the west of Niamey and encompassing 13 hectares, was created in 1969 with the intention of developing fruit trees, included among which would be trees producing vitamin A rich fruit that could ultimately become available to the population at large. The station includes citrus trees, mango trees, intensive orchard production and land for tree nurseries. Its goals are to: (1) introduce varieties of fruit trees; (2) test varieties for adaption to soil and climate of Niger; (3) test grafting stock; (4) maintain a lot of full-grown trees ("parc a bois").

The ultimate objectives of the station are:  
(1) to enable the creation of department level tree nurseries with collections of citrus and mango trees; (2) to make available to producers good quality varieties that are resistant to dryness and diseases; (3) to serve as a site of

practical training in planting and grafting for village nursery growers and for students of the Institut Pratique de Developpement Rural (IPDR) of Follo.

Research activities of the station include: (1) testing previous findings; (2) evaluation of production; (3) fight against diseases. In the case of combating mango tree withering, research has included a survey of affected trees and a rating system on the seriousness of the disease. Conclusions were that lack of irrigation and fertilizer brought about the current situation.

To date the station has obtained for growers superior grafting stock and seeds with improved germination and sprouting rates and has brought about such accomplishments as contributing to the creation of the Gaya fruit tree project. Efforts to make a community orchard self-sufficient, however, failed when members could not pay the necessary costs of fertilizer, electricity and gas.

Questions included:

(1) Asking M. Tankary to identify the type of pumps used by the station (answer: 2 electro-pumps of 200 m<sup>3</sup>/hour and a small electro-pump for when the river was higher);

(2) What pump costs cooperative members had to pay for (answer: all costs are paid by State);

(3) Whether they utilize gravity irrigation (answer: they irrigate by sprinklers and from water tanks);

(4) Whether they charge anything for fertilizer supplied to farmers and cooperative members (answer: no);

(5) Whether the lack of payment charged to date did not explain unwillingness of growers to become self-sufficient (answer: yes);

(6) Whether plans had been made to replace aging trees (answer: yes);

(7) The time limit the State could give for growers themselves paying community orchard costs (answer: community orchard no longer exists, and although H. Tankary would like to start it up again, efforts to do so have failed to date);

(8) What multiplication systems they use (answer: they raise their own seeds and grafting stock at center);

(9) What methods of grafting they use (answer: all tools are sterilized after use on each plant);

(10) Whether they do research on leaf and seed weights to enable peasants to produce their own seeds (answer: locally available fruits such as lemons and limes could already supply good quality seeds);

(11) Whether peasants can already take advantage of fruits on hand to produce own seeds (answer: yes, and peasants with motivation and persistence can and do do so);

(12) Whether peasants can succeed on own without necessary materials (answer: while proper materials can be expensive, many things can also be made by local blacksmiths if peasants can provide a model).

Mr. Klim Maling and Mr. Ken Patterson, Volunteers, U.S. Peace Corps, Niger - "The A.F.S.I. Program of the Peace Corps"

Mr. Maling and Mr. Patterson did complementary presentations describing the A.F.S.I. (Africa Food Systems Initiative) program of the Peace Corps and their experiences with this program in Niger. Mr. Maling worked in Ouallam, Niger on work including villager gardening activities. Unfortunately, the taping of his presentation was faulty, and so only the presentation of Mr. Patterson is summarized here.

Mr. Patterson described gardening activities in his region of Say, Niger. He said the A.F.S.I. goals for the area included creating community gardens, improving existing gardens, constructing cement wells, and improving gardening, forestry, and agriculture techniques.

Mr. Patterson said that activities by Peace Corps volunteers followed the directives of the village councils ("Conseil Villageois de Developpement," or "CVD"). When he began work, the CVD was just beginning to become established. He noted that, increasingly, the CVD was able to take charge of defining desired activities. He found that gardening was very new to many villagers but was encouraged by their progress and by the success of the community gardens.

Cold season vegetables included: potatoes, lettuce, tomatoes, cabbage, beets, peppers, gumbo, and oseille de Guinea. In the future, they hoped to extend gardening to other villages, increase the links between villages and the national extension services, and enable improved transportation systems for obtaining gardening inputs. Other areas of change hoped for were the introduction of volunteers versed in cooperatives to assist in produce transport and selling activities, having Nigerien assistants working closely with volunteers, increasing women's gardens, and providing nutritionists to teach general nutrition and vegetable preparation.

Questions to Mr. Patterson included:

(1) Whether villagers were trained in handling monies (answer: Yes, they recently began establishing village funds, training 3 financial people in each village to keep track of accounts. He found this worked well);

(2) What technical service was available in Say (answer: They worked with the sousprefet and are were unsure if they would at some point begin working with the service "de plan");

(3) Whether they had prepared villagers for continuing when the AFSI program would be finished (answer: This was a topic recently discussed in an evaluation. Initially, a volunteer's presence was required to motivate villagers in starting activities. Increasingly, however, other villagers were able to work with less supervision due to the examples of villages where work had already begun);

(4) Whether upon his departure villagers could train each other and continue the work (answer: Every effort was made to link village cooperatives directly with supplies of needed

inputs. To date, distance was one of the main obstacles, and the AFSI volunteers were actively trying to insure that things would continue smoothly once they had gone);

(5) Whether any effort was being made to improve the transition process between departing and arriving volunteers to increase continuity of work (answer: This was an issue discussed at their evaluation and one that could present difficulties. He, for instance, however, would be present until his successor arrived);

(6) Whether new volunteers were located in the same villages as old volunteers (answer: Yes, since a six-year period of having the volunteers present is desirable).

M. Ide Djermaakoye, Coordinator, Projet Vitamine A, Helen Keller International Niamey, Niger - "Vitamin A Deficiency"

M. Djermaakoye described in detail the findings of surveys on vitamin A deficiency in Niger, the zones and target populations of work by Helen Keller International, and the strategies, objectives, activities, and resources of their vitamin A project.

A 1986 HKI survey conducted in on the prevalence of nutritionally induced blindness and on trachoma showed for the departments of Maradi, Tahoua, and Zinder an incidence of 3.97 % hemeralopy, 1.15 % xerophthalmia, and 23 % vitamin A deficiency. As a result of this survey, HKI project zones in the arrondissements of Birnin N'Konni and Cuidan Roumji were established to focus on target populations of children from 6 months to 6 years, recently delivered nursing mothers, children showing signs of vitamin A deficiency, and children with diseases such as measles, chronic diarrhea, and respiratory infections that put them at high risk for vitamin A deficiency.

Objectives of the project included: informing and increasing awareness of the situation among authorities, health professionals, community leaders, and in the populations as a whole; training technical personnel in measures to combat blindness causing diseases; promoting nutritional education and awareness; planning, organizing, directing, and executing activities appropriate to fighting nutritional blindness and vitamin A deficiency.

M. Djermaakoye described a comprehensive system of planning project activities and carrying work out with the assistance of appropriate government authorities and professionals as well as personnel provided directly by HKI. He described a large number of activities planned by HKI relevant to the project that included training programs, workshops, and producing visual aids such as t-shirts promoting awareness to vitamin A deficiency.

Questions to M. Djermakoye consisted principally in having him explain in greater detail work to date and plans of HKI in combating vitamin A deficiency. Unfortunately, the taping of this question period proved faulty, so precise details are not available.

M. Sinare D. Hippolyte, Instituteur at School of Fibaore, Sanmatenga Province, Burkina Faso - "Organizing Vegetable Gardening"

M. Sinare, a primary school teacher involved in supporting school gardening activities of his students, described the production of vegetables as an important activity for both reasons of improving health and providing students with a practical skill to complement their other learning at school. He noted that the government of Burkina Faso put great stock in teaching students gardening skills, but that lack of funds and technically skilled teachers was often a limiting factor in implementing such programs.

M. Sinare observed that certain tools such as watering cans, rakes, and hoes are essential to the production of garden vegetables, and that in some instances, such as in the assistance of UNICEF to his school in Boungou, these materials are supplied by an NGO.

M. Sinare described the steps in starting gardening work at his school, including the provision of many materials by UNICEF, the award of a nearby parcel of land by a village official, and a meeting with teachers, parents, students, and a health and extension service official to plan how work would be organized. M. Sinare related how students were divided into groups and how the tasks such as watering were scheduled through the week. M. Sinare explained that produce of the garden---including carrots, lettuce, local tomatoes, beans, gumbo, and onions---was predominantly consumed by students in the school cafeteria, with the remainder sold in the market to provide money for small school expenses and for the maintenance of gardening materials.

Elsewhere in Burkina Faso, M. Sinare reported, schools lacked necessary materials for school gardens, and teachers did not have adequate technical backgrounds to feel at ease teaching gardening. Additionally, texts on gardening were virtually non-existent. M. Sinare hoped that in the course of the workshop he would be able to learn from others having had experience in gardening how to improve work at the school and how to better manage operations. He maintained that gardening was essential in addressing the nutritional problems present.

Questions to M. Sinare included:

(1) Whether parents of students assist only with gardening irrigation (answer: yes, some parents help students in this respect and, in fact, it is in their interests to do so financially since garden profits help save money on school books and notebooks that parents would otherwise have to pay for themselves);

(2) Whether students are taught in financial management of garden activities as well as in production (answer: to date teachers head up accounting activities since the initial goal of gardening is simply for students to have practical gardening experience and to eat produce);

(3) Whether they have trouble accounting for monies (answer: when teacher alone is in charge of funds, funds are sometimes mis-appropriated, but under their system where parents assist students, students sell produce, teacher notes earnings, and money goes into students' parents' savings account, there is usually little problem);

(4) Whether similar school gardening has not already been happening elsewhere (answer: in the four provinces of Burkina Faso where UNICEF assists school gardens, work has just begun; other projects have not included vegetable production by students);

(5) Whether he can further explain the problem of lack of competent gardening instructors (answer: the time allotted to teach gardening to students is often very limited due to the time needed for other subjects. To do an adequate job in such a short time, a teacher must be very well informed on gardening. This, however, is not always the case);

(6) Whether they could not ask a technical service to send an agent to teach students part time (answer: yes, there are agents who sometimes help since it is essential that students not simply produce but produce using the best methods possible, especially for those who will continue on in agriculture).

M. Lulful Kabir, Directeur, Save the Children (UK), Mali - "Lack of Awareness and Vitamin A Deficiency"

M. Kabir gave a description of his organization and its programs, specifically referring to their efforts in vitamin A capsule distribution and in encouraging increased vegetable production as a means of supplying vitamin A.

Save the Children Fund-UK (or "Fonds Britannique pour la Protection des Enfants") is an international NGO working on behalf of children suffering from hunger, sickness, and other problems. Their programs in Mali include two separate activities. The first activity consists of supporting and assisting the health services in the Cercle of Doumboua of Mopti. Included in this first activity is training of health personnel,

supplying medicines, and keeping track of the nutritional status of mothers and children. The second activity is providing a technical service (PIA) which gathers useful data and information relating to food production in order to assist relevant programs. Work of the PIA ("Projet d'Information Alimentaire") includes: studying various population groups (farmers, fishermen, etc.), studying displaced populations, and nutritional concerns.

M. Kabir discussed the problems of lack of awareness and vitamin A deficiency in Mali, noting that despite the Mali government's policy of emphasizing vegetable gardening to provide self-sufficiency in food, that much of the rural population was either uninformed as to how to proceed with this policy or incapable of doing so. He cited lack of appropriate knowledge as well as other factors of water, seeds, and tools insufficiency as some major causes of the situation.

M. Kabir emphasized the importance of farmers focusing on traditional vegetables to meet their needs, rather than concentrating on foreign vegetables. He emphasized the need to increase awareness of growers to the link between food and vitamin A deficiency as well as to the relation between lack of vitamin A and measles, malnutrition, diarrhea, respiratory infections, and child diseases and mortality. He also noted that counter-productive food labours, the use of many green leafy vegetables only for animal feed for sale, and the overcooking of vitamin A containing vegetables were all problems that would need to be addressed.

M. Kabir maintained that the importance of vitamin A was only beginning to have any role in government programs. He viewed capsule distribution as a short term solution to vitamin A deficiency and said a long term solution would need to include changes in dietary and food production practices and nutritional education. He said that even small deficiencies in vitamin A could increase child mortality and urged cooperation of government services, NGOs, religious organizations, and others in using an integrated approach to the problem, including the collection of data in areas particularly at high risk for vitamin A deficiency.

Questions to M. Kabir included:

(1) Whether there was anyone studying indigenous plants rich in vitamin A (answer: UNICEF was the organization most active in such work, as well as a number of NGOs including Oxfam. SCF would do such work in areas where nutritional centers were located);

(2) What the status was for vitamin A capsule distribution activities (answer: Two campaigns of distribution carried out by mobile teams including a doctor/nutritionist had taken place so far, one in 1986 and one in 1987. These teams determined whether capsule administration was needed for children. Other health work to date included teaching nursing techniques);

(3) Whether they have tried to change the dietary habits of people (answer: For the most part they have given nutritional education and encouraged consumption of good foods without

directly criticizing unsatisfactory practices);

(4) What measures they take to prevent double dosages of vitamin A capsules and resulting vitamin A toxicity (answer: They use vaccination cards on which they note the administration of vitamin A capsules. In addition, they keep a list of children receiving capsules);

(5) Whether capsule distribution would not undermine any efforts to encourage increased gardening of vegetables supplying vitamin A and, if so, whether they should not focus on the production of vitamin A foods and discard capsule distribution (answer: Capsules distribution and increasing vegetables containing vitamin A are two completely different activities. The vegetable equivalent of one 200,000 AU capsule, for example, would be 2 kg of dried baobab leaves. Also, they only give capsules where diseases had been noted);

(6) How in storage and distribution they can distinguish between their 50 IU and 200,000 AU capsules, given their identical appearance (answer: boxes are appropriately marked and kept separate).

M. Mamadou Issa, Directeur Perimetre, Cooperative Agricole de Tillakaina, Niger - "The Agricultural Cooperative of Tillakaina"

M. Mamadou described the background of the cooperative and the activities they were involved in. He noted that the government of Niger had placed a high emphasis on agricultural production and that proper irrigation was the main element necessary for any accomplishments in this field.

Financed by the FED (Fond Europeen pour le Developpement), the area of land and crops of the cooperative have changed over time to its current size of 88 hectares with electric pumps, store room, sorting room, cold room, refrigerator, and pick-up truck.

From October to March, most vegetable gardening activities of the cooperative are performed and include: green beans, tomatoes, melons, cucumbers, zucchini, squash, and peppers. Except for a bad year in 1987-1988, their production has been increasing over the last 4 years. Problems in vegetable production include: lack of organic material, lack of customers, insufficient thinning of plants, parasites, and diseases.

Questions to M. Mamadou included:

(1) Who finances the cooperative (answer: The FED, with cooperative members paying a fee at the end of each season as well as paying for the amortization of all equipment);

(2) Whether the cooperative favors vegetable commercialization over consumption (answer: Some sale of produce is necessary to keep the cooperative going but, given the large amount of produce grown, there is still some remaining for growers to consume);

(3) Whether vegetable production not intended for sale is sufficient to provide dietary needs of growers (answer: Sale of

vegetables is approximately 50%, leaving plenty for consumption needs. Other plants grown in the rainy season---okra, sesame, and peanuts---he does not discuss since they are not sold by the cooperative);

(4) Why not include the rainy season produce in discussion (answer: It does not enter into marketing activities of the cooperative);

(5) Whether he finds growers are nutritionally independent due to produce consumption (answer: He does not know since he is a producer, not a public health official);

(6) Whether problems that had caused the cooperative to close in the past had been resolved (answer: At one point when sale of onions was a major activity, regional overproduction caused monetary losses. Their focus is no longer so heavily on onions);

(7) Whether cooperative production follows market needs closely enough (answer: Attempts are made at the start of each season in their general meeting to consider issues of auto-consumption and sale and to make appropriate decisions);

(8) Whether focus on marketing did not detract from the goal of food self-sufficiency (answer: Only green beans are actually exported);

(9) How much do growers earn (answer: In 1987-1988, profits came to 5 million francs (CFA). Fees charged growers had been 16 million francs);

(10) How were overall profits calculated (answer: Exports accounted for greater income than goods sold in Niamey and permitted the final overall profits);

(11) Whether figures on sales included the vegetables consumed by growers (answer: no);

(12) What measures have they taken to prevent the closing down of the cooperative as had occurred in 1980 (answer: They have already begun to focus on other plants).

M. Moussa Mamadou Sow, Agriculteur, World Vision International, Mauritania - "Gardening Cultural Practices"

M. Sow told the steps he followed in Mauritania, and which he tried to explain to growers, to insure a successful gardening season. He briefly mentioned procedures necessary in seed selection and planting, in transplanting, and in performing post-transplanting activities and harvest.

He noted that constraints to optimal gardening in Mauritania included: lack of seed selection and use of too many seeds, poor plant spacing, lack of thinning, lack of knowledge or observation necessary to identify diseases, damage causes by birds, animals, disease, and wind-blown sand.

Questions to M. Sow included:

(1) What were the necessary steps in gardening preceding planting (answer: Choice of land and soil preparation);

(2) Whether seed selection can be performed only by noting

exterior appearance of seeds (answer: He had explained in presentation that seeds must be disease free, ripe, and viable);

(3) What does he plan to do to address problems of waste in nursery and lack of thinning (answer: They have not done anything to date, but plan to run demonstrations where, in the case of thinning, they will do a bed where plants are thinned and leave another bed in which the farmers can conduct their usual practices).

M. Zakari Madougou, Assistant, Projet Agroforestier et Fruitier, CARE, Niger - "Development of Fruit Tree Arboriculture in the Department of Tahoua"

M. Madougou described the regional fruit tree nursery of Guidan Idder located in the department of Tahoua, Niger. He explained that the goals of the nursery were to train village agents the skills necessary to begin their own local fruit tree nurseries and to provide follow-up technical assistance to these village agents.

M. Madougou said that their training program ran for 1 year to insure that agents fully understood all phases of arboriculture and could teach these skills to others. He explained that at the end of the training, trainees receive some materials to help them begin a tree nursery in their own village. M. Madougou said the advantages of their system were to bring about a more decentralized system of fruit tree production where villagers could obtain fruit trees more easily near their village and where technical assistance would be easily available. He reported that in 1987 13,790 mango trees had been produced at these local nurseries.

M. Madougou maintained that their tree nursery program was extremely important in bringing food self-sufficiency to Niger, including the provision of important vitamins. He added that the role of women, sometimes the only family members present in a village at certain times of the year, was an important consideration which they were addressing by training some women arboriculturalists.

Questions to M. Madougou included:

(1) Whether women who were trained were already practicing arboriculture (answer: Yes);

(2) How well do they succeed in grafting fruit trees of plants transported long distances from center (answer: Long distances are difficult on trees and trees must be kept and observed for some time first to see if they have withstood a long transport);

(3) Whether he could explain the technique used for raising plants (answer: They use a "germoir," where they grow mango plants from ordinary mango pits before putting them into a nursery);

(4) Whether the "germoir" is a garden bed (answer: Yes, they use a bed in which different rows are used for different

types of pits, and they are put into a nursery 4 or 5 months later);

(5) Whether after 5 months, mangos are put in plastic pots in the nursery, and the method of planting them (answer: They are put in plastic if money is available since each pot costs 50 francs CFA. They usually put them in a pot only upon sale to prevent pre-sale deterioration of pot. Planting can be done in a number of different manners;

(6) What profit arboriculturalists can make on plants (answer: They do have a profit, but he does not know how much. He knows only the total revenues figures, often around 100,000 francs CFA);

(7) How prices in different nurseries were determined (answer: There is a fixed price per tree for the entire department of Tahoua).

M. Jean Yves Marleau, Cooperant Volontaire Technologiste Agricole Centre Canadien d'Etude et de Cooperation Internationale (CECI), Mali - "Vitamin A Rich Vegetable Production in conjunction with Vegetable Marketing by Village Groups (TONs) in Mali"

M. Marleau described the climatic conditions of Mali as well as the crops grown in the region of Koulikoro, at 70 km from Bamako, where his present project is located. He explained that a high proportion of the population of some villages in the area was blind, principally due to onchocercosis, and that the condition of these people had been worsened further by the drought, leading to the agricultural aspect of the project. M. Marleau's project, which is considered overall as an integrated health project, includes five aspects: (1) health, entailing hygiene and sanitation; (2) socio-economic, including trying to curb the exodus of people from the villages and train people in self-management, cooperatives, and general literacy; (3) nutrition; (4) technology, where an attempt is made to use research to find the best solutions for all aspects of the project; (5) agriculture, for which village associations ("TON"s) are assisted in gardening.

M. Marleau noted that family nutrition and income were closely related, and thus they try to assist villagers in gardening activities oriented toward generating income and for which some of the produce was inevitably consumed as well. He compared types of water extraction methods and concluded that diesel motor pumps and solar pumps were the most effective and said these were the methods they used. He noted that fencing provided to villagers in order to protect gardens was given on a temporary basis until live fencing could become established.

M. Marleau described the other characteristics of their gardens, including gravity irrigation, the use of animal and vegetable fertilizers, efforts to encourage composting, and the association of various plants such as corn and hot pepper, bananas and gumbo. He noted that in the area of rural exodus,

the activities provided by the gardens they introduced had succeeded in preventing any young people from leaving the villages.

In the area of nutrition, they had required families to keep at least a few garden beds devoted to vitamin A vegetables such as cabbage, lettuce, tomatoes, peppers, and carrots, among others. He described the plant associations, spacing, and various techniques used to insure effective yields, and noted that over 20% of the garden production was consumed by the producers. M. Marleau stated that, overall, the problem of nutrition was not isolated to the field of health, that the many related factors needed to be addressed, and that this was what his project attempted. M. Marleau showed slides of their gardens, illustrating the different plants and techniques used.

Questions to M. Marleau included: .

(1) How long a solar pump worked and what area of land each could irrigate (answer: He had not yet personally had much experience with solar pumps, but understood them to last for about 10 years before any major pieces needed to be replaced. As for the land a solar pump could irrigate, it was usually 1-4 hectares);

(2) Whether the use of gravitational irrigation did not require a high level of work on the land by machinery (answer: It would depend on the location; they had been lucky enough to have gardens situated in areas easily adapted to gravitational irrigation);

(3) Was the earth clay or sandy in the gardens (answer: It was river deposit land, with a high lime content. Some of the gardens were more sandier than others, some had a higher clay content);

(4) Whether soy bean grew well and was eaten by the women (answer: M. Marleau referred this and the following question to his co-worker, Mme Rita Gregoire, to answer: It was not difficult to grow soy bean and women liked it if the flour from the beans was mixed with other flour to make a pasta or couscous);

(5) How the flour of soy bean was made (answer: They boiled the seeds for 15 minutes, dried them, and then crushed them);

(6) Whether farmers entered into production contracts with merchants (answer: Bad experiences of the past had made villagers reluctant to agree to any contract whatsoever, although M. Marleau was trying to convince them otherwise);

(7) Why composting had not caught on to date (He thought demonstration methods had not yet been effective enough and that it would catch on once they used more effective awareness increasing techniques, such as the GRAAP technique he would be demonstrating shortly with Mme Gregoire);

(8) What produce would lend itself to export from their gardens (answer: Principally green beans).

Mme. Rita Gregoire, Conseillere Hygieniste Dietetitienne, CECI, Mali - "Description of the Nutritional Component of the Program of Nutritional Demonstration (PND)"

Madame Gregoire described a program addressing malnutrition in which she was involved and which was located in the commune of Koulikoro, at 70 km from Bamako, Mali. Their goals include: increased consumption of produce, increased long-term socio-economic conditions of farmers, decreased malnutrition of infants, and improved general health of the overall population. Strategies involved are "animations" (skits) geared toward increasing the awareness of women's groups to the importance for themselves and their children of well-balanced diets as well as by demonstrations. In addition, an experimental program is being run to teach school students about good diets.

To insure success of programs, medical information on dietary habits of people as well as on sanitation, water availability and the nutritional status of children 0-6 is being collected. In addition, two women of Koulikoro have been instructed at the GRAAF institute of Bobo-Dioulasso in techniques of animation.

The project included a first phase of using the GRAAF-trained animatrices to increase the awareness and knowledge of villagers to nutrition, health, hygiene, and other issues by bringing the villagers to actively participate in the training process. A second phase consisted of cooking demonstrations utilizing locally available foods, with attention on certain high value vegetables and other foods, as well as cooking techniques to maintain high vitamin content.

Rather than holding a question and answer period, Mme Gregoire went on with M. Marleau to give a demonstration of GRAAF animation techniques to workshop participants, asking them the same questions that she would ask villagers about the division of people into different age and sex groups and the division of foods into different nutritional groups. Accompanying the responses to these questions, representations of the appropriate food or group of persons would be attached to a blackboard for visual reinforcement.

M. Moussa Bangre, Economist, Africare, Burkina Faso - "Gardening Activities of Africare in Burkina Faso"

M. Moussa Bangre spoke on the subject of the work being done in Burkina Faso by Africare. This work including the construction of small dams in areas of Burkina Faso including the northern province of Yatenga. The construction of such dams permitted the local agricultural extension services of the national government to teach villagers how to grow garden vegetables in the lands adjacent to the dams. Unfortunately, the quality of the taping of M. Bangre's presentation was not sufficient to permit a more complete summary here.

Mr. Christopher Winters, Peace Corps Volunteer, Mali - "Vitamins and Gardening, an Example of a small Malian Village"

Mr. Winters works for the Peace Corps in Mali for the "AFSI" program, which he described as providing long-term (10 year) projects in which volunteers specialized in different fields work in the same region to complement each other. Mr. Winters described his village of Nanguila, at 90 km to the south of Bamako, telling of the distribution of tasks between men and women and of his work in gardening and nutrition.

He said the men took care of the agricultural plants such as millet and sorghum, while the women did gardening of peanuts (in the rainy season) and sauce leaves. While some vegetable gardening is done by children in the rainy season, most is done in the dry season by women, men, and children. He noted that women know many good gardening techniques that men do not use, such as transplanting, keeping seeds, and plant associations. He added that, unfortunately, women were abandoning some of these techniques to copy the men, and that their main concern is often on money producing crops such as peanuts, rather than on nutrition.

Mr. Winters instructs men in gardening techniques such as composting, organic insecticides, shading, and spacing. In two regional schools he also teaches gardening techniques, soil conservation, and nutritional value of vegetables; however, he notes that instructors at the school are often discouraged by receiving paychecks very late.

