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9. ABSTRACT
In October 1976, the League for International Food Education (LIFE) conducted a workshop at Santa Barbara, California, as a forum to exchange views on family food production efforts by private voluntary organizations and members of the agricultural science community. One purpose of the workshop was to review the state of the art of the French Intensive/Biodynamic Gardening technique for its applicability to Third World countries. This report presents the addresses, group reports, and summaries of discussions conducted during the three-day workshop. Some fifty participants explored the idea that a small-scale, low-input, high-output system of food production might be an appropriate technology to improve nutrition for many of the poorest families in the world. The reports of the working groups emphasized the importance of recognizing resource limits in Third World countries, of beginning with an assessment of local needs, and of understanding the socio-cultural and environmental context of any proposed work program. They also stressed the value of establishing an open program of delivery systems to spread the theory and practice of small-scale intensive food production. Neither the agricultural scientists nor the organic gardeners changed their opinions about the values or dangers of using chemical fertilizers and pesticides. They interpreted small-scale intensive food production, not as a competitor of large-scale commercial agriculture, but as a supplement or alternative approach to improve the well-being of poor families. They also agreed that if intensive food production techniques were integrated with a philosophy based upon the relationship of man and nature, the method would be most effective in less developed countries. LIFE now needs to formulate a plan for field testing the validity of small-scale intensive food production under a variety of tropical conditions.

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Small Scale Intensive Food Production

Improving the Nutrition of the
Most Economically Disadvantaged Families

WORKSHOP PROCEEDINGS

October 24-27, 1976

Santa Barbara, California U.S.A.

SMALL SCALE INTENSIVE FOOD PRODUCTION

Report
of a
Workshop
on
Improving the Nutrition
of the
Most Economically Disadvantaged Families

Sponsored by

LEAGUE FOR INTERNATIONAL FOOD EDUCATION

in cooperation with

Direct Relief Foundation
Santa Barbara Community Environmental Council
International Institute for Urban and Human Development

La Casa de Maria
Santa Barbara, California

October 24-27, 1976

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FOREWORD

The League for International Food Education (L.I.F.E.) is a consortium of professional societies whose members volunteer their expertise to assist people working on nutrition and food technology problems in the less developed countries. One of L.I.F.E.'s objectives is to identify ways of improving the nutritional status of the "poorest majority" through increased linkages between the less developed countries, U.S. private voluntary organizations, and the L.I.F.E. consortium societies.

The L.I.F.E. Workshop on Small Scale Intensive Food Production--and the L.I.F.E. Family Food Production Proposal that served as the Workshop's focus--was an attempt to achieve that objective. For three days members of the American Society of Agronomy and representatives of a dozen private voluntary organizations, together with experts in French Intensive/ Biodynamic Gardening and other resource persons, explored the idea that a small scale, low input, high output system of food production might be an appropriate technology to improve nutrition for many of the poorest families in the world. This report is a summary of those three days.

L.I.F.E. is funded under a contract with the Office of Nutrition, Bureau for Technical Assistance, U.S. Agency for International Development. However, financial assistance in the form of a grant from Private Agencies Collaborating Together (PACT) was essential to the success of the workshop, as was a contribution from an anonymous donor that enabled participants to attend from Ecuador and Honduras.

Hugh J. Roberts
Washington, D.C.
December 1976

SUMMARY

The Small Scale Intensive Food Production Workshop sponsored by the League for International Food Education (L.I.F.E.) was a milestone event in the cause of improved nutrition among the world's most impoverished families. The workshop, held October 24-27, 1976, at La Casa de Maria, Santa Barbara, California, served as a forum for an exchange of views, information, and experiences related to family food production efforts by private voluntary organizations (PVOs) and members of the agricultural science community. More specifically, it was the special occasion for reviewing the state of the art of the French Intensive/Biodynamic Gardening technique and for assessing its applicability to Third World countries.

The meeting was highly productive, and the success can be attributed directly to

1) the leadership of Dr. Hugh J. Roberts, Executive Director of L.I.F.E.,
2) the cooperation of the Santa Barbara Community Environmental Council, the Direct Relief Foundation, and the International Institute for Urban and Human Development, and
3) the active involvement of the fifty agricultural scientists, practitioners, resource persons, and PVO representatives attending the workshop.

The substance of the three-day meeting was self-evident and the spirit of the workshop was characterized by openness and responsiveness to issues and considered opinions. In short, the sum of these efforts goes beyond the proceedings reported herein. The continuing individual and collaborative efforts of the mixed assembly of professionals, practitioners, and participant observers provide the tangible testimony to the significance of the L.I.F.E. gathering.

As Hugh Roberts commented in his "Opening Remarks", the results of French Intensive/Biodynamic Gardening are impressive, but questions remain: "Is it scientifically sound?" and "Does it work with field crops as well as garden fruits and vegetables?" He pointed out that vitamins and minerals are important, but that the principal nutritional deficiencies in Third World countries are calories and protein that translate into cereals, grains, pulses, oilseeds, and tubers. The questions he posed were not indictments but provocative inquiries.

Richard Joos stated in response: "The approach is holistic and much more than a method of food production. We welcome scientific documentation to assist in an even more efficient development of the techniques and in their communication." It was this kind of interaction, coupled with the persistent pragmatism of the PVOs that gave form to the Santa Barbara workshop.

Sterling Wortman's comment in the September issue of Scientific American concerning the limited value of mechanized agriculture per unit of land and the use of Western-style, large scale mechanized farming in developing countries provided a sense of timeliness.

Stuart Hill's definition of the problem of working within the framework of short term linear systems (based on economic and political considerations) instead of within the framework of an ecological system (based on natural, cyclical, nutrient flows) set the stage for the workshop. The presentations on the French Intensive/Biodynamic Gardening method by Richard Joos, Steve Kaffka, John Jeavons, Paul Relis, and Warren Pierce provided added substance for the dialogue, discussion, and debate which took place throughout the three days.

The reports of the working groups served as a capstone of the workshop. They emphasized the importance of recognizing resource limitations in Third World countries, of beginning with a local needs assessment, and of understanding the socio-cultural and environmental context of any proposed work program. They also stressed the value of establishing an open program of delivery systems to propagate the theory and practice of small scale intensive food production.

Neither the agricultural scientists, who are from some of the major U.S. land grant universities, nor the organic gardeners, who practice and teach French Intensive/Biodynamic Gardening, changed their opinions about the value or danger of using chemical fertilizers and pesticides. Nevertheless, by the end of the three-day session, they found common ground in their mutual concern about malnutrition among the poorest of the world's poor. They interpreted small scale intensive food production not as a competitor to large scale commercial agriculture, but as a supplement or alternative approach to improving the health and well-being of economically disadvantaged families. They also agreed that if intensive food production techniques were integrated with a philosophy based upon the intimacy of man and nature, the method would be most effective in less developed countries.

Adding to that consensus were the presentations by Y. H. Yang (on the home garden as a low input high output food resource for rural families in Asian and Pacific countries) and by Janice Gallagher (on the Direct Relief Foundation study sites in Milagro and Guayaquil, Ecuador). The workshop ended on this note signaling a swelling of a wave of interest in and support for the method and for taking up the challenge posed by the new knowledge and insights gained.

What remains to be done is the reformulation of the L.I.F.E. Proposal on Family Food Production to include the insights and recommendations generated at the workshop. Also needed is the formulation of a plan of action engaging the talents and enthusiasm of the workshop participants to field test the technical validity of small scale intensive food production under a variety of tropical conditions and to investigate its potential impact on the nutritional status of the urban and rural poor of the Third World.

Thomas A. MacCalla
San Diego, California
December 1976

OPENING REMARKS

Hugh J. Roberts

Good evening. I know I have already introduced myself to most of you; but in case I missed someone, let me say again that my name is Hugh Roberts and I am Executive Director of the League for International Food Education. May I take this opportunity to welcome you to our Workshop on Small Scale Intensive Food Production for Improving the Nutrition of the Most Economically Disadvantaged Families, and take a few minutes to talk about why we are together in this truly extraordinary setting.

To understand the forces that brought us together, you first have to understand the League for International Food Education, which we usually call by its happy acronym, L.I.F.E. (spelled with capital letters with periods to distinguish it from the now defunct magazine and the breakfast cereal of the same name). The truth of the matter is that the acronym came first and the name was designed later to fit it. And that explains why some people are misled into thinking we are an educational institution. A more accurate name might be the League for International Technical Assistance in Food and Nutrition; but then our friends would not have the fun of saying, "Hi, how's L.I.F.E.?", or "That's L.I.F.E.", or "Say, when did you come to L.I.F.E.?". Nor would the little green and white leaflet in your folders have been entitled "The Facts of L.I.F.E.".

I hope you will read that leaflet sometime; but for now let me try to summarize it in two sentences:

L.I.F.E. is a private, non-profit consortium of nine organizations, eight of which are scientific societies whose members span the field of food and nutrition from production to consumption; the ninth is VITA, an organization with some similarities to L.I.F.E.

L.I.F.E.'s purpose is to respond to the needs of two constituencies:
--a significant portion of the members of the scientific societies in the consortium who want to volunteer their expertise in the cause of international technical assistance and
--the international development community that is working on food and nutrition problems.

To summarize my two-sentence summary:

One group (chemists, food scientists and technologists, nutritionists, chemical engineers, agricultural engineers, agronomists, food marketing specialists, and the like) wants to help;

the other group (overseas missions of the U.S. Agency for International Development, Peace Corps volunteers, missionaries, PVO personnel, ministers of agriculture and health in foreign governments, foreign businessmen in the food industry, researchers in foreign universities, etc.) needs support.

L.I.F.E.'s role is to be the broker, the facilitator, the deviser of the linkages that can bring the two together.

This workshop has its genesis in an earlier workshop of November 1975, one that the Overseas Development Council organized for PVOs on the subject of food and nutrition in rural development. It was there I learned that the Direct Relief Foundation had recently undertaken an Agricultural Development Program in which they planned to train volunteers in something called French Intensive/Biodynamic Gardening and to send these volunteers to Third World countries to demonstrate this small scale, low resource food production system. (We will hear about that program on Tuesday.)

I was eager to learn more; and as I talked to people working for PVOs in international development, I discovered a lot of interest in promoting food production by families for their own consumption. I found that another organization, Community Development Foundation, was highly interested in French Intensive/Biodynamic Gardening as a means for doing that. And I came to California last March to see what it was all about.

I was intrigued by what I saw, but there were a couple of basic questions in my mind. First, is this a scientifically sound approach to small scale food production? The fact that there did not appear to be any work on French Intensive/Biodynamic Gardening under way at any of the major land grant universities seemed significant. And second, does it work with field crops as well as with garden fruits and vegetables? After all, vitamins and minerals are important; but the principal nutritional deficiencies in Third World countries are calories and protein, which translate into cereals, grains, pulses, oilseeds, and tubers.

Since one of the members of the L.I.F.E. consortium is the American Society of Agronomy, and agronomists are experts in crops and soil science, it seemed to me that here was an excellent opportunity for some agronomists to volunteer their expertise to assist an important segment of the international development community. Why not a workshop in which agronomists, experts in French Intensive/Biodynamic Gardening, and representatives of interested PVOs would explore together the technical validity of small scale intensive food production and its potential impact on the nutritional status of those families that Congress calls "the poorest of the poor?" The idea sounded good.

Then to answer the question, "So you have a workshop, then what?", I wrote a proposal outlining one course of action that might be followed if the workshop resulted in a favorable recommendation. Most of you received a copy of that proposal before you came here; there is also a copy in the folder you received when you registered. Before you leave you will be faced with the task of deciding whether that proposal should be pursued, modified, or quietly recycled for its waste paper content.

So there you have the background; and I think I have indicated where L.I.F.E. is coming from. For myself, personally, although I would like to play the role of the objective researcher and say that I don't care

how it turns out as long as we learn something in the process, that is not possible. No researcher is ever that objective, neither agronomists nor biochemists. So let me state where I am coming from. I am convinced that there are millions of very poor people in the world who are not able to develop their full human potential because they are malnourished; and they will remain malnourished in spite of the success of the Green Revolution because they do not have access to the resources that the Green Revolution requires. I was pleased to see some recognition of that fact in the September Scientific American article by Sterling Wortman, Vice President of the Rockefeller Foundation. Furthermore, I believe that a low resource, small scale, family food production system is a sound approach that will enable those people to help themselves, and I am pulling for it. But by Wednesday, you could convince me that I am wrong.

Now what about you? Where are you coming from? And what are your expectations with regard to the workshop? Obviously I can't know the answers to those questions for each of you, at least not at this point. But I do know that each of you has decided to spend a valuable resource, three days of your time, to be here. Most of you have squeezed some travel funds out of a budget, your own or someone else's, that was already tight. And a few of you have even dipped into your personal funds to be here.

That tells me you are concerned about the problem and interested in this particular approach. But I also know some of you feel you are taking a risk to be here, and you're not really comfortable about that. For instance, the people who will be presenting their work tomorrow (Steve Kaffka, John Jeavons, Richard Joos, Paul Relis) are taking the risk that you agricultural scientists from the big land grant universities will tear them apart. Not that they don't believe in what they are doing; but they are painfully aware that their work has been done on a shoestring over a relatively short time, and is far from being satisfactorily documented.

On the other hand, Steve, John, Richard, Paul, did you know that some agronomists were unwilling to accept the risk to their reputations that they felt they would incur by participating in this workshop? The reputation of a scientist among his peers is vital to his professional livelihood; and if French Intensive/Biodynamic Gardening should turn out to be nothing more than a mixture of mysticism and compost, there could be damage to the reputations of the scientists who are here. Perhaps the people who have the most to gain and the least to lose (as long as they don't get caught in the cross fire) are those of you who are with PVOs. Even so, many of you have already made an investment in this approach and might be hurt if the workshop concludes that the French Intensive/Biodynamic Gardening system is totally unsound.

Given that somewhat sobering background, you will agree, I think, that it is particularly important that each of us understands the context, the philosophical framework if you will, within which we will be working together. Our concern is not whether "organic food" (and I put that term in quotes in deference to those who would point out that precious

little food is inorganic) or "organic farming" is good or bad. In fact we are not concerned with farming at all. What we are concerned with is food production primarily for home consumption (although the potential for a marketable surplus does exist) by families whose access to land and other resources is minimal, well below that of the small farmer. It is to emphasize that focus that I have studiously avoided the word "farming" or even "small scale agriculture". And while we are on the subject of word choice, please remember that words have different connotations for people coming from different backgrounds. Many disagreements stem from different interpretations of a word or phrase. In the diverse group of people at this workshop it will be especially important for us to check with each other on definitions of words and terms, so that we can communicate effectively.

Within that context, or philosophical framework, the structure of the workshop has seven main components that are reflected in the agenda you have in your folder.

1. This evening - orientation; the problem and an approach to a solution.

2. Tomorrow morning - first the "what" of the method; the fundamentals or essence and some results.

Let me interrupt here to follow some of my own advice and define some terms. When I talk about "the method" I do so in lower case letters. For me the method is a combination of techniques and principles adapted to a specific situation. I will also refer to that combination as a "technology". Some people may talk about The Method, referring to a specific combination of techniques, principles, and philosophy as taught by Alan Chadwick who introduced it to the U.S. I would hope that during the workshop we could consider The Method to be but one (possibly the best) of a number of intensive methods based on the same technical principles.

3. Tomorrow, late morning, and afternoon - the "how" of the method, first on slides, then an on-site demonstration.

4. Tomorrow evening - an in-depth discussion of the method involving the entire group.

5. Tuesday morning, first half - the application of the approach to developing countries.

6. The rest of Tuesday - we will break out into small groups which will set their own schedules for an analysis and synthesis of recommendations.

7. Wednesday morning - we come back together to hear and respond to the recommendations of the groups, and we will either agree, or agree to disagree, on a final set of recommendations.

Those recommendations plus a record of the formal presentations and your comments on the conference feedback sheet will constitute the output that I am seeking from you. Any questions? All right, let's go to work.

THE PROBLEM DEFINED

Hugh J. Roberts

The world food problem has been the subject of a sufficient number of articles, books, seminars, and conferences that there is no need to dwell upon it here. But there is a need for someone to shout, loudly and repeatedly, that the world food problem is multi-dimensional; and that there is no one-dimensional solution. Neither increased food production, nor reduced population growth, nor widespread nutrition education, nor redistribution of income, nor any other single approach is going to solve it.

The 1974 World Food Conference made an effort to reduce the magnitude of the problem. It called for a focus on malnutrition in the least developed countries among the most vulnerable individuals: pregnant and lactating women and their preschool children in families where income is insufficient to provide their minimum daily food requirements. Nevertheless, since an estimated 25% of the world's population consume less than 80% of the minimum daily food requirements, and most of those are families of landless laborers or migrants to urban slums, the dimensions of the problem are still enormous.

Moreover, the causes of malnutrition are complex and multi-faceted. Basically, the direct causes are inadequate quantity and quality of food consumed and poor utilization of nutrients due to infectious diseases and parasites. However, these direct causes are in turn the result of a broad range of sociocultural, economic, and environmental factors such as underemployment, contaminated water supplies, inadequate sanitation and public health services, unequal distribution of food within the family, and dietary taboos.

Clearly programs to reduce malnutrition, even in a limited target population, should address the entire complex of causes. Yet that approach should not preclude the investigation of individual aspects of the problem. Any strategy designed to deliver a broad-based and integrated package of reinforcing health, education, and food production/distribution programs will, of necessity, be built out of interventions that address individual components.

Furthermore, in spite of the need to attack the problem on all fronts simultaneously, implementation of such a complex strategy may be beyond our capability. On the other hand, we can find encouragement in some recent integrated rural development projects that promise to improve the well-being of small farmers. Unfortunately such schemes offer nothing to the poorest families among whom the most serious malnutrition is concentrated. Their limited resources fall below the minimum requirements for admission.

And that is the problem to be addressed in this workshop: the plight of the world's most economically disadvantaged families. Their resources

are insufficient to allow their participation in development projects designed to improve the productivity of the small farmer. Their income is inadequate to purchase sufficient food to meet their nutritional requirements. Consequently, in these families the babies die most frequently, the surviving children are the most seriously malnourished, and the women's lives are shortened the most by too many pregnancies and too little food. Still these people are filled with human potential and with human dignity that demands our respect.

What do we suggest?

AN APPROACH TO A SOLUTION: Round Valley Garden Project

Richard Joos

The Round Valley Garden Project, located on a fifteen acre farm in the northern California mountain village of Covelo, is an unusual educational experiment in which a group of young people are committing their energies to a garden and to agricultural practice which focuses on human survival. The people who teach and learn in this garden deal with specific questions: "How may I spend my life usefully?" "What in the world may I do that matters?" "How may I survive by doing things I believe in and care about?"

Under the direction of Alan Chadwick, one of the world's most respected horticulturists, young people have been trained in the classic traditions of intensive gardening techniques by which plants producing healthful foods may be obtained in greater yields, leaving the soil improved rather than depleted, and without resorting to chemical intervention.

Twenty-five apprentices and a staff of five work in the garden and participate in a program of lectures and workshops dealing not only with horticultural subjects but also the related arts and crafts. Training is given free of tuition charges in exchange for a year's commitment of time and energy. The students share in the garden's output of food and are expected to provide their own shelter. The work is hard and they soon discover that for every fragment of knowledge of the horticultural techniques, there must be an equivalent deepening of self-awareness and direction.

The Round Valley Garden Project was started in 1972 and was supported initially by the Planning Conservation Foundation. In 1974, the Institute for Man and Nature, a non-profit California educational organization, was established to coordinate support for the Project's activities. Under its sponsorship, plans are being made to introduce a number of projects into the community and beyond, which relate to and support the garden and its training program.

The procedures followed in the Round Valley Garden Project, and much of its philosophic basis, are derived from European traditions and particularly from the work of the German scientist-philosopher Rudoph Steiner. The classical techniques of England, France, and Italy and the ideas of Steiner have been synthesized by Steiner's student, Alan Chadwick, who is the director of the Round Valley Garden Project. Intrinsic to the approach (it is much too comprehensive and complex to label as a "method") is the integration of meticulous technique and a world view. The parts of this approach that may be described as "method" are intensely practical -- centering on the building of soil fertility, the maintenance of productivity, and the creation of environments in which each plant may reach its maximum potential. The result is a radically increased yield of a superior nutritional quality. Inseparable from such techniques is a set of philosophic and spiritual principles as intensely idealistic as

the other is practical. The two are as one; and in their union is the secret of the enormous appeal of this approach and the key to its potential.

Work in the biodynamic garden is labor intensive. Machine power is employed only in those instances where hand labor is unequal to the task, which is seldom. Beds are dug by hand. Field crops are cultivated by hand. Soils are prepared and crops are harvested by hand. The reasons go beyond a simple abundance of apprentice labor. The biodynamic view of things places the human in a very special relationship to the plants and creatures in his or her care. It involves obligations that may not be discharged by machinery or from a distance, but may only be properly met by individuals who have finely tuned perceptions, who pay close attention to every detail, and who have direct physical contact with the soil and plants.

It quickly becomes clear to garden visitors that the biodynamic approach is enormously productive compared with conventional methods. What is more difficult to see and, for some, harder to accept, is that the abundance of superior fruits, flowers, and vegetables is as much a result of human caring as it is of special techniques. Though biodynamic "methods" can heal abused soils and restore productivity, the significance of this approach lies in bringing the human spirit into harmony with natural forces -- a union the potential of which may be glimpsed in the Round Valley Garden.