He grows vegetables in a demonstration garden for men and women, using techniques of shading, mulch, compost, organic insecticides, and manure. The produce of his garden is shown to the women to whom he explains nutritional concepts.

Questions asked Mr. Winters included:

(1) What organic insecticides he uses and for what purpose (answer: The men have problems with worms and other insects in their gardens and he has taught them how to make insecticide from millet. During the dry season when no millet seeds are available, they make a preparation out of leaves and soap which is dried to make a good insecticide, although it is toxic. Another method consists of using orange peel and hot pepper and putting the orange peel next to the millet);

(2) Whether villagers use modern insecticides (answer: No, they are too expensive);

(3) How well the foot operated water pump he works with is accepted in the village (answer: His pump works well both in the garden and in the river, and the Peace Corps will be coming up with a new model this year. Many growers, however, use motor pumps).

M. Amboise Nanema, Chef de Service Nutrition, Ministry of Health and Social Action, Burkina Faso - "The Program of Combating Vitamin A Deficiency"

M. Amboise noted that Burkina Faso suffered the effects of dryness beginning in 1973, and had a high rate of infant and child mortality, with problems such as malaria, meningitis, measles, leprosy, xerophthalmia and others.

M. Amboise went on to describe programs in Burkina Faso addressing the problem of xerophthalmia. He said work had begun by surveys conducted in 1981 in 4 northern provinces of Burkina and with visits conducted in 3 of the provinces with the assistance of UNICEF in 1984. He said the problem of xerophthalmia was found to be serious and required both treatment programs and preventative programs focusing on foods rich in vitamin A.

M. Amboise said a pilot program against vitamin A deficiency had begun in collaboration with USAID and UNICEF in the 4 northern provinces of Burkina Faso. The goal of reducing the incidence of vitamin A deficiency, in particular among children ages 0-10 and mothers, was to be met through the following activities: increasing public awareness to the problem; training health personnel in the problem and in vitamin A capsule distribution; integrating nutritional education and vegetable production into schools; conducting meetings with all local authorities to be sure the problem of vitamin A deficiency and its solutions are well understood; conducting an awareness increasing campaign at the level of Ouagadougou for government officials and other organizations.

M. Amboise said that strategy would be to include in their program considerations at a village level of vitamin A food production, marketing, consumption, processing, and storage, and that school gardens would take an active part in this program. He noted that vegetables of these gardens could be consumed in the school cafeterias. He said that available extension agents from the ministry of agriculture would be called on to assist school programs. M. Amboise gave figures on some work done to date and mentioned special considerations and problems.

In the area of capsule distribution, M. Amboise noted the importance of keeping careful control over distribution to prevent overdosage. He said current distribution programs were run in association with existing health structures and that health cards and infant and mother cards were used to keep track of capsule distribution but that a better system was needed to children of 5-10 years, who sometimes had no such cards.

M. Amboise noted that the problem of xerophthalmia was very serious and that the help of NGOs in addressing the problem would be crucial in achieving success since the government alone did not have the necessary means.

Questions to M. Amboise included:

(1) How they could evaluate their capsule distribution program (answer: Health cards would indicate capsules distributed and effects on recipients, and a count was kept of the number of treated individuals);

(2) To explain the problem of capsule distribution that he had noted (answer: For children 5-10 there is a high enough level of migration that they are hard to keep track of);

(3) How much the current project costs and how activities have progressed (answer: Of \$70,000 slated for the final phase, half has been spent. Filming has taken place for a video cassette being made, for nutritional education a consultant has been hired to do an assessment of current programs in preschools and primary schools, with the goal of producing a workbook to be tested in the following year);

(4) What his major message was for vitamin A deficiency (answer: That the problem should be principally addressed through foods rich in vitamin A);

(5) Whether giving away capsules can be used in the long term (answer: No, in the long term the solution is the consumption of vitamin A rich foods);

(6) Whether, rather than giving away capsules, they could not be sold cheaply to merchants (answer: Donors currently require that no payment be required for capsules nor for the ointment given in treatment of trachoma);

(7) What the ingredients were that were used for the "bouillies" (a sort of porridge) that women were shown (answer: The base is millet, the same as they usually include, and possible additions include green fruits/vegetables cut into small pieces, dried, and added to the baby's glass).

#### Mr. David Leege, Peace Corps Volunteer, Mauritania - "Constraints to Agricultural Extension"

Mr. Leege described food practices in his town of Atar, located in an oasis region of Mauritania at 450 km north of Nouakchott. He noted that the population of Atar itself was sedentary but that in surrounding villages people were partly sedentary and partly nomadic, and that the nomadic side of life did not favor their involvement in gardening activities.

Mr. Leege told of climatic, cultural, and socio-economic conditions disfavoring vegetable gardening. Climatic conditions restricting vegetable gardening included: water insufficiency, the presence of salty water in some locations, high temperatures, and hot winds carrying dust. Cultural factors restricting vegetable gardening included the lack of vegetables in the traditional diet of Maures, and the preference to produce dates, which require less work and provide greater profit. Socio-economic factors unfavorably affecting gardening include landowners preferring steady employment or marketing activities elsewhere rather than gardening and the fact that some of the

gardeners are former slaves who do not own the land they work on and so are not certain of remaining.

Mr. Legee said that his work in Atar included: encouraging people to grow small home gardens, including tomatoes, carrots, beets, and "oseille de Guinee" (Mr. Legee gives seeds on the condition that recipients do the work); giving cooking lessons to women; introducing dried vegetables to women restaurant owners; encouraging people to begin gardens earlier in the season.

He noted that most people accepting his seeds for gardening were women and children, people less likely to be involved in date production. Despite efforts to teach women cooking techniques, he noted that to date few women showed a good understanding of the nutritional value of the foods nor an inclination to try anything new. For the restaurant owners, he noted many were not prepared to store vegetables for a long time. To date, earlier garden planting has not been very successful due to consumption of seeds by insects, birds, and other pests.

Questions to Mr. Legee included:

(1) What the average yield was for date trees (answer: This varies considerably, but is often about 35 kg per adult tree, although locusts this year had brought production down as much as 40 % in one oasis);

(2) Whether Mauritania uses biological control in protecting date production (answer: There is some, but the lack of humidity has prevented much effectiveness to date);

(3) What size land holdings are for gardens and date palms (answer: This varies considerably. In Atar itself land is typically divided into about 1 hectare parcels, although in villages there are often large areas of date palms with little cultivation at all under the palms);

(4) How the division of land worked (answer: It is complicated, but many owners are more often in Nouakchott than at their land, and there are often "metayes," or former slaves, left behind working the land);

(5) Whether water problems are serious (answer: It depends on the location. In Atar itself there is running water, although most people do not have it at their house but manage to get it somewhere or to go to wells by the date palms).

Ms. Jane Toll, Field Representative, ICPGR, ICRI&T Sahelian Centre, Niger - "Preserving Genetic Resources"

Ms. Toll cited the nutritional importance of vegetables and said that the development of improved species was often accompanied by the loss of local varieties of many plants. She noted that stresses to the environment such as drought, overgrazing, or desertification, could also destroy habitats of wild species. She said that her center, ICPGR, was created in order to promote the collection, conservation, evaluation, documentation, and utilization of the genetic diversity of useful

plants, concentrating on 8 vegetables in the world: tomatoes; amaranth; egg plant; onions (and related plants); cabbage (and related plants); squashes/cucumbers/melons; peppers; and gumbo.

Ms. Toll stated that having genetic diversity of traditional varieties of plants and related wild species insured keeping a reservoir of genes that was essential for improving species. Although some organizations such as ICRISAT, AVRDC, and other national and international organizations had representative collections of many vegetables important to Africa, she said little had been saved to date for semi-cultivated and wild vegetables used in food.

She urged that workshop participants assist in the task of collecting these "minor plants" used as vegetables in peoples' diets as well as related plants, and gave a collection sheet with necessary information to accompany any samples of seeds.

Questions to Ms. Toll included:

(1) Whether genetic banks for vegetables present in Africa already existed (answer: Yes, international institutions have collections of such vegetables including amaranth and gumbo);

(2) Whether traditional varieties had already been collected for such vegetables (answer: Yes, in some cases, traditional varieties have already been collected and stored in gene banks. For millet, for example, collection has been going on for 20 years for storage of genetic materials at the ICRISAT center in India).

M. Prosper Sapathy, Nutrition Supervisor, World Vision International, Mauritania - "Combating Vitamin A Deficiency in a Child Survival Project"

M. Sapathy said their vitamin A program, run by the NGO World Vision International in Mauritania, had begun in 1987 and was called "Fight against xerophthalmia." It is a two year program run under existing WVI child health programs in 5 departments of the Assaba region and in cooperation with the Ministry of Health and the Ministry of National Education. The magnitude of work to accomplish means that an extension beyond two years will be required.

He noted that water was a limiting factor of the entire Assaba region, with some wells 30 m in depth, and that since the beginning of the drought years there has been less meat, milk, and grazing available. The result of the nutritional situation has been the occurrence of xerophthalmia in the population and the continual presence of food assistance programs.

The vitamin A program of WVI has as a goal reducing xerophthalmia by 50% in the Assaba, and activities include: conferences and workshops to enable training of village-level health extensionists; nutritional education; a gardening project; and distribution of 200 IU vitamin A capsules by mobile vaccination teams to children of 6 months to 10 years of age.

Their work is supported by a program of "Social Marketing," producing and using videos to show government officials, and showing slides and presenting pertinent local language songs in villages.

Nutritional education on general nutrition and vitamin A is done by multi-disciplinary teams including specialists in agriculture, health, education, nutrition, and other fields. Education is also achieved through group discussions, cooking demonstrations, posters, and tape recorded messages. The goal of education is to change the behavior of the population to improve food consumption practices, particularly in regards to foods rich in vitamin A.

For vegetable gardening work, support is given to both village cooperatives and school gardens. Dietary habits of villagers will have to be changed since, in the case of many green leafy vegetables, people consider such plants as animal food. Seeds given by the inspection of agriculture include: sweet potatoes; tomatoes; carrots; cabbage; and others. Capsule distribution, considered a short term solution, is performed with the use of vaccination cards. For children 6-10 years old, school teachers are in charge of distribution. Their receipt of capsules is noted in their yellow fever cards. Other health centers give capsules to mothers and to women giving birth. Administration of capsules is noted to facilitate follow-up. It is hoped that, with the maturation of vegetable gardening, capsule distribution can be discontinued. For this to occur, he noted a multi-sectoral solution would be needed which must include village water projects.

Questions to M. Sapathy included:

(1) What population was affected by their program (answer: He had explained in his presentation that the total of the Assaba region population was 200,000. Of these, all should be reached by educational activities to increase awareness. For capsule distribution, children 6 months to 10 years and women giving birth are affected);

(2) How many people have been affected to date (answer: Each month they mark on a sheet the total number of capsules distributed and the number reached per age group);

(3) What people are included in performing program activities and what is their relation to WVI itself (answer: All health and agriculture personnel in the area are included to some extent. There are also 4 mobile teams that do vaccinations and education. All of these are utilized to help in the vitamin A program. The regional hospital and health centers as well are involved by performing capsule distribution);

(4) Where does funding come from (answer: World Vision International is in charge of the child survival project that the vitamin A work is provided in conjunction with. The financing for vitamin A work comes from USAID);

(5) How much is the financing (answer: He is unable to answer that question);

(6) What data is used to base program on (answer: They did

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a survey on food habits, consumption habits and vegetable production before beginning. For capsule distribution, they know the population of each age group and can thus calculate how many capsules are required);

(7) What percentage of people are affected by xerophthalmia (answer: It is difficult to be precise since indicators such as night blindness have been used to date which may not give the full extent to the problem. Also, they would like to run another study since some of their data collected have depended on the responses of mothers in the cases of infants too young to talk).

M. Peter Engels, Entomologist, Protection Végétale, Ministère de l'Agriculture, Niger - "Entomological Considerations"

M. Engels spoke about the major insects attacking tomatoes, cabbage, cucurbits, lettuce, peppers, and cowpeas. For each vegetable, he named the insects in Niger which caused the greatest damage. He supplemented his discussion with slides and information on the symptoms of damage characteristic to the different insects.

M. Engels went on to describe phytosanitary products used to control the insect pests he had named. He described the methods of preparing an extract from the seeds of neem trees which could be used as a natural insecticide for many vegetables. He noted that an advantage of this extract was that vegetables could be consumed immediately after application. The same is not true of lindane, whose application should be followed by a waiting period of two weeks before consumption, though this period is often not abided by in Niger.

M. Engels strongly advised against using the product malathion for vegetable pests since it remains in the environment for quite a long time. He also mentioned that decis was not a good product to use against aphids, since it could actually increase an aphid problem, perhaps by killing their natural predators.

M. Engels concluded by describing two types of applicators of phytosanitary products that could be made easily and relatively inexpensively at a village level. He mentioned that such tools could be very useful in the long run in improving current application practices by villagers which waste chemicals and are often hazardous to the person applying the substances.

The length of M. Engel's presentation and slides precluded a question and answer period.

Mr. Peter Neillich, Centre Coopératif de Recherches, Niger - "Agroforestry Activities to Improve Vegetable Garden Production"

Mr. Neillich described his work in agroforestry, telling of the problems existing for vegetable gardening and suggesting some solutions. The major garden vegetables in his region are

cabbage, lettuce, tomatoes, egg plant, and squash. Major constraints to gardening include wind, animals, lack of water, and high temperatures. His work has been to explain to people how to protect their gardens and increase productivity by planting trees as wind breaks and live fencing. He said using such techniques can increase garden production by 50-100%. He described some of the plants used for these wind breaks and fencing. He added that besides protecting garden plants from wind and animals, trees could provide shade, fire wood, mulch material, and additional feed.

Mr. Heitlich proposed that any gardening project sponsored by an NGO should include an initial phase of informing villagers of the utility of live fencing and wind breaks and not providing any assistance to other gardening activities until work on these protecting plants had begun. He felt this would provide proof of the villagers' motivation, insure that they were prepared to become personally involved in work, and establish a protected environment for the garden produce. He emphasized the importance of follow-up and encouragement in all such gardening projects.

Questions to Mr. Heitlich included:

(1) What was his reaction was to the discouragement by experts in other countries against planting euphorbes and prosopis plants because of possible harboring of parasites (answer: He was not sure the evidence is conclusive on the hosting of nematodes by these plants, but noted that farmers found the wood of prosopis useful);

(2) Why they did not use bene as a wind break (answer: He has occasionally used bene here as such, but it is not thorny. However, it could sometimes work).

The remainder of the question and answer period consisted principally of observations voiced by other people having experience in agroforestry on species which they had found particularly useful.

M. Ali Hamidou, Chef de Service Agricole, Keita, Niger -  
"Development of Arboriculture and Vegetable Gardening in Keita"

M. Hamidou spoke on agriculture work in the arrondissement of Keita, including arboriculture and vegetable gardening. He said that work being done in the area was by the national agriculture service and by an integrated project called "Projet Integre Keita." The project focuses on environmental protection and agricultural development with the goal of food self-sufficiency for the population. His work consists of village-level development where needs are raised and discussed initially in a village council ("Conseil Villageois de Developpement" or "CVD") before being acted on by the project. Problems and solutions are thoroughly discussed with the population before any work is begun, and appropriate technical training and support is brought in by project staff and agriculture service agents. Necessary materials, such as fencing and cement, are supplied by

the project, while villagers supply labor.

Project work includes assisting women in vegetable gardening and arboriculture. Since there is a large exodus of men during the dry season, assistance to women is seen as a means to provide them with activities to help their household and to address the problem of vitamin A deficiency. In gardening, collective fields for manioc are provided as well as support of measures to process and save the manioc. A well digging program serves to provide appropriate areas for gardens and an effort is made to encourage diversification from tomatoes and onions to other vegetables. The project also assists in vegetable treating and conservation techniques, such as making juice from tomatoes and storing tomatoes in traditional bottles.

For arboriculture, women are provided with a collective orchard which they help to establish and maintain, while technical assistance is given by the agricultural service. To date, 7 villages have been affected, with the initiation of 8 orchards and participation of 274 women; 1,802 trees have been planted, including mangos and papayas.

Questions to H. Hamidou included:

(1) How much do the wells they put in cost (answer: 30,000 CFA);

(2) What is the depth and volume of the wells (answer: 8-9 meters deep, 30 liters in volume);

(3) What size of holdings does each woman deal with for agricultural activities (answer: Manioc land is about 500 m<sup>2</sup> for each woman, and in the orchard each woman had an area that includes about 8-10 plants).

Mme. Alet Versnel, Agronomiste, I.N.R.A.H., Association Neerlandaise d'Assistance au Développement, Niger - "Agronomic Research on Diversification of Crops in the Research Station and in the Real World"

Mme. Versnel explained her work for INRAN (Institut National de Recherches Agronomiques du Niger) on researching diversification of crops for various goals including increased marketing, and working on improving some crops already begun. Her work included studies on tomatoes, potatoes, cabbage, and onions as well as studying traditional vegetables such as the leaves of Faku (cochorus) and voundzou in addition to sesame. Her seed sources include the Center for Development of Horticulture (CDH) in Senegal, France, Taiwan, and Hawaii.

Some problems in villagers' gardens she has noted are: a tendency to use hybrid varieties for which new seeds must be bought each year, and an overapplication of fertilizers to clay soils. One goal she hoped for was to encourage women to grow traditional leafy green vegetables such as faku throughout the year, and to not just rely on gathering them in the rainy season.

The question and answer period consisted principally of showing slides illustrating Mme Versnel's research findings on which participants had questions on details. Mme Versnel answered a question on what work had been done to date for saving vegetable seeds, noting that in the case of cabbage and lettuce, seed selection by farmers was not very effective and the quality of plants decreased over time as a result. Other questions focused on onions and problems of viruses. Mme Versnel introduced M. Moumouni Ousseini of INRAN to give further details on research activities being done at the center (his information, not part of a scheduled presentation, is included at the end of these presentation summaries).

M. Jack Feith, Association Neerlandaise d'Assistance au  
Developpement, Niger - "Vegetable Gardening in the Region of  
Baleyara"

M. Feith spoke on the subject of vegetable gardening in the region of Baleyara, located at 100 km east of Niamey, emphasizing the role of live fencing and wind breaks in gardens. He noted that his project included four aspects: well construction, live fencing, agricultural diversification, and rainy season crops. M. Feith said that they worked with individual farmers, and one condition the project required before digging a well was that the farmer first plant a live fence around the garden site.

M. Feith described the steps taken in planting a live fence and he named the different species of plants with which he was familiar and gave their attributes. He also gave information on various seed treatments useful to enable a high rate of germination. He said that their major obstacles to date had been: lack of watering of plants, rural exodus, chickens, and lizards.

M. Feith gave instructions on proper maintenance of a live fence and noted the advantages of a good fence, including protection against wind, sand, and animals, as well as in some cases providing good firewood. He said that vegetables grown in their live fence-protected gardens included peppers, hot peppers, carrots, tomatoes, zucchini, cabbage, lettuce, and potatoes. The Baleyara market greatly helped the sale of produce. He added that the project gave farmers instructions on vegetable production and also benefited from the assistance of local extension agents. They also assisted women's community gardens in villages. The wells dug by the project, now having numbered 182 in the region, required a 5,000 francs CFA investment by the farmer.

Questions to M. Feith included:

(1) What the frequency of watering was for live fences when planted (answer: Usually once every three weeks is advisable, though sometimes once every 5-6 weeks is possible in times of water shortage);

(2) Whether they did not have difficulty with the women's association assisting women villagers (answer: No, there was a woman extension agent who has assisted for this task and this has worked well so far);

(3) What the purpose was of the 5,000 CFA advance required from farmers for well digging (answer: To insure that farmer will be fully prepared to pay remaining cost of wells and to help project to fund future operations. When this requirement was not made, many farmers did not pay for wells);

(4) Whether advance money for wells was principally to aid money supply or insure farmer motivation (answer: For a farmer truly interested in purchasing a well, the advance was not a serious obstacle and it helped money availability);

(5) Whether there were extensionists who advised women farmers (answer: There was a woman extension agent who should do this if she were hired, and this would depend on the Ministry of Plan);

(6) Whether drying of tomatoes had worked well and gained villager interest (answer: Sun-dried tomatoes tended to become discolored and spoil while those dried in the shade looked much better. He did not know how the taste of the two compared);

(7) What was the best time to plant a live fence (answer: After 100 mm of rain, or typically somewhere around mid-July);

(8) Whether one could plant a live fence in December (answer: He believed so, though he has not tried. Water would have to be available, especially given the presence of dry winds of the Harmattan);

(9) Whether they tried to involve villagers in the fiscal responsibilities of the project (answer: They had a fund available to villagers for purchasing improved seeds, but otherwise villagers were already quite responsible and individualistic);

(10) Whether 30 cm was the best spacing of live fencing plants (answer: Yes, this provides a dense enough fence so that goats do not get through);

(11) Whether alternating varieties used in a live fence would not be the best method (answer: Farmers often did not want a mixture).

Mlle. Veronique Adragna, Volunteer, Association des Volontaires du Progres, Tamou, Niger - "Presentation of the Tamou Project of Integration of Women into the Development of Garden Vegetables"

Mlle. Adragna described her work as a French volunteer involved in a project of women's animation in the rural area of Tamou along with another volunteer specializing in water projects. Their work came under the jurisdiction of a French NGO working in the area to assist blind people. The goal of the overall program was to try to keep blind people involved in the village by giving them work to do such as dry season vegetable gardening.

She mentioned that the wells constructed by villagers with the assistance of her fellow volunteer served one or more of three functions: vegetable garden wells, drinking water wells, animal water wells. She noted that the wells they helped to construct were less costly than conventional cement wells and could be easily constructed by villagers on their own initiative once the project had ended. A major problem to date was in finding a system of animal traction to raise water from the well which would work well in the villages.

For her own project on women's animation, she said the goal was to increase the revenues of women participants and to improve upon the traditional diet of families, especially that of children. Her work involved 4-7 villages, depending on the season. During the dry season she worked on developing vegetable gardening and in drying vegetables. They also did other work related to animal raising, chickens, and nutritional education. One limitation she had found to accomplishing her work was locating an effective Nigerien co-worker capable of helping her with translations into the different languages used. She hoped in the future her work would bring more vegetables into the sauces women prepared, noting that men gardeners were often interested only in earning money and not in family nutrition.

Although her initial work had consisted of working with women's community gardens, the gardeners had changed to a system of individual gardens since these more effectively provided profit to the women. Vegetables grown by women included gumbo, corn, local eggplant, peppers, and cabbage. She noted that although women currently did less vegetable production than men, they should not be overlooked because of their potential contribution to family nutrition.

Questions to Mlle. Adragna included:

(1) Whether irrigation trenches were made using earth or cement (answer: Cement to form small canals. Her colleague, the water specialist, could answer more completely when he was around);

(2) Whether they gave seeds away to the women (answer: Yes, but they were later reimbursed);

(3) What her target population was, women or blind people (answer: Women, of whom few were blind. Although the organization under whose jurisdiction she worked was interested in assisting blind people, she and her work were fairly autonomous and focused on women in general);

(4) In the training of health personnel, whether this entailed working with paid expatriates (answer: No, they pay for training of Nigerien health officials and volunteers).

M. Nangazana Kone, Researcher, Institut d'Economie Rural, Mali -  
"Research on Fruit Trees and Garden Vegetables in Mali"

M. Kone described the structure of his organization, the Institut d'Economie Rural (IER). He said the institute handles studies of evaluation and planning and applied agriculture in cooperation with national services. Among its 6 divisions is included the division of agronomic research. This division attempts applied and experimental research on newly introduced plants, and coordinates regional and international research activities. One section of this division is the section on fruit and vegetable research. This section tries to solve problems affecting fruits and vegetables and includes a component devoted to fruit tree and vegetable garden productions, with focus on new varietal introductions and improved cultural techniques.

The garden vegetables worked on include onion, tomato, local egg plant, hot pepper, gumbo, oseille de Guinee, and potato. The fruit trees, of which he is the director, include mangos, citrus trees, bananas, and papayas.

M. Kone went into detail describing the varieties of mango trees grown, their attributes, and planting practices recommended to growers. He also discussed problems pertaining to banana and papaya production. He cautioned against introducing new species that might not suit the customs of growers and might contain harmful parasites, advising that such introduction be left to services specialized for this activity.

For vegetables, M. Kone noted that some conservation problems existed, although tomatoes could be cut into slices and dried. For mangos, he mentioned one problem they were trying to address was the lack of good consecutive crop years.

Questions to M. Kone included:

(1) What is the disease affecting mangos (answer: There is a canker that affects mangos, but does not cause significant economic losses);

(2) What are the main problems affecting mangos (answer: Grasshoppers and also some virus problems, but the latter are not significant during the dry season);

(3) Where is most research on fruit trees oriented (answer: on grafting techniques and associations).

Mr. Timothy Ellis Fontaine, Peace Corps Volunteer, Mauritania -  
"A Nutritional Garden during the Hot Season in Kiffa"

Mr. Fontaine described his experiences over the last six months of working on a garden at the maternity clinic of Kiffa with the object of improving nutrition. He noted that before his efforts there had been no hot season garden in Kiffa. He mentioned the high temperatures of 50 degrees Celsius, the dry wind, and lack of rain as major constraints to such gardening.

By experimenting with manipulating the micro-environment of the garden, Mr. Fontaine hoped to enable vegetable production

under otherwise adverse conditions and provide an example that could be followed by others, ultimately to improve nutritional levels. Although normal gardening activities in Kiffa ran from October to April, he had tried after this period to extend the season into a period when people could benefit greatly from increased produce and when farmers would be able to get good prices for their goods. His experimentation was just beginning, and so he did not as yet have findings to show.

Questions to Mr. Fontaine included:

(1) Whether he believed the benefits of hot season gardening would be realized by those people needed improved nutrition (answer: This depended on whether his efforts were successful. If they were, existing cooperatives might pick up the new practices);

(2) What type of extension network existed (answer: A national service existed and contact by other organizations as well with interested farmers could be useful);

(3) Since vegetables were abundant during only three months of the year, what could be hoped to accomplish in the area of agriculture (answer: Crops could be diversified and the hardier ones used when others could not survive);

(4) Whether he would not be better advised under the harsh environmental conditions he described, to plant more suitable rainy season vegetables such as manioc, sweet potatoes, eggplant, and peppers (answer: The objective of the gardening was not just child nutrition but to create a micro-climate in which vegetables not normally grown in a given season might be raised).

M. F. Omer Sawadogo, Responsable, Service Analyses Economiques et Programmation, Centre Regional de Promotion Agro-Pastoral du Centre, Burkina Faso - "Impact of Vegetable and Fruit Production on Nutritional Equilibrium in Sahelian Populations, the Case of Burkina Faso"

M. Sawadogo noted that vegetable gardening in Sahelian countries such as Burkina Faso had evolved from colonial origins where certain plants' production was imposed upon villagers. He said that for both garden vegetables and fruits there was currently a conflict of interest at times between income generation and exportation activities on one hand, and consumption by the nutrition deficient population on the other hand. He mentioned that some areas where improvement was needed included seed quality and more staggering of planting dates among farmers.

Questions to M. Sawadogo included:

(1) To what extent Burkina Faso exported vegetables (answer: From 1986 to 1987 from the Koba cooperative, 2,132 tons were exported to Europe and 19,000 tons to neighboring countries. Of mangos, 205 tons were exported to Europe, with 500 tons going to neighboring countries. From 1987-1988, 1,310 tons of green beans were exported);

(2) Whether Burkina Faso's goal were to use vegetable and fruit production for income generation purposes or to aid nutrition (answer: Although income generation was important, the major emphasis in Burkina Faso is not on exportation).

M. Moumouni Dusseini, INRAN (Institut National de Recherches Agronomiques du Niger), Niger

M. Dusseini, a workshop participant from INRAN, the institute for which speaker Mme Alet Verspel worked, was not scheduled to give a presentation, but delivered during the course of the workshop an impromptu description of some common practices of agroforestry. He said that the area of an orchard could be effectively used by including vegetables such as lettuce and cucumbers. He noted that spacing of trees was very important, with 8 meters x 8 meters recommended for oranges and 12 meters x 12 meters for mangos, to provide adequate sunlight. He said that most orchards in Niger are small in size, with the average about one or two hectares, and only very rarely attaining 30 hectares. In the north, he said that date palms were planted with 10 meters x 10 meters spacing and that vegetables could be planted in association with them.

Questions to M. Dusseini included

(1) Whether he knew where people could get seeds of faku (corchorus) (answer: Over the past 2-3 years they have been interested in such plants and have asked their researchers in Kollo and Agadex to collect (and, in the latter case, to multiply) seeds);

(2) Where research results could be obtained (answer: He was in charge of coordinating research and disseminating findings and they have already prepared simple texts on dry season vegetables which they are also translating into local languages).

APPENDIX A  
SUMMARY REPORT OF WORKSHOP  
ATTACHMENT 1  
LIST OF WORKSHOP PARTICIPANTS

PARTICIPANTS AU SEMINAIRE "JARDINS DE VITAMINE A"

M. AMBOUKA ABDOU  
MONITEUR AGRICOLE  
C.O.S.V.  
B.P. 12628  
NIAMEY, NIGER

Mlle. VERONIQUE ADRAGNA  
VOLONTAIRE  
ASSOCIATION FRANCAISE DES VOLONTAIRES DU PROGRES  
B.P. 11468  
NIAMEY, NIGER

Mlle. ANNA AGUILAR  
VOLONTAIRE  
PROJET AFSI  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 22  
OUALLAM, NIGER

Mlle. MARIANNE BAILEY  
VOLONTAIRE  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 117  
SEGOU, MALI

M. MOUSSA BANGRE  
ECONOMISTE  
AFRICARE  
B.P. 608  
OUAGADOUGOU, BURKINA FASO

M. LOU BEER  
LUTHERAN WORLD RELIEF  
B.P. 11642  
NIAMEY, NIGER

M. IBRAHIM JEAN CACHALO  
STENOGRAPHE  
ICRSAT CENTRE SAHELIEU  
B.P. 12404  
NIAMEY, NIGER

Mlle. ROSANNA CAVANA  
C.O.S.V.  
B.P. 12628  
NIAMEY, NIGER

M. AMADOU AMADOU CISSE  
INGENIEUR AGRICOLE  
PROJET HORTICOLE VITAMINE A  
B.P. 12820  
NIAMEY, NIGER

M. IDE DJERMAKOYE  
COORDONNATEUR  
PROJET VITAMINE A  
HELEN KELLER INTERNATIONAL  
B.P. 10155  
NIAMEY, NIGER

M. MOUSSA DJIBRIL  
SECRETAIRE  
PROJET HORTICOLE VITAMINE A  
B.P. 12820  
NIAMEY, NIGER

M. FALAYE DOUMBIA  
GROUPE JEUNES  
S/C CCA-ONG  
B.P. 1721  
BAMAKO, MALI

(ABSENT)

M. PETER ENGELS  
ENTOMOLOGUE  
PROTECTION VEGETAUX  
MINISTERE DE L'AGRICULTURE  
NIAMEY, NIGER

M. JACK FEITH  
ASSOCIATION NEERLANDAISE D'ASSISTANCE AU  
DEVELOPEMENT  
BALEYARA  
B.P. 10110  
NIAMEY, NIGER

M. TIM FONTAINE  
VOLONTAIRE  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 222  
NOUAKCHOIT, MAURITANIA

M. YAOU GARBA  
DIRECTEUR NATIONAL DU PROGRAMME CONJOINT  
D'APPUI A LA NUTRITION  
MINISTERE DE LA SANTE PUBLIQUE ET DES AFFAIRES SOCIALES  
B.P. 623  
NIAMEY, NIGER

DR. JACK GERSHON  
CHEF D'EQUIPE  
PROJET HORTICOLE VITAMINE A EN AFRIQUE  
B.P. 12820  
NIAMEY, NIGER

MME. RITA GREGOIRE  
CONSEILLERE HYGIENISTE DIETETITTIENNE  
CENTRE CANADIEN D'ETUDE ET DE COOPERATION  
INTERNATIONALE (C.E.C.I.)  
B.P. 25 KOULIKORO/B.P. 109 BAMAKO, MALI

M. ALI MAZOU HAMIDOU  
CHEF SERVICE AGRICOLE  
SERVICE DE L'AGRICULTURE DE KEITA  
MINISTERE DE L'AGRICULTURE  
B.P. 36  
KEITA, NIGER

M. HATIANI HAROUNA  
NUTRITIONISTE  
PROGRAM CONJOINT D'APPUI A LA NUTRITION  
MINISTERE DE LA SANTE PUBLIQUE ET  
DES AFFAIRES SOCIALES  
B.P. 623  
NIAMEY, NIGER

M. PASCAL HUTINET  
VOLONTAIRE  
ASSOCIATION FRANCAISE DES VOLONTAIRES DU PROGRES  
B.P. 11468  
NIAMEY, NIGER

M. MOUSSA IDRISSE  
ENCADREUR AGRICOLE  
SECOURS MONDIAL LUTHERIEN (LWR)  
B.P. 56  
OUALLAM, NIGER

M. MAMOUDOU ISSA  
DIRECTEUR DE PERIMETRE  
COOPERATIVE AGRICOLE DE TILLAKAÏNA  
B.P. 36  
TILLABERY, NIGER

M. LUTFUL KABIR  
DIRECTEUR  
SAVE THE CHILDREN FUND - UK  
B.P. 2145  
BAMAKO, MALI

MME. MARILY KNIERIEMEN  
DIRECTRICE,  
LUTHERAN WORLD RELIEF (LWR)  
B.P. 11624  
NIAMEY, NIGER

M. NANGAZANA KONE  
CHERCHEUR  
DIVISION RECHERCHE AGRONOMIQUE  
INSTITUT D'ECONOMIE RURALE  
B.P. 30  
BAMAKO, MALI

M. DAVID LEEGE  
VOLONTAIRE  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 222  
NOUAKCHOTT, MAURITANIE

M. ZAKARI MADOUGOU  
ASSISTANT  
PROJET AGROFORESTIER ET FRUITIER  
CARE  
B.P. 168  
TAHOUA, NIGER

M. SALEY MAIZOUMBOU  
PROJECTIONISTE  
UNITE DE PRODUCTION DES MOYENS PEDAGOGIQUES  
INSTITUT PRATIQUE DE DEVELOPPEMENT RURAL  
B.P. 76  
KOLLO, NIGER

M. KLIM MALING  
VOLONTAIRE  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 30  
OUALLAM, NIGER

M. JEAN YVES MARLEAU  
COOPERONT VOLONTAIRE TECHNOLOGISTE AGRICOLE  
CENTRE CANADIEN D'ETUDE ET DE COOPERATION  
INTERNATIONALE (C.E.C.I.)  
B.P. 109  
BAMAKO, MALI

M. ABDOU AZIZ MBAYE (ABSENT)  
C.D.H., I.S.R.A.  
B.P. 3210  
DAKAR, SENEGAL

M. OUSSANI MOUMOUNI  
RESPONSABLE LIAISON RECHERCHE VULGARISATION  
INSTITUT NATIONAL DE RECHERCHES AGRONOMIQUES  
DU NIGER (INRAN)  
B.P. 55  
SAY, NIGER

M. ISSAKA MOUSSA  
MONITEUR AGRICOLE  
C.O.S.V.  
B.P. 12628  
NIAMEY, NIGER

M. AMBROISE NANEMA  
CHEF DE SERVICE NUTRITION  
MINISTERE DE LA SANTE ET DE L'ACTION SOCIALE  
B.P. 7013  
OUAGADOUGOU, BURKINA FASO

M. PETER NEITLICH  
VOLONTAIRE  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 641  
ZINDER, NIGER

M. IBRAHIM OUMAROU  
DIRECTEUR  
INSTITUT PRATIQUE DE DEVELOPPEMENT RURAL  
B.P. 76  
KOLLO, NIGER

M. KEN PATTERSON  
VOLONTAIRE  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 55  
SAY, NIGER

M. DOUGLAS ROBERTSON  
FORMATEUR HORTICOLE  
PROJET HORTICOLE VITAMINE A (AVRDC)  
B.P. 12820  
NIAMEY, NIGER

M. ALIOU MAMADOU SALL  
CHEF DE SERVICE NATIONAL DE LA NUTRITION AU  
MINISTERE DE LA SANTE ET DES AFFAIRES SOCIALES  
B.P. 177  
NOUAKCHOTT, MAURITANIE

M. PROSPER SAPATHY  
NUTRITION SUPERVISION  
WORLD VISION INTERNATIONAL  
B.P. 335  
NOUAKCHOTT, MAURITANIE

M. P. OMER SAWADOGO  
RESPONSABLE  
SERVICE ANALYSES ECONOMIQUES ET PROGRAMMATION  
CENTRE REGIONAL DE PROMOTION AGRO-PASTORAL DU CENTRE  
B.P. 2472  
OUAGADOUGOU, BURKINA FASO

DOCTEUR SEMEGA (ABSENT)  
SERVICE DE NUTRITION DU MALI  
S/C M. OUMAR CISSE  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 85  
BAMAKO, MALI

M. BOUBACAR SEYNI  
CHAUFFEUR  
PROJET HORTICOLE VITAMINE A  
B.P. 12820  
NIAMEY, NIGER

M. HIPPOLYTE D. SINARE  
MINISTERE DE L'EDUCATION NATIONALE  
INSTITUTEUR, L'ECOLE DE PIBAORE,  
PROVINCE DE SANMATENGA  
BURKINA FASO

M. MOUSSA MAMADOU SOW  
AGRICULTEUR  
WORLD VISION INTERNATIONAL  
B.P. 335  
NOUAKCHOTT, MAURITANIE

M. HASSANE TANKARY  
AGENT TECHNIQUE D'AGRICULTURE  
INSTITUT NATIONAL DE RECHERCHES AGRONOMIQUES DU NIGER (INRAN)  
B.P. 429  
NIAMEY, NIGER

Mlle. JANE TOLL  
FIELD REPRESENTATIVE, WEST AFRICA  
IBPGR  
ICRSAT SAHELIEU CENTRE  
B.P. 12404  
NIAMEY, NIGER

M. SOULYMANE TRAORE (ABSENT)  
KILABO  
S/C CCA-ONG  
B.P. 1721  
BAMAKO, MALI

MLLE. ANNE TURNER  
HORTICULTEUR  
PROJET HORTICOLE VITAMINE A  
B.P. 12820  
NIAMEY, NIGER

MME. ALET VERSNEL  
ASSOCIATION NEERLANDAISE D'ASSISTANCE AU DEVELOPPEMENT  
INRAN  
B.P. 10110  
NIAMEY; NIGER

M. CHRIS WINTERS  
VOLONTAIRE  
CORPS DE LA PAIX DES ETATS-UNIS  
B.P. 85  
BAMAKO, MALI

DR. AHMED ZAYAN  
DIRECTEUR  
HELEN KELLER INTERNATIONAL  
B.P. 10155  
NIAMEY, NIGER

M. YACOUBA ZEBE  
COORDINATEUR DE PROGRAMMES  
OXFAM  
B.P. 489  
OUAGADOUGOU, BURKINA FASO

APPENDIX A  
SUMMARY REPORT OF WORKSHOP  
ATTACHMENT 2  
WORKSHOP EVALUATION

JULY 1988 WORKSHOP EVALUATION FORMS

SUMMARIZED BY DOUGLAS L. ROBERTSON, TRAINING OFFICER. SAMPLE FORM ATTACHED.

INTRODUCTION: Evaluation forms identical to that attached were completed by one-third of the 43 participants. Thus, while answers may not represent the opinion of all, in some cases they may at least give an idea of general reactions and help in the planning of future workshops.

I. DAILY MEETINGS

Most respondents felt that the length of daily meetings and their organization were good. One-third expressed the opinion that some afternoon meetings could have been useful for the purpose of discussion (rather than leaving afternoons completely free), giving an outlet for issues arising from daily meetings.

II. SPEECHES

All but one respondent felt that the length of speeches was appropriate. As far as the content, one-half of respondents found it satisfactory; the others either commented that quality varied among speakers or noted that some speeches tended to describe programs rather than address a topic.

III. QUESTION AND ANSWER PERIODS

Almost every respondent felt the length of time allotted for questions and answers was appropriate, although a few felt that not enough opportunity was permitted to go into depth on topics.

IV. FIELD TRIP TO KOLLO

The majority of respondents enjoyed the trip to Kollo, with most of them citing the visit to the gardens as the highlight of the trip.

A few respondents felt that the excursion was either not sufficiently organized or that there were too many people visiting things at once. Most people had no comment as to what they "least liked" about the trip, although a couple of respondents thought that the time of day chosen was too hot. Few respondents had any further comments on how they would have done the trip differently although a couple suggested a more active participation in the PMI cooking demonstration.

V. MEETINGS ATMOSPHERE

Almost all respondents felt the atmosphere was conducive to the exchange of ideas, although a few respondents commented that more aggressive participants at times caused friction.

## VI. HOTEL TERMINUS

Almost all respondents felt that the rooms and meals were good and that the hotel worked well as the location for the workshop. A number of respondents named the convenient location of the hotel and having meetings and lodgings in one place as positive points for the hotel.

## VII. OTHER

A third of respondents felt that more opportunity for group discussions on specific topics should be provided, with a couple of people suggesting more overall meeting time.

## EVALUATION DU SEMINAIRE

Votre Nom:  
(Pas Obligatoire)

Nous aimerions bien savoir votre opinion sur ce séminaire et sur notre façon de le diriger. Toute suggestion que vous pourriez nous faire nous aidera à mieux faire la prochaine fois.

### (1). LES SEANCES

Avez-vous trouvé les séances de chaque jour:

"trop longues"  OUI  NON  
"trop courtes"  OUI  NON  
"organisées d'une manière trop rigide"  OUI  NON  
"...pas assez rigide"  OUI  NON

Commentaires?

### (2). LES PRESENTATIONS

Comment avez-vous trouvé la durée?  trop longues  trop courtes  OK  
Comment avez-vous trouvé le contenu?

(3). LES QUESTIONS ET REPONSES  trop longues  trop courtes  OK  
Commentaires?

### (4). L'EXCURSION A KOLLO

Qu'est-ce que vous avez pensé de l'excursion?

(4) L'EXCURSION A KOLLO (continuée)

Qu'est-ce que vous avez mieux aimé de l'excursion?

Qu'est-ce que vous n'avez pas aimé?

Y a-t-il des choses que vous auriez faites d'une manière différente?  
(et s'il y en a, quelles sont-elles?)

(5) L'AMBIANCE DES REUNIONS

En général avez-vous trouvé l'ambiance dans la salle pendant les présentations favorable a l'échange d'idées?

OUI       NON

Commentaires?

(6) L'HOTEL

Comment avez-vous trouvé votre chambre?

Comment avez-vous trouvé les repas?

Est-ce que l'hotel vous a convenu comme endroit du séminaire?  OUI  NON

Pourquoi?

(7) AUTRES

Si vous avez d'autres critiques ou conseils pour nous pour ce séminaire nous serions très intéressés de les savoir surtout parce que nous allons organisé d'autres séminaires dans l'avenir;

APPENDIX B  
SUMMARY REPORT OF TRAINING PROGRAM

REPORT ON TRAINING PROGRAM, AVRDC VITAMIN A GARDENING PROJECT  
IN AFRICA, JANUARY 4 - FEBRUARY 23, 1989, IPDR, KOLLO, NIGER

The Vitamin A Gardening Project in Africa of the Asian Vegetable Research and Development Center ran a 50-day training program on vegetable gardening and nutrition at the Institut Pratique de Developpement Rural (IPDR) in Kollo, Niger from January 4 - February 23, 1989. The 16 trainees were African extension agents from four Sahelian countries, all responsible for village level training in vegetable gardens. The countries represented were: Burkina Faso, Mali, Mauritania, and Niger.

The purpose of the training program was to improve the technical and extension skills of the trainees in vegetable gardening and to give them an understanding of basic nutrition concepts in order to teach them, and enable them in turn to teach others, the importance of growing and consuming vegetables rich in vitamin A. The training graduates were thus expected through their work to achieve the project's goal of increasing the production and consumption of vegetables and fruits rich in vitamin A. An integral component of the training was to have been follow-up visits to training graduates' work sites over the years following their training for the purpose of back-stopping their efforts.

Trainees were carefully screened for their fulfillment of a number of criteria. First, they had to be currently working in the field of vegetable gardening extension and their employers had to agree that they would return to similar work upon the completion of the training. Thus, they already possessed at least a basic understanding of, and hands-on experience in, vegetable gardening. Second, they had to be prepared to perform difficult field labor during the course of the training, yet at the same time possess a sufficient level of literacy in French---having at minimum completed primary school---to understand gardening and nutrition theory taught during class hours. Third, they had to be highly motivated individuals prepared to actively participate in group discussions. Finally, the employers and trainees had to agree to the living conditions and remuneration of the training, under which the project provided the round-trip transportation between Niamey and their country's capital, housed them in dormitory facilities at IPDR, supplied their meals and laundry service, classroom materials, texts, and field tools, and furnished them with a modest amount of pocket money.

Trainees were selected almost exclusively from non-governmental organizations. The rationale for this was that the extension services of the governments dealt with might not be prepared to provide the support needed by trainees following their graduation in order to put to action what they had learned. It was hoped that non-governmental organizations could provide training graduates with more support and be more likely to insure their utilizing what they had learned. In one case, an exception was made to this when a government extension agent from Burkina Faso was chosen. There were many reasons for his selection.

First, he was a highly motivated individual working in an area of Burkina Faso severely needing assistance in vegetable gardening. Second, the government of Burkina Faso had put a great emphasis over the last years in encouraging vegetable gardening and self-sufficiency and had an active gardening program going in the province from which the trainee came. Third, a non-governmental organization, Africare, worked hand-in-hand with the vegetable gardening component of the national extension service in the trainee's province by constructing small dams well suited to vegetable gardening activities.

Recruiting trips were run from September to November of 1988 by the project training officer, Douglas L. Robertson, in all the countries participating in the program. Most trainees from Niger were located by contacts already established by the project in the Niamey headquarters of the participating organizations. In the other three countries, both headquarters and field sites were visited for the identification of suitable trainees. Initial contacts were often made through the coordinating agencies for non-governmental organizations located in each country ("SPONG" and "BSONG" in Burkina Faso, "CCA-ONG" in Mali, "CAP" in Mauritania, and "GAP" in Niger).

The content of the training program was of a dual nature, practical and theoretical. Each day included at least a few hours of field work by trainees, during which they were able to hone up on their technical gardening skills through hands-on work and demonstrations, as well as conducting individual group experiments in their own plots. In field site, whose sandy soil was typical of many parts of the Sahel, the content of instruction was derived from research done by the Vitamin A Gardening Project to date and from information on gardening practices and plant varieties compiled by the project horticulturalist from numerous visits and collaboration with other organizations and farmers throughout the Sahel. Trainees were divided into groups of two and given a specific research topic pertinent to Sahelian gardening practices and constraints which they were to study in the field by means of plots of vegetables for which they were responsible. The remainder of the day, apart from the time spent on visits to regional gardens and attending field demonstrations, was devoted to classroom teaching and discussion of vegetable production, nutrition, extension theory, and vegetable marketing.

For both the field and classroom instruction, the project utilized numerous human and written resources. The project horticulturalist, Anne D. Turner, provided field instruction and supervision to the trainees, as well as organizing relevant garden field visits and offering classroom instruction. The horticulturalist was assisted by M. Amadou Amadou Cisse, the Nigerien assistant scientist consigned to the project from its host institution IPDR. In addition, M. Morou Chaibou, field assistant, provided trainees with further assistance and gave demonstrations on such topics as seeding of nursery beds. During the initial week of the training program, trainees were brought

to a number of gardening sites in the region with instructions to identify grower's major problems and to consider methods of solving them. The purpose of these visits was to improve trainees' observation, communication, and analytic skills, bringing them to abandon set ways of judging gardening situations and to refrain from offering ready made cookbook solutions to gardeners.

For specialized topics such as insects and diseases, drying of vegetables, planting live fencing and windbreaks, and others, consultants from a number of organizations assisted the training program. A couple of trainees having particularly impressive backgrounds in a specific field were themselves able to give field demonstrations for the benefit of the entire group.

A highly experienced adult educator and child survival researcher, Ms. Nancy Keith, was able to present the section on the fundamental elements of nutrition theory and on how to communicate them to others. For the section on extension techniques, the training officer began the week, helping trainees consider different extension strategies, and members of various extension services provided instruction for the remainder of the week. The section of insects and diseases attacking plants was taught by Mr. Peter Engels and M. Mamadou Issa, of the national Nigerien service "Protection des Vegetaux."

As for written resources used during the training, a few gardening-related books were heavily relied on: Jardins et Vergers d'Afrique (Terres et Vie, Belgium) and three publications of the Centre pour le Developpement de l'Horticulture ("CDH," Cambarene, Senegal); namely: Guide Pratique du Maraichage au Senegal (Practical Guide to Vegetable Gardening in Senegal), Les Principaux Ennemis des Cultures Maraicheres au Senegal (The Major Vegetable Pests in Senegal), and La Pepiniere (The Nursery). Other publications from the following institutions were referred to but relied on less heavily: INADES-Formation, Ivory Coast, and CESA0, Bobo-Dioulasso, Burkina Faso. For the section on extension theory, reference was made the the 1986 FAO publication Guide Pour la Formation des Vulgarisateurs (Guide for the Training of Extension Agents). Posters showing the vitamin A and general nutritional value of various vegetables and fruits were procured from the Office de Recherches sur l'Alimentation et la Nutrition ("ORANA"), Dakar, Senegal.

Despite the availability of a number of useful books such as those mentioned, preference was given to trainees getting hands-on experience or witnessing different gardening practices rather than reading about them. The section on nutrition, for example, including skits and cooking demonstrations by the trainees. Furthermore, the objective of the initial weeks of the training program---to have to trainees look at extension work with an open mind and not search for ready-made solutions---precluded initially relying on text books.

An expanded schedule of the training program, including brief descriptions of the various activities, is given in Attachment 1. Trainees were extremely enthusiastic and, for the

most part, willing to actively participate in discussions. While the French level of the trainees was, for the most part, adequate for their comprehension of verbal and written components of the training as well as for communicating, most trainees were not typical "students," but rather practitioners. Partly because of this, their filling out forms such as surveys and questions on their future course of action in extension was not always satisfactory. In the latter case, for example, when asked what they intended to do when they returned to their regions of work, the answers they provided were often overly idealized, bearing little relation to what they actually intended to or could do. One-on-one discussions with the trainees often proved more valuable than the written feed-back they supplied, and provided perhaps the most accurate idea of what trainees had learned and what they intended to do following the training. Most trainees admitted that they could not say with absolute certainty what changes they would make when they returned to work since this would be dependent on their supervisors. The results of these discussions are summarized in Attachment 2, which lists the major thing(s) each trainee indicated he had learned from the training, as well as telling how his actions at work upon his return could be influenced by having completed the training program. As for the surveys given trainees on vegetable production and consumption practices in their work regions, a very extensive amount of information was collected pertaining to each season of the year. However, it was always hoped that follow-up trips would enable gauging the accuracy of these responses as well providing an opportunity for using this information to help focus trainees' activities in a useful direction. Barring the continuation of the project, it would not be constructive to attach these voluminous surveys to this report, although they are stored at files at AVRDC should they ever be desired in the future.

Because an essential element foreseen for the training program, the follow-up trips, were not held as planned, the training program cannot be considered as a completed product. Although the follow-up process was begun in March and April, 1989 in Burkina Faso and Mali by the project horticulturalist, these were only the first such trips and were intended principally to begin assessing conditions in trainees' areas, help guide them in the most promising directions, and provide them and their employers with encouragement and advice on their efforts related to vegetables and fruits rich in vitamin A. No such trips were held for Mauritania nor Niger, and, due to the close of the project, no follow-up was possible in any of the participating countries for the next major vegetable growing season, in October-April 1990. In written and personal contacts subsequent to the completion of the training program, both training graduates and their employers expressed considerable enthusiasm on the results of the program. It is a sad footnote to what

appeared to be a promising beginning of a fruitful relationship between the project and graduated trainees that none of the anticipated follow-up assistance can be provided.

APPENDIX B  
SUMMARY REPORT OF TRAINING PROGRAM  
ATTACHMENT 1  
SCHEDULE OF ACTIVITIES

# ATTACHMENT 1

## SCHEDULE FOR TRAINING PROGRAM OF GARDENING EXTENSION AGENTS

### AVRDC - VITAMIN A GARDENING PROJECT IPDR, KOLLO NIGER

JANUARY 4 - FEBRUARY 23, 1989

#### JANUARY 4

11: 00 am - 12 : 00 pm

Presentation (opening) of Training, Director of the Institut Pratique de Développement Rural (IPDR).