One of the most important tasks at the Round Valley Garden Project is the restoration of genetic balance in common food plants in order to recover their original nutritional characteristics. The hybridization of domestic plants was not an overnight event, but has taken place over a century or more during which agriculture in this country evolved from home practice to corporate enterprise.

The widespread application of machine technology and the demands of commercial marketing have brought about a corresponding attempt to standardize farm produce. The price nature has exacted for this convenience to man is a large and ominous decline in nutritional quality and flavor. As plants are bred for special characteristics, they lose the vitality of the original form. In order to restore the vigor of the original plant, specimens which survive in more or less original form must be found and propagated for seed.

Nutritionists have pointed out that a continued trend toward processed foods and the further mechanization of agriculture without attention to the decline in nutritional quality will lead to the gravest consequences. Our nation is as healthy as the food we consume. The genetic restoration of domestic food plants is a matter of urgent necessity.

The project is at work to recover early strains of grains and orchard fruit as well as a variety of vegetable and flowering plants. A number of these are already in use in the Round Valley Garden.

Editor's note: The above comments introduced a slide presentation of the Round Valley Garden Project.

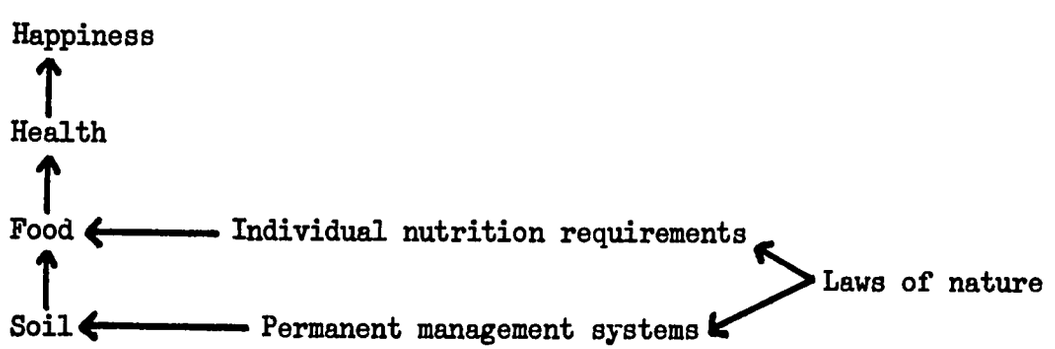
TOWARD ALTERNATIVE AGRICULTURE

Stuart B. Hill

Some view ecological or organic farming as the way of the past. I tend to view it as the way of the future. For an increasing number of people, it is the way of the present. For some it is a new technique; and for others, a kind of religion. It is really all of these things: the past, present, and future brought together with a new technology and life-style. It is important that we do not concentrate on just one part of this and that we view it as one aspect of an attempt to establish a life-style for our species that can be permanent within the limitations of geological change.

In defining the problem of this conference, I would like to focus on the soil-food-health chain (Figure 1). I hope that by doing this some of the fundamental differences between current and ecological methods of food production will be clarified.

Figure 1. The Soil-Food-Health Chain



There are two primary needs within this chain:

1. A permanent, self-sustaining system for producing food and fiber. As the present system is dependent on fossil fuels and other non-renewable resources, it can be only temporary. We have to establish a "post-industrial" agriculture.
2. A way of identifying and satisfying our individual nutritional needs. There is a tendency with mass approaches to everything to work out what the average person needs to be nutritionally satisfied. Because individual needs vary enormously, this is unsatisfactory.

Thus, the establishment of an alternative agriculture is dependent on knowing our specific nutritional needs and knowing how to manage agro-ecosystems in a permanent way.

Our political and economic systems, by requiring us to examine short-term relationships only, has deluded us into believing that organisms and environments can be forced to conform to artificial and not ecological laws. The tendency for many harmful effects to take a long time to manifest themselves has encouraged this attitude. However, the problems that we now encounter are symptomatic of this approach. Most of the solutions being proposed are developed without consideration for their broader or long-term effects.

The generation of these solutions may be regarded simply as irresponsible dreaming. An amusing example of this was displayed by an uninhibited colleague who remarked at an extravagant luncheon that he was looking forward to the day when science will have advanced to the point where he can have his anus joined to his mouth, and so cut out the middleman.

It is obvious that such an attempt to bypass nature would not solve the food crisis. However, we are indulging in the same sort of dreaming when we imagine we can solve problems of infertile soils, pests, diseases, and deficient foods simply by means of inorganic fertilizers, pesticides, antibiotics, and food supplements. The proposal of these kinds of solutions is symptomatic of a science trapped in the stranglehold of inductive logic and reductionism. Adherence to these approaches is preventing us from dealing with the causes of our problems.

Pests do not arise because of a deficiency of pesticide in the environment any more than headaches result from a lack of aspirin in the blood. We get headaches because of the way in which we conduct our lives, and we get pests in the fields because of the way we manage them [18, 29, 48].

In addition to the above criticism, solutions to symptoms eventually create problems in other areas. Hence, in order to increase yields, nitrogen fertilizers, synthesized from natural gas, are being applied to our soils in ever-increasing amounts. The side effects of this application include the depletion of natural gas reserves, the contamination of food and water with nitrates (resulting in health and pollution problems), damage to the ozone layer by nitrous oxides, and the accelerated decomposition of soil organic matter. The associated loss of soil structure has led to increased erosion. The use of synthetic inorganic fertilizers has also allowed us to discard food and agricultural wastes rather than returning them to agricultural land as fertilizer. Thus, most food wastes are incinerated, released into bodies of water, or deposited on non-productive land as landfill, causing air, water, or land pollution.

Rather than work within the natural cyclical nutrient flows we have used manpower and resources to establish linear systems. The fact that they function within the framework of our short-term economic view only justifies them economically. Ecologically, linear systems make no sense at all.

Unfortunately, we have allowed powerful bureaucracies to develop that are able only to generate and implement these "specialist (simplistic) solutions". Also, it is questionable whether they are even anxious to solve the problems in the long term, as this would deprive them of their

power. It is little wonder that alternative lines of research are systematically stifled.

Solutions to symptoms are guaranteed to be addictive and disruptive. While our present system provides the means for generating profit, employment, and political power, it is a treadmill that we must get off if we are to deal with the causes of our problem.

It is important to realize that our survival is dependent not on economic but ecological relationships with the environment. Consequently economic systems must develop around ecological realities. Therefore, in order to establish agricultural policies that can be permanent, we have to recognize

1) the current state of our food system,
2) our needs and the ways in which agriculture can satisfy them, and
3) the laws of nature and the limitations of the environment.

It is a matter of recognizing where we are now, deciding where we want to go, and finding out how we are going to get there.

The Current State of Our Food System

Our present "production for profit" food system has evolved from one in which production was for "use". In striving to survive economically, agriculture has had to increase production per area and per farmer. This has led not only to an increased dependence on non-renewable resources, but it has also become a threat to its renewable resource base, and to human health. The farmer is unfortunately in a weak position. He has little control over costs of his outputs and no control over his inputs; he is unfairly taxed and is continually having to run to the bank manager to bail himself out. Few other sectors of society are so vulnerable. Consequently, it is unlikely that the farmer will be able to correct this situation alone.

It is our view that this state of affairs has already led to a loss of food quality. The ways in which the nutritional quality of plant materials might be decreased are illustrated in Figure 2. This deductive model is based on the concept of Roger Williams[45], that the body can only suffer from two nutritional problems -- lack of certain required nutrients (malnutrition) and the presence of toxins (poisoning). The model asks how our various food production and handling practices might affect the nutritional and toxic status of the food currently available.

Figure 2. Factors That Might Negatively Affect Food Quality

AGRICULTURAL PRACTICES INVOLVED IN PLANT PRODUCTION
(equivalent practices associated with animal production could be examined in a similar way)

Selection of plant:
for non-nutritional factors
e.g. productivity & profit (by hybridization)
cosmetic appearance
shape & size
shelf life
pest & disease resistance
ability to be machine picked

Selection of site:
criteria may conflict with nutritional objectives
e.g. economic factors
ease of mechanization

Planting design:
may reduce food quality
e.g. monoculture depletes soil of certain plant nutrients

Maintenance of site:
cultivation: damage to plant roots may lead to mineral imbalance
irrigation: in drylands may lead to salting up of soil; in other areas to leaching out of nutrients
fertilizer use: use of limited nutrients may cause imbalance in others; "N" use often increases
pesticide use: may leave residues of herbicides, insecticides, etc. in crops

Harvesting:
may compromise food quality
e.g. picked when unripe
damaged during harvesting

FOOD HANDLING

Transportation:
harvested before ripe to permit this damage & contamination during transportation

Storage:
physical or chemical treatment to:
prevent ripening or to ripen
control pests

Processing:
physical & chemical treatment to:
prevent deterioration
make "more attractive"
change the form & flavour

Packaging:
contamination with:
PCB's & other chemicals in packaging materials

Preparation:
cooking may involve loss of nutrients by:
heat
salting out in oil or water

Consumption:
under stress; with other foods that interfere with their assimilation

→

POTENTIALLY NEGATIVE NUTRITIONAL CHANGES

Reductions in certain:
amino acids
vitamins
trace minerals
enzymes
flavour factors
and in fibre

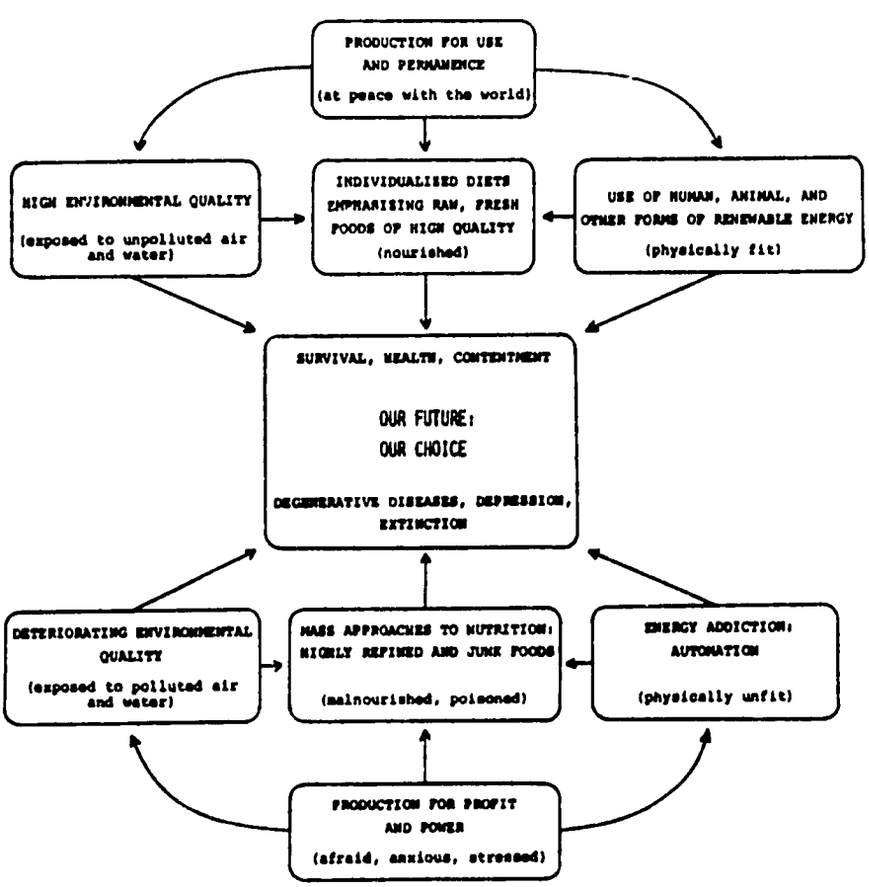
Additions:
synthetic organic chemicals:
herbicides
insecticides, etc.
growth regulators
natural organic chemicals:
sugars
fats
toxins
antibiotics
hormones
botanical pesticides
inorganic chemicals:
water
nitrates
heavy metals
food additives:
preservatives
colours
flavours
antioxidants, deoderizers
emulsifiers, stabilizers
extenders
modifiers, testurizers
bleaches
acidifiers
clarifiers, etc.

More subtle changes:
in the balance between nutrients;
from laevo- to dextro-rotary amino acids & certain vitamins;
from cis to trans fatty acids

This is particularly important because our nutritional requirements have increased, partly as a result of exposure to the growing number of poisons in the environment [35, 47] that require detoxification. Thus, we have a greater need for high-quality food that cannot be satisfied by current agricultural practices. Ironically, the system that should supply us with this food is, instead, contaminating it with poisons and decreasing its nutrient content.

The increase in degenerative diseases in the developed world, and in the less developed areas under the influence of the former[6], should not come as a surprise. Degeneration is the consequence of genetic predisposition, malnutrition, toxification (through air, water, and food)[10, 24, 34], lack of exercise, stress, and inadequate relaxation (Figure 3). This makes common sense, yet the dominant approaches being taken to deal with degenerative diseases include the search for causative organisms, the physical or chemical destruction of degenerative tissues (remember that the surgeon reigns supreme within the medical profession), and the masking of the situation with pain killing drugs. This tendency to deal with symptoms rather than with causes, which is equally prevalent in medicine and agriculture, has become the major degenerative disease of science.

Figure 3. Relationships Between Factors That Affect Our Well-Being



Thus, we consider that the prevention of degenerative diseases will require not just medical approaches, but the combined efforts of agriculturalists, nutritionists, geneticists, environmental scientists, clinical ecologists, and experts concerned with physical and mental health.

Needs and the Way in Which Agriculture Can Satisfy Them

To survive in a healthy, contented state, we essentially have to develop a symbiotic relationship with our support environment. This requires that we identify our real needs[10, 24] and the ability of the environment to satisfy them. Economists frequently distinguish between "real needs" (basic food, shelter, and clothing) and "manipulated or non-essential wants" (many of which we strive for to lift us above our fellows). All too often "real needs" are sacrificed for the latter.

The food industry has had to manipulate our eating habits in order to dispose of the surpluses generated by our highly specialized and "efficient" production system. Thus, more money is now spent on foods such as corn, wheat, and potatoes in their highly processed and nutritionally inferior forms (e.g., cornflakes, cookies, and potato chips) than in their more valuable elemental state[16]. The processing industry, through the clever use of advertising, has become so successful that it now dominates the food system[17, 28]; and agriculture has been relegated to the position of merely supplying the raw materials. Hence, agriculture now caters largely to "manipulated wants".

Unless we change our myopic view of efficiency, we are misleading ourselves in believing that a more "efficient" agricultural system is the panacea for the food and energy crisis. Changes in policy will result in "real" progress only if such increases in efficiency are concerned with the production and fair distribution of items that we really need.

Laws of Nature and Environmental Realities

In considering this subject, we have repeatedly felt that the problems identified above are obvious. And yet they have not been able to stimulate any real attempt to deal with them at the causal level. Why do most people find it so difficult to deal with these problems? There appear to be three reasons for this.

First, we have become so adapted to the present situation that we find it difficult to view ourselves objectively. The tendency to defend the status quo and to recognize problems as being apart from ourselves provides evidence of this.

Second, the information explosion and expanding scale of production have forced people to specialize. The increase in inductive and reductionist approaches in science and the tendency to deal with symptoms rather than causes (as discussed above) are associated with this. In this way it has become increasingly difficult for people to comprehend the complex realities of nature.

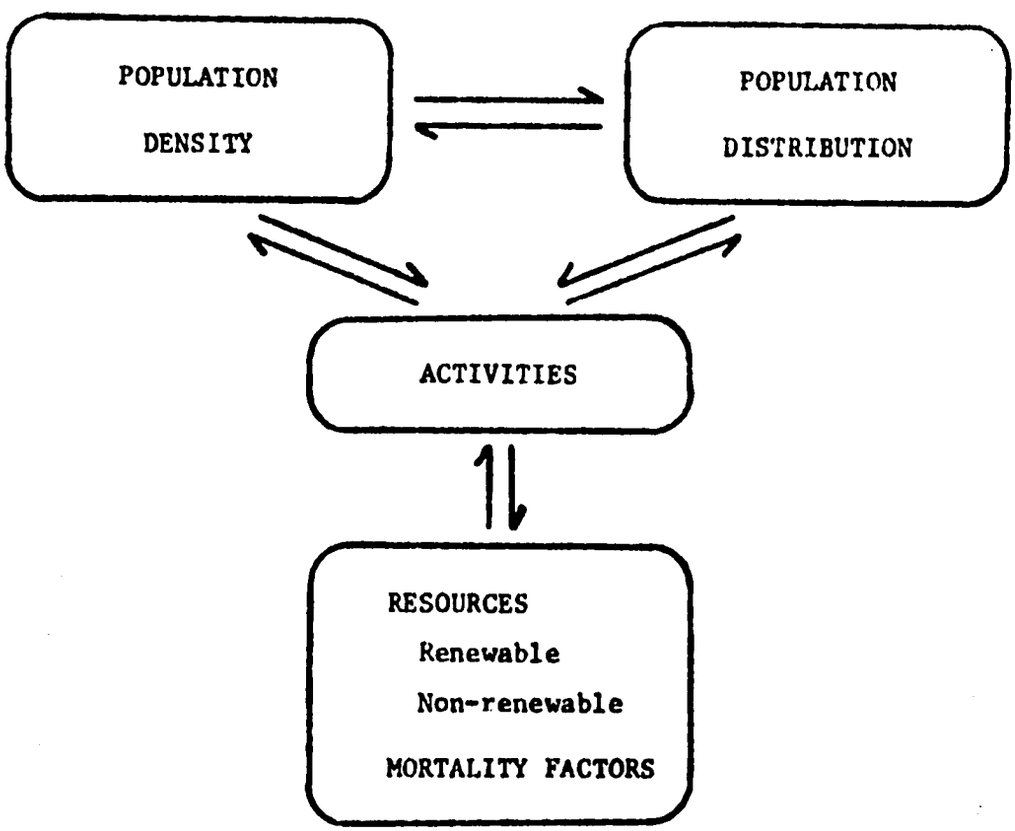
Third, most religions and political ideologies tend to separate us from the support environment, e.g., our "dominion over nature"[44]. This has been considerably reinforced over the past hundred years by our use of fossil fuels to free ourselves from the constraints that dominated the lives of our ancestors. For example, when it is hot we tend to seek places that are air-conditioned; we no longer know where the naturally cool areas are within the environment.

To counteract these problems we must make a conscious effort to examine ourselves objectively, comprehensively, and in relation to the support environment. One way to do this is to ask questions of ourselves that an ecologist would ask when studying other organisms:

How many are there?	For us how many is optimum?
How are they distributed?	How should and shouldn't we distribute ourselves?
What are they doing?	What should and shouldn't we do?

The relationships among these three variables and the support environment are shown in Figure 4.

Figure 4. Interrelationships Between the Factors That Determine Survival



Many people concerned with the food crisis tend to regard it as a population problem. However, we cannot expect to solve our problems by reducing population growth if some or all members of the remaining population continue to distribute themselves out of context with the environment or indulge in activities that are a threat to survival.

In deciding what we should and should not do, it is useful to consider the following four "laws of nature"[7, 8, 9]. All species, including our own, are subject to these laws. The fact that we have been able to follow a "live now pay later" philosophy for so long should not be taken as evidence to the contrary. The Earth has an enormous amount of capital in the form of fossil fuels and other non-renewable resources, soil fertility, and ecosystem stability (evolved over millions of years through increased complexity). We have developed a life-style dependent on the exploitation of this capital[31]. It is understandable that people are not willing to sacrifice those activities and life-styles supported by these resources; and hence, that they become defensive when it is suggested they will have to reduce this dependence.

The first law of nature is that survival for any species, whether it is a plant, animal, or microorganism, is dependent on needs, the availability of what is needed, and on various mortality factors. If we examine our current food system we find that it contravenes this law at every stage. We are producing many things we do not need. The system is based on non-renewable resources; and some of the technologies we employ are lethal or sub-lethal, e.g., injuries by machinery and poisoning by toxic chemicals. The implications for policymakers are that they support efforts to distinguish between real needs and manipulated wants and establish a safe food system based on renewable resources.

The second law is that relationships are cyclical. Modern agriculture is characterized by linear nutrient flows. Thus we produce fertilizer to feed plants, to feed animals, to feed people, and in the process, to pollute rivers. It is essential that we abandon this practice and develop cyclical systems. For instance, natural organic waste materials should be returned to the land as fertilizer.

The third law is that all natural ecosystems become more complex with time. Complex systems develop naturally by means of energy from the sun. It is ironic that we have developed a food system based on simplifying the biological components of the environment by means of a technology of increasing complexity. The farmer needs to know less and less about biology and more and more about engineering, chemistry, and economics. In trying to keep the agro-ecosystem simple, we are essentially using fossil fuel in opposition to the energy from the sun. Clearly we must learn to manage complex biological systems, an example of which is intercropping.

The fourth law is that there are various biochemical constraints that apply to all life. For example, there are many compounds which do not exist in living organisms. Consequently, the decomposers that break down dead organisms have adapted to a very restricted diet. Thus if organic compounds are produced that have no counterpart in nature, they will not

likely break down biologically. We must establish a life-style that relies only on those organic materials that have a counterpart in nature and ban or severely restrict the production of other organic chemicals.

The laws of nature know no compromise. They are constant, at least within the framework of human history, and the sooner our species becomes aware of these laws and establishes political, social, and economic systems that are consequential upon them, the sooner we will be able to move toward real solutions to our problems.

Our preliminary views of what a "permanent" food system might involve are presented in Figure 5 [14, 21, 26, 27, 37, 43, 46]. In designing this system we have taken the above constraints into consideration. The difference between our system and the present food system may be seen most clearly by comparing Figures 5 and 6.