#### JANUARY 5

7: 30 am - 10: 00 am

Introduction of training program to trainees. Training goals announced: for trainees to learn to better identify vegetable growers problems and for trainees to acquire further knowledge in gardening, nutrition, and other subjects. Trainers' expectations of trainees announced: that trainees have an open spirit, actively participate in all aspects of training, and continue discussions of the class to discussions among one another in their free time.

Description by trainees of their projects/ organizations each trainee giving his name, organization, location and nature of work involved in.

Administrative business: time permitted for trainees to ask questions concerning training program and concerning AVRDC.

11: 30 am - 12: 30 pm

Lecture Vitamin A Deficiency M. Idé Djermakoye, Coordinator, Helen Keller International, Vitamin A Project M. Djermakoye gave a description of the signs of vitamin A deficiency and strategies for preventing night blindness, with information on products rich in vitamin A. Materials passed out to trainees included: posters, table of foods containing vitamin A, book and visual aid showing eye symptoms of vitamin A deficiency.

3: 30 pm - 5: 00 pm

Discussion and questions by trainees on vitamin A deficiency.

Description of the trip to Niamey gardens for the following day with the goal given of identifying the "real" problems of the farmer by asking him questions, making observations, and discussing findings afterwards in groups.

JANUARY 6

- 7: 30 am Departure by bus to Niamey gardens and division of trainees into two groups, each with a spokesman.
- 12: 00 pm Return to Kollo from gardens.
- 3: 00 pm - 3: 30 pm Discussion in groups of garden visit. Determination by each group of the five major problems of the farmer visited (problems could include technical problems, material problems, economic problems, or other).
- 4: 00 - 5: 00 pm Description of garden visit by spokesman of each group, presenting his groups determination of the major problems of the farmer.
- Discussion of all trainees on question of whether problems they identified were actually the most critical ones and whether their observations in the garden and questioning of farmers could be improved.
- Discussion of some possible solutions to problems identified.

JANUARY 9

- 7: 00 am Departure by bus to visit Coopérative Agricole de Tillakaina.
- 10: 00 am - 11: 30 am Visit of fields of cooperative with trainees divided into three separate groups, each group asking their farmer questions, observing his garden and trying to identify his major problems.
- 11: 30 am - 12: 15 pm Presentation on Coopérative Agricole de Tillakaina by M. Mamadou Issa, Directeur de Perimetre, followed by answers to questions of trainees.
- 12: 15 am - 2: 30 pm Return to Kollo
- 4: 00 pm - 5: 00 pm Discussion in separate groups of the visit to the cooperative, each group trying to identify the five major problems of their farmer.

JANUARY 10

7: 30 am - 11: 00 am

Description of visit to Coopérative Agricole de Tillakaina by spokesman of each group, and presentation of the five most important problems of farmer.

Discussion by all trainees of visit to cooperative in order to determine whether the problems identified by each group were actually the most important problems and how to solve them.

3: 00 am - 3: 30 pm

Meeting with 2 representatives chosen by trainees to establish communication system between trainees and trainers to continue throughout training program.

3: 30 pm - 5: 00 pm

Discussion of the results of the visit to the Coopérative Agricole de Tillakaina, with the goal of improving the identification of problems by trainees on the garden visit of the following day. Examples given of some questions forgotten or not well followed up on by trainees.

Homework assigned: list made by each trainee of 2 problems relevant to gardening that he would be interested in studying in the field for the duration of the training program.

4: 00 pm - 5: 00 pm

Description of Bourbour Kabé visit by spokesman of each group, with presentation of farmers problems.

Discussion of all trainees with a comparison of problems identified by different groups and an examination of the methods necessary to identify farmers' problems and how to solve them.

JANUARY 11

7: 30 am

Departure by bus for trip to village of Bourbour kabé.

9: 00 am - 11: 00 am

Visit of gardens of Bourbour Kabé, with trainees divided into three groups, each looking at a separate garden and asking its farmer questions in order to identify his major gardening problems.

11: 00 am - 12: 30 pm

Return to Kollo.

3: 00 pm - 4: 00 pm

Discussion in separate groups of visit to Bourbour Kabé, each group trying to identify the five most important problems of the farmer it interviewed.

#### JANUARY 12

7: 30 am

Homework turned in by each trainee (list of 2 or 3 problems that could most interest him to study through a field test).

Remainder of day.

Preparation of report by each trainee of the three garden trips taken since the beginning of the training program.

#### JANUARY 13

8: 00 am - 10: 00 am

Discussion of entire group of trainees, with comparison of farmers' problems identified on different trips.

10: 00 am - 12: 00 pm

Preparation of report by each trainee on three garden trips.

3: 00 pm - 5: 00 pm

Discussion by entire group of possible solutions to the farmers' problems identified during the garden visits.

#### JANUARY 16

7: 30 am - 10:00 am

Reports on farm visits turned in.

Visit of trainees to training program field site.

10: 30 am - 11: 30 am

General Introduction on types of insects that attack vegetables and how to identify and distinguish them according to signs on plants  
M. Peter Engels, Protection des Végétaux.

11: 30 am - 12: 30 pm

General introduction to the types of diseases that attack vegetables and how to distinguish them according to symptoms on plants,  
M. Issa Adamou, Protection des Végétaux.

3: 30 pm - 4: 30 pm

Course: Preventative Fight Against Diseases of Garden Crops (M. Issa)

4: 30 pm - 5: 30 pm

Course: Pesticides and apparati for their application.

### JANUARY 17

- 7: 30 am - 10: 00 am Discussion between trainees and designated pairs of trainees on their field projects for the training program.
- 10: 30 am - 12: 30 pm Course / Visit to training fields: Identification of Pests (insects and diseases) on Garden Crops ( M. Engels and M. Issa).
- 3: 30 pm - 4: 30 pm Course: Description of Insects Attacking Garden Crops and how to Combat each. (M. Engels).
- 4: 30 pm - 5: 30 pm Course: Description of Diseases Attacking Garden Crops and how to Combat each. (M. Issa).
- 5: 30 pm - 6: 00 pm Trainees meet with each other in assigned pairs to develop their protocols for the field projects they are to conduct.

### JANUARY 18

- 7: 30 am - 10: 00 am Meeting of assigned pairs of trainees with trainers to review protocols for field projects.
- 10: 30 am - 12: 30 pm Course : Combatting Insects and Diseases of Garden Crops including precautions for application of pesticides (M. Engels, M. Issa)
- 3: 30 pm - 4: 00 pm Meeting of trainees among themselves in their assigned pairs to discuss procedures for their field projects.
- 4: 00 pm - 5: 00 pm Demonstration of the preparation and use of extract of neem seeds as natural pesticide, Heike Ostermann, Protection des Végétaux - GTE.

### JANUARY 19

- 7: 30 am - 10: 00 am Meetings of assigned pairs of trainees with trainers to discuss field projects.
- 10: 30 am - 12: 30 pm Course: The Nursery and Transplanting by Improved Techniques. (M. Cissé, Vitamin A Gardening Project).
- 3: 30 pm - 5: 00 pm Preparation of report for week by each trainee.

JANUARY 20

7: 30 am - 10: 00 am

Trainee Projects Bed Preparation : trainees pairs shown field space to use for each of their field projects, given tools and delineate and prepare beds.

10: 30 am - 12: 30 pm

Course : Soils, their Improvement and Nutritive Elements for Plants. The types of soils and problems linked to each; how to improve soils for garden crops and the use of organic fertilizer. Needs of plants in nitrogen, potassium, phosphorous and trace elements, with consideration given to root depth, signs of deficiencies, (Mlle Anne D. Turner, Trainer).

3: 30 am - 4: 00 pm

Preparation by each trainee of list of specific subjects outside of those on programs he would hope to have covered during training.

4: 00 pm

Hand in list of specific topics trainee would like training to cover.

JANUARY 23

7: 00 am - 10: 00 am

Field work on this day trainees begin field projects to be conducted in groups of two throughout remainder of training. All future " field work " periods will permit trainees to work on these independent projects as well as to spend time on the following activities: identification of insect and disease attacks; non-chemical combatting of insects; how to cultivate leafy greens; installing and maintaining a traditional trap against rats and mice; pH testing of soil; planting Moringa trees; transplanting techniques; seeding and trasnplanting of plants in association; soil management; harvesting garden produce (selection, sorting, storing); using locally made instruments for applying substances to plants (powder-sprinkler and atomizer); identifying signs of nutrient element deficiencies; observation on and comparison of growth of plants in soils treated with organic fertilizer and chemical fertilizer.

10: 30 am - 12: 30 pm

Course: Protection of Crops from Climatic Factors. Presentation and discussion of climatic factors - sun, dryness, wind, and temperature addressing their effects on crops and methods to fight non-desired effects. M. Nelson Cronyn, Peace Corps.

3: 30 pm - 5: 30 pm

Demonstration of signs of damage on plants due to climatic factors and how to protect garden crops from these factors. Discussion of techniques of protection and construction in field of wind breaks. (M. Nelson Cronyn).

#### JANUARY 24

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 12: 30 pm

Field Work.

3: 30 am - 6: 00 pm

Course: Irrigation Systems. Examination of characteristics of soils, factors of climate, and different methods of irrigation. M. Gandah Mohamadou, Institut National des Recherches Agricoles du Niger (INRAN).

#### JANUARY 25

7: 30 am - 8: 30 am

Field Work.

8: 30 am - 9: 30 am

Course: Live Fencing / Wind Breaks. How to install and maintain live fences / wind breaks around gardens, including choice of species according to soils, producing young trees / bushes, transplanting and pruning techniques. M. Jack Feith, Association Néerlandaise d'Assistance au Développement, Baléyara, Niger.

9: 30 am - 6: 00 pm

Departure from Kollo and visit of villages of baléyara and Bonkougou. Visit to Baléyara vegetable gardens with examples of live fences and wind breaks. Visit to Bonkougou, model village for vegetable gardening.

#### JANUARY 26

7: 30 - 10: 00 am

Field Work.

10: 30 am - 12: 30 pm

Course: Production and Storage of Seeds. Selection of mother plant; extraction, drying, and storing of seeds; advice on flower pollination, hybrids, and on transmission of diseases to seeds. (Mlle Anne D. Turner).

3: 30 pm - 6: 00 pm

Course / Demonstration. Description of different structures for drying vegetables, with hand-outs given including diagrams. Demonstration of methods of preparing, slicing, and drying vegetables. Mlle Lucia Nass, Association Néerlandaise d'Assistances au Développement, Fillingué, Niger.

#### JANUARY 27

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 12:30 pm

Course: Varietal Improvement and Choice of Varieties. Description of variety trials on tomatoes, peppers, carrots, lettuce, and cabbage done at the University of Niamey, with results and yields obtained for various varieties. Professeur Francois Raverdeau, Ecole d'Agronomie, Université de Niamey.

3: 30 pm - 6: 00 pm

Field Demonstration (with trainees participation) : construction and production of compost, an organic fertilizer.

#### JANUARY 30

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 12: 30 pm

Course / Discussion: Nutrition. Objectives of Nutrition program presented and discussed. Trainees divided into groups by country. Trainees discuss and present to class recipes, staple foods, and typical day's diet in their regions. Trainees begin to develop list of proverbs, taboos, and food classification systems in their areas.

Discussion of meaning of nutrition, malnutrition, etc. Trainees relate signs of malnutrition they have seen. Nutrition vocabulary presented and discussed.

3: 30 pm - 5: 30 pm

Course / Discussion : Nutrition. Three food groups: Discussion of roles of nutrients in the body. (Mme Nancy Keith).

3: 30 pm - 5: 30 pm

Course / Discussion : Nutrition. Human Nutritional needs- special needs of special groups: discussion of pregnancy, lactation, infant growth, illness, work, etc. Green leafy vegetables: how adding a few green leaves help a person meet their nutritional requirements in several areas. Case study- diet of 1-3 year old with millet staple than 100 grams of green leafy vegetables added: trainees calculate what happens with addition.

FEBRUARY 1

7: 30 am - 10: 00 am

Field Work.

Demonstration: arborculture- explanation and demonstration of techniques for fruit tree culture (planting, grafting, etc).  
(M. Cissé).

10: 30 am - 12: 30 pm

Course / Discussion: Nutrition. Staple diets in trainees' areas: trainees to analyze nutritional value, add vitamin A sources, and analyze results. Discussion of diet in trainees' areas and how to improve it. Adult education theory: how adults learn; what we know about motivation among adults; what we know about diffusion of innovations; how this knowledge can be applied to trainees' extension work in village.

3: 30 pm - 5: 30 pm

Course / Discussion: Nutrition. Trainees to identify nutrition problems in their area, brainstorm or solutions, and set up solution priorities.

FEBRUARY 2

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 12: 30 pm

Course / Discussion: Nutrition. Trainees examine steps they can go through to attack nutrition problem in their area, analyzing situation, and beginning to develop a plan of action.

3: 30 pm - 5: 30 pm

Course / Discussion: Nutrition. Guidelines for village talks and health lessons; review of nutritional highlights; discussion of important health messages.

FEBRUARY 3

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 12: 30 pm

Course / Discussion: Nutrition. Village meeting and health talk role playing and critiques.

3: 30 pm - 5: 30 pm

Cooking Demonstrations. Group of trainees by country use staple food and local ingredients with vitamin A rich foods to prepare nutritious sauce acceptable to people in trainee's area. Trainees observe and sample results of each others' preparations. Assignment: Write first stage of a nutritional plan of action: what problem will be addressed and how.

FEBRUARY 4

10: 30 am - 2: 00 pm

Weekend Field Trip: Visit to Petit Marché in Niamey to vegetables available and method of presentation and sale; visit to cultural museum of Niamey; lunch at Hotel Terminus.

FEBRUARY 6

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 12: 30 pm

Completion of evaluations by trainees on nutrition section of training.

Course / Discussion: what is Agricultural Extension ? An examination of what one means by "extension," as well as desirable characteristics for extension agents and typical attitudes of farmers towards extension agents. M. Douglas L. Robertson, trainer.

3: 30 pm - 5: 30 pm

Course / Discussion: what is Agricultural Extension? Continuation of morning session and discussion of trainees' personal experiences. ( M. Douglas L. Robertson).

FEBRUARY 7

7: 30 am - 10: 00 am

Field Work.

Field Demonstration: Improved techniques for nursery seeding, (M. Morou Chaibou, aide-encadreur).

10: 30 am - 12: 30 pm

Course / Discussion: The methods of Agricultural Extension. Presentation of characteristics and advantages of different methods of extension (individual, group, and mass). M. Djibo Hamidou, Formateur, I.P.D.R. , Niger.

3: 30 pm - 6: 00 pm

Film: "Le Vulgarisateur Sur le Terrain"  
The case of one agricultural extension agent and his strategies upon entering a new village

FEBRUARY 8

7: 30 am - 10: 00 am

Field Wrok.

Field Demonstration: How to determine seed quality (germination tests). (M. Morou Chaibou).

10: 30 am - 12: 30 pm

Meetings of trainees in assigned pairs of Field projects. Analysis and summary of findings in field to date prepared for following day discussion with trainers.

3: 30 am - 5: 30 pm

Field Demonstration: Construction of diguettes to counter erosion.  
M. Jean Gustave Rouamba, trainee.

FEBRUARY 9

7: 30 am - 12: 30 pm

Course / Discussion: The farming Systems Approach and Extension: the case of Niger. Description of the Farming Systems approach where a number of steps and series of evaluations are carried before and after beginning and agricultural program.  
M. Fred Sowers, Direction de la Vulgarisation et de la Promotion Cooperative, Projet Céréaliier, Niger.

3: 30 pm - 6: 30 pm

Course / : continuation of morning, with slides and a presentation on farming systems steps followed for a land management program in Niger.

FEBRUARY 10

7: 30 am - 9: 30 am

Field Work.

9: 30 am - 10: 00 am

Meeting. Plans of action handed for work to do upon return from training in order improve gardening / nutrition practices combat vitamin A deficiency. Discussion of oral and written presentations expected upon completion of field projects.

10: 30 am - 12: 30 pm

Course / Discussion: Constraints to Extension for Fruit Trees and Gardens Examination of the limitations of the classical approach toward extension ("approche classique") where the farmer is not sufficiently taken into consideration. Description of more innovative extension ("Action sur les Problèmes") which focuses on farmer. Discussion of steps necessary to solve gardening problems. M. Zakari Madougou, Assistant des Projets Agroforestiers et Fruitiers, CARE International, Tahoua, Niger.

3: 30 am - 6: 30 pm

Course / Discussion: continuation of morning.

FEBRUARY 13

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 11: 30 am

Trainee completion of evaluations on the section of Agricultural Extension.

11: 30 am - 12: 30 pm

Trainee preparation of written reports on their field projects.

3: 30 am - 6: 00 pm

Course / Discussion: The Commercialization of Vegetables. Discussion of the Characteristics of "marketing" or commercialization including aspects of product, price, distribution, and promotion. Game on same subject introduced to and tried by trainees

FEBRUARY 14

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 12: 30 pm

Course / Discussion: The Commercialization of Production by Means of a Cooperative, Description by speaker of his experiences in the establishment of the Coopérative Agricole de Tillakaina and of the necessary steps to establish any cooperative and to commercialize vegetable produce. M. Didier Allély, Moniteur de Projets sur Tillabery et Tahoua, Lutheran World Relief, Niger.

3: 30 pm - 6: 00 pm

Preparation by trainees of written and oral reports on field projects.

FEBRUARY 15

7: 30 am - 10: 00 am

Field Work.

10: 30 am - 12: 30 pm

Group photo of trainees and trainers.

Evaluation I, Vegetable Production. Each trainee fills out evaluation on the section of the training involving vegetable production to show what he learned and provide advice useful for a future training.

11: 45 am - 12: 30 pm

Evaluation, Commercialization. Each trainee fills out evaluations on the section of the training involving the commercialization / marketing of vegetables covered at the beginning of the week.

3: 30 pm - 6: 00 pm

Preparation by trainees of written and oral reports on field projects.

FEBRUARY 16

7: 30 am

Written reports due on trainee field projects.

7: 30 am - 10: 00 am

Field Work.

8: 00 - 10: 00 am

Individual meetings of trainees with trainers. Meetings to present trainee plans of action for their strategy upon returning to work from training and for them to give trainers useful background information on current vegetable production practices in their areas.

10: 30 am - 12: 30 pm

Individual meetings continued. Trainees not in meetings preparing oral presentations.

3: 30 pm - 6: 00 pm

Preparation by trainees of oral presentations on field projects.

FEBRUARY 17

7: 30 am - 10: 00 am

Field Work.

8: 00 am - 10: 00 am

Individual meetings of trainees with trainers, same as previous day.

10: 30 am - 12: 30 pm

Individual meetings continued. Those not in meetings prepare oral presentations of field projects.

12: 30 pm

Meeting. Copies of trainees' written reports of field projects handed out to all trainees. Following week oral presentations and other matters discussed.

3: 30 pm - 6: 00 pm

Preparation by trainees of oral presentations on field projects.

FEBRUARY 20

8: 00 am - 8: 30 am

Presentation of Field Project by group 3, M. Barry Mamadou and M. Alzouma Diori Moussa. Subject: non chemical protection of plants.



10: 30 am - 12: 30 pm

Field demonstration: Preparation of vitamin A rich sauce using dried vegetables (all trainees participating).

3: 30 pm - 5: 00 pm

Consumption Questions. Each trainee to fill out questionnaires on vegetable consumption practices in his work region to provide trainers with useful background information.

#### FEBRUARY 22

8: 00 am - 9: 00 am

Evaluations: Field Projects and Garden Visits. Each trainee to fill out evaluation on usefulness of field project he conducted and on garden visits conducted at beginning of training.

10: 00 am - 11: 30 am

Availability Questions. Each trainee to fill out questionnaires on vegetable availability in his region of work to provide trainers with useful background information.

5: 00 pm - 6: 00 pm

Distribution of Travel monies for trainee return trips.

#### FEBRUARY 23

8: 00 am - 10: 30 am

Distribution of Field Materials and Publications to trainees.

11: 00 am

Closing Ceremony, I.P.D.R. Speeches by trainers, administrators, and trainees, and presentation of certificates.

7: 30 pm - 12: 00 am

Closing Dinner, Hotel Temrinus, Niamey, Dinner featuring sauces of each country rich in vitamin A, with meal followed by dancing.

Calendrier du stage de perfectionnement des encadreurs maraichers-  
AVRDC Projet Horticole Vitamine A - IPDR Kollo Niger  
4 janvier - 23 février 1989

4 janvier

11H 00 - 12H 00

Présentation (ouverture) du stage, Directeur de l'Institut Pratique de Développement Rural (IPDR)

5 janvier

7H 30 - 10H 30

Introduction du stage de perfectionnement aux stagiaires. Définition des objectifs du stage: pour les stagiaires, apprendre à mieux identifier les problèmes des producteurs de légumes et pour les stagiaires, acquérir d'autres connaissances en maraîchage, nutrition et autres sujets. Définition de ce que les formateurs attendent des stagiaires: que les stagiaires aient un esprit ouvert, participent activement à tous les aspects du stage, et poursuivent entre eux et à leurs heures libres, les débats entamés pendant les sessions de formation.

Description par les stagiaires de leurs projets/organisations, chaque stagiaire donnant le nom son organisation, sa localité ainsi que la nature de ses activités.

Affaires administratives: temps accordé aux stagiaires pour poser des questions concernant le stage de perfectionnement et l'AVRDC.

11H 30 - 12H 30

Exposé sur la déficience en Vitamine A. M. Idé Djermakoye, Coordinateur, Helen Keller International, Projet Vitamine A. M. Djermakoye a fait une description des signes de la déficience en vitamine A et des stratégies portant sur la prévention de la cécité nocturne, avec des informations sur les produits riches en vitamine A. Le matériel utilisé pour instruire les stagiaires comprenait: des posters, des tableaux d'aliments contenant de la vitamine A, des livres et des images et support visuels indiquant les symptômes oculaires de déficience en vitamine A.

15H 30 - 17H 30

Discussions et questions par les stagiaires sur la déficience en vitamine A. Description de la visite des jardins maraîchers de Niamey pour le reste de la journée avec pour objectif d'identifier les "véritables" problèmes du cultivateur en lui posant des questions en faisant des observations et en discutant, par la suite en groupes, des résultats obtenus.

6 janvier

7H 30

Départ par car pour les maraîchers de Niamey, et division des stagiaires en deux groupes ayant chacun un porte - parole.

12H 00

Retour à Kollo après visite des maraîchers.

15H 00 - 15H'50

Discussion en groupes de la visite des maraîchers. Détermination par groupe des cinq (5) principaux problèmes du cultivateur visité (les problèmes peuvent comprendre des problèmes techniques, des problèmes de matériel et autres).

16H 00 - 17H'00

Description de la visite des maraîchers par porte-parole de chaque groupe, présentant la détermination par son groupe des principaux problèmes du cultivateur.

Discussion de tous les stagiaires portant sur la question de savoir si les problèmes qu'ils ont identifiés étaient vraiment les plus critiques et si leurs observations dans les maraîchers et leurs manières de poser des questions pourraient être améliorés.

Discussion des solutions éventuelles aux problèmes identifiés.

9 janvier

7H 00

Départ par car pour visiter la Coopérative Agricole de Tillakaina.

10H 00 - 11H 30

Visite des parcelles de la coopérative avec les stagiaires réparti en trois groupes distincts, chaque groupe posant de questions à son cultivateur, observant son maraîcher et essayant d'identifier ses principaux problèmes.

- 11H 30 - 12H 15                      Présentation sur la Coopérative Agricole de Tillakaina par M. Mamadou Issa, Directeur de Périmètre, suivie de réponses aux questions des stagiaires.
- 12H 15 - 14H 30                      Retour à Kollo
- 16H 50 - 17H 00                      Discussion en groupes distincts de la visite à la coopérative, chaque groupe essayant d'identifier les principaux problèmes de son cultivateur.

10 janvier

- 7H 30 - 11.00                      Description de la visite à la Coopérative Agricole de Tillakaina par le porte-parole de chaque groupe, et présentation des cinq problèmes les plus importants du cultivateur. Discussion par tous les stagiaires de la visite à la Coopérative afin de déterminer si les problèmes identifiés par chaque groupe étaient effectivement les problèmes les plus importants et montrer comment les résoudre.
- 15H 00 - 15H 30                      Rencontre avec deux représentants choisis par les stagiaires pour établir un système de communication entre les stagiaires et les formateurs à suivre pendant toute la durée du stage de perfectionnement.
- 15H 30 - 17H 30                      Discussion des résultats de la visite à la Coopérative Agricole de Tillakaina avec pour objectif d'améliorer l'identification des problèmes par les stagiaires au lendemain de la visite des maraîchers. Exemples de certaines questions oubliées ou par bien suivies par les stagiaires. Attribution de devoir de maison: liste établie par chaque stagiaire de deux problèmes relatif au maraîcher qu'il aimerait étudier sur le terrain pendant la durée du stage de perfectionnement.
- 16H 00 - 17H 00                      Description de la visite de Bourbour Kabé par porte-parole de chaque groupe, avec une présentation des problèmes du cultivateur. Discussion de tous les stagiaires avec une comparaison de problèmes identifiés par les différents groupes et examen des méthodes nécessaires pour identifier les problèmes du cultivateur et comment les résoudre.

## 11 janvier

7H 30

Départ par car pour visiter le village de Bourbour Kabé.

9H 00 - 11H 00

Visite de maraîchers de Bourbour Kabé, avec les stagiaires répartis en trois groupes, chaque groupe visitant un maraîcher spécifique et posant des questions à son cultivateur afin d'identifier ses principaux problèmes de maraîchage.

11H 00 - 12H 30

Retour à Kollo.

15H 00 - 16H 00

Discussion en groupes distincts de la visite à Bourbour Kabé, chaque groupe essayant d'identifier les cinq problèmes les plus importants du cultivateur qu'il a interviewé.

## 12 janvier

7H 00

Devoir de maison remis par chaque stagiaire (liste de 2 ou 3 problèmes qui l'intéresseraient le plus par étude dans le cadre d'un test sur le terrain.

Reste de la journée. Préparation de rapport par chaque stagiaire portant sur les trois visites de maraîchers effectuées depuis le début du stage de perfectionnement.

## 13 janvier

8H 00 - 10H 00

Discussion de l'ensemble des stagiaires avec une comparaison des problèmes identifiés chez les cultivateurs lors des différentes visites.

10H 00 - 12H 00

Préparation de rapport par chaque stagiaire sur les trois visites effectuées.

15H 00 - 17H 00

Discussion par l'ensemble des stagiaires des solutions éventuelles aux problèmes identifiés chez les cultivateurs lors des visites effectuées.

## 16 janvier

7H 30 - 10H 00

Rapports de visites rendus. Visite des stagiaires au site du stage de perfectionnement.

10H 30 - 11H 30

Introduction général sur les différents types d'insectes qui s'attaquent aux légumes et comment les identifier et distinguer en fonction des signes sur les plantes. M. Peter Engels, Protection des Végétaux.

- 11H 30 - 12H 30 Introduction générale sur les types de maladies qui s'attaquent aux légumes et comment les distinguer en fonction des symptômes sur les plantes. M. Issa Adamou, Protection des Végétaux.
- 15H 30 - 16H 30 Cours: Lutte préventive entre les maladies des cultures maraîchères - (M. Issa).

17 janvier

- 7H 00 - 10H 00 Discussion entre les formateurs et des paires désignées de stagiaires sur leurs projets spéciaux d'essai et de démonstration sur le terrain concernant le stage de perfectionnement.
- 10H 30 - 12H 30 Cours / Visite aux sites de formation: identification des ennemis (insectes et maladies) des cultures maraîchères. (M. Engels et M. Issa)
- 15H 30 - 16H 30 Cours : description des insectes s'attaquant aux cultures maraîchères et comment les combattre. (M. Engels).
- 16H 30 - 17H 30 Cours : description des maladies s'attaquant aux cultures maraîchères et comment les combattre. (M. Issa).
- 17H 30 - 18H 00 Les stagiaires se rencontrent par paires constituées pour élaborer leurs protocoles concernant les projets spéciaux d'essai et de démonstration sur le terrain qu'ils doivent entreprendre.

18 janvier

- 7H 30 - 10H 00 Rencontre des paires de stagiaires constituées avec les formateurs pour examiner les protocoles élaborés.
- 10H 30 - 12H 30 Cours : Lutte contre les insectes et les maladies des cultures maraîchères y compris précautions relatives à l'application des pesticides. (M. Engels , M. Issa).
- 15H 30 - 16H 00 Rencontre des paires constituées de stagiaires pour discuter des procédures relatives à leurs projets spéciaux d'essai et de démonstration sur le terrain.

16H 00 - 17H 00

Démonstration de la préparation et de l'utilisation des extraits des noix de neem en tant que pesticide naturel, Heike Ostermann, Protection des Végétaux.

19 janvier

7H 30 - 10H 00

Rencontre des paires constituées de stagiaires avec les formateurs pour discuter des projets.

10H 30 - 12H 30

Cours : Pépinière et repiquage par techniques améliorées. (M. Cissé, Projet Horticole Vitamine A).

20 janvier

7H 30 - 10-00

Projet des stagiaires. Préparations des lits: indication aux paires de stagiaires les parcelles à utiliser pour chacun de leurs projets; remise des outils et délimitation et préparation des lits.

10H 30 - 12H 30

Cours : les sols, leur amélioration et les éléments nutritifs pour les végétaux les types de sols et les problèmes liés à chacun d'eux; comment améliorer les sols pour les cultures maraîchères et utilisation des engrais organiques. Besoins des plantes en nitrogène, potassium, en éléments phosphoreux et oligo - éléments, en tenant compte de la profondeur des racines, des signes de déficience et des intrants recommandés. (Mlle Anne D. Turner, Formatrice).

15H 30 - 16H 00

Préparation par chaque stagiaire de la liste des thèmes spécifiques en dehors de ceux au programmes qu'il aimerait couvrir pendant le stage.

16H 00

Soumission de la liste des thèmes spécifiques que le stagiaires aimerait couvrir pendant le stage.

23 janvier

7H 00 - 10H 00

Travaux pratiques. A cette date, les formateurs ont débuté les projets à entreprendre par groupes de deux pendant le reste du stage. Toutes les futures périodes de travaux pratiques permettront aux formateurs de travailler sur ces projets indépendants et de consacrer du temps aux activités ci-après: identification des insectes et des attaques de maladies; lutte non-chimique contre les insectes; comment cultiver les plantes vertes à feuilles; mise en place et entretien de pièges traditionnels contre les rats souris; test pH du sol; plantation des arbres moringa; techniques de repiquage; semis et repiquage des plantes en association; gestion des sols; récolte des produits maraîchers (sélection, tri, stockage);

utilisation d'instruments fabriqués localement pour les applications de substances aux plantes (poudreuse et pulvérisateur); identification des signes de déficience en éléments nutritifs; observation et comparaison de la croissance des plantes sur les sols traités avec des engrais organiques et des engrais chimiques.

10H 30 - 12H 30

Cours : Protection des cultures contre les facteurs climatiques. Présentation et discussion des facteurs climatiques... soleil, sécheresse, vent et température... en cherchant à trouver une solution à leurs impacts sur les cultures effets indésirables. M. Nelson Cronyn, Corps de la Paix.

15H 30 - 17H 30

Démonstration des signes de dégâts sur les cultures dûs aux facteurs climatiques et comment protéger les cultures maraîchères contre ces facteurs. Discussion des techniques de protection et construction de brise-vent dans les parcelles. (M. Nelson Cronyn).

#### 24 janvier

7H 30 - 10H 00"

Travaux pratiques

10H 30 - 12H 30

Travaux pratiques

15H 30 - 18H 00"

Cours : Systèmes d'irrigation - Examen des caractéristiques des sols, des facteurs climatiques et des différentes méthodes d'irrigation. M. Gandah Mohamadou, Institut National des Recherches Agronomiques du Niger (INRAN).

#### 25 janvier

7H 30 - 8H 30

Travaux pratiques

8H 30 - 9H 30

Cours: Clôture à l'aide d'arbres vivants / brise-vent. Comment installer et maintenir ces clôtures et un tel brise-vent autour des maraîchers, y compris le choix des espèces en fonction des sols, production de jeunes plants / buissons, techniques de repiquage et d'élagage. M. Jack Feith Association Néerlandaise d'Assistance au Développement. Baléyara, Niger.

9H 30 - 12H 00

Départ de Kollo et visite des villages de Baléyara et Bonkougou. Visite des maraîchers de Baléyara avec des exemples des clôtures et brise-vent décrits ci-dessus. Visite d'un village modèle de Bonkougou spécialisé en maraîchage.

26 janvier

7H 30 - 10H 00

Travaux pratiques

10H 30 - 12H 30

Cours : Production et stockage de semences. Sélection des plantes mères; extraction, séchage et stockage de semences; conseils sur le pollinisation des fleurs, les hybrides et la transmission des maladies aux semences. (Mlle. Anne D. Turner)

15H 30 - 18H 00

Cours / Démonstration . Préservation des différentes structures pour le séchage des légumes avec distribution de photocopies contenant des diagrammes. Démonstration des méthodes de préparation, de mise en tranches et de séchage de légumes.  
Mlle Lucia Nass  
Association Néerlandaise d'Assistance au Développement  
Filingué, Niger

27 janvier

7H 30 - 10H 00

Travaux pratiques

10H 30 - 12H 30

Cours : Amélioration variétale et choix des variétés. Description des essais variétaux sur les tomates, piments, carottes, laitues et choux réalisés à l'Université de Niamey avec des résultats et les rendements obtenus pour les différentes variétés.

Professeur François Raverdeau  
Ecole d'Agronomie Université de Niamey.

15H 30 - 18H 00

Démonstration sur le terrain (avec la participation des stagiaires) : construction et production du compost, un engrais organique.

30 janvier

7H 30 - 10H 00

Travaux pratiques

10H 30 - 12H 30

Cours / Discussion: Nutrition, Objectif du programme de nutrition présentés et discutés. Stagiaires répartis en groupes par pays. Stagiaires discutent et présentent à la classe des recettes, les aliments de base, et le régime alimentaire type de leur région. Stagiaires commencent à établir une liste de proverbes, tabous, et les systèmes de classifications des aliments dans leurs régions.

Discussion du sens de nutrition, malnutrition, etc ... Stagiaires décrivent les signes de malnutrition qu'ils ont vus. Présentation et discussion du vocabulaire sur la nutrition  
Mme Nancy Keith, Responsable de la formation des adultes / consultante en nutrition.  
Guidan Ider, Niger.

15H 30 - 17H 30

Cours / Discussion : Nutrition. Trois groupes d'aliments : construction, energy, production. Discussion du rôle des éléments nutritifs dans le corps.  
(Mme Nancy Keith).

### 31 janvier

7H 30 - 10H 00

Travaux pratiques

10H 30 - 12H 30

Cours / Discussion : Nutrition. Six nutriments et leurs fonctions dans le corps, Aliments riches, sources de chaque nutriment, la Vitamine A et sa fonction, la déficience en Vitamine A.

15H 30 - 17H 30

Cours / Discussion : Nutrition. Besoins nutritionnels de l'homme, besoins spécifiques des groupes spéciaux: discussion sur la grossesse, la lactation, la croissance de l'enfant, les maladies, le travail etc... Les légumes à feuilles vertes: comment le fait d'ajouter quelques feuilles vertes aide un individu à satisfaire ses besoins nutritionnels dans plusieurs domaines. Etudes des cas-régime alimentaire d'un enfant de 1 - 3 ans ; avec du mil comme aliment de base et ensuite 100 gr de légumes à feuilles vertes ajoutés: les stagiaires calculent ce qui change avec cet apport.

### 1er février

7H 30 - 10H 00

Travaux pratiques

Démonstration: arboriculture - explication et démonstration des techniques de culture des arbres fruitiers (plantation, greffage, etc...)  
(M. Cissé).

10H 30 - 12H 30

Cours / Discussion : Nutrition. Régimes alimentaires de base dans les régions des stagiaires: analyser la valeur nutritionnelle, ajouter les sources de vitamine A, et analyser les résultats.  
Discussion des régimes alimentaires dans les régions des stagiaires et comment les améliorer. Théorie de l'éducation des adultes: comment les adultes apprennent; ce que nous savons de la nutrition chez les adultes; ce que nous savons de la diffusion des innovations; comment cette connaissance peut être appliquée aux travaux de vulgarisation des stagiaires dans les villages.

15H 30 - 17H 30

Cours / Discussion: Nutrition. Stagiaires: identifier les problèmes de nutrition dans leurs régions, échange d'idées sur les solutions et fixer les priorités au niveau des solutions.

## 2 février

7H 30 - 10H 00

Travaux pratiques

10H 30 - 12H 30

Cours / Discussion : Nutrition. Stagiaires examinant les étapes qu'ils peuvent suivre pour résoudre le problème de nutrition dans leur région, en analysant la situation et en commençant l'élaboration d'un plan d'action.

15H 30 - 17H 30

Cours / Discussion: Nutrition. Directives pour les causeries villageoises et les leçons de santé; examen des principes nutritionnels; discussion des messages importants portant sur la santé.

## 3 février

7H 30 - 10H 00

Travaux pratiques

10H 30 - 12H 30

Cours / Discussion: Nutrition. Réunion au niveau du village et rôle des débats sur la santé, réalisation et critiques.

15H 30 - 17H 30

Démonstration de cuisines. Groupes de stagiaires par pays utilisent les aliments de base et les ingrédients locaux avec des aliments riches en vitamine A pour préparer une sauce nutritive acceptable aux populations de la région des stagiaires. Les stagiaires observent et échantillonnent les résultats de leurs préparations respectives. Devoir: Ecrire la première étape d'un plan d'action nutritionnel: quels sont les problèmes résolus et comment sont-ils résolus?

## 4 février

Excursion de fin de semaine: visite du petit marché de Niamey pour voir les légumes disponibles ainsi que la méthode de présentation et de vente; visite du Musée culturel de Niamey; déjeuner à l'Hotel Terminus.

6 février

7H 30 - 10H 00

Travaux Pratiques

10H 30 - 12H 30

Achèvement des évaluation par les stagiaires sur la section nutrition du stage.  
Cours / Discussion . Qu'est-ce que la vulgarisation agricole? Examen de ce que signifie vulgarisation et caractéristiques souhaitables pour les agents de vulgarisation et attitude des cultivateurs à l'endroit des agents de vulgarisation. M. Douglas L. Robertson, Formateur.

15H 30 - 17H 30

Cours / Discussion Qu'est-ce que la vulgarisation agricole. Poursuite de la session des matin et discussion sur les expériences personnelles des stagiaires (M. Douglas L. Robertson)

7 février

7H 30 - 10H 00

Travaux pratiques

Démonstration sur le terrain: techniques améliorées de semis en pépinière. M. Morou Chaibou, aide - encadreur

10H 30 - 12H 30

Cours / Discussion: méthodes de vulgarisation agricole. Présentation des caractéristiques et avantages des différentes méthodes de vulgarisation (individuelle, groupe, masse).  
M. Djibo Hamidou, Formateur, IPDR Kollo, Niger

15H 30 - 18H 00

Film: Le Vulgarisateur sur le Terrain. Le cas d'un agent de vulgarisation et ses stratégies quand il rentre dans un nouveau village.

8 février

7H 30 - 10H 00

Travaux pratiques

Démonstration sur le terrain . Comment déterminer la qualité des semences (tests de germination) (M. Morour Chaibou).

10H 30 - 12: 30

Réunions des stagiaires en paires constituées pour les projets spéciaux d'essai et de démonstration sur le terrain . Analyse et résumé des résultats obtenus sur le terrain à ce jour préparés pour la discussion du lendemain avec les formateurs.

15H 30 - 17H 30

Démonstration sur le terrain: Construction de diquettes pour lutter contre l'érosion.  
M. Jean Gustave Rouamba, Stagiaire.

9 février

7H 30 - 10H 00

Travaux pratiques

Réunions des équipes des projets spéciaux avec les formateurs pour discuter des projets et des résultats obtenus à ce jour.

10H 30 - 12H 00

Cours / Discussion: les Systèmes Cultureux: Approche et Vulgarisation: le cas du Niger. Description d'une approche de système cultureux dans laquelle un certain nombre d'étapes et une série d'évaluations sont réalisées et après le démarrage d'un programme agricole.  
M. Fred Sowers, Direction de la Vulgarisation et de la Promotion Coopérative, P.C.N.

15H 30 - 18H 30

Cours / Discussion: poursuite des travaux de la matinée avec des projections et une présentation sur les étapes des systèmes cultureux suivies pour un programme de gestion des sols au Niger.

10 février

7H 30 - 9H 00

Travaux pratiques

9H 30 - 10H 00

Réunion. Soumission des plans d'action concernant les travaux à effectuer dès le retour du stage afin d'améliorer les pratiques de maraîchage / nutrition et lutter contre la déficience en vitamine A. Discussion des présentations orales et écrites prévues des l'achèvement des projets spéciaux.

10H 30 - 12H 30

Cours / Discussion: Contraintes à la vulgarisation concernant les arbres fruitiers et les maraîchers. Examen des limites de l'approche classique à la vulgarisation selon laquelle le cultivateur n'est pas assez pris en considération. Description d'une vulgarisation plus innovative ("Action sur les Problèmes") qui met l'accent sur le cultivateur. Discussion des étapes nécessaires pour résoudre les problèmes de maraîchage.  
M. Zakari Madougou, Assistant des Projets Agroforestiers et fruitiers CARE INTERNATIONAL, Tahoua, Niger.

15H 30 - 18H 30

Cours / Discussion  
Poursuite des travaux de la session du matin.

13 février

- 7H 30 - 10H 00 Travaux pratiques
- 10H 30 - 11H 30 Achèvement par les stagiaires des évaluations sur la Section Vulgarisation Agricole.
- 11H 30 - 12H 30 Préparation par les stagiaires des rapports écrits sur leurs projets spéciaux d'essai et de démonstration sur le terrain.
- 15H 30 - 18H 00 Cours / Discussion: Commercialisation des légumes. Description des caractéristiques de la commercialisation, y compris les aspects produits, prix, distribution et promotion - Jeu sur le même thème introduit à l'intention des stagiaires et essayé par eux.

14 février

- 7H 30 - 10H 00 Travaux pratiques
- 10H 30 - 12H 30 Cours / Discussion: Commercialisation de la production par le biais d'une coopérative. Description par un orateur de ses expériences de la mise en place de la Coopérative Agricole de Tillakaina et des étapes nécessaires pour mettre en place une coopérative et commercialiser les légumes produits.  
M. Didier Allély, Moniteur de Projets à Tillabéry et Tahoua. Lutheran World Relief, Niger.
- 15H 30 - 18H 00 Préparation par les stagiaires des rapports écrits et oraux sur les projets spéciaux d'essai et de démonstration sur le terrain.

15 février

- 7H 30 - 10H 00 Travaux pratiques
- 10H 00 Photo de famille: Stagiaires et Formateurs
- 10H 30 - 11H 30 Evaluation I, Production de légumes. Chaque stagiaire remplit la section du formulaire d'évaluation portant sur la production de légumes pour indiquer ce qu'il a appris et donner des conseils utiles pour un futur séminaire.
- 11H 45 - 12H 30 Evaluation, commercialisation. Chaque stagiaire remplit la section du formulaire d'évaluation portant sur la commercialisation / marketing des légumes, thèmes couverts au début de la semaine.
- 15H 30 - 18H 00 Préparation par les stagiaires de rapports oraux et écrits portant sur les projets spéciaux d'essai et de démonstration sur le terrain.

16 février

7H 30

Rapports écrits sur les projets spéciaux d'essai et de démonstration sur le terrain dûs.

7H 30 - 10H 00

Travaux pratiques.

8H 00 - 10H 00

Entretien individuels des stagiaires avec les formateurs. Réunions pour présenter aux stagiaires les plans d'action de leur stratégie des leurs retour du stage de perfectionnement, et pour permettre aux stagiaires de donner aux formateurs des informations de base très utiles concernant les pratiques actuels relatives à la production de légumes dans leurs régions.

10H 30 - 12H 30

Poursuite des entretiens individuels avec les stagiaires. Les stagiaires attendant leurs tour d'entretien préparent leurs présentations orales.

15H 30 - 18H 00

Préparation par les stagiaires de leurs présentations orales portant sur les projets spéciaux d'essai et de démonstration sur le terrain.

17 février

7H 30 - 10H 00

Travaux pratiques

8H 00 - 10H 00

Entretiens individuels avec les stagiaires, comme la veille.

10H 30 - 12H 30

Poursuite des entretiens individuels. Les stagiaires attendant leurs tout d'entretien préparent leurs présentations orales sur les projets spéciaux d'essai et de démonstration sur le terrain.

12H 30

Réunion. Exemplaires des rapports écrites de tous les stagiaires portant sur les projets spéciaux d'essai et de démonstration distribués à tous les stagiaires. Semaine suivante : présentation orales et discussion d'autres questions.

15H 30 - 18H 00

Préparation par les stagiaires des présentations orales portant sur les projets spéciaux d'essai et de démonstration sur le terrain.

20 février

8H 00 - 8H 30

Présentation des projets spéciaux d'essai et de démonstration sur le terrain par le groupes 3 M. Barry Mamadou et M. Alzouma Diori Moussa. Thème : protection non-chimique des végétaux.

- 8H 30 - 9H 00  
Présentation des projets spéciaux d'essai et de démonstration sur le terrain par le groupe 7  
M. Soumana Theinta et M. Halidou Badie.  
Thème : conservation de l'eau par les techniques de préparation et de gestion des sols.
- 9H 00 - 9H 30  
Présentation du projets spéciaux d'essai et de démonstration sur le terrain par le groupe 4  
M. Amadou Ba et M. Yaya Koné.  
Thème : conservation de l'eau par des méthodes culturales (espacement, disposition et associations des espèces).
- 9H 30 - 10H 00  
Présentation des projets spéciaux d'essai et de démonstration sur le terrain par le groupe 2  
M. Jean Baptiste Bilgho et M. Rabiou Mousseini  
Thème : conservation des engrais organiques et de temps grâce aux méthodes de préparation des sols.
- 15H 30 - 17H 00  
Questions sur la production.  
Chaque stagiaire remplira des formulaires sur les techniques de production de légumes dans sa zone de travail pendant les différentes saisons de l'année. Ces informations permettant aux formateurs de savoir l'assistance future qui pourrait s'avérer la plus bénéfique aux stagiaires, et d'avoir **évaluer les** résultats du stage de perfectionnement et toute assistance future.

## 21 février

- 8H 00 - 8H 30  
Présentation des projets spéciaux d'essai et de démonstration sur le terrain par le groupe 5  
M. Bilali Kader et M. Abdoulaye Adama Ouédraogo.  
Thème : fabrication et utilisation des engrais organiques.
- 8H 30 - 9H 00  
Présentation des projets spéciaux d'essai et de démonstration sur le terrain par le groupe 1  
M. Mohamed Salek et M. Demba Diallo.  
Thème : conservation de l'eau en tout que fonction de l'espacement et / ou de la variété des plantes.
- 9H 00 - 9H 30  
Présentation des projets spéciaux d'essai et de démonstration sur le terrain par le groupe 6  
M. Jean Gustave Rouamba et M. Dodo Bodo.  
Thème : Lutte contre les ennemis des cultures par le choix d'espèces ou variété résistantes.

9H 30 - 10H 00

Présentation des projets spéciaux d'essai et de démonstration sur le terrain par le groupe 8 M. Fambougoury Diarra et M. Sidi Lamine Sidibé.  
Thème : Conservation des légumes par le séchage.

10H 30 - 12H 00

Démonstration sur le terrain. Préparation d'une sauce riche en vitamine A en utilisant des légumes secs. (avec la participation de tous les stagiaires).

15H 30 - 17H 00

Questions sur la consommation. Chaque stagiaire remplira les questionnaires sur la consommation des légumes dans sa région de travail pour fournir aux formateurs des informations de base très utiles.

## 22 février

8H 00 - 9H 00

Evaluation : Visiter des projets spéciaux d'essai et de démonstration sur le terrain et des maraîchers. Chaque stagiaire remplit l'évaluation sur l'utilité des projets spéciaux d'essai et de démonstration sur le terrain qu'il a réalisés et des visites de maraîchers effectuées au début du stage.

10H 00 - 11H 30

Questions sur la disponibilité. Chaque stagiaire remplit le questionnaire sur la disponibilité des légumes dans sa région de travail pour fournir aux formateurs des informations de base très utiles.

17H 00 - 18H 00

Distribution des allocations de voyage pour le retour des stagiaires.

23 février

8:00 - 10:30

Distribution du matériel de terrain et de publicaitons aux stagiaires.

11:00

Cérémonie de clôture IPDR, Kollo discours prononcés par les formateurs, les administrateurs et les stagiaires et présentation des certificats.

19:30 - 24:00

Diner de clôture Hotel Terminus, Niamey. Diner présentant des sauces de chaque pays riches en vitamine A. Diner suivi d'une soirée dansante.

APPENDIX B  
SUMMARY REPORT OF TRAINING PROGRAM  
ATTACHMENT 2  
TRAINEES' PLANS OF ACTION

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## ATTACHMENT 2

### Highlights of what individual trainees learned and what their pertinent course of action would be upon return to their work

1. Name: Abdoulaye Adama Quedraogo; Country: Burkina Faso  
What learned: Much on nutrition, and also about seed selection, neem extract organic pesticide, and certain culture associations not previously known.  
What to do with knowledge: Contribute to nutrition efforts of village women animatrices and encourage the consumption of leafy greens from a nutritional standpoint. Use other technical knowledge mentioned in course of vegetable extension work.
2. Name: Alzouma Diori Moussa; Country: Niger  
What learned: Nutritional importance of leafy green vegetables; gardening techniques such as methods of conserving water, use of organic neem extract against pests, using organic fertilizer and compost, and drying vegetables.  
What to do with knowledge: Promote leafy green vegetables in addition to other vegetables with which already work. Introduce to village gardeners gardening techniques mentioned.
3. Name: Ba Amadou; Country: Mauritania  
What learned: More about leafy green vegetables.  
What to do with knowledge: Would discuss with employer possibility of introducing seeds for these leafy green vegetables to villages where works.
4. Name: Barry Mamadou; Country: Burkina Faso  
What learned: More about insects and their control; more about the importance of vitamin A in fruits and vegetables.  
What to do with knowledge: Apply knowledge of insect control to vegetable gardening extension work. Supplement efforts of women health workers to teach about vitamin A and the importance of vitamin A containing vegetables and fruits.
5. Name: Bilgho Jean-Baptiste; Country: Burkina Faso  
What learned: Much about nutritional importance of vegetables and how to maximize vitamin A content by choice of vegetables and harvest dates.  
What to do with knowledge: Encourage on an informal basis farmers to grow and consume more vitamin A rich produce. Encourage farmers to allow vegetables/fruit to ripen longer.
6. Name: Demba Diallo; Country: Mali  
What learned: Additional vitamin A vegetables of which he had not previously been aware; more about nutrition; about drying vegetables.  
What to do with knowledge: Encourage farmers growing

additional vitamin A produce, such as yellow fruits and tubers and sweet potatoes in the dry season in addition to the rainy season. Spreading nutrition knowledge throughout village. Making drying of vegetables a priority in his extension efforts.

7. Name: Dodo Bodo Country: Niger  
What learned: Nutritional importance of vegetables; new technique of protecting plants from rodents by sunken trap.  
What to do with knowledge: Incorporate new trap into efforts of protecting plants from pests.
8. Name: Fambougourry Diarra Country: Mali  
What learned: The importance of vitamin A.  
What to do with knowledge: Promote vegetables containing vitamin A in course of his gardening extension work.
9. Name: Halidou Badie Country: Niger  
What learned: Techniques for conserving water, such as mulch, sunken beds, surface fertilizer; Vegetable drying.  
What to do with knowledge: Use new water conservation techniques in village extension work. Apply knowledge on vegetable drying to try to alleviate problem of seasonal overabundance of vegetables.
10. Name: Jean Gustave Rouamba Country: Burkina Faso  
What learned: More about nutritional importance of vegetables; methods of avoiding needless waste of seeds.  
What to do with knowledge: Make goal of trying to convince people to eat and further cultivate vegetables and not just to sell them. Use new knowledge of seeds in course of work.
11. Name: Kader Bilali Country: Niger  
What learned: Methods of shade drying of vegetables.  
What to do with knowledge: Introduce to village, specifically by having people preserve cabbage leaves.
12. Name: Mohamed Salek Country: Mauritania  
What learned: About existence and traits of new leafy greens; More about nutrition and understanding food groups and effective food preparation for children.  
What to do with knowledge: Introduce leafy greens learned, if employer permits.
13. Rabiou Housseini Country: Niger  
What learned: Methods of vegetable drying; Extension techniques.  
What to do with knowledge: Try out vegetable drying. Continue efforts in vegetable gardening extension with increased enthusiasm and effectiveness.