The only group of producers currently attempting to utilize a significant number of these approaches are the "organic" farmers. Despite the findings of the Center for the Biology of Natural Systems[22, 23], many agriculturalists still maintain that the people of the world could not be fed by employing these methods[5, 12]. A number of years ago Dr. O. W. Grussendorf[15] of Manitoba set out to prove that this was not so. He selected a piece of land declared completely unfit for agriculture. In fact, it was so unfit that he purchased it for one dollar an acre. He established a mixed farm, composted his waste biodynamically[39], and applied it to his land, while importing no fertilizers, pesticides, or other materials into the system. In 1968 he produced 1000 bushels of potatoes an acre and 50 bushels of top quality wheat. The average for Canada at that time was 168 and 22 bushels, respectively.

It is our opinion that we could learn much by studying the methods of such people as Dr. Grussendorf, for they are doing what many conventional agriculturalists regard as impossible[5]. Their efficient use of energy[22, 23] represents only one feature of the system they are employing. (Several other successful "organic" farmers are interviewed in Christopher Chapman's recent film for the National Film Board of Canada entitled "A Sense of Humus", 1976).

Summary

Currently our food system is designed to produce food that can be sold rather than food that meets real needs. It is imperative that we establish

1) systems for producing food (and fiber) that can be "permanent" and
2) ways for identifying each individual's nutritional needs.

As both of these are determined by the laws of nature, it essential that we become aware of those laws.

Many changes will be required if we are to develop a viable alternative food system. Even though energy studies have revealed several weaknesses within the present system, far-reaching political and socioeconomic changes

Figure 5. An Alternative Agriculture

ECO-AGRICULTURAL POLICIES AND OBJECTIVES

"Permanent" production strategies to meet individual nutritional needs while maintaining ecosystem stability (environmentally supportive, minimally disrupting, using, yet respecting the "laws of nature" - part of a survival ethic).
Based on renewable resources.
Holistic approach to problem solving utilizing multidisciplinary, preventative methods.

Regional self-sufficiency; decentralized food systems; supportive of:
1. urban food production;
2. self-sufficient homesteads, with small surplus;
3. large farms, redesigned along ecological lines.

CLIMATE & COSMIC INFLUENCES

Cognisant of planetary influences.

Long-range weather forecasting.

BUILDINGS & MACHINERY

Energy efficient technology with low environmental impact.
Solar greenhouses, driers & barns.
Machinery for managing mixed crop operations, including small-scale, fuel & animal powered equipment.
Composters.
Seed energizers.

SOIL MANAGEMENT

Conservation or improvement of soil fertility.
Utilizing biological & chemical indicators in balancing all plant nutrients.
Application of microbial inoculants, compost, sewage, green manure & other natural organic materials; minimal use of inorganic materials.
Minimal, low-impact tillage; mulching; drip-irrigation.

PLANT PRODUCTION

Breeding, selection, & management to minimize environmental impact, dependence on synthetic chemicals & energy, & to optimize nutritional quality.
Preventative disease & pest control (resistant varieties, nutritional & habitat management approaches, etc.).
Reliant on expanded gene pool (new species & varieties).
Complex planting design: strip & mixed cropping; rotations.
"Herbal" & indigenous mixtures for pastures.
Seed & foliar application of naturally occurring plant nutrients, hormones (e.g. seaweed cytokinins) & microorganisms.
New uses for crop outputs.

ANIMAL PRODUCTION

As above.
Improved feed quality (e.g. mold prevention); alternative sources of feed.
Use of early indicators, gut microflora, herbs, non-specific antigens, trace minerals, & vitamins in disease prevention & treatment.
Mixed pasture management systems.
Humane handling of livestock.
New sources of animal protein (e.g. small mammals, wild game, fish ponds, insects).

FOOD & NUTRITION

Improvement of food quality to meet individual nutritional needs (improved labelling sta standards).

Promotion of alternatives to animal proteins where appropriate (legumes, single cell, etc.).

Minimal processing to permit storage & distribution.

Return of food wastes to agro-ecosystem.

RESOURCE INPUTS

Dependent on solar & renewable energy, managed on a regional basis for permanence without pollution; conserving non-renewable resources.

Supportive of cyclical nutrient flows through optimal management of waste.

SOCIO-ECONOMIC ASPECTS

Meta-economic approach: sensitive to non-profit criteria (externalities, ecological & human values; distinguishing between real & manipulated needs).
Redistribution of wealth & power.
De-urbanization, decentralization, direct & co-operative marketing.
Use of cybernetics in long-term planning.
Human-capital intensive, employing ecologically appropriate technologies.
Sensitive to work quality.
Supportive of rural people.

ENVIRONMENTAL QUALITY

No waste overload through controlled production, recycling & monitoring of environmental quality.

No synthetic organic chemicals.

Manipulation of diversity & succession to provide stability.

Conservation of rural landscape & wildlife habitats.

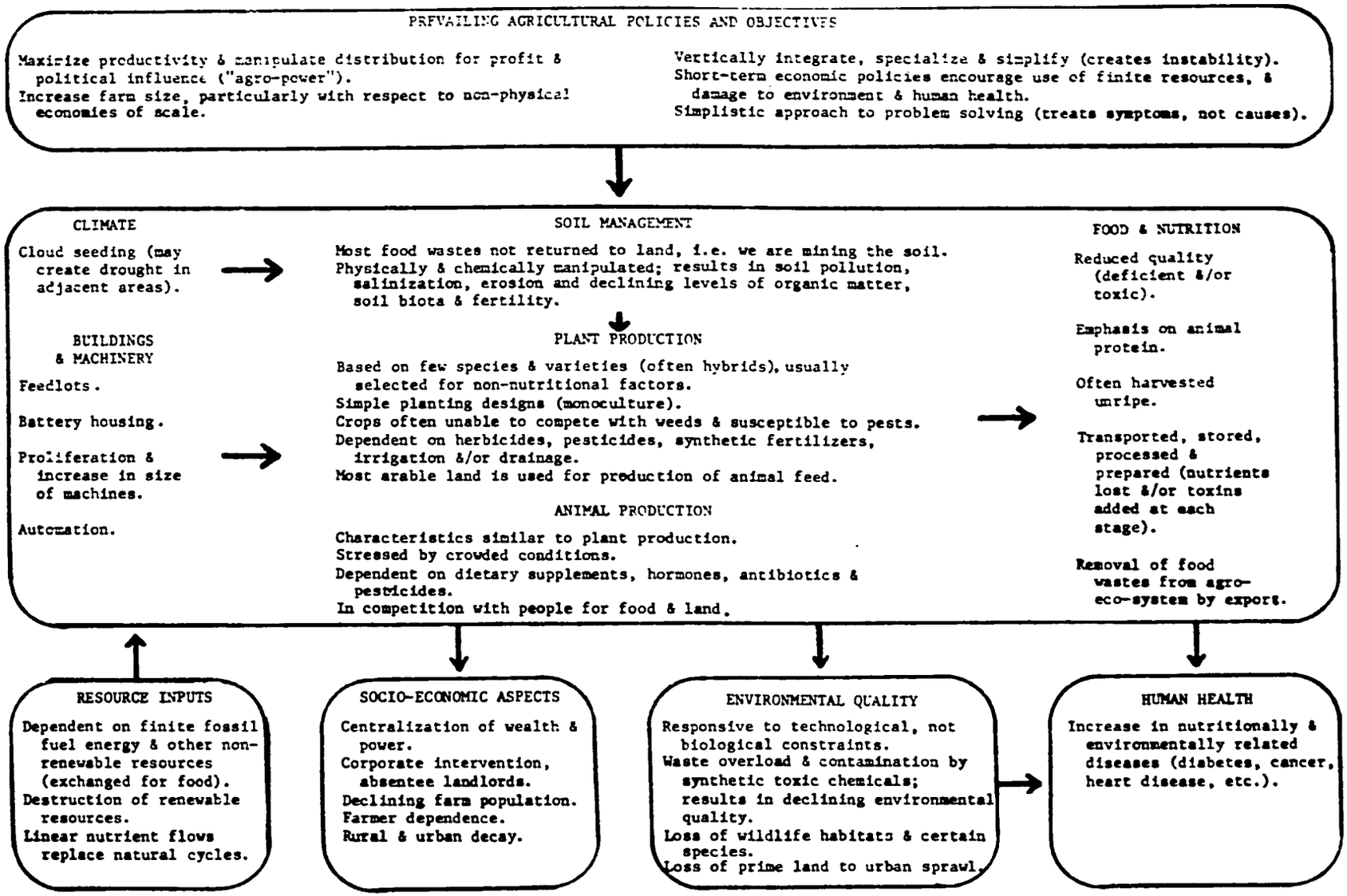
Rejuvenation of damaged & non-productive land.

HUMAN HEALTH

Environmental/nutritional models of health & disease.

Cognisant of soil-food-health relationships & importance of identifying optimal diet for each individual.

Figure 6. Some Possible Negative Aspects of Modern Agriculture



will be needed in order to create an environment in which those involved can respond to these findings. This situation will similarly prevent people from adequately responding to the findings of any other studies of the food system.

Consequently, scientists are naive if they expect that the required changes will necessarily follow high quality research. One potentially serious weakness within our food system (to which energy studies have not addressed themselves) is that food quality maybe compromised at every stage within the food chain. Unless attention is paid to this situation, we predict we will experience further increases in the incidence of degenerative diseases. Indeed, this situation already may be further advanced than we suspect.

We are encouraged, however, by the recent food and nutrition policies implemented by the Norwegian government[4]. They have established models of consumption based on health and resource considerations and have proceeded to implement policies that will lead to changes in production and eating habits. For example, the price of range fed beef, which contains less saturated fat than feedlot beef, has been reduced below that of the latter. They expect, among other things, that this will help reduce the incidence of heart disease.

It is our hope that other countries will soon examine their food systems and make the necessary changes in policy.

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THE FRENCH INTENSIVE SYSTEM OF GARDENING

Stephen Kaffka

Techniques that rely on resourcefulness and creativity and training that stresses these characteristics are important parts of the answer to questions posed by the problem of human hunger in a world of rapidly diminishing resources. The French Intensive System is a particular example of creativity and resourcefulness adapted to a small scale approach with the self-imposed limits of organic (or ecologically minded) techniques. What follows is a description, using as an example a discussion of the techniques involved in developing vegetable and flower beds according to the French Intensive System of what I consider to be essential about the technique. What is important in the French Intensive System for this workshop are those qualities about it that represent a creative, ingenious approach to the problems of cultivation within self-imposed, ecological limits.

The French Intensive System is an innovative combination of traditional practices with new and somewhat novel insights into the phenomenon of plant growth. It was first introduced into the United States at the University of California at Santa Cruz by Mr. Alan Chadwick. He has continued to evolve his techniques and to expand upon his insights since leaving Santa Cruz. I am not speaking for Mr. Chadwick in discussing the French Intensive System. I hope to express what I consider to be the essence of the system based on my work with Mr. Chadwick and my experience with it these past eight years.

In doing so I will further elaborate on what I mean when I say "French Intensive System" by discussing first the systematic nature of this method, and then describing the historical antecedents and philosophical origins of the method. After this, I will elaborate on some technical principles which underlie certain aspects of the French Intensive vegetable garden and its design.

There are other topics that could be discussed that are important in the system, such as certain techniques of plant propagation and composting. All of these topics are of the same thread, however, and in discussing one aspect of the system, principles will be established which pertain throughout.

Definition of the System

There are two reasons why I use the word "system".

First, the French Intensive System is comprised of a series of interdependent techniques that are followed through each phase of the propagation, growth, and harvest of the crops. Take, for example, the way in which carrots are grown. We use wide, raised beds. The seeds are broadcast across the surface of the bed. If the gardener is skillful, he

achieves a uniformity in the spacing of his plants which, in fact, many people would consider to be too dense. The gardener sows them this way intentionally because he is trying to create a particular combination of effects, upon which I will elaborate later, and because he will harvest the roots in a fashion already determined before the seeds are sown. As the carrots begin to reach maturity, the gardener begins to pull the biggest of the roots from throughout the bed. This leaves room for smaller plants that may have been slightly crowded, up to that point, to develop to larger size. This extends the life of the harvest from the bed and increases the total yield of carrots. Each of the steps used in the technique follows logically from the preceding step, all of the steps being inspired by the cultural requirements of the plants themselves.

Second, I believe there are relationships (biologically speaking) among all the live organisms in a French Intensive Garden that resemble in some important ways the relationships existing among the living creatures in an environment not altered by man -- what I will call the "natural world". All forms of cultivation are to a degree unnatural. When the earth is dug, there is an interruption and degradation of the conditions established by nature over time. But the French Intensive System garden mimics nature's building processes much better than the other methods with which I am familiar. Certain balances reestablish themselves in the garden after a time. This idea carries its greatest force for me when I think about the techniques employed specifically for pest and disease control. A garden is not a natural ecosystem, but a balance which is reminiscent of the balances achieved in the natural world. This is achieved when the French Intensive System is well executed. To borrow a phrase from Richard Merrill, the method aims at producing a well-balanced garden ecosystem.

Sources/Origins

The French Intensive System is not an entirely new technology. It did not separate itself fully developed from Mr. Chadwick's brow in one magic moment, as Athena sprang from Zeus. It has definite historical and philosophical antecedents based upon sound traditional practices and philsosophical perspectives of human limits. An understanding of some of this will aid in knowing what the system is about.

The first source is the British horticultural tradition. Gardening has long been considered a craft and, like most of the handcrafts we know today, it has undergone a long, experimental development with only those techniques persisting that have stood the test of time. By the beginning of the 20th century, horticultural practice in Europe, especially in Britain, had reached a highly developed professional state. I am not familiar with horticultural development in the Orient but, judging by the fame and accomplishment of Chinese and Japanese gardeners, similar successes must have been achieved.

Sound, thorough practices for the care and cultivation of plants existed. Not only could vegetables and some fruits be produced to satisfy urban needs in much of Europe, even during the coldest months of winter, but also these needs were satisfied employing technology and resources that today would be considered inadequate. Growers were able to do almost everything we do today and with considerable success. It might even be argued that because they had fewer technological tricks, they had to be better growers than we are today. This highly developed, highly professional tradition is very much in evidence in the French Intensive System. The tools used, the digging techniques, and particularly certain ways of handling the propagation of plants seem to have their basis in this horticultural tradition.

A <u>second</u> historical source for the system comes from France. Around the larger urban centers, particularly before the first World War but still carried on in a modified fashion today, a method of food production called by one author "French Market Gardening" was practiced. This was a truly intensive system employing huge quantities of fresh and composted manure, glass cold frames, and cloches, and producing up to eight different crops of high quality vegetables with very large yields on a single plot or bed within a calendar year. These sophisticated and hard working gardeners grew their crops through the coldest parts of the winter as well as through the hottest parts of the summer. This was done without natural gas heated greenhouses, chemical fertilizers, modern pesticides, herbicides, or fungicides. The system that Mr. Chadwick introduced is not as intensive. It makes use of much less manure and glass and does not produce as many crops. Nevertheless, his system has a root in this intensive, traditional practice.

The French Intensive System also has philosophical and technical sources that are more modern. Two men are important to mention. One is Sir Albert Howard who had a great deal of influence in England and America with his teachings about the value of organic farming and of naturally grown foods. The other was Rudolf Steiner, father of bio-dynamic agriculture.

Sir Albert performed most of his research in tropical India. After some initial experience with the use of the then new and untried chemical fertilizers, he became dissatisfied with them and turned to the use of manures and composts. His results were far better, and he became convinced of the efficiency of organic methods. He wrote several books on his beliefs and was a source of inspiration to, among others, J. I. Rodale, the founder of Rodale Press and Publications.

Rudolf Steiner is more difficult to discuss. In 1924 he gave a series of lectures on agriculture to a group of his followers at a large estate in what is now East Germany. He extended Goethe's principle of the interrelatedness of all phenomenon (an early formation of the ecosystem concept) to agriculture. He called for the development of truly independent and self-sufficient farms, saying that each farm should look on itself as an organism and that the whole of the farm's operation (like an organism)

would be somehow greater than the sum of its parts. He also claimed that the growth of plants was affected by many subtle influences as well as the most obvious environmental ones. Steiner advocated the use of special compost additives and field sprays derived from particular plants and minerals to promote the health and fertility of the farm.

To Steiner's credit, biodynamic farming has become, on the basis of successful practice, a worldwide phenomenon. It is most extensively practiced in Europe. To be a member of the Bio-Dynamic Agricultural Association in Europe, a farmer must use the practices described by Steiner and may not import more than 10% of his feed or fertilizing materials. I am talking about farmers who are commercially successful; some of them have followed these practices for over 40 years. These farmers obtain yields comparable to farmers using standard methods and export enough to survive in the competitive market.

Mr. Chadwick has tried to reinterpret Steiner's ideas on the scale of a garden. In discussing some of the sources of the French Intensive System, I do not intend to minimize the original role Mr. Chadwick has played in the creation of the system. I believe that the greatest originality lies in understanding, in a new and deeper way, the value of what we already have available in techniques and materials and in making new combinations out of these. Each gardener who practices this system must, in a sense, re-create it for himself, learning the techniques and grasping the insights just as Mr. Chadwick has done. In discussing the origins of the system, I have tried to describe the highly developed horticultural traditions drawn upon to supply the basic techniques that went into the synthesis of the French Intensive System.

Technical Aspects

I would like to go on now and talk more specifically about some of the technical aspects of the French Intensive System.

Fertilizing

There are a lot of organic gardeners who make use of composts, manures, and other organic amendments, as we do in the French Intensive System. The quantities of such substances used in this system are probably, for the most part, larger than most organic gardeners are apt to use. But the yields obtained from the French Intensive garden are larger than yields from a garden where plants are grown in widely spaced rows. I tend to think that less is lost of the valuable effects of these organic amendments with regard to their long-term and short-term influences on plant growth. Manures and composts are at times used in special ways in the French Intensive System, but these are refinements and not basic to the technique.

Fertility is thought of in a different way. I have often talked to organic farmers who evaluate their use of manure by its "actual" nitrogen (N), phosphorus (P), or potassium (K) content. If they need 150 pounds of nitrogen for a crop, they buy a quantity of manure that, by analysis, gives them that much nitrogen. This is not the way fertility is thought

of in the French Intensive System. A qualitative approach is taken. Instead of thinking in terms of quantities of N, P, and K, biological processes are considered. We ask

--What will be needed to create the appropriate soil condition for this crop? (Such as good structure, improved water holding capacity?)
--What will stimulate the soil's life?
--What microorganisms will help the plant to grow? (The life from which comes the life of the plant.)
--How do we improve the life processes in the soil that are crucial to the availability of the nutrients present in the organic materials we have applied?
--How do we help release the abundant minerals already in the soil mineral reservoir?

This kind of fertility, which looks at plant nutrition as a dynamic biological process rather than a routine chemical one, has been successful in producing high-quality crops at Santa Cruz for nine years. This experience is also shared in bio-dynamic agriculture. Bio-dynamic farms in Europe, where fewer organic materials are returned to the soil per acre than in the French Intensive System, have remained fertile and productive for much longer periods. From practical experience, it seems that when well performed the combination of practices that constitute the system maximize the efficiency of all the resources. There is a synergistic effect that cannot be explained by an input-output way of thinking.

Cultivating

Though I think it is a more common practice in Europe, most gardening books in this country rarely mention deep cultivation in their descriptions of techniques. Usually instructions on how to garden assume people do not want to work very hard and just urge that people make sure the surface soil is loose. The French Intensive System relies on good soil drainage. In many cases deep cultivation is the only way to ensure that the soil will drain well. There are other critical advantages that come from deep cultivation. If the soil is loose to a greater depth, much more soil is accessible to the sometimes timid roots of our food plants. Gas is exchanged rapidly between the atmosphere and the soil and air penetrates deeper into the soil increasing the depth of biological activity.

Raising the soil above ground level (which is achieved through digging techniques) enhances all these dynamic biological processes still further, especially when compared to level or flat rows of crops. For the same reasons, the beds tend to be warmer than the surrounding soil. Raised beds can only be successfully prepared by handwork (human labor is a tremendous asset in the system). Machines like Rototillers are incapable of reaching the depth desired or creating the wide raised beds used in the system. Human sensitivity to the very localized, specific conditions of the soil is brought to bear by the gardener with each spadeful of soil he moves.

Watering

Water application in most gardens is furrow type, although sometimes sprinkler type. Often the soil is allowed to dry out to, or close to, the permanent wilting stage before water is again applied. Irrigations tend to be infrequent and deep. The surface is often dried out by the time water is next applied. Gardeners who use the French Intensive System are very concerned about the upper portions of the soil. They water frequently enough to keep that level as well as the deeper ones close to field capacity (the optimum amount of moisture for plant growth). When the soil moisture is close to field capacity, it ensures not only the steady uniform growth on the part of the plant, but also that the plant will be more efficient at getting water from the soil.

The surface soil, where gas exchange is greatest, remains an area where roots can exist without the normal interruption of growth due to drying out. The surface soil remains friable and open to allow water penetration. There are other benefits as well. I have read that the breakdown of organic matter is slower in soil with constant soil moisture than in a soil with fluctuations in moisture.

Spacing

The closer spacing of plants in the French Intensive System helps to make for efficiency in water use as well as for conservation of land. Little water evaporates from the land if it is properly applied because the plants themselves shade the surface of the bed, protecting it from the drying effects of both sun and wind. Efficiency of water use can also be achieved to a degree by using mulches. However, there are some difficulties associated with the use of mulches and it is not possible to use them in a wide bed where seed is broadcast.