14. Sidi Lamine Sidibe Country: Mali  
What learned: How to improve seed planting techniques; Composting; Additional knowledge on shade drying and its application for leafy green vegetables.  
What to do with knowledge: Utilize improved techniques learned.
15. Soumana Thienta Country: Mali  
What learned: Many gardening techniques, such as the use of organic fertilizer to conserve water, good nursery methods, saving of seeds, and others; More on nutrition.  
What to do with knowledge: Effectively follow-up ongoing garden activities of organization. Better collaborate with project nutritionist.
16. Yaya Kone Country: Mali  
What learned: Better methods of nursery planting; More on importance of mulch and association of cultures to conserve water.  
What to do with knowledge: Use new techniques learned, in the case of water conservation particularly helpful to his area, where water is often quite limited.

TRAINEES' PLANS OF ACTION

VITAMIN A GARDENING PROJECT TRAINING PROGRAM JAN. 4 - FEB. 23, 1989

BADIE HALIDON, NIGER

PROBLEM: The water problem especially during March, April and May because the well level falls down during this period of time and the ways they use to increase water level are elementary, that means, traditional since they only use small water drawer, how to solve this problem?

SOLUTION: Thanks to this training of this project, diverse solutions are proposed, for example the mulching, scattering of manure on surface, digging planting beds.

STAGES: Upon my return:

- Contact village leaders.
- Convene a meeting to reorganize all groups.
- Point out meeting goal to participants.
- Inform farmers technical news on learned water conservation.
- Draw farmers' attention on the consumption of leafy vegetables rich in vitamin A.
- Explain to farmers the food value of these crops rich in vitamin A.
- Prepare a demonstration for new crop techniques (right in my place).

PROBLEM: Water problem is one of the major problems known in my place, especially during hot season from end March to May.

SOLUTION: Water conservation by soil preparation.

STAGES: - Mulch planting beds.

- Dig planting bed.
- Planting bed with manure on surface.
- Manure incorporated into soil.

PROBLEM: Spacing problem happened to me in my working site, but it's necessary for the farmers to learn certain preservation techniques.

SOLUTION: Vegetable conservation practices.

STAGES: Drying vegetables and leaves, the transformation of dried potatoes and sweet potatoes flours.

PROBLEM: Consumption of certain vegetables is limited. That is, those as food habits.

SOLUTION: Start classes on nutrition and food value of these crops.

STAGES: Demonstration meeting on preparation of these vegetables and leaves. Explain the food value on these vegetables and leaves to human organism.

MOHAMED SALEK, MAURITANIA

PROBLEM: Popularization of vegetables and leaves rich in vitamin A.

SOLUTION: Making people aware through education and demonstration.

PROBLEM: Conservation of vegetables and leaves rich in vitamin A.

SOLUTION: Education, cooking demonstrations.

PROBLEM: Drying vegetables and leaves rich in vitamin A.

SOLUTION: Drying demonstration.

PROBLEM: Malnutrition of children from 0 to 36 months.

SOLUTION: Follow nutritional advises, demonstration on boiling for weaning, Hygiene, S.R.O.

STAGES: Village courses or meetings.

- See the authorities.
- See village leaders.
- Meeting with the leaders and members of his office and village people.
- Explain subject.
- Explain the importance of subject.
- See their common problems.
- Organizing village people.
- Evaluate their knowledge on the subject.
- Study the environment.
- See materials and their usage.
- Choose place.
- Make demonstration.
- Use those materials available from the village.
- Give results to the participants.
- Individual visits.
- Evaluation.

PROBLEM: Introduction of vegetables and leaves rich in vitamin A., ignorance of food value on leaves.

SOLUTION: To introduce the products I have to make a model garden. Make the women and men aware of and consume what they produce by showing them what I have produced. Give classes to students on vitamin A and nutrition. Visit patients in clinics and encourage them to consume leafy vegetables. See PMI ladies make individual visits to garden program. Also make extension work in agreement with hospital director - this will depend on the attestation given by AVRDC.

STAGES: First give students information and explanation on vitamin A. Then visit patients and those who take care of them to explain vitamin A value. Encourage them to prepare leafy vegetables rich in vitamin A for the patients, invite everyone to build their own garden of amaranth, moringo and others. Especially with the women who come to weigh pods, with malnourished children - in a big hospital in Einiace, at 9 km from Donsé, I can also take the chance to encourage them. Visit each family to give more explanation. I can also change the menu of these family by making prepare a lot of leaves. As to the farmers, I can explain the food value of vitamin A.

I have a lot of ideas to propose on vitamin A that I can not explain in this sheet. I have much to emerge if you can favorite the task. thanks.

#### ACTION PLAN REVIEW

- Actions I will take upon my return to Mauritania.
- If the Project can put at my disposal some method on selecting crop species rich in vitamin A.
- Finance for the necessary truck farming.
- Land.
- Fence.
- Water.
- Necessary material for field work.

#### AFTER THE PRODUCTION

- Cooking demonstration on consumption of vegetables and leaves rich in vitamin A.
- Drying demonstration to avoid loss of vegetables and leaves and for the season when there is no vegetables and leaves.

KADER BILALI, NIGER

PROBLEM: Tomato beds are attacked by aphids and white flies.

SOLUTION: First make observation and analysis to see which product can treat them with dymethocte.

STAGES: Consult the nearest cooperation institute.

#### ACTION PLAN REVIEW

PROBLEM: Application of subject techniques - while preparing beds how to incorporate the organic manure into soil - soil preparation.

SOLUTION: Farmers' awareness on

- Training.
- Demonstration.
- Follow planting density (sowing and transplanting) and spacing between plants.
- Deep plowing.
- Organic manure application well incorporated, watering one or two days before transplanting.
- Consumption of vegetable leaves for vitamin A.

STAGES: Meetings: individual rounds with follow-up on plots - general meeting for method and hold a demonstration.

ALZOUMA DIORI MOUSSA, NIGER

PROBLEM: When I go back, the first chapter of my program will be extension work to the public on the production of nutritious vegetables and consume same to control certain diseases caused by vitamin deficiency. Some diseases lead to night blindness and stomach distending on children and this become very serious. Other vegetables are easy to find in the vicinity of the hut but my people ignore their food value and planting conditions.

SOLUTION: The solution for this problem could be the education work to the farmers on planting practices with demonstration supported by some good methods to attract people.

STAGES: I will start with the first education work, that is, contact village leaders and influential people on the district. Then I pass instructions to them on the method to be learned. Be noted that I already know the place so well, thus I have full confidence in doing this.

#### ACTION PLAN REVIEW

I am an extensionist in CARITAS-Niger project working in Anzourou canton in Tillabéry district. More precisely, the Anzourou canton includes 19 villages.

As my duty I conduct cereal cropping during rainy season and dry/cold season. I supervise the gardening of vegetables like cowpeas, potatoes, lettuces, tomatoes.

To be noted that all gardening activities are preserved to about 230 women.

Upon return to my working site, I plan to cultivate and popularize other crops rich in vitamin A such as corete, moringa, carrot, cabbage.

If CARITAS falls in with my requests regarding working equipment I will try to cover other part of the Anzourou area.

I will popularize other techniques learned in this training like non-chemical control, water-conservation because water is rare in my place, food preservation practices without destroying vitamins, windbreak, mulching.

In any cases I plan to start production if my ONG gives me material support.

Also I plan to contribute to malnutrition control in PMI center if my office agrees.

YAYA KONE, MALI

PROBLEM: Ignorance of planting techniques.

SOLUTION: Theory and practical training on planting techniques.

- Supervisors.
- Beneficiaries.

STAGES: - Information meeting on the techniques.

- \*\* Supervisors.
- \*\* Beneficiaries.
- Demonstration:
  - \*\* experimental bed: nurseries, bed preparation, transplanting, maintenance.
  - \*\* individual bed: follow-up on bed, demonstration according to actual need.
- Activity supervision.
- Evaluation.

PROBLEM: Vegetable overproduction.

SOLUTION: - Group training on preservation practices.

- Creation of marketing structure for preserved products.

STAGES: - Agreement with homologous services.

- Information meeting on preservation.
- Demonstration on preservation practices.
- Consumption on preserved products.
- Follow-up work.
- Evaluation on program of preservation, marketing and consumption of preserved products.

SOUMANA THIENTA, MALI

PROBLEM: Malnutrition.

SOLUTION: - Encourage vegetable cultivation.  
- Produce and consume vegetable leaves.  
- Food balance.

STAGES: - Socioeconomic study on environment.  
- Promote vegetable production.  
- Village meeting (village leaders, young and old groups).  
- Collaboration with intervention services.  
- Demonstration on vegetable arrangement practices.  
- Preparation of vegetable leaves adapted to the area.  
- Training of farmers through visits to research stations or study of successful cases.  
- Culinary demonstration to village women on food categories.  
- Present research results.

PROBLEM: Short of planting practices.

SOLUTION: Gardener retraining, (sowing/planting, transplanting, soil and bed preparation, nursery maintenance).

STAGES: - Information exchange meeting.  
- Methodology demonstration.  
- Individual contact.  
- Technique vouchers.  
- Follow-up.

DEMBA DIALLO, MALI

PROBLEM: Insufficient availability of vegetable crops rich in vitamin A in my place.

SOLUTION: Increase production of vegetables rich in vitamin A by

- Draw rural people's attention (especially that of the women's) to the vitamin A deficiency which causes infantile diseases such as Kwashinhor, marasnic, blindness, etc.
- Encourage consumption of leafy vegetables rich in vitamin A.
- Improve practices of production and preservation of crops rich in vitamin A.
- Introduce new vegetable species or varieties to the unknowns in the area.

STAGES: - First I will make courtesy visits to traditional chief of Koursale village (1st village of our development program) to report him my garden training in Niger. I will also take chance to ask for a meeting with the woman organization members extended to government management committee and female gardeners. Time Schedule: report the development of my 23-FEB-1989 training in IPDR, Kollo)

\*\* Lean on the research subject of preventive aspect of infantile diseases such as blindness, Kwashinhor, marasnic, which cause death of small children from 6 months to 6 years old.

\*\* Assure them of my full availability on technical support which will not fail to be provided because I am now more strengthened than before.

\*\* Propose to village women to cultivate new vegetable species rich in vitamin A as experiment during rainy season or to the unknowns in the area, or to those who ignore their food value (rich in vitamin A).

In case this experimentation is to be conducted we can organize some "open-door days" for the sake of village vegetable growers (women and men) in a radius of 15 km at least.

\*\* Then I will make individual visits and follow-up to garden growers in Kowsole and in surrounding villages (Djoliba, Kirina, Kolé Samayana, Dalekona, Raba, etc)

\*\* Demonstration meeting on balanced food for weaning, especially meals sauced with leafy vegetables or tuber plants, such as yellow-orange sweet potato.

FAMBOUGOURY DIARRA, MALI

PROBLEM: Malnutrition

SOLUTION: Production and consumption/preservation of products rich in vitamin A.

STAGES: Through making-aware meetings and demonstrations on vitamin A.

- Its role in the organism.
- Vegetable consumption.
- Vegetable preservation.
- How to prepare vegetables rich in vitamin A.

SIDI LAMINE SIDIBE, MALI

PROBLEM: Short of nursery techniques.

SOLUTION: Prepare nursery bed with different sowing/planting (in line, broadcast).

STAGES: - Meeting with corporation members.

- Family meeting in the area.
- Nursery demonstration.
- Sowing in line.
- Broadcast.
- Evaluation when emerging.
- Getting their confidence.
- What you will do with new method.

HOUSSEINI RABIOU, NIGER

PROBLEM: Food preservation.

SOLUTION: Drying.

STAGES: Prepare a dryer, this solar dryer made as a tent is a very simple conception and does not cost much and it's easy to use. For not to destroy the vitamin A quality it's better to put the dryer in shadow under a tree then spread the products thus will always keep the vitamin A as fresh.

DODO BADO, NIGER

PROBLEM: Caterpillar attack on cabbage nursery.

SOLUTION: Using neem fruit.

STAGES: - I go to the field to observe the kind of caterpillar.

- Collecting neem fruits.
- Sorting fruits.
- Store in a non-plastic bag put in dry place.
- Demonstration on how to pound and used quantity.
- I let him pound.
- Winnow.
- Put in water for 4 to 6 hours.
- I show him my equipment of 1000 CFA.
- Application demonstration.
- Filter two times with handkerchief.
- Pour liquid into machine and start the treatment, then I give it to him to continue the treatment.
- If the product is left inside the machine, I tell him to treat other unattached garden beds.
- I will tell him if he does not have the machine, he can use a broom.
- This is a product which requires little expenses and without poison.

ABDOULAYE ADAMA OUEDRAOGO, BURKINA FASO

PROBLEM: Vitamin A deficiency.

SOLUTION: Family consumption of vegetables rich in vitamin A.

STAGES: - Diagnostic inquiry on the problem.

- Study on gardening sociological potentials.
- Define the population.
- Working organization and planning, programming, study existing problems, aimed objectives and solutions - promotion methods.
- Find a sponsor to support the program execution.
- Carry out the program, evaluation and modification.

BILGHO JEAN-BAPTISTE, BURKINA FASO

PROBLEM: Ignorance of vitamin A by the public which results in malnutrition. People grow vegetables but don't know the vitamin A value. They sell products in market instead of family consumption.

SOLUTION: Make people aware of the importance of vitamin A, give demonstration, make a model garden, invite others to see it. Show available seeds, encourage consumption of vitamin A rich leafy vegetables by children and women.

STAGES: I will talk about the food value of leafy crops rich in vitamin A, make people aware, encourage cultivation and consumption. If possible give some recipes. Also I will organize a special talk with village women, invite them to make family gardens. I will give example by making a model garden to make them interested when I talk to them. I have one garden with almost all leafy vegetables rich in vitamin A. If possible, go through every family to pass messages and to show advantages of vitamin A.

BARRY MAMADOU, BURKINA FASO

PROBLEM: Production of one sole crop - potato.

SOLUTION: Encourage plantation of other crops in the area (tomato, cabbage, lettuce, carrot, onion, cowpeas, corete).

- STAGES:
- Inform producers the holding of meeting on other vegetable crops other than potato (through village representatives and village group leaders).
  - Meeting: talk to producers about the importance of vegetables and leaves of legumes, fruit, etc.
    - \*\* encourage the combination of several vegetable products in food.
    - \*\* explain (or show) samples of new crops.
    - \*\* explain to farmers proper agricultural practices.
  - Demonstration of agricultural practices in a vegetable area.
  - Individual follow-up on each farmer to control practice application.
  - Evaluation the location, awareness of producers, consumption of new crops.
  - Evaluate the impact of these products to village people.

JEAN GUSTAVE ROUAMBA, BURKINA FASO

PROBLEM: Ignorance of Vitamin A value.

SOLUTION: Crop demonstration to make people aware.

STAGES: - Whom to make aware: administrative authorities, political authorities, traditional authorities, village groups including women, men and young people.

- How to make aware: through meetings (important), demonstration meeting on related agricultural practices and food preparation (for female groups).
- Food preparation: inform the local administration, contact political members in the village and offices of the female/male groups, inviting village people for next meeting through group leader: with exact date, time, place in the circular letter one week beforehand. Prepare in advance the meeting agenda on the subject to discuss. Put summaries together for the meeting.
- Preamble: at the date of meeting, have to: 1. prepare all necessary documents; 2. be punctual (arrive 30 minutes in advance); 3. verify the location of meeting place (for last check); see the place be prepared and if group leader has well done their own work; 4. consider and arrange the position of auditors.
- Materials: invite village people to take their place - men, women, young people, in circle; ask silence by the customary salutation; introduce yourself and the present authorities; start the meeting by making the participants comfortable - a. either by an example aimed on the subject to discuss, or by a proverb on the chosen subject.
- Meeting statement: it's better that the extensionist be clear-headed, tactful and confident in village people and like to stimulate them, create an environment of confidence, know to interrupt those who don't have right to speak, be brief and precise while giving message, know how to ask questions and how the problems come. Note those proposed solutions and analyze situations which will produce results for next meeting.
- End of meeting: shake hands with participants to thank for their participation; avoid introducing the discussions after meeting sessions.

BA AMADOU, MAURITANIA

PROBLEM: Improve agricultural practices.

SOLUTION: Demonstration.

STAGES: - Contact, visit, meeting, etc.  
- Land rent.  
- Planting material.  
- Practices (soil preparation, seeding, spacing, etc).  
- Protection.  
- Seeding.  
- Results.

PROBLEM: Introduction of certain varieties (leafy vegetables).

SOLUTION: Extension work.

STAGES: - Meetings with farmers to introduce the importance of leafy vegetables.  
- Draw working plan.  
- Find technique sources (agricultural practices, protection, etc).  
- Harvest.  
- Consumption.  
- Preservation (for overproduction).  
- Results.

DODO BADO, NIGER

PROBLEM: Insect control.

SOLUTION: Treatment with neem fruit and make people aware of this.

STAGES: - Collect fruits.  
- Select (demonstration).  
- Store a part of fruits in a bag where the air can circulate and put in a non-humid place.  
- Prepare the quantity to use  
- Find pestle and mortar.  
- Slightly pound (demonstration).  
- Winnow (demonstration).  
- Strain (demonstration).  
- Put in water for 6 hours.  
- Restrain with a handkerchief.  
- Put in sprayer.  
- Treatment (demonstration).

PROBLEM: Beetle control on cowpeas fruits.

SOLUTION: Treatment with neem oil.

STAGES: - Shell fruits.  
- Pound grains.  
- Continue pounding until the pestle is with oil spot.  
- Add some water (demonstration).  
- Keep on pounding by adding water progressively until becoming pastry.  
- Remove the pastry.  
- Knead until the oil appear (demonstration).  
- Mix the small box of tomato and bean grains and store it in a bag which contains a rubber inside and is well closed - when we want to eat it, it's easy, just wash the grains and add it to the meal.

BA AMADOU, MAURITANIA

PROBLEM: Production of some seeds (leafy vegetables), promote the consumption, a good water system.

SOLUTION: Extension methods by visit and meeting.

STAGES: - Contact superiors, project leaders, agriculture inspectors, local agencies.  
- Result test for the first year in some villages.  
- After getting results make same process for the following year.

APPENDIX B  
SUMMARY REPORT OF TRAINING PROGRAM  
ATTACHMENT 3  
LIST OF TRAINEES

# ATTACHMENT 3

## STAGE DE PERFECTIONNEMENT DES ENCADREURS MARAICHERS

4 JANVIER - 23 FEVRIER 1989

AVRDC - PROJET HORTICOLE VITAMINE A, IPDR DE KOLLO, NIGER

### NOMS ET ADRESSES DES STAGIAIRES

#### NOMS ET PRENOMS

#### ADRESSE

Abdoulaye Adama Ouedraogo	Agent d'Agriculture Centre Régional de Production Agro-Pastoral (CRPA [ government extension service] ) NORD / YATENGA B.P. 39 Ouahigouya, Burkina Faso (tel 55-02-32)
Alzouma Diori Moussa	Encadreur au Projet CARITAS (Anzourou) B.P. 2381 Niamey, Niger (tél: 73-53-00)
Ba Amadou	Agent de Développement Rural, Lutheran World Federation S/C de L.I.R.A.A. (FLM) B.P. 80 Kiffa (Assaba) R.I. Mauritanie (tél: 529-90)
Barry Mamadou	Fédération de Développement Communautaire (Save the Children USA) B.P. 30 Dori (tél: 66-01-57) Burkina Faso
Bilgho Jean-Baptiste	Moniteur au Centre de Formation des Cathéchistes Ruraux (C.F.C.) Donsé B.P. 90 Ouagadougou Burkina Faso (tél: 30-60-25, Coordinating Organization Ouagadougou)
Demba Diallo	Animateur au Projet Action d'Auto-Développement de Koursalé-Djoliba B.P. 2566 Bamako, Mali (tél: 22-36-87)
Dodo Bodo	Encadreur/Vulgarisateur Agricole Projet Productivité Niamey, Niger S/C Zakou Seybou, Niger Afrique, Niamey, Niger
Fambougoury Diarra	Plan International de Parrainage-Banamba B.P. 1598 Bamako, Mali (tél: 22-40-40 headquarters; 22-20-02 extension 21 field office)
Halidou Badié	Projet Microrealisation Fédération Européenne de Développement (FED) Tillabery, B.P. 56 Niger (tél: 72-30-69, Association Francaise des Volontaires du Progrès)
Jean Gustave Rouamba	Animateur, Sahel Solidarité B.P. 372 Ouagadougou Burkina Faso (tél: 33-63-12)

NOMS ET ADRESSES DES STAGIAIRES

<u>NOMS ET PRENOMS</u>	<u>ADRESSE</u>
Kader Bilali	Secrétaire Général des Anciens Combattants Commune de Tahoua, Niger (tél: 61-05-02, Swissaid)
Mohamed Salek Ould Mohamed El Moctar	Agent de Santé/Agricole, World Vision International, B.P. 335 Nouakchott, Mauritanie (tél: 530-55)
Rabiou Housseini	Vulgarisateur Projet Eglise Evangelique de la République du Niger / Sudanese Interior Mission (EERN / SIM) B.P. 121 Maradi, Niger (tél: 410-450)
Sidi Lamine Sidibé	Animateur au TON villageois ("village council") de Kayo Région de Koulikoro S/C Centre Canadien d'Etudes et de Coopération Internationale (CECI), B.P. 109 Bamako, Mali (tél: 22-48-44, CECI)
Soumana Thienta	Groupe Jeunes / Association Malienne Pour l'Insertion Professionnelle des Jeunes (AMIPJ) B.P. 3179 Bamako, Mali (tél: 22-36-87)
Yaya Koné	Chargé de Programme, ("Program Officer") Aide à l'Enfance Canada, (Save the Children-Canada) B.P. 2976 Bamako, Mali (tél: 22-58-88)

PERSONNEL DE L'AVRDC, PROJET HORTICOLE VITAMINE A,  
B.P. 12820 NIAMEY, NIGER (TELEPHONE 73-50-71, TELEX 5488 NI)

Dr. Jack Gershon, Chef de l'Equipe  
Mlle Anne D. Turner, Horticulteur  
M. Douglas L. Robertson, Formateur Horticole  
M. Amadou Amadou Cissé, Assistant Scientifique  
M. Marou Chaibou, Aide au Champ  
M. Moussa Djibril, Secrétaire  
M. Boubacar Seyni, Chauffeur-Logicien  
M. Issoufou Tchiroma, Agent d'Achats

APPENDIX C  
PROJECT INVENTORY  
ATTACHMENT 1  
ITEMS OF VALUE >\$500; TURNED OVER TO AVRDC

INVENTORY LIST OF VITAMIN A PROJECT PROPERTY  
ABOVE US\$500 TURNED OVER TO AVRDC

1. TAPE BACK-UP SYSTEM, CAPACITY 20 MB, EXTERNAL  
WITH 2 INTERFACES, IRWIN 425, INCLUDING MANUAL,  
SOFTWARE, CABLE
2. Z-NIX PC-1600 IBM PC/XT COMPATIBLE 3088-2 CPU,  
TURBO, INCLUDING HARD DISK, PRINTER, MONITOR AND  
OTHER ACCESSORIES
3. IBM 6705 ELECTRIC III TYPEWRITER

APPENDIX C  
PROJECT INVENTORY  
ATTACHMENT 2  
ITEMS OF VALUE >\$500; TURNED OVER TO IPDR

INVENTORY OF ALL VITAMIN A GARDENING PROJECT ITEMS  
 VALUED AT \$ 500 OR MORE AND TURNED OVER TO THE INSTITUTE  
 PRATIQUE DE DEVELOPPEMENT RURAL, KOLLO, NIGER AT PROJECT  
 CLOSE.

<u>ITEM</u>	<u>AVRDC NO</u>	<u>QUANTITY</u>	<u>TRANSFER DATE</u>	<u>SIGNATURE OF IPDR REPRESENTATIVE</u>
AIR CONDITIONER NATIONAL	VIT A 254	1	- 19-08-89	<i>[Signature]</i> A. U. F.
COMPUTER, IBM PCXT	VIT A 007	1	25/08/89	<i>[Signature]</i> A. U. F.
COPY MACHINE, FUJI XEROX	VIT A 62	1	25/08/89	<i>[Signature]</i> A. U. F.
COPY MACHINE, GESTEINER 2201	VIT A 61	1	25/08/89	<i>[Signature]</i> A. U. F.
ELECTRIC TYPE- WRITER, FACIT 7850		1	25/08/89	<i>[Signature]</i> A. U. F.
ELECTRIC TYPE- WRITER OLYMPIA MASTER TYPE D	VIT A 54	1	25/08/89	<i>[Signature]</i> A. U. F.
mitsubishi pajero station wagons	VIT A 226/267	2	- 29-08-89	<i>[Signature]</i> A. U. F.
REFRIGERATOR ROMMER		1		

*[Signature]*

*[Signature]*

APPENDIX C  
PROJECT INVENTORY  
ATTACHMENT 3  
TOTAL INVENTORY TURNED OVER TO IPDR

INVENTAIRE DES MATERIAUX DE L'AVRDC, PROJET HORTICOLE  
VITAMINE A, RENDUS A L'IPDR DE KOLLO A LA FIN DU PROJET

CATEGORIE DU MATERIEL     MATERIEL DE BUREAU

Inventory list of items turned over to IPDR

DESCRIPTION	AVRDC NO.	LIEU	QUANTITE	DATE DE TRANSFERT	SIGNATURE
					DU RECEPTIONISTE DE L'IPDR
AGRAFE (GRAND) hock	VIT A 80		6 PAQUET	25-08-89	[Signature]
AGRAFEUSE stapler	VIT A 71		1	25/08/89	[Signature]
BASKETBALL	VIT A 87		1	25/08/89	[Signature]
BUREAU POUR MACHINE A TAPER typewriter table	VIT A 009		2	25-08-89	[Signature]
BUREAU SECRETAIRE desk	VIT A 53		1	25-08-89	[Signature]
CADENAS padlock	VIT A 20		2	25/08/89	[Signature]
CAMERA CANON AUTOFUCUS	VIT A		2	25-08-89	[Signature]
CANON MACHINE A TAPER (NO. G 22058259) typewriter	VIT A 264		1 (Panne)	25-08-89	[Signature]
CARTE D'AFRIQUE map	VIT A 128			25-08-89	[Signature]
				25-08-89	[Signature]
CHAISE chair	VIT A 004		9	25/08-89	[Signature]
CHAISE DU SECRETAIRE secretary chair	VIT A 56		1		[Signature]
DIAPOS slides	VIT A 118		27 BOITE	25-08-89	[Signature]
DOCUMENTS/ LIVRES books	VIT A 137			25/08/89	[Signature]
EQUIPEMENTS LABORATOIRE	VIT A 35	laboratory equipment	3 PAQUETS	25/08/89	[Signature]
FOURNITURES DE BUREAU (3 ALBUM POUR LES DIAPOS, 4 TONERS XEROX, 8 BOITES DE DISKETTES, 17 CARTON PAPIER DE MACHINE A TAPER, 3 PAQUETS DE CHEMISE PENDANTES, 1 CARTON D'ETIQUETS, 17 PAQUETS DE PAPIER CARBON, 1 CARTON D'AGRAFE, 1 CARTON DE DATA CARDS, 5 CARTONS PAPIER ORDINA-TEUR, 1 CARTON PAPIER XEROX DE GRANDE TAILLE, 10 CHEMISE EN PLASTIQUE, 3 DOUZAINES DE ROULEAUX DE SCOTCH, 1 PAQUETS PUNAISES, 5 BOUTEILLES DE COL IDEAL, 21 CARTOUCHES POUR MACHINE A TAPER CANON, 2 PAQUETS DE CRAYONS, 1 PAQUET PAPIERS PH, SCOTCH 3 ROLEAU, PAQUET PUNAISES)	VIT A	office supplies		18/08/89	[Signature]

INVENTAIRE DES MATERIAUX DE L'AVRDC, PROJET HORTICOLE  
VITAMINE A, RENDUS A L'IPDR DE KOLLO A LA FIN DU PROJET

## CATEGORIE DU MATERIEL MATERIEL DU BUREAU

<u>DESCRIPTION</u>	<u>AVRDC NO.</u>	<u>LIEU</u>	<u>QUANTITE</u>	<u>DATE DE TRANSFERT</u>	<u>SIGNATURE DU RECEPTEUR-ISTE DE L'IPDR</u>
HORLOGE clock	VIT A 011		1	25/08/89	<i>[Signature]</i>
IMPRIMEUR DE ORDINATEUR	VIT A 265	computer printer	1	25-08-89	<i>[Signature]</i>
INSECTICI.	VIT A 37		3	25/08/89	<i>[Signature]</i>
KODAK EKTAGRAPHIC UNIVERSAL SLIDE TRAY	VIT A 85		1	25-08-89	<i>[Signature]</i>
MACHINE A COPIE GESTETNER (NO. 171J0410)	VIT A 61	copy machine	1	25-08-89	<i>[Signature]</i>
MACHINE A COPIE XEROX (NO. 10493)	VIT A 62	copy machine	1	25-08-89	<i>[Signature]</i>
MACHINE OLYMPIA (NO. 66.200-4584.1)	VIT A 54		1	25/08/89	<i>[Signature]</i>
MICROSCOPE ELCETRONIC	VIT A 009		1	25/08/89	<i>[Signature]</i>
ORDINATEUR MARQUE IBM NO. 5610 *	VIT A 007	IBM computer	1	25/08/89	<i>[Signature]</i>
PENCIL SHARPENER	VIT A 82		1	25/08/89	<i>[Signature]</i>
PHILIPS MAGNETOPHONE (NO. KT 01752103998)	VIT A 70	tape recorder	1	25/08/89	<i>[Signature]</i>
PROJECTEUR MODEL AV 310 ZARF EKTG B-ZAR WITH LENS, 220V, AV 780 SLIDE TRAY MODEL2, ELH LAMP 300 W	VIT A 27	slide projector	1	25/08/89	<i>[Signature]</i>
PUMP A AIR	VIT A 017	air pump	2	25-08-89	<i>[Signature]</i>
SONY MAGNETOPHONE	VIT A	tape recorder	1	25-08-89	<i>[Signature]</i>
QUANTUM/RADIOMETRE/PHOTOMETRE	VIT A 014		1	25/08/89	<i>[Signature]</i>
RALOUNGE	VIT A 26		3	25-08-89	<i>[Signature]</i>
SOIL TEST OUTFIT (TESTEUR DU SOL)	VIT A 34		1	25-08-89	<i>[Signature]</i>
SUPPORT DE PAPIER	VIT A 52		1	25-08-89	<i>[Signature]</i>
TABLE	VIT A 002		4	25-08-89	<i>[Signature]</i>
TABLEAU	VIT A 74	board	1	25/08/89	<i>[Signature]</i>
* AVEC LES PROGRAMMES: WORD STAR 2000, FRAME WORK, MS PROJECT, MSTAT, IBM DOS 3.20	VIT A 007	computer softwares			

INVENTAIRE DES MATERIAUX DE L'AVRDC, PROJET HORTICOLE  
VITAMINE A, RENDUS A L'IPDR DE KOLLO A LA FIN DU PROJET

CATEGORIE DU MATERIEL MATERIEL DU BUREAU

<u>DESCRIPTION</u>	<u>AVRDC NO.</u>	<u>LIEU</u>	<u>QUANTITE</u>	<u>DATE DE TRANSFERT</u>	<u>SIGNATURE DU RECEPTIONISTE DE L'IPDR</u>
TABLE POUR ORDINATEUR	VIT A 003	computer table	1	21-08-89	<i>[Signature]</i>
SOUTIEN DE SCOTCH	VIT A 72	scotch tape	3	21-08-89	<i>[Signature]</i>
TRANSFORMATEUR	VIT A 24	transformer	2	28-08-89	<i>[Signature]</i>
THREE PUNCH HOLE (COUPE- TROUS PAPIER A 3 TROUS)	VIT A 90		1	21-08-89	<i>[Signature]</i>
TWO PUNCH HOLE (COUPE -TROUS PAPIER A 2 TROIS)	VIT A 73		3	21-08-89	<i>[Signature]</i>
VOLLEYBALL	VIT A 88		<del>1</del>	<del>25-08-89</del>	<del><i>[Signature]</i></del>
VOLLEYBALL - NET (FILET)	VIT A 89		1	25/08/89	<i>[Signature]</i>
VOLLEYBALL	VIT A		1	25/08/89	<i>[Signature]</i>
FOOTBALL	VIT A		1	25/08/89	<i>[Signature]</i>

INVENTAIRE DES MATERIAUX DE L'AVRDC, PROJET HORTICOLE  
VITAMINE A, RENDUS A L'IPDR DE KOLLO A LA FIN DU PROJET

CATEGORIE DU MATERIEL      VEHICULES

<u>DESCRIPTION</u>	<u>AVRDC NO.</u>	<u>LIEU</u>	<u>QUANTITE</u>	<u>DATE DE TRANSFERT</u>	<u>SIGNATURE DU RECEPTIONISTE DE L'IPDR</u>
PAJERO MITSUBISHI B 1943 RN 8	VIT A 266	vehicle	1	25-08-89	<i>[Signature]</i>
PAJERO MITSUBISHI B 2123 RN 8	VIT A 267	vehicle	1	25-08-89	<i>[Signature]</i>

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INVENTAIRE DES MATERIAUX DE L'AVRDC, PROJET HORTICOLE  
VITAMINE A, RENDUS A L'IPDR DE KOLLO A LA FIN DU PROJET

CATEGORIE DU MATERIEL PETITS MATERIELS

<u>DESCRIPTION</u>	<u>AVRDC NO.</u>	<u>LIEU</u>	<u>QUANTITE</u>	<u>DATE DE TRANSFERT</u>	<u>SIGNATURE DU RECEPTEUR-ISTE DE L'IPDR</u>
AIWA NOZZLE	VIT A 247		6	21/08/89	<i>[Signature]</i>
ARROSOIRS	VIT A 275	watering can	22	"	<i>[Signature]</i>
ARROSOIRS PLASTIQUES	VIT A 241	plastic watering cans	1 CARTON	"	<i>[Signature]</i>
APPAREIL DE TRAITEMENT	VIT A 286		2	"	<i>[Signature]</i>
DABAT	VIT A 289		21	"	<i>[Signature]</i>
BALANCE	VIT A 57	scales	8	"	<i>[Signature]</i>
BAMBOU	VIT A 229		1 ROLL	"	<i>[Signature]</i>
BINETTES	VIT A 279	hoes	48	"	<i>[Signature]</i>
BROUETTE	VIT A 233	wheel battraw	6	"	<i>[Signature]</i>
BOUL	VIT A 231	bowl	9	"	<i>[Signature]</i>
CISAILLE	VIT A 300	patings	4	"	<i>[Signature]</i>
CISEAUX	VIT A 288	scissors	2	"	<i>[Signature]</i>
CORDE	VIT A 290	cord	3	"	<i>[Signature]</i>
CONTRE PLAQUET	VIT A 266	plate	71	"	<i>[Signature]</i>
CONTRE PLAQUET (PETIT)	VIT A 227	small plate	1 ROLL	"	<i>[Signature]</i>
ENGRAIS	VIT A 237	fertilizers	7 SAC	"	<i>[Signature]</i>
ETIQUETTES	VIT A 301	label	204	"	<i>[Signature]</i>
FOURCHES	VIT A 277	fork	2	"	<i>[Signature]</i>
H. SPRAYER	VIT A 101		2	"	<i>[Signature]</i>
JARRE	VIT A 242	jars	5 CARTON	"	<i>[Signature]</i>
SEAUX METALLIQUE		barrel	5	"	<i>[Signature]</i>
MACHETTES	VIT A 284	machete	2	"	<i>[Signature]</i>
MARMITE	VIT A 296	pot	1	"	<i>[Signature]</i>
MORTEAU	VIT A 295		1	"	<i>[Signature]</i>
METRE	VIT A 119		9	"	<i>[Signature]</i>
PELLES	VIT A 276	shovels	10	"	<i>[Signature]</i>
PETITS POTS EN PLASTIQUES	VIT A 293	plastic pots	62	"	<i>[Signature]</i>
PLANTOIRS	VIT A 122	dibbles	16	"	<i>[Signature]</i>
PLATEAUX	VIT A 243	trays	3 CARTONS	"	<i>[Signature]</i>
PLATEAUX DU BOIS	VIT A 258	VILLA DE L'IPDR	2	17-08-89	<i>[Signature]</i>
BIDON DE PLASTIQUE DE DE 20 LITRES	VIT A	20 liter plastic cans	6	21/08/89	<i>[Signature]</i>
ARROSOIR PETIT ET GRAND	watering cans	VILLA DE L'IPDR	2	17-08-89	<i>[Signature]</i>
DABAT		VILLA DE L'IPDR	1	14-08-89	<i>[Signature]</i>

INVENTAIRE DES MATERIAUX DE L'AVRDC, PROJET HORTICOLE  
VITAMINE A, RENDUS A L'IPDR DE KOLLO A LA FIN DU PROJET

CATEGORIE DU MATERIEL

PETITS MATERIELS

<u>DESCRIPTION</u>	<u>AVRDC NO.</u>	<u>LIEU</u>	<u>QUANTITE</u>	<u>DATE DE TRANSFERT</u>	<u>SIGNATURE DU RECEPTIONISTE DE L'IPDR</u>
PIOCHE	VIT A 299	mattock	2	21/8/89	Acutz
PIQUET /CONTRE PLAQUE	VIT A 249	plate	1 CARTON	"	Acutz
PULVERISATEUR	VIT A 244	sprayer	1 CARTON	"	Acutz
ROULEAU PLASTIQUE	VIT A 295	plastic roller	5	"	Acutz
SAC 15-15-15	VIT A 256	VILLA DE L'IPDR	1	17-08-89	Acutz
SEAUX EN PLASTIQUE	VIT A 232		6	21/08/89	Acutz
SEMENCES	VIT A 248	seeds	1 CARTON	"	Acutz
TAMIS	VIT A 297	sieve	2	"	Acutz
TENTS	VIT A 251		3	"	Acutz
THEMO USUELS	VIT A 298		3	"	Acutz
TONEAUX	VIT A 294		6	"	Acutz
TUYAUX	VIT A 287	pipe	2	"	Acutz
KOMA			19	"	Acutz
RATEAUX			16	"	Acutz
GREINER			1 CARTON	"	Acutz
SAC VIDE		bags	1 CARTON	"	Acutz
POTS			3 SAC	"	Acutz
BOUTEILLE PLASTIQUE		plastic bottles	1 CARTON	"	Acutz
SEMOIRS EN BOIS		wooden seed bag	3	"	Acutz

INVENTAIRE DES MATERIAUX DE L'AVRDC, PROJET HORTICOLE  
VITAMINE A, RENDUS A L'IPDR DE KOLLO A LA FIN DU PROJET

CATEGORIE DU MATERIEL AUTRES MATERIELS

DESCRIPTION	NO.	LIEU	QUANTITE	DATE DE TRANSFERT	SIGNATURE DU RECEPTEUR L'IPDR
CUISINIER MARQUE THERMO	VIT A 252	VILLA DE IPDR	cooker . 1	22-08-89	[Signature]
CUISINIER MARQUE ROYAL	VIT A 270		cooker 1	22-08-89	[Signature]
CLIMATISEUR	VIT A 254	VILLA DE IPDR	air conditioner 1	17-08-89	[Signature]
FILTRE A EAU	VIT A 255	VILLA DE IPDR (1)	2	17-08-89	[Signature]
FRIGIDAIRE MARQUE ARTIKO	VIT A 253	BUREAU (1)	VILLA DE L'IPDR refrigerator 1	17-08-89	[Signature]
FRIGIDAIRE MARQUE ARCTIC	VIT A 64	"	" 1	25/08/89	[Signature]
MACHINE A CALCULER MARQUE ZYX	VIT A 273		calculator machine 1	25/08/89	[Signature]
MACHINE A TAPER (FACIT 7850)	VIT A 271		typewriter 1	25/08/89	[Signature]
REGULATEUR	VIT A 272		regulator 1	25/08/89	[Signature]
FRIGIDAIRE MARQUE ROMMER	VIT A		refrigerator 1	25/08/89	[Signature]
PARA - BRISE	VIT A		1	25/08/89	[Signature]
BON DE ESSENCE	VIT A		petrol coupon 350.000 F CFA	25/08/89	[Signature]

(trois cent cinquante mille francs cfa)

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INVENTAIRE DES MATERIAUX DE L'AVRDC, PROJET HORTICOLE  
VITAMINE A, RENDUS A L'IPDR DE KOLLO A LA FIN DU PROJET

CATEGORIE DU MATERIEL AUTRES MATERIAUX DE CHAMPS

<u>DESCRIPTION</u>	<u>AVRDC NO.</u>	<u>LIEU</u>	<u>QUANTITE</u>	<u>DATE DE TRANSFERT</u>	<u>SIGNATURE DU RECEPTION- ISTE DE L'IPDR</u>
FONTAINE A DEUX POMPE	VIT A 302	fountain	1	26-08-89	[Signature]
PISCINE	VIT A 303		1	26-08-89	[Signature]
MAGASIN A DEUX CHAMBRE	VIT A 304	warehouse	1	26-08-89	[Signature]
DOUCHE W.C.	VIT A 305	shower.	1	26-08-89	[Signature]
TABOURETS	VIT A 306	stools	2	26-08-89	[Signature]
HILLAIRES	VIT A 307		4	26-08-89	[Signature]
APPAREIL TRAITEMENT TRADITIONNEL	VIT A 308	press machine.	2	26-08-89	[Signature]
CAHIER DE TEMPERATURE	VIT A 309	temperature notebook	1	26-08-89	[Signature]
PLANCHETTES (LONGUE ET MOUSTIQUAIRE	VIT A 310	shelf	24	26-08-89	[Signature]
	VIT A 311	mosquito net	13	26-08-89	[Signature]

INVENTAIRE ACHEVE AVEC TOUS LES BIENS CI-MENTIONNES RENDUS PAR LE  
PROJET HORTICOLE VITAMINE A DE L'AVRDC A L'IPDR DE KOLLO

**PROJET HORTICOLE VITAMINE A  
IPDR KOLLO  
BP 12 820 NIAMEY - NIGER**

Reviewed, [Signature] 26/8/89

DR. JACK GERSHON, CHIEF D'EQUIPE, PROJET HORTICOLE VITAMINE A

[Signature] 27-08-89

M. AMADOU AMADOU CISSE, ASSISTANT SCIENTIFIQUE, PROJET HORTICOLE  
VITAMINE A, ET FORMATEUR A L'IPDR

[Signature] 27-08-89

M. HABIBOU DODO, SECTION DES MATERIAUX, IPDR

APPENDIX D  
THAILAND SUB-PROJECT REPORT  
ATTACHMENT 1  
SUMMARY OF ACTIVITIES, 11/1987 - 5/1988

THE STUDY ON VITAMIN A GARDENING IN NORTHEAST THAILAND  
A Summary of activities for the period of November 1987-May  
1988.

I. EXECUTIVE SUMMARY

Year II of the Northeast Vitamin A Gardening project covers the period from November 1987 to October 1988. The activities took place in two northeastern provinces namely Nakhon Rajchasi and Khon Kaen.

1. Activities Conducted

The activities reported are those conducted from November 1987 to May 1988. They are summarized as follows.

1.1 Preparation for field work

In November 1987, the project's first activity was the selection of the project site and farming families to participate in the home gardening program. Two subdistricts, Ban Tum and Dang Yai, in Amphoe Muang, Khon Kaen province, were chosen for the study by purposive sampling. In addition, forty pilot families (20 families per subdistrict) were drawn for gardening demonstration and data collection for economic analysis.

1.2 Visit to pilot families and demonstration of home gardening and food preparation

From December 1987 to May 1988, the research staff visited the pilot gardens twice a month in order to demonstrate gardening techniques, control of diseases and insect pests, and to collect economic data. Two cropping systems of Vitamin A home garden were designed for local conditions-farmer's tastes, nutritional status and natural environment. The first cropping pattern was introduced to the pilot areas in December 1987, while the second in March 1988.

For food preparation, the research staff demonstrated methods of preparing and cooking foods from garden outputs to the pilot families at least once a month. A Handbook for Cooking Vegetable Foods was also produced and distributed to farming housewives.

### 1.3 Survey of gardening performance

Besides daily data collection, an additional survey was conducted at the end of each crop in order to evaluate the gardening performance, the impact of home gardens on farmers' consumption behavior, and the farmers' attitude as well as interest in their home gardens.

## 2. Preliminary Results

### 2.1 Kinds of vegetable and types of garden introduced.

Almost 30 kinds of vitamin A and other vegetables were selected to plant in the gardens.

Two types of home garden were designed and brought to the pilot district. There are an ordinary home garden, 6x6 meter as recommended by the F/FLS project in Bangpae, Ratchaburi province, and a composting garden. Every pilot family was required to set up an ordinary type of garden, and two of them (one from each subdistrict) were requested to add a composting planting bed for demonstration.

### 2.2 Farmers' vegetable preference and their attitude towards cropping system

As mentioned above, after the demonstration of cropping systems in the crops 1 and 2 home gardens, the research staff conducted a survey to find farmers' preference to the kinds of vegetable grown, and their attitude towards the cropping system applied. The results reveal that over 80 percent of them liked most of the crops. Some vegetables grown in the home gardens were disliked by some farmers. They are, for instance, amaranth, cha-ploo, and carrot.

Regarding the cropping patterns, over 90 percent of the farmers like them because of having many kinds of vegetables available to consume, good looks, easy to look after, and a good system for farmers having land constraints. A composting plot is good for farmers who have limited time and water.

### 2.3 The application of factor inputs

The factor inputs applied to the home gardens were labor, fertilizers, chemicals and seed. The labor was supplied by each family. In Ban Tum, the labor working in gardens were male, heads of household, and in Dang Yai, all female housewives. The organic fertilizer used was dried manure from cattle and chicken, produced at home. The inorganic or chemical fertilizers provided by the project for vegetable growing were urea, and fertilizer formulation, N-P-K, 15-15-15. The chemicals applied were Polydon, Azodrin, S-85, and detergent mixed with sugar and water. All of the project's seed were purchased from seed shops in Amphoe Muang Khon Kaen.

### 2.4 The harvest from home gardens

The preliminary results show that a garden could provide 2 to 3 kilograms of vegetables per week on the average during the planting period. The total product harvested per week of kang kong and edible rape was the highest. These two crops could be harvested from the third to seventh week of the cropping period. After the eighth week to the twelfth week, Chinese kale, leaf mustard, coriander, spring onion, kitchen mint, Chinese cabbage, fitweed, and pak choy were cut for daily consumption. The other vegetables grown in the home gardens as mentioned earlier were harvested successively from the thirteenth week of the planting period. In sum, the farmers could have sufficient vegetables for consumption day in/day out without any purchases from the markets.

### 2.5 The problems

Some problems occurred during the demonstration period. They are the intervention of diseases, insects, chickens, and weeds. Sometimes water was insufficient, but not seriously.

## II REPORT OF RESEARCH

### 1. Introduction

#### 1.1 Procedure

This report is of the results for year II of a Study on Vitamin A Home Gardens in the Northeast of Thailand, conducted from November 1987 to October 1988. The activities performed during the period are as follows:

##### a) Preparation for field work in November 1987

The activities were to select pilot areas and the farming families to attend the vitamin A gardening program, and to set up a working plan in cooperation with the local agricultural extension workers. Two subdistricts, Ban Tum and Dang Yai, in Amphoe Muang, Khon province, were chosen by purposive sampling. In addition, 40 pilot families, 20 families per subdistrict, were drawn for gardening demonstration and data collection for economic analysis.

b) Visit to the pilot families and demonstration of home gardening activities and food preparation from December 1987 to May 1988

The research staff visited the pilot gardens twice a month in order to demonstrate gardening techniques to control diseases and insect pests, and to collect daily economic data. Two cropping systems of vitamin A home garden were designed to suit local conditions, farmers' taste and preferences, nutritional status, and the natural environment. The first cropping pattern was introduced to the pilot areas in December 1987, while the second in March 1988.

For food preparation, the research staff demonstrated the process of preparing and cooking foods from the gardens to the pilot families at least once a month. A Handbook for Cooking Vegetable in Thai Dishes, written in Thai, was reproduced for the farming housewives.

c) Survey of gardening performance at the end of each cropping period

Besides daily data collection, an additional survey was conducted at the end of each crop in order to evaluate the home gardening performance, the impact of home garden on farmers' consumption behavior, and the farmers' attitude and interest in their home gardens.

## 1.2 Objectives

The objectives of the research from agricultural, economic and nutritional view-points are as follows:

a) To transfer the new technology of home garden systems developed by Thailand's Farming/Family Living System project, to the pilot study farms in Amphoe Muang Khon Kaen. Emphasis was on new cropping patterns of nutritious vegetables sufficient for home consumption day in/day out, with high profitability on the Economic side, both under appropriate environmental and social conditions.

b) To introduce to the pilot-study farms in Amphoe Muang Khon Kaen gardening by permanent composting planting beds, particularly adapted to dry climate in the Northeast. This type of planting uses water in an efficient manner.

c) To demonstrate the new-cropping system of home garden under the conditions as mentioned in (a) & (b) and to gather daily data for on economic analysis.

d) To demonstrate modern methods of vegetable food preparation to the farming housewives.

## 1.3 Description of Garden Size and Cropping Systems.

The size of the garden is 6x6 squares meters. It is divided into three plots, 1x4 m<sup>2</sup> each. The space between plots is for path ways, 0.4x4 m<sup>2</sup>. All plots were surrounded with a path, 0.5x5 m<sup>2</sup>, and followed with planting beds, 0.5x6 m<sup>2</sup> on each side of the garden next to a garden fence. For a composting bed, the size is 1x4 m<sup>2</sup>.

About 30 kinds of vegetables were selected to plant in the gardens. They are kang kong, Chinese cabbage, bird pepper, Chinese kale, pak-choi, tomato, carliander, snake eggplant, amaranth, edible rape, hot pepper, fitweed, Cha ploo, Indian penny wort, sting weeds, spring onion, kitchen mint, Pait-sai, sweet basil, basil, sacred basil, carrot, lettuce, yard long bean, etc.

## 2. Evaluating Home Gardening Performance

### 2.1 Farmers' Preferences to Vegetables and Attitude Towards Cropping System

At the end of the demonstration period of both crop 1 and crop 2, (Figures 1 and 2) a survey of the farmers' preferences to vegetables and their attitude towards home gardening was conducted. The results revealed that over 80 percent of the farmers liked leaf mustard, Chinese kale, coriander, edible rape, bird pepper, Chinese Cabbage, spring onion, kitchen mint, and pai-tsai. These kinds of vegetable are good as supplementary food, have high nutrients for health, and are easy to grow. In addition, most farmers are fond of eating vegetables.

Certain vegetables grown in the home gardens were disliked by some farmers. Those crops were, for instance, amaranth, Cha-ploo, and carrot. The farmers were not used to the taste and smell. Consequently, they gave the unpreferred vegetables to neighbors and/or sold them.

Regarding the cropping patterns, over 90 percent of the farmers liked them because of having more kinds of vegetable for consumption, good looks, easy to look after, and less land needed. A composting planting bed was appropriate to farmers who have limited time and water supply problem.

### III Economic Analysis

#### 2.2 Total Costs and Returns of Vegetable Production

The costs and returns of vegetable production are calculated for 3 main plots, on the basis of per cropcycle, and per kilogram. The results are as follows:

##### 2.2.1 Costs and Returns per cropcycle.

On the average, a garden in Crop I supplied 45.76 kilograms of vegetables valued at 537.17 baht per cropcycle. The cash variable cost was 39.61 baht per cropcycle. After subtracting the cost from the value of total product, the net profit was 497.56 baht per cropcycle. On the average, 26.98 hours of labor were required in a home garden per cropcycle. So, the returns to labor for home gardening was 18.51 baht per hour (Table 1).

A garden in crop II supplied 21.78 kilograms of vegetables valued at 375.29 baht per cropcycle. The cash variable costs was 329.19 baht. Labor time required to produce vegetables in crop II was 27.76 hours. Thus the return to labor was 12.12 baht per hour (Table 2). The net profit and return to labor for homegarden in crop II is less than those of crop I because of low crop yields in the summer time of crop II.

##### 2.2.2 Costs and returns per kilogram.

In comparison among vegetables grown in the project, Pai-tsai gave the highest yield at 8.69 kilograms. The yields of edible rape, kang kong, pak choi, leaf mustard and chinese kale were 6.00, 5.22, 4.52, 4.42, and 4.36 kilograms, respectively (Table 3). All of them were vitamin A vegetables.