The French Intensive System places plants closer together than other methods (some people think too close). Our goal, however, is not the biggest rutabaga on the block, but the best one to eat. Very often this means a smaller rather than a larger rutabaga. There are advantages to the close spacing of crops in addition to the protection it provides for the moisture of the soil in which the crops grow and in addition to the large yields it produces.

Competition can be mutually beneficial when it is carefully guided. What we have here is a kind of free enterprise system among the vegetables. They race each other for light and other desirable things. And, in the process, they grow faster than they would if they had plenty of space. After an initial weeding and thinning, they also outrace the weeds by shading the bed, thus keeping the weeds from germinating.

Another remarkable thing happens as a consequence of close spacing; the vegetables help to create a microclimate for themselves, trapping air underneath their leaves. This trapped air is not only more humid than the air above the leaves (again minimizing water loss from the plants), but also more consistent or stable in temperature than the air above the tops of the plants. It tends to be cooler on hot days and warmer on cool ones.

Of course crops can be oversown. It takes practice to broadcast seed correctly. It is up to the gardener to carefully limit the degree of free enterprise among his vegetables. It is also important to note that some crops (tomatoes for instance) do not take to overcrowding no matter how consoling you are to them. But the system works exquisitely for the crops that can adapt to it.

Controlling pests

Pest control techniques are in some ways similar in both standard organic gardening techniques and in the French Intensive System. Hand collection and trapping, good garden sanitation, crop rotation to break the life cycle of the pests involved, and, above all, attention to the nutritional status of the plant are practices common to all good gardeners who care about the natural environment and who do not wish to handle toxic materials. Further steps are taken in the French Intensive System where the garden is laid out in such a way as to mix in a beneficial manner different types of plants, shrubs, and trees.

We often think of what a plant takes away from the soil, the garden, etc., but we do not often think of what a plant contributes to the place where it lives. Each plant, shrub, or tree has a unique relationship to the garden in which it is placed. In cooperation with the microorganisms present in the soil, each plant helps to create conditions for growth appropriate to itself. I am talking about the rhizosphere, an area just surrounding the roots themselves. Plants vary in the contribution they make to the environment around them. The roots of some plants grow deeper than others. Some are more fibrous. Some taprooted. The leaves of different plants have different odors. Some are particularly pungent, others are mild. Some plants have toxic (allelopathic) excretions. It is a fact that the plants influence the environment around them through their varying and unique characteristics. Besides affecting one another, they also influence insects, birds, soil life, and people near them.

The term "Companion Planting" has been used as a catchall to refer to the diverse and sometimes mysterious influences plants have upon what lives around them. The gardener tries to orchestrate these influences to the best of his knowledge and sensitivity. Translated, this means plants (including certain weeds) are often specifically employed to help create an atmosphere that promotes the growth of healthy, disease-free, and pest-free plants for maximum food production. These pest control practices are efficacious. I've observed visitors who walked into a garden where these practices were being followed and who were struck by something intangible: "It feels like a place where plants must grow well." This feeling is not mere imagination. It is derived from a real phenomenon — a garden with an atmosphere of lush healthy growth — a growing environment created by the gardener.

Summary

The French Intensive System has certain important characteristics.

1. It is an organic system of cultivation, relying upon manures, composts, and other amendments as sources of nutrients, and viewing them as a means of qualitatively improving the life of the soil.

2. The soil is worked deeply and carefully and the beds are raised. These practices promote rapid drainage of excess water, good aeration, and soil warmth.

3. Watering is done frequently; the soil is not allowed to dry out too much. An ample supply of moisture is kept throughout the root zone with special emphasis on the surface area.

4. Spacing of crops is used to promote quick and even growth by creating a small, relatively stable microclimate under the leaves. The closeness of the plants also reduces weeds as well as increasing yield/square foot.

5. The garden is thought of as a whole. An environment is created where life is abundant and crops thrive. Diverse plants are used in specific ways to help achieve this end.

6. The parts of the system operate together to create a dynamic effect which exceeds the sum of the parts and gives to the system its advantage of yields and soil maintenance.

In conclusion, I believe that the French Intensive System is an example of human resourcefulness applied to an old problem -- how to feed ourselves. It is a system of food production that functions on a small scale, requiring minimum resources for the production of plants.

The System's roots go back to well-developed, highly sophisticated horticultural traditions. It embodies a belief in the ability of human beings to rely thoroughly on an approach to cultivation which is more biologically oriented than has been popular in this century. Finally, it is a humanistic approach to cultivation which implies that people will be able to live and be prosperous within ecological limits.

QUANTITATIVE RESEARCH ON THE FRENCH INTENSIVE/BIODYNAMIC METHOD

John Jeavons

Five years ago, Ecology Action of the Midpeninsula in Palo, Alto, California, began tests on the French Intensive/Biodynamic Method. We are a small, non-profit, environmental, educational, and research organization. We operate a 1/6 acre research site in conjunction with a community garden on land donated by the Syntex Corporation in the Stanford Industrial Park.

Our purpose in 1972 was to try to document and publish the basic elements involved in "The Method" and to determine if its yields were as high as reported. Questions we were also interested in were:

1) Could a farm using these techniques be cost-effective and cost-competitive in relation to commercial agricultural techniques?
2) What would resource consumption levels be?
3) What are the smallest amounts of time required to produce a complete balanced diet and a reasonable annual net income?

Three important reference points guide our research work.

1. We are looking for an environmentally sound, sustainable form of small scale personal agriculture.
2. We stay as close as possible to Alan Chadwick's techniques and approach, and especially to the reverence for the earth, fertility, plants, and humans embodied in his approach.
3. We try to keep the understanding of the Method's techniques as simple as possible so that many people can readily assimilate the approach. Our orientation is toward low technology, not intermediate.

It is this simplicity that distinguishes our approach, at least temporarily, from that of the Covelo Project. For example, we grow all crops in growing beds prepared and cared for in essentially the same manner as the French, whereas Alan prepares different kinds of beds for different kinds of crops. His is a horticultural approach of the highest order. The approach we have evolved is a more rustic form we call miniagriculture. We feel that miniagriculture is a simple and easily understood place to begin the Method and from it one can graduate to the more sophisticated levels. Many people around the United States and some located overseas have had good experiences using the miniagricultural approach. (Over 32,000 copies of our manual are in circulation.)

I believe that Ecology Action has made a unique contribution by viewing agricultural production from the twin vantages of one individual and the smallest number of inputs (land, water, capital, tools, fertilizer, time, etc.) needed to produce all his food or income.

Many years ago I was interested in becoming a farmer, but I could not find information on the smallest area needed to provide food and income

for our family in the easiest way and in the shortest time. The information did not exist. Even now the United States Congress is thinking about providing loans of up to $300,000 to small farmers so they can afford to start out. Ecology Action's preliminary research since 1972 indicates the initial capital requirement could be much lower.

Consider the fact that in 2005, 30 years from now, the world will probably have a population of eight billion people, double that of today. This doubling will generally mean the average per capita resources will be cut in half. In the case of many non-renewable resources, the cuts will be even larger. In some cases the crunch will come sooner than 30 years. The United States and the world have approximately a nine year supply of natural gas. (Using natural gas is the most efficient way of making synthetic nitrogen fertilizer.) Thus low capital investment, resource-conserving, high-yield forms of miniagriculture will become increasingly important, especially for the developing countries of the Third World.

What have been the results of our five years of preliminary tests and sample testing?

1. Our vegetable yields have been 2 to 16 times the United States national average (2-16X). Since good U.S. farmers get generally double the national average, our yields are significant. Some examples are:

tomatoes	more than	2	X	(this figure should go much higher)
cucumbers	" "	9	X	
bibb lettuce	" "	5.6	X	

   I expect the ultimate overall average for vegetables and soft fruits to be 8 times the U.S. averages and more than 12 times the world averages.*

2. Grain testing has also begun. Soybeans which yielded 0.25X in 1973 and 0.91X in 1974 increased to 2-1/4X in 1975. This yield (57.3 bu/acre or 3858 kg/ha) is a significant yield for soybeans, especially for novice minifarmers. In contrast, in the best recent U.S. soybean year (1973), the two best yielding counties in the best yielding state (Iowa) averaged 40 to 41 bu/acre. A 60 bu yield is the goal for the U.S. farmer, but to date it has been infrequently achieved.

   I should note, however, that one experimental test station, I believe in Kansas, got a 98 bu yield in 1975 using special hybrid seeds and special fertilization. I expect grain yields using our

*Editor's Note: During the discussion of this paper there was some concern about the expression of yields in terms of national or world averages. Yields are highly dependent upon climatic conditions, and the climate at Palo Alto cannot be considered to be an "average" climate. There is less objection to comparison with a county average if the county is selected to present either a comparable climate, the best commercial production, or some other pertinent situation.

method to eventually average 4 to 6X the U.S. average or 14.5X the world average. We may even go as high as 167 bu/acre.

Our highest yield to date for hard red wheat has been twice the U.S. average. With this yield increase has come an increase in the protein content from 14.8 to 15.7%.

A good question here is: Are the results from our approximately 114 sq ft test plots replicable on a larger scale? From my experience with the Method and from observing Alan Chadwick's horticultural garden results, I believe they are. I should also mention that the yields I project are already frequently being achieved in some country or major geographical area in the world. In most of these cases, the soil has not been as well prepared.

Next is the question: How many square feet are necessary to grow the foods needed for a complete and balanced diet? Robin Leler and I have developed a milk-supplemented, complete, balanced vegetable diet that meets both the U.S. Recommended Daily Allowances (RDA) and the United Nations dietary standards. (In many instances the diet provides much more than these standards. We developed this diet because we could not find any essentially vegetarian diet that met the RDA standards on the one hand and did not call for consumption of enormous quantities of food on the other.) We can grow this 2379 cal diet (which includes the proportional amount of fodder for the cow or goat that supplies the milk) in a four to six month growing season on about 7000 sq ft or about 1/12 ha. (This assumes yields two times the U.S. national average.)

If the optimal yield predictions are reached, this same diet could be grown on 2500 sq ft or about 1/30 ha. These figures of 7000 and 2500 sq ft compare with the 4842 sq ft required to grow a diet of similar caloric value using average U.S. agricultural practices, and the 32,280 sq ft using Indian practices. Meat-supplemented diets grown with the Method will also require much less square footage.

What is the major reason for these increased yields? At first we thought the French Intensive/Biodynamic Method would increase yields only four times. The 24 in deep soil preparation allows close spacing and usually four times the number of plants will fit in a given area. However, when our zucchini yield topped 16X the Santa Clara County average in 1974 (up from 5.5X in 1972) we began to examine the process. Recently we learned of studies performed about 1950 at the University of California at Berkeley (which later received worldwide support) that showed overall root health in agricultural soils has not improved significantly but rather has usually declined. Thus the study showed that even a 2 to 4% increase in plant health could result in 200 to 400% increases in yields.

The Method's soil preparation process appears to make such an improvement possible by optimally texturing, aerating, fertilizing, and watering the soil. In one control test performed by Ecology Action, the average broccoli plant grown in 24 in deep prepared soil weighed 2.5X those grown in 12 in deep prepared soil. If you combine an average four times the

plants per unit of area with two to four fold increases in yield made possible by increased root health, you have a 16X yield potential with some crops.

What amount of resources have been consumed to obtain these yields? In comparison with Santa Clara County, California, 1/2 to 1/8 the water and 1/100 the energy in vegetable production per pound of food produced was consumed. For nitrogen fertilizer it was 1/2 to 1/16. The decreases in fertilizer and water have been due mainly to increases in yield; in other words, as yields increase, input consumption per unit of food decreases. This energy consumption level applies to grains as well as to vegetables.

What has made these resource savings possible? The nitrogen fertilizer saving is due apparently to the slower release of organic nitrogen fertilizers and the increased density of root systems, both of which allow for more efficient use of fertilizers.

The water saving is due to several factors.

Research by academic institutions has shown that soil that has active organic matter as 2% of its volume requires only 1/4 the rainfall or irrigation required by poor soils (soils with about 1/2% active organic matter). The amount of compost used by the French Intensive/Biodynamic Method provides this.

Even under arid conditions, soil which is shaded can decrease water evaporation by as much as 13 to 63%, depending on soil type. The Method's miniclimate roof of closely spaced leaves provides this shade.

Transpiration of water through the plant can be reduced by 10 to 75% in soils which contain large amounts of nutriments in the soil water. The Method prepares the soil in a manner that produces a high level of fertility.

We have documented, roughly but I feel accurately, the energy saving in calories expended at all stages of the production process vs the amount of calories produced in the form of food. We have not yet developed a systematic way to explain why less energy is used. Partly, it is due to the great efficiency of our own muscles. Each of us as human beings uses an energy equivalent of 33 gal of gasoline per year at home and at work. The average U.S. black and white television set (tube type) consumes 10 gal of gasoline per year.

We do not yet have enough experience to indicate how much less water and fertilizer will be required in grain production. I do not believe that the savings will be as great, but they should be significant and should parallel the vegetable pattern.

Two things should be mentioned here. First, the Method as currently practiced by Ecology Action does use double the water per unit area for the production of vegetables. It is the 4-16X yields that makes the water consumption 1/2 to 1/8 per pound of food produced. However, I do

think it possible that our water consumption will decrease further, perhaps by 1/2 to 1/4 the amount currently being used per unit area.

Second, though a developing nation or area without irrigation may have only 1/4 the water per unit area that Ecology Action is using, my guess is that the yields, while not 4 times the U.S. average, will be at least 4 times the yields previously obtained in that area. Tests performed in the arid parts of the U.S. lead me to this conclusion. The main reason for the yield increase is the improvement in efficiency of utilization of water.

Many people have asked if the Method or a modification of it will work in all climates and soils. It is my belief, after five years of study and field work, that it will. For arid areas, there is the experience of the Zulus in South Africa. They prepare growing beds 36 in deep and are able to grow crops in the rainless summers when no one else can. For hot, humid areas, the director of Oxfam in England has written us explaining his belief, derived from experience, that the French Intensive/Biodynamic Method will work well due to its improved drainage characteristics. A field worker with International Voluntary Service (IVS), currently in Bangladesh, has told me the same thing from his experience in Nigeria.

As for soils, Peter Tonge, a long-time garden and food production writer for the Christian Science Monitor, has told us that the Method worked well in his sandy soil in Massachusetts -- something he did not expect. Lateritic soils (which constitute only about 7% of the arable world land) will probably require some significant modification of the Method; but I think Composting in the Tropics, by the Henry Doubleday Association in England, may contain some of the keys to the solution of the problem.

One potential problem is in the way we have been practicing the French Intensive/Biodynamic Method. We have been using 3 to 12 times more organic matter than can be sustained on a "closed system" basis (crop residues, simple cover-cropping, and animal manures). We have used about 300 lb (dry weight) of organic matter per 100 sq ft. It may be that only 25 to 100 lb of organic matter can be easily produced annually. Both cylindra beets and comfrey can produce incredible amounts of organic matter, but they require land resources and part or all of the growing season to grow in large amounts.

We soon hope to test whether the French Intensive/Biodynamic Method's high yields and reduced resource consumption will also occur when only easily sustainable organic matter amounts are used. From the little information we have been able to obtain about Chinese intensive agriculture, it appears that substantially higher yields can be possible. But how high these yields will be is still unclear.

Lastly, it should be noted that the number of people required to grow the 7000 sq ft minifarming diet mentioned earlier could be about 18% of a population, well below the 51% of people currently in the world's agricultural work force. If the highest expected yields are reached, the

2500 sq ft diet could be produced by 6% of a country's population. This compares with the 2 to 4% of the U.S. population now directly engaged in field agriculture, and with the 10% of the U.S. population engaged in other agricultural areas (including transportation, packaging, and marketing). These figures, arrived at by time studies, assume skilled practitioners and a developed healthy soil system in ecological balance.

They also assume a good supply of water. If only 1/2 the water we are using (about 6 acre in per month in the warm season and 3 acre in or less in cooler weather) were available, say 18 in in the soil or through rainfall, then only 14,000 sq ft would be required to grow a complete diet with non-optimal yields and 5000 sq ft for a complete diet with optimal yields. Thus 6 and 16 people could be fed respectively per acre with an agricultural population of 36% and 12% respectively. (I should also mention for reference that about 6000 lb of wheat was recently grown in Arizona on an acre with 24 in of water. This is significant.)

The figures for complete diet production assume that the simplified form of the French Intensive/Biodynamic Method is being used. But you can see that not many people may be required for food production. The Method really can be more skill intensive than labor intensive. Since so few people may be needed for food alone, two or three times as many people can participate to produce the additional horticultural beauty and spirit seen in the Covelo project. I believe that with intensive agriculture, developing nations can expect to obtain their nutritional needs from a small space, that is more consistent with quality work and tender loving care. At the same time the nation would be consuming less resources as well as creating an artistic habitat.

There are four essential time factors to make all the preceding figures work.

Education

One can "learn" the miniagriculture techniques of the French Intensive/Biodynamic Method in about a week. However, a 6 to 12 month apprenticeship is highly desirable. And 2 to 3 years are required to become truly competent. This is not surprising. Farming techniques have been passed on from parent to child through year-round apprenticeship. Or they have been learned through four years of agricultural college, plus several years of on the job experience. We cannot produce "jack-in-the-box" "90-day" wonders. I am glad.

Another reason why a substantial learning time is needed is that the techniques, especially the back-to-the-source problem-solving approaches of the organic farmer, often vary from the approach of the standard commercial farmer by 180°. (Additionally, if you are using the French Intensive/Biodynamic Method, you must often re-orient your thinking another 180°.)

This need for adaptability was demonstrated when one of our staff thought a tomato bed had nematodes. All the outward signs were there and the staff began to act accordingly, following commercial practice. We found

the problem was due to a "dry pan" which was choking off the root water supply about 8 in down. This in turn was due to poor soil preparation and watering. (I believe most insect and disease problems can be traced to and ameliorated by the type of cultural practices used, and recent research is tending to substantiate this.)

Time to improve the soil

A 2 to 5 year period of soil improvement may be required before the projections mentioned here become a reality. This year we have worked with a new rapid soil improvement process that may shorten this period, but it is too early to tell.

Time to train skilled practitioners

There are very few skilled practitioners of this age-old technique. Although it traces back to the Chinese 3000 years ago, it is virtually new to us. Covelo, Santa Cruz, and Santa Barbara are beginning to meet the need for practitioners, but it will take time to train adequate numbers.

Time for adaptation

There are cultural, economic, political, climatic, and soil factors indigenous to each location. Time will be required in each to reach a solid synthesis geared to the specific area or region. No doubt training, education, and research should be performed regionally.

What then remains to be done?

I believe that our five years of preliminary research indicates that ten more years of similar and expanded work are warranted and should be performed. Modifications of the Method will be necessary, but I would like to see a spirit of "how can we do it?" or "can we do it?" rather than "it cannot be done". We still do not know the optimal spacings for grains. A change from 1 to 2 in centers doubled our yields. Tests in 1976 indicate fodder yields should be much higher; for example, 2-4X or more for alfalfa. I expect 2 to 3X yields with fruit trees. We have just planted some.

We would like to see the development of a watering tool specially designed for the Method which could improve watering, making it easier, faster, and more like the light rain desired. We would also like to see the development of minigreenhouse systems that would be modular and would have replaceable panels. They could then become minilathhouses or mininetting houses as the situation demands. We also need low-cost, efficient minithreshers.

More importantly, research and development centers which are strong in miniagriculture are needed to provide in-depth information and serve as a backup for basic training programs.

I would like to see 6 to 12 month training programs that in the process of imparting the technique, would teach an individual how to grow, harvest, and store a complete diet. The self-confidence developed in an individual who knows that he or she is competent in both technique and self-sufficiency would be invaluable and would serve as a building block for overseas programs.

SITE VISIT TO THE MESA PROJECT, A DEMONSTRATION AND TRAINING FACILITY

Paul Relis and Warren Pierce

The Mesa Project and the site here are the evolution of five years of work of the Community Environmental Council (CEC) in developing planning concepts which attempt to integrate agriculture and the uses of solar energy, and to formulate the concept we call Urban Village as a test for prototypes of urban redevelopment and village redevelopment. I'll explain some of the background so that you will have an idea of what this concept is and how it relates to your interests in Santa Barbara. The CEC was started five years ago as an environmental organization focusing on the usual concerns -- environmental abuse and degradation. But very early on, due to the presence of Warren Pierce and Richard Merrill, the emphasis of our work was on agriculture, especially on a gardening level and specifically as it related to the urban issue.

We started with a small garden in downtown Santa Barbara in 1970 and moved a year and a half later to a 4.6 acre site in which we conducted various experiments and demonstrations related to the school system, where we had John Fry and an engineer on our staff working on solar energy. Warren conducted agricultural demonstrations and test plots to determine both the productivity, yield, and sustainability of this small scale agricultural technique, similar to what is being done at the University of California at Santa Cruz and at Covelo. We were solely interested in the focus on urban gardens.

We never really thought of how this work might relate to developing countries until Dennis Karzag thought that small scale agriculture had an important role to play in Direct Relief Foundation (DRF) programs. Based upon mail responses, doctors in the field indicated that one of the chief problems with which they were confronted was that their medicine was not working when people were not eating. So with the cooperation of Warren and the director of DRF, we offered an intensive course to a very limited number of students who would go into the field to see how they could apply their new knowledge.

Jan Gallagher was one of those students who took the two month course from Warren. She was already established near Guayaquil, Ecuador. Through her Peace Corps experience she was fluent in Spanish and knew the culture, so it was not like starting from scratch. She went to Guayaquil and conducted the work that was described in the DRF report, and to which she will speak later.

Since that time, we have conducted two more courses. Right now we have nine students who are going through a program in intensive Spanish and horticulture in preparation for other assignments. We sent four students to Guatemala a month ago, another student to Ecuador to work with Jan, and other sites are being explored.

This program is very much in the formative stage. What we are trying to do is achieve a balance of lectures, which Warren conducts daily, and field work. We emphasize the cultural aspects of the approach and have invited speakers from the University and City College and from other parts of California to speak to the students.

We are now beginning to place students in the field, and our first major task is to find out how our students will fare in the Guatemala project. It is a pioneering tropical settlement, owned by the Indians and conducted under the auspices of a Father Woods. It is a remote site where the Indians have been for nine years, and the attempt there is not to make a difference between whether people starve or have adequate food because they do have adequate food. The question is whether the methods that can be established and taught here can lead to better reforestation and to a more ecological agriculture approach sustainable with the resources at hand.

Some of the other assignments will attempt to go into more fundamental problems where food is an absolute scarcity. I do not know where or when we are going to place the additional students at this time.

At this site the CEC is testing the urban village concept which will integrate the agricultural part with housing and passive solar heating systems (with which we have a fair amount of practical experience in the Santa Barbara area). We also get into complete waste recycling systems and work with the University of California Santa Barbara Sociology Department to evaluate the degree to which these various planning elements can be fused as a basis for urban reconstruction strategies.

So you have, essentially, two major thrusts to the Mesa Project--demonstration and training. After the discussion, Warren will take the group on a tour. Specific questions you might have concerning the garden can be directed to him. Let us now entertain questions.

Q. Where do these students come from?

A. Initially they were from California.

Q. Are they from an institution?

A. Some have been in agricultural schools, such as California Polytechnic and the University of California Davis. Some have completed degrees and others have not completed degrees. The emphasis of our recruitment is on students who have backgrounds in biology or agriculture or the basic sciences so that those subjects are out of the way, so to speak. Warren taught at the university and is not accustomed to starting with the basics. It takes too much time for this particular program to get people to be ready in five months if they have no background.

Q. I heard the term "student" used and I was trying to get a feel of where you draw them from and what they usually do after they leave?

A. After they leave here they are supposed to receive an assignment, depending on whether we are satisfied with them and if they feel prepared enough to go, as was the case with the four students who went to Guatemala. So the program is geared to students going into the field to work on a project rather than coming here, spending five months to a year, and then wondering what they're going to do. Our aim is to place students in projects.

Q. Do some of them return as Peace Corps volunteers?

A. Jan Gallagher is one such person, but she was formerly with the Peace Corps.

Q. During your five or six months' training, do you incorporate communications into the education and economics with instructions in how to utilize these factors in your group?

A. That is something we are working on. In the initial stages of the project, we were not equipped to do that. We were strictly into the agricultural part. Our initial emphasis has been on growing plants and preparing the students in that way. All of the work is documented at the El Mirasol Polyculture Farm project. Warren had five plots established in the last year of the project that attempted to discuss this issue of manpower, planning, concepts, energy (in terms of water), physical time in preparing beds and yields, along with the various composting and other methods used.

Q. There is quite a difference between your students and the Indians. The students, who have agricultural, biology backgrounds and/or university training, receive a five month course. Then they go to a place like Guatemala to communicate with a community of Indians who have had no more than a third grade education. What do you do to prepare these people so that they can effectively communicate these techniques and these methods? Are you preparing them with graphics and visuals? Do you have a Step 1, 2, 3, detailed outline of the process?

A. Initially the emphasis has been on the physical development of projects such as the Mesa Project, or wherever we send students. We do not get into a major community outreach when we first go to a site. Actually we are trying to establish beachheads to sites where there is a long-term relationship with the DRF. In other words, they have been sending medical supplies to specific sites for over 20 years. So the nature of the program has been to maintain contact and to receive a response from areas that appeared most suitable in terms of receptivity to the small scale agriculture approach. The student goes to a site where there is already an established contact and builds a garden project at that site. Beyond that we have prepared a procedures manual on the agricultural component and a health resource manual. In short, the program depends heavily upon the observations of people who have been in the field.

Q. Is there feedback from the local people as to the effectiveness of this approach?

A. We are not that far along yet, although we have had some favorable response from Jan Gallagher.

Q. How much does it cost to train a student at the Mesa Project, and how are the funds obtained?

A. We have set up a tuition of $250 for a five month semester, beginning in February 1977, when our second semester begins.

Q. Where do the students live?

A. The students live in town. We do not support the students while they are here. What we have done so far is to help them try to find housing and part-time work. But it is up to them to work it out.

Q. How many students have you trained?

A. Approximately 16.

Q. Does $250 cover all of the cost?

A. No. The program has been supported partly from a U.S. Agency for International Development (US AID) grant to DRF.

Q. How much does it cost to train 16 students?

A. About $3000 for one student. That includes a year's stipend in the field and round trip transportation. It is not strictly the cost of training here.

Q. What is the stipend?

A. The stipend is $100 a month or $1200 a year. We allow $200 a year for transportation and another $200 for various incidentals. We still have to subsidize the program at about $1500 per student.

Q. Where has the money come from up to now?

A. Primarily from the US AID grant. However, the site was provided by CEC; the tools and equipment, so far about $1200 worth, have been donated by private organizations, such as Kiwanis. Prior to seeking major support, we took on this program as a pilot project to see if the program is applicable.

Let us talk some more about the garden here at the site. It is approximately six months old. It was an old dairy farm with about 70% very fine sand and not much topsoil. A seed flat mix is used to start many of our plants: brassica (broccoli), the lettuce family, celery, parsley, and flowers. Carrots and other root crops are sown out in the garden itself. We make the seed flat mix with whatever we have on hand. This one is a mixture of one-third sifted topsoil, one-third river sand, and one-third sifted oak leaf mulch.

After the seedlings have grown in the seed flat, we do not throw the seed flat mix out. It goes into this bin and later is used for coverage when

we are sowing the crops in the garden. If you stockpile it you get rid of the seedlings, and virtually no weeds will come up if you turn it over a few times. I usually do not bother doing that myself for various reasons.

We are on city water here. It comes through a mountain tunnel and is fairly hard. On top of that the city adds chlorine to it and chloride salts cause a lot of damage to the crops. To help this a little we use water that has settled for a day or so. This is what we call a watering tool. It has a very delicate spray for the seed flats, as demonstrated here.

These are four new seed flats, just sown a few days ago; and this is a lettuce flat, just starting to come up; and this is a brassica flat. Two weeks from now this broccoli will be lifted out and spread into another flat. After four weeks that flat will go into one of these beds. We save the time of occupying the land by using the seed flats. We have saved on seed and it gets protection. We also save on water and fertilizer.

Q. Do you have many problems with damping off?

A. A little, but the oak leaf mold apparently has inhibitors against the water mold. Sometimes we get some petritis with the broccoli. If that happens we just water underneath and set it out in the sun.

Q. How long do you age the leaf?

A. This pile here is about four months old. It depends on whether you water it, turn it, and stockpile it, or if you just let it sit in a dry state and let the rains do it.

This is vegetable waste here. It comes mainly from weeds out of the garden. Weeds are important in building up compost material; consequently, we do not weed out a lot of things in the garden.

Q. The weeds competing with your major crops do not bother you?

A. There is a certain extreme where the weeds could take over. There is a selective weeding process. There are other factors that determine weeding; for example if you have a scorch, you might want taller weeds to protect the plants from burn. Close planting discourages weeds. This is one of the benefits of this kind of method.

This is a seed flat preparation right in the ground. If you do not have a redwood seed flat, you sow them here. You could put a little protection, netting, over it. If it is a brassica then you spread it out here. These will be moved; we follow a moon cycle, so during a new moon it is sowing, then during a full moon, transplanting.

Initially, six months ago, we had 50 lb of radishes, 200 lb of lettuce, 40 lb of string beans, 20 of melons, 10 of squash, 150 bouquets of sweet peas, and at the end of all that, 15 cu ft of vegetable waste went back into the compost pile. Up to now, when the second crop is about to be harvested, there have been about 30 lb of broccoli already pulled out of this. If you add all that up, it is about 350 lb of produce; and if you want to take that out to an acre, it would come to about 25 tons per acre, including the pathways, per six months.

You get a lot of pest problems during the first six months, but after that the fertility of parasitic wasps helps clean things up. Flowers are in this garden to be food reservoirs for parasitic wasps. Your ladybugs and lacewings also need an alternate food source.

Editor's Note: At this point in the site visit, Steve Kaffka joined Warren Pierce in the preparation of a spinach bed. The conversation began with Kaffka's comments on digging.

In our garden I have the advantage of knowing what is underneath the ground. I will do a profile meter by meter to see how the thing lies; then I can go ahead and dig my beds knowing what is underneath. The first thing we will do is finish digging this bed, then very quickly dress it, sow it, and cover it. We have got cover material all ready. Sometimes weeds or leftover vegetables are taken off at this stage, and taken directly to the compost. Now I have the trench open, and I will try to distribute the weeds to get some in every trench. It helps if you chop them up a bit -- the woodier the material, the more you should chop it up. I am turning this soil, and I will try it another way later. It is sometimes helpful to break it up and leave it as rough as you can, and let the air work on it for a day or two. You dig deep, and then you are doing some of the work that the roots would have to do, so they just grow. If you do not want to turn the soil, you can just flip it up.

Q. Could you use fish?

A. Yes, use what you have. But use it.

We put one application per year on like this. That is all we can afford. I would like to do more. I think it is more important to use it in the early stages of the garden than at the end because you are recycling the plant waste.

We are going to keep this bed as shaded as we can, keep the surface area full of roots, full of growing parts of the plant. One of the problems that occur in a windy garden is lack of moisture, so you try to create a windbreak. (This can be done by growing other taller plants) I do not want to make you think that we just care about 6 in of soil. We have

done a lot of digging to make sure the plants can get down and they will. In the watering process several nutrients will go down anyway. I have not done any soil tests yet.

Q. I heard Warren say he does not use bone meal, is that right?

Q. I use bone meal. There are frequencies that you put it in. This one will last for a year. There are different ways of doing it. This will have a reservoir of calcium for a while. Getting back to the problem of conductivity, alkalinity, etc., you should be able to tell what is lacking by how the plants are doing.

Q. What is the purpose of bone meal, what do you hope to achieve?

A. For calcium, phosphorus, and magnesium, primarily.

Q. You could not get this from other sources? At a lower price?

A. Possibly, shell flours, such as oyster shell, or rock phosphate.

You should also know that the sowing of spinach, or any plant in the bed where it is broadcast, is determined by several factors. With spinach I am always tempted to oversow quite heavily; you can always eat thinnings, and you get spinach in about thirty days. Then you continually pull plants until you get your appropriate spacing, until the bed is covered. Then you can make the choice of pulling or thinning the plants by leaf. Sometimes we sow from our own seed, depending on the plant. You cannot take seed from hybrid tomato. You can, but it is not a replica of what you had.

When I am through, these plants should be germinating about three inches apart evenly. If I have a bare spot somewhere, I will stick several lettuce plants in to make use of the space. Then I will thin to at least six inches, then possibly thin again, depending on how well the spinach is doing. All of the time you are trying to leave the bed as covered as possible. This time of year is good to grow spinach, because the day length is right. The rule of thumb about covering is about three times the width of the seed, in this case about half an inch. If it is a smaller seed, it would be more shallow.

I am sure there are many more questions but I think it is time for us to break up now. We will discuss all of this some more later.

EVENING DISCUSSION SESSION

The Monday Evening Discussion Session was organized as an informal participant presentation with questions, answers, and comments. The session lasted for almost four hours. It seemed as though all the questions one always wanted to ask about small scale intensive gardening were asked, and the responses triggered other questions about the specifics of the subject and related issues of professional concern and pragmatic value.

Questions were raised about the requirements for reaching the most economically deprived families in Third World countries with a food production system. The general sentiment of the group was that any food production system has to be simplified or stripped down to its essential components. The cost has to be low or virtually nil. Maximum use has to be made of traditional tools, traditional foods, and locally available seeds. It was also felt that the introduction of a small scale intensive food production system will take hold only if it is cost effective. Furthermore, to ensure user receptivity and a spreading of the method, it will require demonstration, experimental learning, and word of mouth communication.

Obviously the questions and the myriad of responses generated by the participants established the importance of this part of the program. Of particular importance, though, was the sense of collaboration, compromise, and commitment that emerged from the group in the Evening Discussion Session. To approximate that sense of importance and to report the substance of the group interaction, the following selection of questions, answers, and comments are presented. For the purpose of clarity in reporting, the following labeling will be used: Q - Question; A - Answer; and C - Comment.

The meeting began with a series of technical questions on companion planting and the various potentials of certain plants. Steve Kaffka responded by stating his experience with the use of flowers and perennial herbs at Santa Cruz. More importantly, though, he commented on the French Intensive/Biodynamic Method as a highly refined ecosystem.

C. If you try to translate that into one or many of the kinds of ecosystems in the Third World, what would that mean? What kind of soil types would that work with? Would it fall apart piecemeal? When we came to our location, it was considered the worst piece of soil in the area. The topsoil was eroded. Yuca and peanuts had not grown on this piece of soil for 35 years or more. We did not do any double digging the first two and a half years, but we did use compost. We were interested in available resources; we did not use any pesticides, herbicides, fertilizers, or chemicals of any kind. We did take basic soil conservation steps; we used silt pits that we dug on contour, and we stopped the erosion. Within two years we built up the soil and were getting some very good production in terms of feeding families. We wanted to see what we could do to raise the nutritional levels in this very isolated area.

Q. Steve, what are the key components of the system in terms of watering and in terms of securing productivity?

A. The two most important seem to be
1) conservation techniques
stabilizing the soil because no matter what kind of soil you have, if the rains keep washing it away, you have nothing; and
2) composting
deep incorporation of organic matter and soil.

Q. One of the problems in the tropics is the loss of organic matter rather rapidly. Are you able to get enough organic matter for these areas?

A. Yes, there is plenty of material available and more constantly being produced. There is often animal material; also peanut husks and shells and rice husks.

Q. Did other people in the community pick up on these methods?

A. Yes. Step number one in any kind of program of change is that you have to demonstrate to the farmers that you know what you are talking about. That generally takes two or three years, just to get to that point. In a short time gardens started springing up in the area. Of course, we helped distribute the seeds. One of the big problems with these farmers is that they know about collecting and using seeds for crops with which they are familiar, but when you bring in crops with which they are not familiar--such as lettuce, cabbage, and a whole range of vegetables--they do not know how to save seeds.

But the people <u>are</u> interested. We were training a local man, and when the rest of the community saw that someone whom they knew, someone whom they grew up with, could grow lettuce and turn a handsome profit, several farmers started asking to receive guidance in vegetable growing. They soon were willing to turn over their irrigated lands for growing vegetables.

Contour planting was used to prevent the topsoil from washing away. We had 25 people working almost every day, digging ditches on contour. We taught farmers in different parts of the area different techniques of contour ditching. The interest is there, but you have to dedicate a lot of time and support to make it a permanent feature of their lives.

C. We built the first garden in Santa Barbara in 1970, when hardly anyone was gardening. We now have two permanent allotment gardens in Santa Barbara that have about 70 individuals and families. Through Warren Pierce's course, we have reached more than 1000 people. In fact, we feel that the proliferation of gardens all over the United States in response to the economy has been somewhat related to our projects.

Q. The only objection I see is the business of getting enough compost materials. You have fertilizers sitting in the store (down the street) and it seems much easier to use them. What do you do?

A. That is a problem in Santa Barbara. This kind of technology has to be woven into the social aspect as well as into the purely technical aspect. It has to have cultural value, something that people have experience in, one way or another. If you have a family garden in the yard, you are talking about something that is not out of the cultural realm of the peoples' lives. There are, for instance, among the Mayans and other peoples of the Central Americas, traditional systems of home gardens. It may not look like a home garden to us because we are oriented in a different way. But there will be some fruit trees behind the house, and there may be a few pepper plants, flowers for religious or medicinal purposes, etc.

C. In the Dominican Republic we found that exact situation. Every home, no matter how poor, had a garden.

C. In the delivery system of promoting technology in a developing country, it is not unusual to have one extension agent for 300-500 farmers. We are just not doing very well. Now we are going to have to have a technology which will require essentially a one-to-one kind of relationship over an extended period of time. We have to consider how we are going to deliver that to a fairly large number of farms. Unfortunately, that type of support needed is very hard to find. When we were in the Peace Corps, we had to struggle very hard for the agency to come around with a program. With US AID, it took a tremendous amount of talking before they could even understand what was taking place.

C. These are the things that I hoped would come about in this workshop by having a meeting with people in your positions. Hoping that we could develop some kind of understanding of the needs that we have in the field in order to make a real impact. I want to make it very clear that we are not here to talk about producing enough food to feed the world. What we are trying to do is to increase the nutritional levels of low income rural families. We are also talking about poor areas in the cities, too, as in Latin America. It is very difficult to transfer a technique from somebody who comes from outside.

C. We are talking about commodities. Soil as commodity and land as commodity. Another way to look at this is through man and his relationship with nature. This relationship has a different way of looking at the soil and that has long-term implications concerning how land is handled for the future.

Q. Does anyone have any information regarding the religious orientation of Third World people that might be utilized along lines that suggest capitalizing on reverence for the land.

A. The religious institution is sometimes the only institution the people have. There is almost a zero confidence level in the people themselves. In some cultures, the calendar is incredibly intricate. Every day has symbolism and is ritualized, from preparation to planting to cultivating and so on. Being totally aware of the significance of the symbolism would be a far better approach than the so-called Green Revolution. Instead of the government's trying to use a top-

down approach, it seems better to start at the bottom level, and expand it through the community.

C. Concerning intervention, you pointed out that one way is to go through the hip pocket. That is one motivation because people see it as a money-oriented, something-for-me proposition. That is a very narrow intervention. It seems to me that we are talking about more of a social intervention. It is more body-based, community-based, integrated rural development. So we can take the people and find out what they are already doing. Then we should start with a slight intervention and start growing the kinds of things the people are growing with slight improvements, then make it possible to develop other, across-the-board interventions.

C. You have cultural differences all over. Take, for example, tree ownership in some places like Latin America. You plant a tree, then someone else harvests it. Then you have ecological differences. One of the values of field programs is that you can look at the limitations. For instance, I have trouble thinking about the usefulness of composting in the Andes where you have freezing temperatures, or in the Amazon basin where hot weather is the deterrent. So I think it is important to start looking at the adaptations needed over the different ecologies. We have all been working relatively close together in the same environment, so we have developed a rather sophisticated technique. You might say that that is all we have. You have to look at the area first, then determine what application should be used. That is the basis of the educational process we are talking about.

C. I think there is a point to be made here. We were talking about basic principles of soil chemistry, physics, soil environment. We need to get back together so that we can reduce the role of organic matter to relate it to some of the common principles of exchange capacity and aggregation, so that we can discuss the degradation of organic matter in terms of anerobic degradation and nutrients. If we start to invent a new language and try to reinvent the wheel, I do not think that we will achieve what we are seeking to do. Almost everything that was said by one of the three speakers this morning could have been related to some of the traditional principles to show where some of the linkage exists. I think a failure to do that would be a great loss.

C. I agree with that to some extent. One could be utilizing concepts that are outside his own framework, but sometimes those concepts do not always fit. I am a soil biologist, and my concepts with respect to pH would be different than those of a soil chemist. On one side of the soil aggregates, the pH may be several units different. So as far as I am concerned, maintenance of pH may be quite meaningless because roots do not wrap themselves right around aggregates. They move toward where certain conditions are. So, certainly, from a biological viewpoint, I would have to compromise my own standing within biology if I were tied down to concepts acceptable to the soil chemist.

C. I do not really see any violation of any root-soil principles. I think all the things that are done do not do violence to the soil at all. What does biodynamics do that's a violation to the soil? What I saw

this afternoon at the Mesa Project I have been seeing a long time in this culture. The practices seem reasonably logical.

C. What we have here is a system of discussion and consciousness and language that is effective, meaningful, and directly translatable into operation. We have a whole discussion trying to legitimize the approach and make it possible to translate it into terms that a national government would be able to deal with, or a university system in research to cope with.

C. There is a certain amount of witch-doctorism going on in universities. You wouldn't ask the witch doctor not to practice if he were effective; and he is not necessarily the best person to carry out the experiments to find out what it is he is rubbing on that makes it work. However, I've seen university agriculture departments this year set up some plots to test double-digging, and the use of seaweed sprays and seaweed as a fertilizer. It was a very impressive thing; the double-digging was by far the most spectacular, but of course, it was all labor intensive.

C. I cannot believe that the system is the important part at this particular time. It is the components that make up the system and the process involved. It is not a chemical mixture; it is the different components. In certain places we are going to have to deal with those components differently, and I think we would be making an error if that fact were not recognized.

C. I am not a biologist or a chemist but it seems to me that there has been a dichotomy drawn on how you look at how plants grow. The chemists tell us that you can take inorganic materials and feed plants to get them to grow. The others think that you should feed the soil because it is the soil life that is feeding the plant. There is a difference, but I do not know whether or not we have to look at it here.

C. We are getting very academic. We need to go back to the subject and talk about whether this system has any applicability. I find that the little man in these countries is no different from the Iowa farmer. He responds to increase. How do we improve this situation? Will this system do it? I think that our concern with academics and semantics will not solve the problem.