When computing the costs and returns per kilogram of individual vegetables, it appears that the cash variable costs of pai-tsai and eggplant/was the lowest, ~~0.27~~ 0.27/kg. Celery was the highest at ~~8.38~~ 8.38/kg. The profit gained from celery, carrot, mustard green, and pak choi were 31.62, 29.80, 28.50, 20.57, and 19.23 baht/kg, respectively. In summary, the profit gained from celery was the highest because in this season celery can not grow well so the price is very high, and pai-tsai was the lowest because the price of pai-tsai was very low that time (Table 3).

Table 1 Costs and Returns of vegetable production per garden\* in crop I (Nov.87-Jan.88), Dangyai and Bantum subdisytricts, Khon Kaen province.

Unit: B/cropcycle/garden

Item	Dangyai	Bantum	Average
Total product (kg)	46.65	44.86	45.76
Total value product	514.24	560.10	537.17
Cash variable cost:			
Seed	17.90	17.90	17.90
Fertilizers	10.06	10.06	10.06
Chemicals	11.65	11.65	11.65
Total cash variable costs	39.61	39.61	39.61
Netprofit over variable costs	474.63	520.49	497.56
Total hours labor required(hr.)	25.46	28.33	26.89
Netprofit/hours of lagor	18.64	18.37	18.51

\*Including vegetables only in 3 main plots

Table 2 Costs and Returns of vegetable production per garden\* in crop II (Feb.88-May 88), Dangyai and Bantum subdistricts, Khon Kaen province.

Unit: B/cropcycle/garden.

Item	Dangyai	Bantum	Average
Total product (kg)	20.75	22.80	21.78
Total value product	349.02	401.55	375.29
Cash variable cost:			
Seed	24.38	24.38	24.38
Fertilizers	10.06	10.06	10.06
Chemicals	11.65	11.65	11.65
Total cash variable costs	46.09	46.09	46.09
Netprofit over variable costs	302.93	355.46	329.19
Total hours labor required(hr.)	30.90	24.61	27.76
Netprofit/hours of labor	9.80	14.44	12.12

\*Including vegetables only in 3 main plots.

Table 3 Average costs and returns of vegetable production per kilogram, Muang Khon Kaen district, Khaon Kaen province, 1987-88

Item	Total product (kg)	Total value product (B)	Cost/kg (B)	Profit/kg (B)
Chinese kale	4.36	39.68	0.55	8.55
Kang kong	5.28	25.50	1.30	3.53
Edible rape	6.00	60.00	0.34	9.66
Leaf mustard	4.42	33.12	0.64	6.85
Coriander	3.91	113.00	0.40	28.50
Eggplant	3.44	22.44	0.27	6.25
Hot pepper	1.38	24.49	0.65	17.10
Bird chili	1.67	26.20	0.56	15.13
Tomato	2.92	23.89	0.70	7.48
Spring onion	2.18	28.26	5.83	7.13
Pai-tsai	8.69	28.22	0.27	2.98
Pak choi	4.52	90.44	0.78	19.23
Celery	0.80	40.00	8.38	31.62
Yard long bean	2.60	23.03	1.06	7.80
Mustard green	1.20	27.00	1.93	20.57
Lettuce	3.34	44.36	0.47	12.81
Carrot	2.49	77.63	1.38	29.80

#### IV NUTRITIONAL ANALYSIS

##### Nutritional Aspect of Home Garden for Vitamin A

Food consumption of 40 families living in Bantum and Dangyai districts, Khonkaen province, were recorded at least 3 days before and after growing vegetables. Those food items as tabulated in table 1 were consumed per day per person, were not much different in varieties and amount between pre-and post home garden. However, vegetable and fat consumption were

Table 1. Average food intake per person per day of both districts

Food items	Pre-Home Garden		Post-Home Garden	
	Amount (gm)	%	Amount (gm)	%
Meat:pork	28.21 + 12.60	3.88	24.33 + 12.87	2.90
beef	11.34 + 19.71	1.56	12.77 + 15.11	1.52
poultry	26.17 + 16.62	3.60	33.37 + 12.63	3.98
fish	41.08 + 34.69	5.65	51.41 + 28.42	6.13
Vegetables	125.29 + 53.62	17.24	292.61 +103.36	34.87
Fat and oil	22.17 + 12.18	3.05	43.87 + 29.48	5.82
Rice and starch	369.84 + 55.51	50.86	257.78 + 21.31	30.72
Fruits	102.71 + 22.58	14.13	117.98 + 18.16	14.06
<b>Total</b>	<b>726.81 +165.11</b>	<b>100</b>	<b>839.12 +181.13</b>	<b>100</b>

increased while rice intake was decreased. All of intake was calculated for nutrient consumption by means of food composition table <sup>1/</sup>. The result indicated that energy protein and carbohydrate intake during pre-home garden were nearly equal amount to the intake during post-home garden period. Only fat and vitamin A consumption were higher in the second period (Table 2). This may be due to the nutrition knowledge given to them once a month during food preparation demonstration. About 20 recipes were modified to use the home garden vegetables as ingredient. All of these recipes were typed in Thai. The knowledge was emphasized on vitamin A's function, source of vitamin A from vegetables and effect of dietary fat on  $\beta$ -carotene absorption. Since the caloric distribution of the diet consumed before giving nutrition knowledge derived from dietary carbohydrates 71.31%, fats 18.41% and proteins 10.28%. Therefore, the farmers and housewives were encouraged to take a little bit more dietary fat

<sup>1/</sup> Food Composition Table of 100 grams edible portion  
1987.Public Health Ministry, Bangkok.

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or at least 20% of the total energy requirement. According to Kamtrakul (1988) <sup>2</sup> this level of dietary fat significantly improved  $\beta$ -carotene absorption while fat at a level of 30% of the total energy did not significantly differ from 20% of fat. To avoid the coronary heart disease or risks of high fat intake, fat at a level of 20% of calories was more preferable level. At the end of the project, the nutrient intake was evaluated. It was indicated that the energy contribution of carbohydrate, fat and protein were 59.20%, 33.9% and 11.17%, respectively the proportion of this energy contribution was better than pre-home garden period, but fat intake was quite higher than expectance. Therefore, it is suggested that dietary carbohydrates should be increased rather than protein. Because of their cost and the fact that proteins in foods are usually accompanied by fats. For vitamin A, the intake during post-home garden period was almost two times higher than the pre-home garden period's. However, it could not conclude that the total amount of vitamin A intake was absorbed because vitamin A absorption was not only depended on dietary fat but also depended on other factors such as nutritional status etc. Anyhow, among the studied subjects nobody had clinical sign of hypercarotenosis. This amount of intake meets the recommended daily dietary allowance for male, 23-50 years of age (1,000 R.E).

Table 2 Average nutrient intake per day per person during pre-and post-home garden.

Nutrients	Duration Time of Intake		
	Pre-Home	Garden	Post-Home Garden
Energy (kcal)	2092.69 + 640.74		2197.21 + 767.22
Protein (gm)	53.71 + 20.40		58.84 + 28.93
Fat (gm)	42.77 + 30.97		79.37 + 33.33
Carbohydrate (gm)	327.73 + 131.28		311.88 + 140.19
Vitamin A (RE <sup>3</sup> )	566.98 + 207.23		1084.74 + 258.92

The nutrients provided by 17 varieties of vegetables are shown on table 3 and 4. From both districts' home-gardens, carrot provided the highest amount of vitamin A, 92044 RE. per crop per

<sup>2</sup>/ Kamtrakul, R. 1988. Effects of dietary fat and  $\beta$ -carotene from green leafy vegetable supplementation on vitamin A nutrition in pre-school children. Thesis MS (Nutr.) Mahidol Univ.

<sup>3</sup>/ R.E = Retinol Equivalent

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Table 3 Nutrients provided by home garden vegetables per family in Bantum district, Khonkaen Province, 1988.

Vegetables	Total Product (kg.)	Total Value (Baht)	Nutrient Production								
			Energy (kcal)	Fat (gm.)	CHO (gm.)	Fiber (gm.)	Prot. (gm.)	Ca (mg.)	Fe (mg.)	Vit A (RE)	Vit C (mg.)
Chinese kale	4.72	42.96	1652	19	321	57	142	10856	94	39648	4390
Kangkong	4.46	21.54	1338	40	98	58	143	1338	54	26020	624
Edible rape	6.04	60.40	1450	6	199	42	145	3866	79	19781	5557
Leaf mustard	3.58	26.86	859	14	154	36	86	5728	97	10890	2613
Coriander	4.86	140.45	1798	29	355	78	126	6464	219	23168	3791
Snake Egg plant	2.36	16.52	614	7	116	21	21	448	61	835	71
Hot pepper	1.38	24.49	773	11	126	52	44	166	15	29601	1380
Bird chilli	1.45	22.76	986	29	122	109	60	1102	23	12728	464
Tomato	2.00	16.40	400	6	84	14	24	140	12	1684	460
Spring onion	1.82	23.66	655	4	149	22	27	928	18	3640	582
Paitsai	4.84	31.43	871	5	121	24	82	5856	63	1694	2081
Pakchoi	5.33	106.68	3251	16	778	48	133	9807	64	22386	426
Celery	0.06	13.72	12	tr.	1	1	1	56	8	195	27
Yard longbean	2.54	21.18	965	5	208	38	71	1067	23	1448	559
Amaranth	1.20	27.00	561	10	80	12	62	4092	49	15430	1440
Lettuce	3.62	48.15	760	7	120	29	58	2968	141	17890	109
Carrot	2.85	89.00	1563	11	353	26	37	1710	49	52782	257
<b>Total</b>	<b>53.11</b>	<b>733.20</b>	<b>18468</b>	<b>219</b>	<b>3385</b>	<b>667</b>	<b>1262</b>	<b>56592</b>	<b>1069</b>	<b>279820</b>	<b>24831</b>

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Table 4 Nutrient provided by home garden vegetables per crop per family in Dangyai district, Khonkaen Province, 1988.

Vegetables	Total Product (kg.)	Total Value (Baht)	Nutrient Production								
			Energy (kcal)	Fat (gm.)	CHO (gm.)	Fiber (gm.)	Prot. (gm.)	Ca (mg.)	Fe (mg.)	VitA (RE)	Vit C (mg.)
Chinese kale	4.00	36.40	1400	16	272	48	120	9200	80	33600	3720
Kangkong	6.10	29.46	1330	55	134	79	195	1830	73	35587	854
Edible rape	5.96	59.60	1430	6	197	42	143	3814	78	19519	5483
Leaf mustard	5.25	39.38	1260	21	226	53	126	8400	142	15971	3833
Coriander	2.96	85.54	1095	13	216	47	77	3937	133	14110	2309
Snake Egg plant	4.52	23.36	1175	14	222	41	41	859	118	1600	136
Hot pepper	1.38	24.49	773	11	126	53	44	166	15	29601	1380
Bird chilli	1.89	29.64	1285	38	166	142	78	1436	30	16590	605
Tomato	3.83	31.37	766	12	161	27	46	268	23	3225	881
Spring onion	2.53	32.85	911	5	208	30	38	1290	25	5060	810
Paitsai	3.85	25.01	693	4	96	19	66	4659	50	1348	1656
Pakchoi	3.71	74.20	2263	11	542	33	93	6826	45	15582	297
Celery	0.09	20.52	20	1	2	1	2	84	13	325	45
Yard longbean	2.65	24.88	1007	5	217	40	74	1113	24	1511	583
Amaranth	1.20	27.00	516	10	80	12	62	4092	49	15430	1440
Lettuce	3.05	40.56	641	6	101	24	49	2501	119	15073	92
Carrot	2.12	66.25	1166	9	263	19	28	1272	36	39262	191
<b>Total</b>	<b>55.09</b>	<b>675.51</b>	<b>18231</b>	<b>242</b>	<b>3229</b>	<b>710</b>	<b>1282</b>	<b>51747</b>	<b>1053</b>	<b>263394</b>	<b>24315</b>

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Table 5 Comparative average relative nutrient cost of vitamin A produced from both districts' home gardens per crop per family.

Vegetables	Production Cost (Bath)	Relative Nutrient Cost of Vitamin A	
		Bantung's H G (Bath/1,000 RE)	Dangyai's H G (Bath/1,000 RE)
Chinese kale	2.38	0.0600	0.0708
Kangkong	6.88	0.2644	0.1933
Edible rape	2.01	0.1016	0.1030
Leaf mustard	2.82	0.2590	0.1766
Coriander	1.57	0.0678	0.1113
Snake Eggplant	0.94	1.1258	0.5875
Hot pepper	0.90	0.0304	0.0304
Bird chilli	0.94	0.0739	0.0567
Tomato	2.04	1.2114	0.6326
Spring onion	12.72	3.4945	2.5138
Paitsai	2.32	1.3695	1.7211
Pakchoi	3.50	0.1564	0.2246
Celery	1.07	5.4872	3.2923
Yard longbean	2.76	1.9061	1.8266
Amaranth	2.32	0.1504	0.1504
Lettuce	1.57	0.0878	0.1042
Carrot	3.44	0.0652	0.0876
Total	50.18	15.9114	11.8828

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family, even though the total production was only 4.97 kg. while 10.56 kg. of kangkong provided 61607 R.E of vitamin A. However, kangkong was more preferable among the farmers than carrot. This was due to that carrot was not a local vegetable and they did not familiarize themselves with it's odour, even it was used instead of papaya in local salad. They could accept the taste of carrot only when it was dipped in the flour paste and fried. Therefore, to introduce the new variety of vegetable with high content of vitamin A has to take time for the subjects to familiarize with. From this research, breeding the local vegetable for high vitamin A content is suggested.

The total vitamin A production per crop per family of home gardens was 543,214 R.E. Other nutrients' yield per crop were 36,699 kcal of energy; 461 gm of fat, 6614 gm of calcium, 2122 mg of iron and 49146 mg of vitamin C. The comparative nutrient production of Dangyai's and Bantum's home gardens, was found that the total amount of each nutrient produced was nearly equal amount. For relative nutrient cost of vitamin A (Table 5), hot pepper showed the lowest cost per 1,000/RE of vitamin A; while celery showed the highest value, although the production cost of spring onion was 12.72 bath higher than production cost of hot pepper and celery, 11.82 and 11.65 bath, respectively. Comparison between the relative nutrient cost of vitamin A of both districts' home gardens showed that Dangyai's home garden gave the higher relative nutrient cost for chinese kale, edible rape, coriander, paitsai, pakchoi and carrot. Whereas, Bantum's home garden gave the higher relative nutrient cost for kangkong, leaf mustard, snake eggplant, bird chilli, tomato, spring onion, celery, yard longbean and lettuce. Total production cost of home gardens' vegetables per crop per family was 50.18 bath. In conclusion, hot pepper, chinese kale and carrot have given the lower relative nutrient cost of vitamin A produced from home gardens, since the project on home garden for vitamin A has been done.

Galanga		Chinese Cabbage (or Ginger)		Pak Choi		Galanga						
Basil	Kang kong	Chinese kale	Kang kong	Chinese Kale	Edible rape	Mustard green	Edible rape	Snake eggplunt	Hot pepper	Bird pepper	Tomato	Wild betal leaf bush (Cho plo)
Sweet basil												Indian penr wart
Sacred basil												Sting weeds
Pai- tsai												Fit weed
Chinese Cabbage												Amaranth
Cha-Om	Kitchen mint Cha-Om	Cha-Om	Cha-Om	Spring onion Cha-Om	Cha-Om							

Figure 1 Cropping pattern of home garden from December 1987 to February 1988.

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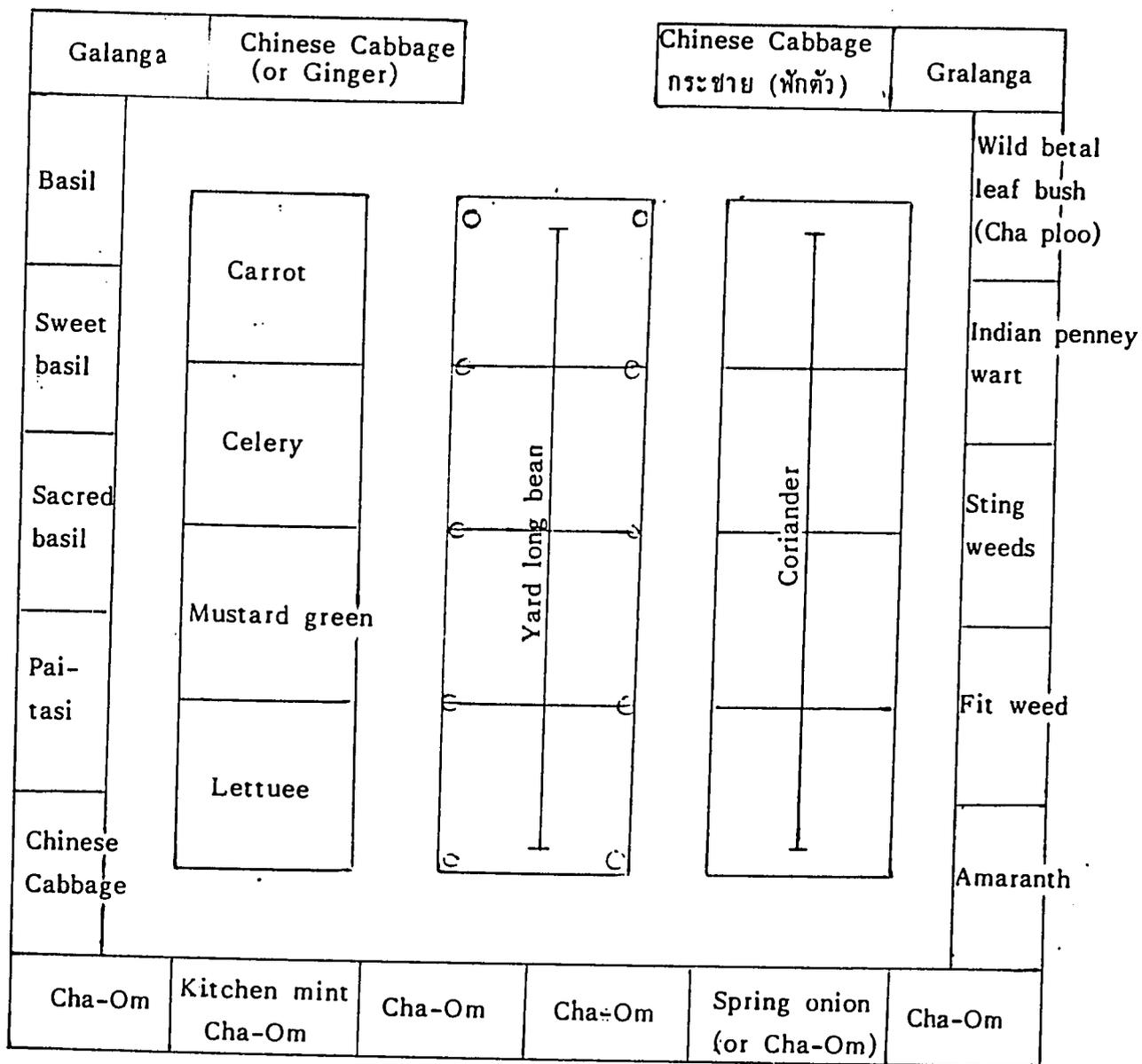


Figure 2 Cropping pattern of home garden from March to May 1988.

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APPENDIX D  
THAILAND SUB-PROJECT REPORT  
ATTACHMENT 2  
DESCRIPTION OF KHON KAEN EVALUATION WORKSHOP

## Vitamin A Gardens Evaluation Workshop

DATE: 17-18 November 1989

VENUE: Kosa Hotel, Khon Kaen, Northeast Thailand

PARTICIPANTS: total 56

- AA. Ministry of Education (34)
  - 16 School Head Masters (3 each from Kalasin, Chaiyaphum, Korat, Mahasarakham & Roist Provinces and 1 from project school)
  - 16 School teachers
    - 1 District education officer from Korat (project area)
    - 1 Representative of Ministry of Education
- BB. Ministry of Agriculture & Cooperatives (8)
  - 5 Assistant provincial agricultural officers (one each from the above 5 provinces)
  - 2 Agricultural extension officers from NE office
  - 1 Agricultural extension officers from Bangkok
- CC. Mahidol University's Institute of Nutrition
  - 3 Officers
- DD. NGOs (4)
  - 3 CRS-Nong Khen School Gardens Project
  - 1 Bua Yai Children Malnutrition Project
- EE. Kasetsart University Vitamin A Gardens Project (7)
  - 5 Researcher
  - 2 Research Assistants

### MAIN OBJECTIVES

To evaluate the Vitamin A Gardens & School Lunch Program under study and its applicability to other schools in NE Thailand.

### CONCLUSION/RESOLUTION

It is agreed that the special emphasis of the Project on producing Vitamin a vegetables for school lunches is the key to success to having nutritious school lunches on a sustained basis. The vegetables produced in the school gardens of the pilot project become the lunch ingredients. Some vegetables are also a source of income for buying additional protein ingredients for school lunches. This model can be adopted by primary schools throughout NE Thailand.

Dr. Chamnien Boonma  
November 22, 1989

## THE ROLE OF VITAMIN A GARDENS IN IMPROVING THE NUTRITION OF RURAL PEOPLE IN DEVELOPING COUNTRIES

Dr. Jack Gershon, Consulting Nutritionist  
Asian Vegetable Research and Development Center

It is an accepted fact that vitamin A, if introduced into the body early enough and taken on a sustained basis, can prevent blindness brought on by the deficiency disease xerophthalmia.<sup>1</sup> Preformed vitamin A in the form of retinol occurs only in foods of animal origin such as fish, eggs and liver. These foods are often not available or are too expensive to many people in the developing world. As a result, xerophthalmia can develop, especially in children. It has been reported that as many as five million Asian children develop xerophthalmia each year.<sup>2</sup> Various interventions have been undertaken to combat vitamin A deficiency: distribution of vitamin A capsules (often referred to as "magic bullets"); nutrition rehabilitation at clinics; and fortification of foods with vitamin A (e.g., monosodium glutamate--or MSG). These can be never-ending types of interventions, and may be expensive when administrative and distribution costs are considered. But they are certainly most effective and are accepted cures for the problem.

There are cheaper and more readily available food sources of vitamin A. These are provitamin A carotenes found in plant foods, from which the body can synthesize vitamin A. Yellow and orange fruits and vegetables and green-leafy vegetables (GLVs) are excellent sources of carotene.<sup>3</sup> When these vegetables and fruits are incorporated into small home gardens they can make a significant contribution to the vitamin A needs of an Asian family of five.<sup>4,5</sup>

Small amounts of nutritious garden crops, eaten by families on a daily basis, may improve a family's overall nutrition. Recent research into the problem of vitamin A deficiency has shown a linkage between xerophthalmia and mortality. An Indonesia study found that the mortality rate among children with mild xerophthalmia was 4-12 times the rate of children without xerophthalmia.<sup>6</sup> This suggests that not only blindness from xerophthalmia can be reduced if a person eats more foods rich in vitamin A or provitamin A, but overall child mortality can be reduced by eating garden crops such as those grown in Kasetsart University's vitamin A gardens.<sup>7,8</sup>

But how does one get people to eat the increased amounts of nutritious foods they produce? One answer to that question may surface during this workshop.

We are gathered here today to review and evaluate Kasetsart University's gardening activities in its collaborative effort with AVRDC to increase levels of production and consumption of vitamin A gardening crops in Thailand. Let us take a brief look at what has been accomplished so far:

1. 1983-86. Kasetsart and AVRDC initiated gardens research and then started a village gardens study in Bangpae, to evaluate the research in real-life settings. During the study the team developed methods for planning, implementing and evaluating a Thailand home garden, as well as incorporating a garden's output into traditional Thai diets.
2. 1986. Based on the Bangpae research, the team produced a how-to-do-it gardening manual covering topics from production through consumption.
3. 1987. The pilot gardens were transferred to the northeast of Thailand, where there is vitamin A deficiency.
4. 1987-88. The gardening manual has been used as a tool in training workshops conducted in collaboration with the Thai Department of Agricultural Extension (DOAE), to train agricultural officers and extension agents, who in turn work with rural families to promote increased levels of production and consumption of home garden crops.
5. 1988-89. The home garden concept was expanded to include school gardens, with a pilot school garden started at the Nondoo School, in Bua Yai. The production through consumption theme exists here too, as schoolchildren grow garden crops and eat them in school lunches.

In six short years the team's efforts have resulted in a number of reports, and many agriculturists have attended the training workshops. There is no question as to the value of these efforts. But the real value of the whole six years--and it should be decided at this workshop--may be in the education benefits rural villagers have received in the home garden phase of the project, and the education benefits they will receive in the future as the team's concept of a school garden further develops in Thailand.

In the early years the team conducted cooking demonstrations, educating Bangpae families in how to incorporate nutritious garden crops into the daily foods they eat. The team then added this education technique to the how-to-do-it gardening manual, subsequently using the manual to train Thai agriculturists in ways to educate rural families. More recently the team has expanded the education idea into perhaps its most natural setting--in schools, where children can have hands-on experience in learning the value of nutritious garden crops, as well as eat them. The children in turn can spread this information to their families.

Why is education so important? Why must we go beyond increasing production levels of nutritious garden crops among rural Thai families? One answer lies in the geographic distribution of vitamin A deficiency throughout the world. It shows that the problem occurs for the most part in the tropics,

where local GLVs and other yellow and orange fruits and vegetables are plentiful. It is a case of deficiency amidst plenty. This suggests that many people in tropical regions of the world develop vitamin A deficiency not from a lack of availability of the right foods, but because they may not know which foods are best for them to eat. In other words they are not informed. This may be especially so among mothers--who are the 'gatekeepers' of a family's daily food intake. Educating mothers, either directly or from ideas brought home by their children, can contribute to a family's overall quality of life.

A recent survey reported that "research from 46 developing countries has described that a 1% rise in women's literacy has 3 times the effect of a 1% rise in the number of doctors on deaths of children in the first year of life." <sup>9</sup> This implies that the better educated a mother is, the better the health of her children. This concept can of course be expanded to a general statement that should be a concern of this workshop: a better educated mother will know the value of vitamin A garden crops, and her increased knowledge will motivate her to use these foods more often in her family's diet, and thus reduce the risk of infant mortality in her family.

As we spend these few days reviewing and evaluating the team's efforts I urge you to keep in mind this underlying educative value of the project. In the long run, a well-informed mother could be the best 'magic bullet' available for alleviating nutritional deficiency among rural people in developing countries.

Keynote speech given at the Thailand Vitamin A Gardens Project evaluation workshop, Kosa Hotel, Khon Kaen, Thailand, November 16-18, 1989.

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