C. At the same time people have to talk to each other. I come from an institution where dialogue is very difficult. It seems to me that this is legitimate.

C. I think that an essential point is how to get the food, in quality and quantity, to powerless people in rural and urban areas. Whether the biodynamic or chemical method is used is not essential for me. I feel that some compromise is necessary. We need a blending of both.

C. I react very strongly to those statements because what is applicable to Taiwan is certainly not applicable to Indonesia, India, or Mexico. Because of the access of countries like Taiwan and Japan--their proximity--they are partly developed. You are looking only in terms of yields, of economic benefits, and you should look at several other factors, too. For instance, the Indonesian rice paddy is a complete

life support system. It not only provides rice, it provides fish for protein. It has soybeans growing on embankments. It has a very intricate ecosystem that can be entirely destroyed by chemicals.

There are a number of other factors. Access of the farmer to chemicals and technology is totally manipulated and controlled by the centralized system from institutes like IRRI or CIMMYT. The kind of technology that we are talking about here is one that is at the level of the peasant. I am not at this time totally advocating the intensive method. I am dealing with a complex of social and ecological problems existing in these countries. But I feel that you cannot talk purely in terms of grain production or strict increments. Mainland China has succeeded with the Green Revolution solely because of its distribution system of chemicals or technology and extension system.

Q. I am having problems trying to set in my own mind what it is we want to discuss. I am looking for a problem statement. We started out in the beginning of this session talking about stability and permanence. If chemicals are not going to meet the world's needs, then what kind of agriculture will?

A. The improvement of the nutritional status of the poorest families in the rural areas of developing countries. That is the ultimate objective.

Q. Are we going to help people feed themselves tomorrow or are we going to try to do that over a long term?

A. I think that if we teach people how to feed themselves tomorrow, then we will have time to come to a long-term conclusion.

C. Pesticides and herbicides affect nutrition and since they do, I think we should discuss whether we use them.

C. The evidence that has come out over the last 50 years does not support what I think you are indicating. I think to get into that topic is irrelevant to what this meeting is all about. Literature is loaded with information that bears out very well that the use of chemicals (and I am not talking about the use of pesticides but chemical fertilizers) has not been shown to be deleterious to the nutritional quality of crops.

C./Q. It seems to me that if we can agree that we do have a concern about underdeveloped countries and people that are not eating, then we might ask what kind of system serves these needs? Then we ask ourselves what is it that we are trying to accomplish? We describe what the rural situation is in underdeveloped countries, then we work backward. Does an organic system seem to fit? It seems to me that what's being said is, "I'm poor. I have little land. I have traditional skills. I haven't used intensive labor. I do have some tools. I don't have much money. I have access to very little in the way of fertilizer, herbicide, or pesticide. Even if I have access to these things, I don't know much about using them."

It certainly seems that the Intensive/Biodynamic System holds a lot of promise. But what is the trade-off? For every action there is a reaction. The trade-off, it seems to me, is that you have to get out into the community. You have to have people who are reasonably trained to understand this technique in the place where they are. We need to help bring in an agricultural system that looks at what the interest and needs of the people are. And that does not mean that you have a magic quick-fix on the system, because it takes time to develop. But I think looking at the needs is one way of finding out what we could do right now to determine whether we would or would not start a hybrid of mixing organics and inorganics later on.

C./A. Several of the problems we are facing in the food situation are not being met because of things that Sterling Wortman mentioned in his article. Because many of the countries have relatively small populations, they cannot provide the scientific backup and they have poor distribution systems. These problems are not the problems of a back yard garden project. I don't think the extension of the method is as much of a problem as has been suggested. My experience has been that the people who copy the method are the greatest extension workers. They have relatives all over the place. I was looking for mulch in one area of Canada and I used newspaper; the next year there were newspapers flying all over the road. They got half the method. On the other hand, we are going to come face to face with these different approaches.

It is rather similar to the problem I face within the Canadian agricultural college of which I am a part. People phone into the college saying that they have a pest problem with their cabbage and asking what to do about it. The switchboard operator says, "Use a pesticide". They do not want to use a pesticide, so the operator puts them through to me. Then they say to me, "I want to use a pesticide, but I cannot find DDT in the store anymore and I want to find out what I should use instead." So they get put through to the guy in the next room. So the college is putting out two opposite pieces of information.

I am saying, "Don't use a pesticide". But this involves asking the person what variety are you planting, when are you planting it, how do you irrigate, how do you manage your soil, what are the other plants in the garden? In fact, I get to know that person's garden very well. The other guy is concerned with the identification of the pest. He's got it crossed to something like Malathion. It's one thing when you use organic methods. Another when you use chemicals. One does get into a problem which certainly is going to come up sooner or later.

C. I would like to respond to that. Yes, you are talking about a problem. For example, the Peace Corps is training people in agriculture to give them a shot of organics as well as inorganics. The people are bewildered. Well, my view is to go to the people with whom you are going to be working and ask them if they have the money for these

things. Find out if they have the knowledge of how to use them. The answer comes up with a resounding NO! Then you go back and say, "Why are you teaching inorganics, chemicals, and pesticides, giving a skill to someone that he/she cannot use?" So I am saying that when one gets into that end of the service, many of these problems (the poor switchboard operator) get eliminated right away, by virtue of the fact that you have to accept the people and the situation that they are in.

C. I agree. We have to identify the target populations. We are going to talk about people who do not have any access to these systems. The poorest of the poor, people who do not have access to financial resources. One of the reasons is that they are not organized into cooperatives to develop a structure. We are not talking about people who have access to supply inputs. We are not talking about people who have access to technical knowledge or the input of information. When you get down to that level, and if that is the level we are focusing on, then there are questions to be asked.

One is the production problem. We think that when production is increased, there will be an increase in consumption which will increase nutritional levels. My experience is that any time anything is valued, it will bring cash and that cash will be used for what is most important, including some things which you and I would think ridiculous. It is their value system. Only as there becomes a surplus will nutrition rise. Obviously there are exceptions. We need an educational approach and a demonstrational approach, both in terms of production and in terms of use.

C. Our experience was somewhat different. We found that food was sold but the need to improve nutrition in the family was addressed first. The children were eating the greens. There is no market for new foods outside the area in which the foods are being grown. So the new foods were not being sold because the farmer would take them to the market and the people would not buy. I have heard that cash is more attractive than increased food consumption. That's what people have told me. That's what I have read in books. But that was not my experience.

C. I am talking about where a market does exist.

C. I would like to speak as a person from a developing country. I grew up during the Second World War, living with the people we are talking about. So far we have discussed problems in technology with which we should not be concerned. I wish that there could be a partnership between the scientists and the people who are not scientists but who have much more experience in delivering.

C. I would like to say that one of the main reasons I am here at this workshop is the same reason that Mark is here. Approximately eight months ago, when I first ran into Paul Relis at a meeting of Project Concern and Direct Relief here in Santa Barbara, I was very much impressed with the idea of small plot farming, especially after working over 20 years in Asia. There chemicals are not available to the

poor farmer. The farmer has land but he is not utilizing it. He does not compost. There are needs for chemicals in the big rice paddies and the commercial enterprises. But again, getting down to the grass-roots level of the individual farmer who is poor, I feel there is a tremendous possibility and approach here to increase his nutritional status. It is going to take time to fit into the cultural patterns of Honduras, Korea, India.

But you have to get back to the fundamental level of the people. Schumacher, in his book, Small Is Beautiful: Economics As If People Mattered, states that all development starts with people, their organization, and education. Without them everything else is impotent, sterile, and latent. I would like to form a consensus that we need to get down to help the individual farmer in the rural area. He does not have chemicals available. He does not have the other things available. I think Intensive/Biodynamic farming has much to offer him. The impact of these demonstration farms also has to be recognized. I had a demonstration piggery. Before I went into the area, no one castrated hogs. They didn't know how. Organizations and foundations are risk people. We took the risk that Phil Leavenworth was speaking about a few minutes ago. The farmer cannot afford to take the risk. We have to be prepared to take it. We have to be prepared to fail, to show the people that eventually something will work, whether it is organic farming or castrating hogs.

C./ Q. I would like to agree. However, I would like to say that I find some difficulties in the question of transferring new crops. I think we have to re-evaluate the situation. What do we mean by development? Are we talking about improvement or shaping? Are we talking about building or total transfer?

C./ Q. One thing that should be mentioned in regard to tropical countries, where you do not have storage for perishables, is that they usually have a lot of corn or rice that they need to carry through poor times. This leads to another question, that of storage. There are some nice methods coming along, so that producing staple crops and storing them for lean times can be done. Also the biological aspects of pest management are extremely important so that the use of chemicals can be kept at a minimum. The area of West Africa is very low in phosphorus. Manure is not going to put that much more into the system. But I do think it is important to get animals into the system. Sometimes organic animal waste is as good as a compost pile. Eggs or ducks in rice fields are used, and some other neat little systems are used, such as the sour orange peel, which is something like 47% phosphorus.

In the approach being discussed, more intense labor in some cultures will cause problems. The input is what the wife can do. If that culture is not accustomed to accepting change, we have to understand the sociology going on. That comes first. What is the incentive? Is it the fact that someone's child is going to live to be 60 instead of 45? He will never see that incentive. Is it the fact that his belly is going to be full that night? He probably will not see that

either because in his culture he eats first and the children eat last. So labor intensity is going to be a problem.

C./A. One point that this technology or methodology has which would give it a more or less universal advantage with the small farmer is that the small farmer has a very intimate understanding of the systems and the interrelationships with those systems. For instance, I was traveling in Sumatra with a group of my students and we got one of the best lectures on energy levels within the plant canopy from a fellow in a loin cloth. The people understand, for instance, the balance between crop and weed. And it seems to me that that kind of feeling is basic to technology. It is not the kind of feeling that the U.S. farmer has because he never gets closer to his crops than the seat of his tractor. This is the kind of understanding that we, as scientists, have to possess by working closely with crops for a long time. I sense that people working with the Intensive/Biodynamic Method have this feeling. This gives your technology a real advantage. We have been trying to do research in the Philippines to get a handle on this. We call it farmer/participant research, where most of the research is done in the tropics in the farmer's field. The problem is with training extension workers from cities to help rural farmers. If you can get someone from a rural area to teach, you are far better off.

C. From this intensive approach come a great many benefits. Tools can be made locally. Education can be spread through the people. Let me show a few slides to demonstrate what I mean.

One of the people who has worked with Alan Chadwick since the beginning of the process in Covelo has his own small homestead to the east of Covelo. He has a garden very similar to the garden that we have. Currently there are three people working it. They are doing what we have done. He is particularly interested in animals. He has made a great effort to get this aspect of the Biodynamic approach together. Steve is also getting into animal traction tools.

C. Temperature tends to favor crop production over crop decomposition, and the optimum temperature for decomposition is higher than the optimum for production. So in temperate countries we tend to produce more organic matter than we break down. Consequently, even if you double dig and speed up decomposition, you still have a problem in tropical countries where the organic matter is breaking down faster than it is being produced. I think this is going to require some modifications of the techniques.

C. There is one other principle that comes in here. That is that the total amount of organic matter in the soil is important as far as aggregates and physical structure are concerned. But with respect to releasing plant food, it is the matter of organic turnover that is important. This can be a compensating factor as long as you get the turnover.

Q. The problem, it seems to me, is whether you as a group or confederation of people involved in Intensive/Biodynamic agriculture, are willing to open yourselves to compromise and deal with a broader group of people, even to the extent of going and dealing with the industrial, commercial sector. I mentioned to Richard this afternoon that it seems to me that you are, collectively, making what amounts to a political statement by your willingness to come here and discuss this with a group of people who perhaps are not of your persuasion.

A. First of all, the attitude we would like to convey is that we do not have any universal answers to the problem of food. There has been a great effort to deal with this technique. Some approach it from a research focus, some from an educational focus, and some from a training focus. It is not really for us to choose how to get the information out to millions in a very short time. We are bringing in evidence for this technique before a larger audience now in hopes that some of the institutions and funding agencies can respond to an idea that appears to work and to be worthy of someone's support.

C. I think it is absolutely essential that the system be as simple as possible, stripped down to its essential elements. One thing I have learned from experience is that you should try to adopt whatever plan that is basically in use in the culture at the time. Try to adapt to the tools in use. Also we should try to use the native food, things people actually are eating, rather than trying to introduce a new food, because you just complicate the issue. In Ecuador seeds are difficult to come by. Consequently if you use seeds that everybody uses anyway, you are a step ahead.

What I would do before anything is talk to the people as long as possible to find out what their opinion is on vegetable production and adapt to that system as closely as possible. That, with success, will encourage people to spread the word. You have got to have something that is tested in their environment. You have to test without drawing on their resources because they are so needy. It has got to be done either by an agency of some sort or government before you can introduce it to the people.

C. What you want to do is minimize the intervention and get the system to work better. You are working with an existing agricultural ecosystem, bringing in little addenda that might make it more efficient or practical. I tend to fault IRRI for trying to develop a package deal which comes in with a new crop system, which has got rotation, etc.

C. It would be very easy to get sidetracked here in that those of us who are promoting what we are doing are using this concept as a paradigm of small scale thinking. When you take something people are doing and improve upon it, if possible, the success ratio will go up and the ripple effect will promote fast adoption. If you try to put in a whole package of new practices at one time, the ratio

of success will drop tremendously. The ripple effect will die out and the people will remember the failures more than the successes.

Q. I would like to address this question to Mark. If you take a 1200 sq ft plot which would produce 350 lb of vegetables for supplementary diet per month, would that be a problem because a family cannot eat that much?

A. In our area they are very happy to produce that surplus because the surplus is marketable to a certain extent. The people also use it it for their animals.

Q. To what extent can this gardening practice be interspersed with existing or other cropping methods?

A. From our experience in the Dominican Republic, the practice is more or less universal. What we need to concentrate on is labor intensive practices. There is a tremendous amount of unemployment in rural areas. In our town there was a group of young men who had no land because the population had grown so tremendously. The land base was no longer there; the population had eaten it up. Because of the population density, there was not enough land for the young men to go out and find land to farm. But the labor was there.

C. Another question to be raised in this workshop is how do you go about implementing the adaptation? Whom do you send? We could possibly send a person with a certain kind of orientation and a certain kind of sensitivity. At Covelo, Santa Cruz, and Santa Barbara they are attempting to help people acquire that sensitivity. In many cases urban people have acquired that sensitivity. So one of the things that we have come here to offer to potential helpers is assistance in acquiring that sense about life.

Q. Why bring them here? Why not train them in their own country?

A. If they themselves could take it back to the people, they could more easily adapt. Meals for Millions has a pilot food processing plant in Santa Monica and we have ten students now from all over the world. We bring them here for eight weeks of training and send them back. I was thinking along these lines.

C. There is a whole method of technology transfer that still has to be developed. We have experience in a lot of what is successful and what is not successful. But a great deal of work still has to be done. It has to be done in the field in all areas. This is expensive. It is also in the nature of experimental work. It is very hard to get support for experimental work. The human and financial resources for carrying out projects of this nature, until now, have not been forthcoming. A major point of this workshop is that there will be some united effort here to shake loose the kind of support that is necessary to get more meaningful work done in these areas.

C. We are talking about human life in numerous isolated variations. Solutions have to be tailored in a very individual fashion. The more general you get, the farther you get from actually working in the field.

C. I think two years is the minimum amount of time required for a person to become sensitive to and aware of the problems that exist among his neighbors. Sometimes it takes five, six, or seven years before these people will come and express interest. There has to be an understanding of the time element involved in this educational process.

C. You have a model for a delivery system, but we are going to need a million more of you because the impact is about 1/2000 people. We have got to be looking for other kinds of delivery systems.

C. I don't think you are going to find them. The process of education is a long one.

C. I think that we are going about trying to define our own goal the wrong way. I think it should be defined by the people in developing countries. I think we should question and challenge the bases of the assumptions of dependency. What are creating these conditions in underdeveloped countries? What are the means by which the resources and land are distributed? Why do people have no control over the productive process in their countries? From my experience in Indonesia and South America, the process of promoting self-determination was exploited by the intervention by multinational corporations and by various government agencies.

C. It bothers me to hear you talk about the location-specific or environment-specific nature of your work, because there are elements of it that have universal application. No funding agency is willing to lay money on the line for such location-specific projects. If you look at the format for applications to USAID or any other agency, they want to know the time-frame, the impact area, and the extent of impact. I think that if you could look at your method as one that has a whole series of universalities, you could bring these common denominators down to a fairly low level before you have to start splitting them up into environment-specific kinds of things. Then you would meet with more success.

C. I don't know how successful I or any of the other speakers were this morning in trying to do that. We tried to generalize as much as possible. I would like to make a comment. You send individuals who understand the work so that they no longer need "the book". In fact, there is no book for this particular area that has both individual and more generalized approaches to cultivation.

I would like to raise another point here which I think is important. We need to recognize the role of women in this work. This has been tremendously overlooked and the worst kind of male chauvinist attitude has been practiced. You are out in a community trying to give a body of knowledge to that community. If you are a man you can approach fewer than 50% of that community. Some of the most essential work must be done by women because in many of the cultures men cannot get at the people who control the nutritional level of the family. Men control the money; women control the nutrition.

Q. How much training is the absolute minimum for getting these ideas across? Can you bring the campesinos in for a week for observation?

A. We do it in a year, but I would say longer if I had a choice.

C. If each person needed a year's training to pick up this system I think it would be too expensive.

C. There has to be an understanding that if one person in a community is properly trained, someone from a farming family, a campesino, you get a good result. When that family returns to the home and starts the demonstration, that family stays there for a lifetime and the ripple effect starts.

One of the delivery systems employed involves bringing the campesino types to a training center for only a few days. Half the time is spent giving them technical tools and tricks and half the time teaching them how to teach those tricks back home. People are selected very carefully: some of the community experts come -- a livestock guy, a poultry guy, and so forth. By coming there they become the official system of information. And they each are obliged in turn to train five assistants. And each of the assistants are supposed to train five more assistants. Here is a very rapid method of propagating technical specialties. What we do need is a set of lesson plans that work with farmers all over and start propagating that.

Editor's Note: At this point time caught up with endurance and the discussion trailed off on a positive note. It concluded not as the end of a meeting but as a break until the next day.

HOME GARDENS AS A NUTRITION INTERVENTION

Home Garden: A Low-Input and High-Output Food Resource for Rural Families in Asian and Pacific Countries

Y. H. Yang

Abstract

The results of nutrition surveys in three Asian countries and in the USA indicate that anemia and Vitamin A deficiency are major public health problems. The relation of Vitamin A deficiency to a low intake of dark green leafy vegetables is identified. Problems of home garden programs in different countries are discussed. The nutrition contribution of a 300 sq ft and a 450 sq ft home garden to a family of five is estimated. An East-West Center community nutrition project, "Agriculture for Nutritional Improvement", is presented.

INTRODUCTION

Population and food supply

The global nutrition problem rests on the relationship between population and food supply. Much attention has been paid in recent years to this problem by individual governments, regional agencies, and international organizations. In the past decade world population has increased at a rate of 2% per annum while from 1962 to 1973 per capita food production increased only 8% (Attachment 1). The food production increase occurred mainly in the developed countries; people in Asia did not enjoy an equal share. Per capita calorie and protein availabilities in most countries still fall below nutritional requirements (Attachment 2).

The problem in Asia is further aggravated by the fact that this 57% of the world's population owns only 32.7% of the world's arable land. In other words, the only reliable approach to improving the food and nutritional status of Asian people is to increase the efficiency of food production, with special attention to crops rich in the nutrients now deficient in the common diet.

Vegetable crops as efficient producers of calories and protein

It has generally been assumed that while cereal crops are efficient producers of calories and legumes supply protein, vegetable crops provide neither calories nor protein. This assumption is wrong. Most vegetables can provide similar amounts of energy and even more protein than cereal crops (Attachment 3). The dark green leafy vegetables are also outstanding sources of pro-Vitamin A, iron, calcium, ascorbic acid, other essential nutrients, and crude fiber. They are also free of cholesterol. Undoubtedly vegetable crops should receive attention in a country's agricultural planning.

ANEMIA AND VITAMIN A DEFICIENCY AS MAJOR PUBLIC HEALTH PROBLEMS

Common nutritional problems

Generally speaking, protein-calorie malnutrition among young children is a major nutrition problem in the developing countries while obesity and its associated disorders are a problem in the developed world. However, there are two problems common to both: anemia and Vitamin A defiency. Here are the situations in a few selected countries.

Republic of Korea

A food and nutrition survey conducted in February 1973 in four areas of South Korea and covering 304 households indicated that although protein intake was generally adequate (with the exception of the fishery area), calories, iron, Vitamin A, and ascorbic acid were in most cases below the recommended dietary allowances for Koreans. The details are shown in Table 1.

Table 1. Average Nutrient Intake per Adult per Day in Four Areas

Area	Calories	Protein	Iron	Vitamin A	Ascorbic Acid
		g	mg	IU	mg
Farm	2296	67	14.5	1060	31
Fishery	2056	53	8.4	2040	27
Mountain	2491	68	11.1	3010	60
Urban	2228	79	13.1	3669	43
Average	2266	66	11.8	2445	40

Source: Lee Ki-Yull and Kim Sook-He, 1974

The pattern is similar to the data collected by the Office of Rural Development in 1968 in three pilot villages of the Applied Nutrition Project. Although substantial amounts of vegetables are consumed by Koreans, most of them are of the pale varieties, such as Chinese cabbage and radish. Incidence of anemia and Vitamin A deficiency is high, particularly in farm and fishery areas.

Indonesia

The seriousness of Vitamin A deficiency and anemia in Indonesia has long been reported and great efforts have been exerted by the Health Ministry toward treatment and prevention. The situation seems little changed. The prevalence of xerophthalmia, a manifestation of prolonged serious Vitamin A deficiency, has ranged from 1.64 to 13.0% as recorded in hospitals and the community (Table 2).

In the early 1960s, it was reported at a hospital in Bandung that 82% of the completely blind patients between infancy and nine years of age had lost their sight as a result of Vitamin A deficiency (Roels, 1962). In 1972 the Department of Health estimated that there were 120,000 blind people in Indonesia, mostly children.

Table 2. The Prevalence of Xerophthalmia in Indonesia

Regions	Year	Number	Xeroph-thalmia %	Recorded from
Semarang	1958-59	5,699	6.0	Hospital
Bogor	1959	156	12.8	Squatter community
Pondok Pinang, Jakarta	1960-66	877	13.0	Semirural village
Bogor, Central Java	1967	2,487	7.1	Nutrition clinic
Rural Central Java	1963	867	4.0	Village
Rural	1973	1,374	5.2	Village
Urban	1973	1,438	4.3	Squatter community
Jakarta	1968	118,631	1.64	Hospital
		35,048[a]	5.56[a]	

[a]Number classified as malnourished

Source: Soekirman, 1974

In 1969 a field survey of adult women and men was conducted in several regions. It showed 59-90% of pregnant women, 35-85% of non-pregnant women, and 16-50% of adult males to be suffering from anemia. Details are shown in Table 3.

Table 3. Prevalence of Anemia Based on Hemoglobin Level[a]

	Females				Males	
	Pregnant		Non-pregnant			
Regions	No.	% Anemic	No.	% Anemic	No.	% Anemic
Bandungan	40	92.5	84	84.6	34	35.2
Bogor area	109	68.8	75	35.1	--	--
Indramayu-Purwakarta	51	78.4	21	56.0	10	50.0
Gunung Kidul	54	50.9	34	44.1	53	28.3
Bali	57	54.6	31	38.7	25	36.0
Bali	46	46.0	19	47.3	31	16.1

[a]WHO standard: Less than 11 g/100 ml for pregnant women, 12 g for non-pregnant women, and 13 g for adult males

Source: Soekirman, 1974

Philippines

During 1958-69, the Food and Nutrition Research Center of the National Science Development Board of the Philippines conducted nutrition surveys covering 2813 households in nine regions. These surveys identified four major deficiencies: calories, protein, Vitamin A, and iron (Florentino, 1975).

The average daily per capita food intake, compared to the recommended food allowances, was very low for milk and milk products, oil and fats, leafy and yellow vegetables, eggs, fruits rich in Vitamin C, and dried beans and seeds. Details are shown in Table 4.

Table 4. Average Daily Per Capita Food Intake Compared to Recommended Food Allowances in Nine Regions of the Philippines, 1958-69

Food Groups	Average Daily Intake	% of Recommended Food Allowances
	g	
Cereals and ceral products	345	106.2
Starchy roots and tubers	65	89.0
Sugars and syrups	16	64.3
Dried beans and seeds	7	43.8
Leafy and yellow vegetables	28	32.9
Meat, poultry, and fish	119	85.6
Eggs	5	33.3
Milk and milk products	21	23.3
Fats and oils	8	26.7

Source: Food and Nutrition Research Center, National Science Development Board of the Philippines

As a result, the diet was seriously deficient in Vitamin A, riboflavin, and calcium, and to a lesser degree, thiamine, calories, and iron. Protein and ascorbic acid were also below the borderline. Details are shown in Table 5.

Table 5. Average Daily Per Capita Nutrient Intake Compared to Recommended Allowances in Nine Regions of the Philippines, 1958-69

Nutrients	Daily Intake	% of Recommended Food Allowances
Calories	1671	83.5
Protein, g	46.5	93.5
Calcium, g	.34	59.6
Iron, mg	9.0	90.0
Vitamin A, IU	1812	44.6
Thiamine, mg	.73	71.6
Riboflavin, mg	.47	46.1
Niacin, mg	14	107.7
Ascorbic acid, mg	67	97.1

Source: Food and Nutrition Research Center, National Science Development Board of the Philippines

Biochemical assessment made during the surveys further verified the seriousness of malnutrition (Table 6). Half of the subjects examined were suffering from anemia and Vitamin A deficiency, with the most serious deficiencies occurring among pregnant women and children under six.

Table 6. Biochemical Findings in Nine Regions of the Philippines, 1958-69

Age Groups	% of Population[a] Anemia	Vitamin A Deficiency	Protein Deficiency
1-6 years	71	82	10
7-12 years	52	76	5
13-20 years	41	47	2
21 years and over	41	27	3
Other Groups			
Pregnant women	78	30	36
Nursing women	52	41	1
Entire population	49	50	5

[a]Including those with deficient/low levels of hemoglobin, serum Vitamin A, and serum albumin

Source: Food and Nutrition Research Center, National Science Development Board of the Philippines

USA

The result of the Ten-State Nutrition Survey conducted in 1969-70, covering some 24,000 families and including over 86,000 persons, indicated that a significant proportion of the population surveyed was malnourished, particularly in regard to iron and Vitamin A deficiencies.

The survey reported:

--Many infants consumed much lower intakes of calories, iron, Vitamin A, and Vitamin C than required by the standard.

--A large percentage of the adolescent group had intakes below the standards for calcium, iron, and Vitamin A.

--The diets of pregnant and lactating women in this survey were below the standards for calories, iron, calcium, Vitamin A, and protein.

--Persons 60 years of age and older consumed far less food than needed... other limiting nutrients were protein, iron, and Vitamin A.

The biochemical assessments made during the survey further confirmed the prevalence of iron and Vitamin A deficiency. The survey reported that

--on hemoglobin, hematocrit, and related measures, it appears from these data that nutritional iron deficiency, producing lowered hemoglobin levels, is a public health problem in the population studied and

--on Vitamin A and carotene, the data...indicate that Vitamin A nutritional status is a major public health concern among Spanish-Americans in the low-income-ratio states...There was a positive relationship between the level of plasma Vitamin A and the amount of Vitamin A consumed in the diet.

These deficiencies, in fact, occurred in both high- and low-income-ratio states and among different ethnic groups, including high-income whites. However, low-income blacks suffered most from iron deficiency and Spanish-Americans most in Vitamin A deficiency. These findings suggest that in-

come is not the only determinant of nutritional status. Other factors, such as social, cultural, and educational differences, also play an important role.

Measures to combat iron and Vitamin A deficiencies

Many studies have been made on different measures to combat iron and Vitamin A deficiencies. Some of these measures have long been practiced, such as enrichment of wheat flour and skim milk powder and distribution of ferrous sulfate tablets through maternal and child health centers. Enrichment of white sugar with Vitamin A is also under serious consideration. The periodic administration of heavy doses of Vitamin A has yielded very promising results. The problem is whether the country has effective health delivery systems and financially adequate logistic resources to operate the program continuously without interruption.

Recently some economists and nutritionists have alleged that it is not economical to obtain iron and Vitamin A from food. The cost of synthetic Vitamin A, for instance, is an infinitesimal fraction of the cost of an equivalent amount of Vitamin A derived from vegetables. Furthermore, the conversion efficiency of carotene is low and absorption of iron from vegetables is poor. It is understandable that in numerous publications on national food and nutrition policy in recent years, little attention has been paid to the production and consumption of dark green vegetables as a practical measure to improve the nutritional status of the population. It is tempting, though possibly fallacious, to assume that as income increases, consumption of green vegetables will automatically increase. But how long will it be before the small subsistence farmer in Asia is rich enough to create any effective demand for vegetables?

It may be emphasized that the promotion of home gardens in rural areas is intended to develop additional food resources at the local level, not to replace commercial vegetable gardens or emergency nutrition intervention programs where the need for such programs is apparent.

HOME GARDENS AS A PRACTICAL MEASURE

Current programs in different countries

The cultivation of home gardens is a standard practice in rural areas of many countries. The gardens receive strong emphasis in the Applied Nutrition Projects that are implemented with FAO/WHO/UNICEF assistance. Results are not uniformly encouraging, due usually to lack of research and planning, leadership, and continued follow-up. Vegetable gardens flourish during periods when production contests are going on, then gradually disappear. However, such experiences, even if expensive, are useful as a guide for future planning.

Recently the government of the Philippines launched its "Green Revolution Campaign" and Malaysia introduced a "Green Book" to encourage local food production. The "Saemaul Undong" (New Community Movement) in Korea featured home food production as an important component. Indonesia and Thailand also renewed their efforts in this direction.

Potential nutrition contribution of a home garden

The basis of calculation may be summarized as follows.

Vegetable selection and yield calculation

An experiment was carried out to calculate the potential nutrition contribution of a small home garden, based on the situation in Hawaii. The College of Tropical Agriculture, University of Hawaii, published for general distribution a mimeographed pamphlet "Planting Guide for Vegetables and Melons in Hawaii". It gives estimates on the number of days to harvest and on the yield per 100 ft row of 57 different vegetables and of various melons. Sixteen different varieties were selected from the Guide on the basis of their nutritional content (Attachment 4) and their ease of cultivation under local conditions. Their daily yields in weight per 10 sq ft were calculated (Attachment 5). They range from 0.018 lb in the case of hot peppers up to 0.167 lb for mustard greens (kai choy) and Chinese cabbage (pak choy), a ten fold difference in the speed of production.

Output of calories and nutrients

The differences in output of calories and nutrients are even greater. For example, mustard greens yield 15 times as many calories as pumpkin, 32 times as much iron as peppers, and 372 times as much Vitamin A value as green soybeans (Attachment 6).

Rating of crops in terms of nutrient output

Based on the efficiency of producing four essential nutrients, protein, iron, Vitamin A, and ascorbic acid, 16 vegetables were arranged in descending order. Those with the highest value received 16 points and those with the lowest, 1 point (Attachment 7). When added together, mustard received the highest total score, 63 points, while pumpkin received the lowest, only 6 points. This comparison, as mentioned above, was made among the 16 selected vegetables only, identifying the most efficient producer of four nutrients commonly deficient in the diet (Attachment 8).

Output of nutrients from a home garden

The output of nutrients from a typical small garden, 300 sq ft in size, was calculated on the basis of planting four vegetables common in Hawaii: Manoa lettuce, snap beans, cucumber, and eggplant (Attachment 9, Section B, Garden 1). The nutrition contribution to a family of five was very low.

However, when vegetables with a high nutritional value (for instance, water convolvulus, pak choy, and amaranth) were planted in the garden, the picture was entirely different (Attachment 9, Section B, Garden 2). Both ascorbic acid and Vitamin A were available in abundance to the family while iron and protein availabilities also showed valuable increases. Only a better crop selection could make such a vital difference. In addition to the nutritional improvement, based on current vegetable retail prices in Hawaii, the small garden could result in a savings of $1.20 a day in the family's food expense, a significant consideration in these days of high inflation.

If additional space and labor are available, the size of the garden may be expanded to 450 sq ft (50 sq yd). This could give more variety and even better nutrition support to the family (Attachment 9, Section B, Garden 3).

Garden 2 and Garden 3 are currently under field trial in Pearl City, Hawaii.

Legume production

In view of the fact that the low intakes of protein and fat affect the absorption and utilization of iron and pro-Vitamin A, it is desirable that legumes, particularly soybeans, should be included in home food production programs. However, a plot of 100 sq yd is needed to produce enough beans for a family of five (15 g daily per person). A small garden is inadequate to produce the necessary quantity of this crop.

Other systems of vegetable production

If there is no space for a home garden, vegetables may be planted between major crop seasons, as intercrops, or as a separate crop in crop rotation. The production of extra vegetables from the home garden for exchange or sale should be encouraged. In the meantime commercial gardens should be developed to cater to the needs of urban inhabitants and other people who cannot produce their own vegetables.

Advantages and disadvantages

Many pros and cons on home gardens have been stated by agricultural economists. They are as follows.

Advantages

1. Efficient production of nutrients deficient in the common diet
2. Productive utilization of spare land and labor
3. "Garden-to-kitchen" freshness; no transportation or storage losses
4. Fight against petroleum shortage
5. Development of children's interest in agriculture and provision for exercise and recreation to adults
6. Reduction in family food budget

While points 1. and 2. have been elaborated before and points 5. and 6. are evident, the other two points, 3. and 4., require further explanation.

Fresh vegetables perish easily, particularly in hot climates. Aside from the loss of nutritive value and table quality, the percentage of spoilage during transportation and storage may range from 30 to 60. The cost involved from farm gate to consumer's kitchen, together with a profit margin for the middleman, makes vegetables prices exorbitant to low-income people.

Food production in the developed countries, and to an increasing extent in the developing ones, is heavily dependent on petroleum for chemicals, irrigation, and the operation of farm machinery. Food packaging, refrigerated transportation, and cold storage also require petroleum. In home garden production, where food moves directly from garden to kitchen, no such expense is involved. Heavy farm machinery is not required and chemi-

cals can be efficiently utilized. For instance, foliar and mud-ball application of fertilizers can be easily introduced. In fact, natural manure of both plant and animal origin could be used to improve soil texture and replace a part of the petroleum-dependent chemicals.

Disadvantages

1. Requirement for production inputs such as seeds, tools, water, and chemicals
2. Requirement for constant care
3. Difficulties in insect and disease control
4. Inability of extension workers to reach scattered families
5. Lack of applicability to landless families who may be most in need of nutritional improvement

There is no way to obtain the projected output without adequate input. One of the lessons learned from past failures with home gardens concerns the lack of adequate production inputs. Such problems should be solved before the launching of home garden campaigns.

Compared with other crops, vegetables need careful and regular attention. Except during land preparation, however, 1 hr/day of work in a 300 sq ft garden is usually sufficient.

While some chemicals may be required to control insects and diseases, consideration must be given to vegetables resistant to insects and diseases. In other words, attention should be paid to crop breeding and selection.

Extension support, both in nutrition education and in agronomy, is essential to the success of a home garden program. However, if a community is motivated and organized with the assistance of local volunteers, extension work can be made much easier.

The solution of the problem of home gardens for landless families depends on government policy and arrangements at the local level, often case by case, such as the operation of community gardens on rented or government land. If there is a will, there is a way. Even table-top gardens are possible.

AGRICULTURE FOR NUTRITIONAL IMPROVEMENT

Objectives

The East-West Center, in response to recommendations from the Workshop on Curriculum Development for Community Nutrition, planned a project on "Agriculture for Nutritional Improvement" with the following objectives.

General

Demonstrate the relevance of agriculture to the nutritional needs of people, introducing the nutrition dimension to agricultural planning, research, and extension of a country.

Specific

Plan/strengthen country projects that encourage increased production and consumption of dark green leafy and yellow vegetables, beans, and nutritious starchy root crops as one of the practical measures to combat protein-calorie malnutrition, Vitamin A deficiency, and anemia, through home and commercial gardens and multiple cropping.

Crop variety selection

While the general objectives may be met gradually in the years ahead, vegetables and beans should be taken into priority consideration to meet the pressing need of Asia and the Pacific countries. The criteria for crop selection are:

1) Easy-to-grow, long-yield season, tolerant to different soil and climatic conditions
2) Resistance to pest and disease
3) High in nutritive value and low in substances harmful to health
4) Palatable and easy to prepare
5) Relatively high in market value
6) Locally grown plant or similar variety

Applied research

The cooperating institutions may include the Asian Vegetable Research and Development Center (AVRDC), the Southeast Asia Regional Center for Graduate Study and Research in Agriculture (SEARCA), the University of Hawaii, and other interested universities and research institutions. The following applied research will be conducted with the cooperation of concerned institutions:

1) Variety selection and breeding
2) Field observation of recommended varieties
3) Experimentation on year-round gardens
4) Education materials production and field testing
5) Pilot areas operation for expanded country programs

Planning, operation, and evaluation

A two week planning seminar was tentatively scheduled in August 1976. It is hoped that through the joint effort of all concerned, the home and commercial garden program and efficient nutrition-oriented multiple-cropping practice could be reactivated or gradually developed in the participating countries. While the major responsibility in implementing the program will rest on governments and country institutions, the joint research, training, and evaluation by interested institutions and regional agencies may have a far-reaching effect on the success of this project.

It is hoped that concerned international and funding agencies could pool their experiences and resources to assist in planning and operating the project. The serious nutrition problems of protein-calorie malnutrition, anemia, and Vitamin A deficiency, when attacked with all available weapons, may one day disappear from Asian and Pacific countries.

[1]Soekirman. 1974. "Priorities in Dealing with Nutrition Problems in Indonesia". Cornell International Monograph Series No 1.

[2]Lee, Ki-Yull and Sook-He, Kim. 1974. "A Scientific Search for the Improvement of Korea Diet, March 1972-June 1974". Yonsei and Ewha Women's Universities.

[3]Florentino, Rodolfo F. 1975. "The Malnutrition Problems in the Philippines" (mimeograph). Food and Nutrition Research Center, National Science Development Board, Manila, Philippines.

[4]Knott, James E and Deanon, Jr., Jose R. 1967. "Vegetable Production in Southeast Asia". College of Agriculture, University of the Philippines.

[5]US Department of Health, Education and Welfare. 1972. "Ten-State Nutrition Survey, 1968-1970". DHEW Publication No (HSM) 72-8134.

[6]National Academy of Science. 1974. "Recommended Dietary Allowances". Eighth Edition.

[7]Harvard University School of Public Health. "Priorities in Child Nutrition", Volumes I-V.

[8]"Planting Guide for Vegetables and Melons in Hawaii" (mimeograph). College of Tropical Agriculture, University of Hawaii.

[9]"Composition of Foods". 1963. USDA Agriculture Handbook No. 8.

[10]FAO Agriculture Production Yearbook, 1971 and 1973.

Attachment 1: Population, Food Production, and Land Use

A. POPULATION AND FOOD PRODUCTION

Year	World Population 1,000,000	Index (1961-65=100)	Index Numbers of Food Production (1961-65=100)	Index Numbers of Per Capita Food Production (1961-65=100)	Asia Production 1,000,000	Index	% of Asia Population in World Population
1962	3099.6	98	98	100	1715.7	98	55.4
1964	3221.9	102	103	102	1790.0	102	55.6
1966	3348.2	106	110	104	1868.7	107	55.8
1968	3479.2	110	117	107	1952.0	111	56.1
1970	3617.4	114	122	106	2040.1	116	56.4
1972	3760.2	119	125	105	2131.8	122	56.7
1973	3834.1	121	131	108	2179.0	124	56.8

Unit: 1,000,000 ha

B. LAND USE (1973)

	World	Asia	% of Asia in World Total
Total area	13,399.3	2,754.3	20.6
Arable land and land under permanent crop	1,474.9	481.7	32.7
Permanent meadows and pastures	3,005.0	536.6	17.9
Forest and woodlands	3,990.6	568.0	14.2
Other land	4,928.8	1,168.0	23.7

Source: FAO Agriculture Production Yearbook, 1973

Attachment 2. Daily Per Capita Calorie and Protein Availabilities and Selected Food Supply in USA and Some Asian Countries

	Year	Calorie	Protein	Net Food Supply (1971), of Pulses, Nuts, and Seeds	Vegetables
USA	1970	3300	98.6	22	318
ASIA COUNTRIES					
India	1969/70	1990	49.4	53	10
Indonesia	1970	1920	42.8	43	57
Japan	1970	2470	76.9	44	362
Korea, Republic	1969	2490	72.4	24	182
Malaysia	1964/66	2350	53.3	26	77
Pakistan	1969/70	2410	54.9	16	51
Philippines	1969	2040	53.2	18	79
China					
People's Republic	1964/66	2050	57.2	39	149
Republic	1969	2620	68.2	36	204
Thailand	1964/66	2210	50.2	48	101
Vietnam	1964/66	2200	48.6	11	136

Source: FAO Agriculture Production Yearbook, 1971

Attachment 3: Crop Yield and Its Calorie and Protein Output, World Average and USA

Crop	World Average kg/ha	Calories 1000	Protein kg	USA kg/ha	Calorie 1000	Protein kg
Cereals:						
Wheat	1,696	4,638	137	2,197	6,045	178
Rice, paddy	2,390	4,618	85	4,794	9,574	177
Maize	2,810	8,789	186	5,735	17,937	380
Starch Roots/Tubers:						
Irish potatoes	14,356	8,830	244	25,575	15,731	434
Sweet potatoes	8,850	8,175	120	10,932	10,098	149
Beans/Nuts:						
Dry bean	493	1,676	110	1,355	4,606	302
Soybean	1,423[a]	5,734	485	1,867	7,524	637
Groundnuts in shell	924	3,805	175	2,603	10,720	494
Vegetables:						
Cabbage	19,916	4,303	323	18,354	3,965	397
Tomato	20,435	4,505	225	35,873	7,909	395
Carrot	24,926	6,155	159	29,691	7,331	190

[a]This figure was much affected by USA production as 67.8% of world soybean was produced in the USA. Reginal averages, for instance, for Africa and Asia were 412 and 814 kg/ha respectively.

Sources: FAO Agriculture Production Yearbook, 1973, and USDA Agriculture Handbook No 8, 1963

Attachment 4: Food Composition of Selected Vegetables Grown in Hawaii
(in 100 g as purchased)

Crop	Calories	Protein	Calcium	Iron	Vitamin A	Thiamine	Ribo-flavin	Ascorbic Acid	Refuse
		g	mg	mg	IU	mg	mg	mg	%
Amaranth	23	2.2	168	2.5	3845	0.05	0.10	50	37
Beans, snap	28	1.7	49	0.7	530	0.07	0.10	17	12
Carrot	33	0.9	29	0.5	8580	0.05	0.04	6	22
Endive	18	1.5	71	1.5	2905	0.06	0.12	9	12
Lettuce, Manoa	12	0.8	44	0.9	1215	0.03	0.05	12	36
Mustard, green	22	2.1	128	2.1	4900	0.07	0.15	68	30
Onion, green	35	1.4	49	1.0	1920	0.05	0.05	31	4
Pak choy	13	1.3	132	0.6	2480	0.04	0.08	20	20
Pepper, hot	27	0.9	7	0.5	560	0.07	0.04	172	27
Pepper, sweet	18	1.0	7	0.6	345	0.07	0.07	105	18
Pumpkin	18	0.7	15	0.6	1120	0.04	0.08	6	30
Soybean (immature pod)	71	5.8	36	1.5	365	0.23	0.08	15	47
Spinach	17	2.0	57	1.9	4940	0.06	0.12	31	39
Sweet potatoes	92	1.4	26	0.6	7130	0.08	0.05	17	19
Tomatoes	20	1.0	12	0.5	820	0.05	0.04	21	9
Water convolvulus	23	2.4	59	2.0	5105	0.06	0.10	26	19
Beets	21	0.8	8	0.3	10	0.01	0.02	5	51
Cucumber	14	0.9	24	1.0	240	0.03	0.04	10	5
Eggplant	20	1.0	10	0.6	8	0.04	0.04	4	19
Onion, bulb	35	1.4	25	0.5	35	0.03	0.04	9	9

Source: USDA Agriculture Handbook No 8, 1963

Attachment 5. Selected Vegetables Grown in Hawaii

Crop	Varieties to Plant	Area sq ft	Yield lb	Days to Harvest	Yield per 10 sq ft/d lb
Amaranth	*Amaranthus gangeticus*	100	60[a]	50	0.120
Beans, snap	Hawaiian Wonder	400	70	60	0.029
Carrot	Nantes	150	100	90	0.074
Endive	Green, curled	150	75	90	0.056
Lettuce, Manoa	Green Mignonette	125	70	55	0.102
Mustard, green	Kai choy, Waianae strain	150	125	50	0.167
Onion, green	—	100	80	60	0.133
Pak Choy (Chinese green cabbage)	Crispy choy	150	125	50	0.167
Pepper, hot	Hawaiian chili	200	25	70	0.018
Pepper, sweet	Keystone resistant giant	200	50	70	0.036
Pumpkin	Big Max	900	200	120	0.019
Soybean, vegetable type	Kailua, Kahala	150	30	70	0.029
Spinach	Viroflay	150	40	50	0.053
Sweet potatoes	Kona B	300	150	140	0.036
Tomatoes	F_1 hybrid	500	400	90	0.089
Water convolvulus (swamp cabbage)	Ung choy	150	100[a]	45	0.148

[a]Yield estimated according to experience in Jamaica. Amaranth Fotete in Dahomey has yield of 113 lb.

Source: College of Tropical Agriculture, University of Hawaii, 1974

Attachment 6: Nutrients Output of Selected Vegetables in Hawaii

Crop	Yield per 10 sq ft/d	Calorie	Protein g	Iron mg	Vitamin A IU	Riboflavin mg	Ascorbic Acid mg
Amaranth	0.120	12.36	1.20	1.33	2090	0.05	27.48
Bean, snap	0.029	3.71	0.22	0.09	70	0.01	2.20
Carrot	0.074	8.29	0.21	0.14	2180	0.01	1.55
Endive	0.056	4.48	0.38	0.38	740	0.03	2.35
Lettuce, Manoa	0.102	5.36	0.39	0.42	570	0.02	5.56
Mustard, green	0.167	16.37	1.59	1.59	3710	0.12	51.44
Onion, green	0.133	20.88	0.86	0.59	1160	0.03	18.49
Pak choy	0.167	11.52	1.15	0.57	2230	0.08	18.40
Pepper, hot	0.018	3.87	0.14	0.08	1285	0.01	22.00
Pepper, sweet	0.036	4.03	0.18	0.08	580	0.01	26.64
Pumpkin	0.019	1.58	0.06	0.05	95	0.01	.57
Soybean, green	0.029	9.34	0.76	0.19	50	0.01	2.00
Spinach	0.053	4.51	0.56	0.54	1400	0.03	8.85
Sweet potato	0.036	15.08	0.22	0.09	1165	0.01	2.77
Tomatoes	0.089	8.9	0.45	0.20	365	0.02	9.08
Water convolvulus	0.148	15.84	1.63	1.36	3425	0.07	17.46

Source: College of Tropical Agriculture, University of Hawaii, 1974 and USDA Agriculture Handbook No 8, 1963

Attachment 7. Rating in Terms of Output of Nutrients by Selected Vegetables Grown in Hawaii

Seq.	Score	Protein		Iron		Vitamin A value		Ascorbic Acid	
		Crop	g	Crop	mg	Crop	IU	Crop	mg
1	16	Water convolv.	1.63	Mustard, green	1.59	Mustard, green	3710	Mustard, green	51.4
2	15	Mustard, green	1.59	Water convolv.	1.36	Water convolv.	3425	Amaranth	27.5
3	14	Amaranth	1.33	Amaranth	1.33	Pak choy	2230	Pepper, sweet	26.5
4	13	Pak choy	1.17	Onion, green	0.59	Carrot	2180	Pepper, hot	22.0
5	12	Onion, green	0.86	Pak choy	0.57	Amaranth	2090	Onion, green	18.5
6	11	Soybean, green	0.76	Spinach	0.54	Spinach	1400	Pak choy	18.0
7	10	Spinach	0.56	Endive	0.38	Pepper, hot	1285	Water convolv.	17.5
8	9	Tomatoes	0.45	Lettuce, Manoa	0.42	Sweet potato	1165	Tomatoes	9.1
9	8	Lettuce, Manoa	0.39	Tomatoes	0.20	Onion, green	1160	Spinach	8.9
10	7	Endive	0.38	Soybean, green	0.19	Endive	740	Lettuce, Manoa	5.6
11	6	Sweet potato	0.22	Carrot	0.14	Pepper, sweet	580	Sweet potato	2.8
12	5	Bean, snap	0.22	Bean, snap	0.09	Lettuce, Manoa	570	Endive	2.4
13	4	Carrot	0.21	Sweet potato	0.09	Tomatoes	365	Bean, snap	2.2
14	3	Pepper, sweet	0.18	Pepper, hot	0.08	Pumpkin	95	Soybean, green	2.0
15	2	Pepper, hot	0.14	Pepper, sweet	0.08	Bean, snap	70	Carrot	1.6
16	1	Pumpkin	0.06	Pumpkin	0.05	Soybean, green	50	Pumpkin	.6

Attachment 8: Overall Rating of Selected Vegetables Grown in Hawaii

Seq.	Crop	Total Score	Time to Plant
1	Mustard, green	63	Year round
2	Water convolvulus	56	Year round
3	Amaranth	55	Year round up to 2000 ft elevation
4	Pak choy	50	Year round
5	Onio, green	45	Year round
6	Spinach	40	November-March below 2000 ft elevation
7	Tomatoes	30	Year round
8	Endive	29	November-March below 2000 ft elevation
9	Lettuce, Manoa	29	Year round below 2000 ft elevation
10	Pepper, hot	28	Year round up to 3000 ft elevation
11	Pepper, sweet	28	Year round up to 2500 ft elevation
12	Potato, sweet	25	Year round up to 3000 ft elevation
13	Carrot	25	November-March below 2000 ft elevation
14	Soybean, green	22	Year round
15	Bean, snap	16	Year round
16	Pumpkin	6	Year round

Attachment 9. Calculated Nutrition Contribution of Home Garden in Hawaii

A. RECOMMENDED DIETARY ALLOWANCES (RDA) FOR A FAMILY OF FIVE

Member	Age	Calories	Protein	Iron	Vitamin A Activity		Ascorbic Acid
			g	mg	RE[a] MCG	IU	mg
Father	42	2,700	56	10	1,000	5,000	45
Mother	38	2,000	46	18	800	4,000	45
Son	18	3,000	54	18	1,000	5,000	45
Daughter 1	14	2,400	44	18	800	4,000	45
Daughter 2	6	1,800	30	10	500	2,500	40
Totals		11,900	230	74	4,100	20,500	220

[a]Retinol equivalent

Source: National Academy of Sciences Recommended Dietary Allowances, 8th edition, 1974.

Attachment 9. Calculated Nutrition Contribution of Home Garden in Hawaii

B. OUTPUT FROM HOME GARDENS

Plot	Area sq ft	Estimated Output lb/d	Protein g	Iron mg	Vitamin A Activity IU	Ascorbic Acid mg
Garden 1:[a]						
Lettuce, Manoa	45	0.47	1.76	1.89	2,565	25
Bean, snap	45	0.13	0.99	0.41	315	10
Cucumber	45	0.04	0.15	0.19	430	2
Eggplant	45	0.07	0.31	0.18	20	1
	180	0.71	3.21	2.67	3,330[b]	38
Fence and space	120 } 300					
Nutrition Contribution in RDA of family:			1.4%	3.6%	8.1%	17.3%
Garden 2:[c]						
Water convolv.	45	0.67	7.34	6.12	15,415	79
Pak choy	45	0.75	5.18	2.57	10,035	81
Amaranth	45	0.54	5.40	5.99	9,405	124
Bean, snap	45	0.13	0.99	0.41	315	10
	180	2.09	18.19	15.09	35,170[d]	294
Fence and space	120 } 300					
Nutrition Contribution in RDA of family:			8.5%	18.8%	86.4%	144.5%
Garden 3:[e]						
Mustard, green	45	0.75	7.16	7.16	16,695	231
Water convolv.	45	0.67	7.34	6.12	15,415	79
Pak choy	45	0.75	5.18	2.57	10,035	81
Tomatoes	45	0.40	2.03	0.90	1,645	51
Bean, snap	45	0.13	0.99	0.41	315	10
Onion, green	15	0.20	1.29	0.89	1,740	28
Pepper, sweet	15	0.05	0.27	0.12	870	40
Pepper, hot	15	0.03	0.21	0.12	1,930	33
	270	2.98	24.47	18.29	48,645[f]	543
Fence and space	180 } 450					
Nutrition Contribution in RDA of family:			10.6%	24.7%	118.9%	244.8%

[a] Typical current garden, no nutritional consideration
[b] Equivalent to 334 MCG retinol
[c] Same as Garden 1, but planted with nutritious vegetables
[d] Equivalent to 3542 MCG retinol
[e] Medium size, 450 sq ft, with nutrition considerations
[f] Equivalent to 4875 MCG retinol

DIRET RELIEF FOUNDATION STUDY SITES IN MILAGRO AND GUAYAQUIL, ECUADOR

Janice Gallagher

Janice Gallagher, a Direct Relief Foundation (DRF) volunteer on assignment in Ecuador, has had remarkable results in two study sites: Milagro and Guayaquil, After only two months in the DRF-sponsored Intensive Garden Farming training course in Santa Barbara, Jan reported to Ecuador in August 1975. There she introduced the intensive gardening techniques. The response has been amazing: 20 types of vegetables and other plants have been cultivated with consequent generation of attitudes ranging from simple curiosity to outright enthusiasm. Where before local farmers could not conceive that such variety and abundance were possible, now they have become Jan's active colleagues in intensive gardening. Newly introduced foods, such as soybeans, mustard greens, and zucchini, have been widely accepted. It was found that people would follow the suggestion to include these new foods in their soup; acceptance followed easily.

The following excerpt from her report to DRF explains her experience best and summarizes her remarks to the workshop.

In August of 1975 I flew to Ecuador taking with me a shovel, digging fork, and 20 lb of seeds in order to introduce new kinds of food plants to the area and a new method of growing them. I worked in two areas: Milagro, a rich agricultural area growing little but rice and pineapples, and the slums of Guayaquil, where absolutely nothing grows. In the latter case I brought topsoil from Milagro and was able to get a very successful garden going.

In the beginning I did all of the work myself, planting lettuce, tomatoes, carrots, radishes, onions, cucumbers, peppers, parsley, green beans, spinach, lima beans, soybeans, mustard greens, summer squash, zucchini, basil, sunflowers, marigolds, and other flowers on about one-half acre of land. Of all those plants, only tomatoes had been grown in the area before. The first ten listed were known to the people but were shipped in from the Andes making them too expensive for most people to purchase. The rest were completely unknown. All of the plants did very well with the exception of spinach.

To get the plants growing quickly I sought some good topsoil and found it under the guava and cocoa trees. I made seed flats of a mixture of this rich soil and sand and added topsoil to the planting beds. I also started making compost piles for the future. There were plenty of materials lying around and I was able to get chicken manure from the neighboring farmers. No one there had seen a compost pile before. They have always let the chicken manure "age" (lose most of its nitrogen) so that they could put it on plants without burning them.

The response of the Ecuadorean people was amazing. The farmers are very hard working (usually using only a machete or a hoe) but often enjoy meager results from their efforts. In Milagro they all plant pineapples at the same time. When they are harvested, the market is glutted and the price so low it is not worth the bus trip to town to try to sell them. After struggling for years just to stay alive and feed their families, the farmers were very open-minded and receptive to new ideas. One of them actually said, "We know there are better ways of doing things. We would like to find out what they are." They have no money to buy machines or fertilizers. They were excited about the prospect of doing something immediately to change their situation with only the resources at hand.

The two workers who hoe on the mission property at Milagro were very much interested in my method of transplanting lettuce in dense beds rather than in rows. They had never seen lettuce grow in that climate and doubted it would be a success. But they helped build a sun shelter out of bamboo and banana leaves and were almost as happy as I was to see the lettuce grow so well. We had five successful varieties growing at once, and that was instrumental in getting other farmers interested in the project. The sunflowers grew to 10 ft and caused people to come from all over to find out what was going on. They asked for seeds and information on planting. The same thing happened in Guayaquil but on a smaller scale. Basically the program sold itself.

There are now about 25 families interested in one aspect or another of the program. We have started classes in nutrition and there are seven women starting their own vegetable gardens to help feed the children.

Perhaps the most important response, however, was that of the agricultural engineer working at an Ecuadorean government experiment station down the road from us. He came to visit just to see what was going on. He was impressed by the layout of the garden and the fact that things were planted so close together. His fields of soybeans planted 18 in apart were choked with weeds. We had hardly any weeds at all. He was also amazed that we used no pesticides, an unheard-of practice in the hot, humid climate of coastal Ecuador. Our only insect problem had been with ants; but a colony of baby frogs came to live under the cool lettuce leaves and ate most of them. The ag engineer started working with us on his own. Since then his cooperation has been officially recognized by the government agency so that we are in a position to influence or participate in their future programs.

After successfully growing new foods, the next problem is to persuade the people to accept them in their diet. Again the results were amazing. Soybeans, for instance, were a completely new food to these people, as were mustard greens and zucchini. One of the best and easiest ways to introduce the new foods was to put them into their soup. We discovered that the people would eat almost anything if it were in their soup. Sunflower seeds proved to be very popular eaten directly out of the shell, in salads, on cereal, and, of course, in soup.

It is hard to judge the actual quantities of food produced. Nothing was sold. Almost everything was eaten as it came out of the ground, mostly by 13 hungry orphans at the mission. A month before I returned to the U.S., another DRF volunteer came to Ecuador to help. He is carrying on the program very successfully.

The important thing about Milagro and Guayaquil is that they are pilot projects, study sites for DRF. They show people what can be done -- what they can do. They are based on the idea of community development and education, making people aware of what possibilities there are for them to live with dignity and self-respect. Giving handouts (disaster aid) has nothing to do with the projects. What is important is that people understand that with their own resources and abilities they can solve their own problems. What they do is not as important as the fact that it is they who are doing it, thereby determining their own destiny. Community gardens and playgrounds could replace garbage dumps in Guayaquil, but the important thing is that the changes come from the people themselves, working together in the community. The projects are part of a larger movement that includes all the Indians still in the mountains. That movement involves the immediate survival, and aspires to the eventual restoration, of the Inca Indian culture through such measures as land reform and elimination of the caste system.

Jan has returned to Santa Barbara for the L.I.F.E. workshop and her latest report is given here.

I returned to Ecuador in September of 1976 to continue the Intensive Gardening program introduced successfully the year before. Michael Pope, another volunteer sent down by DRF, arrived in Milagro October 4. Under his direction we began setting up a permanent demonstration garden. It is to be used as a future DRF training site for Ecuadorean teachers from the nearby government experiment station. This will make it possible to introduce the method in the most efficient way.

Mary Cusack, a volunteer from Australia who came to help with the orphans, is also lending us a hand as we are working to get things growing before the monsoon rains come in February. We have chosen a one-quarter acre area at the edge of the cacao forest to be the demonstration garden. It is visible from the road, and there is plenty of water available.

The first few days were spent laying out the garden and gathering materials for the compost piles. Seed flats and seed beds have been started. Double digging has begun (so far lettuce, carrots, cucumbers, beans, radishes, and mustard greens have appeared). Work on the fence to completely surround the garden is progressing rapidly with the help of the bean trees already planted in rows. They are being fortified with bamboo. As many varieties of trees as possible are to be included in the garden. Mango and guava will be the large shade trees, plus citrus, avo-

cados, and many local tropical fruits. Bananas and papayas will line the main walkways.

The Ecuadorean agricultural engineer who expressed interest in the project last year has continued to be of help to us. After I left last year he helped carry on the classes in nutrition and the demonstration garden plots started by the women. This year he has offered to help us introduce our methods officially at the experiment station. Already we have had an informal influence there in the reduced use of pesticides and in increasing the plant density.

A few hundred yards down the road from the demonstration garden is a separate piece of property that is going to be the future home of 50 orphans. It is here that Mike and I are establishing a community agricultural trainer program as a component in what will eventually be a complete DRF Health Resource Center. Eight to ten children will live in small houses scattered over the five and a half acre site. Each will have its own garden. Most importantly, solar energy will be used for cooking and heating water, and clivus multrum toilets will be introduced. The engineer in charge of providing housing for all the government employees in the area has already asked for plans for the toilet and intends to install them in all future projects if ours is a success. The potential is very exciting. Next to the lack of food, the greatest health hazard in Ecuador is lack of sanitation.

Introducing new foods and farming methods on the coast of Ecuador is very important for the future development of the country because the land there has a great unexplored potential for supplying many of the needs of the people. But it is the situation in the Andes that must be changed before any real progress can be made in the country as a whole. The Inca Indians are starving on the land that is available for them to farm and therefore they are leaving, going down to the coast of Guayaquil and forming one of the worst slums in the world. (In 1964 the Incas made up 40% of the population. They have lost over half a million people in the last ten years and now make up less than 25%.)

If they were able to grow enough food to feed themselves, they wouldn't have to leave and it would be possible to start reversing the process that will otherwise result in the destruction of their culture.

The Inca Indian Catholic priest, Fr. Carlos, with whom we work in Guayaquil and Milagro, still has relatives in the Andes. One of these is a young cousin, Andres, who has just received his M.A. from an Andean agricultural college (Riobamba). He is planning on coming to Santa Barbara to study Intensive Gardening in the spring of 1977. Both Michael Pope and I intend to take this five month course at the same time. Then with Andres' help, DRF would have the exciting prospect of introducing its Agricultural Trainer Program in the Andes where it is most needed. We will be cooperating with the Bishop there who is already effectively working with the Indians.

WORKING GROUP SESSION REPORTS

Editor's Note: The participants were organized into three working groups similar in composition. Each group was asked to answer the following questions:

1. Is the French Intensive/Biodynamic Method scientifically sound?
2. What research needs to be done regarding the method?
3. What is your evaluation of the Family Food Production Proposal. What are your recommendations concerning it?

The comments and recommendations that follow represent the report of each group.

Group A

To establish a base line from which to work, the group first determined that the approach indicated specifically in the proposal as the "ultimate objective", that is "improving nutritional status", is the proper approach. The group also felt that an important determinant of the effectiveness of this approach is whether it is acceptable to the people with whom we are concerned. This attitude, of course, raises several unanswered questions regarding program development, training, implementation, and technique, which should be settled through feedback of practitioners, research, and communication.

First we explored some of these questions as reported in the following capsule of a question-answer session. We then provided some recommendations for the Family Food Production Proposal.

Q. The program development and training, in present form, are adapted to temperate climates. What is the ecological range in which this is workable? What modifications need to be known?

A. The program is badly in need of feedback from trained technicians who have already gone into the field. But the program is too new to have this needed feedback.

Q. What is the framework for choice of sites, geographical?

A. Geographical considerations are advisable for selecting areas, especially where soil conditions are favorable and there is a reasonable chance of success. After a favorable impression has been made, one could gradually move into more difficult areas.

Q. What about storage practices and use of animals, both of which seem to be important considerations?

A. It is agreed that these are important considerations. The application of both is presented in training. More research is needed in the matter of storage because of the many and varied conditions. Regarding animals, we need to consider them, but we need to recognize that in some areas animals are not common.

Q. Is the trainee who is in the five month training program introduced sufficiently to all that is necessary?

A. Somewhat.
--DRF provides needed cultural and language training.
--Santa Cruz has no cultural training but trainees do seem to have complete immersion in gardening. The student formulates his own questions before formal presentations are made to him. Each student develops a subject of interest and carries out a project in that area. There is also teaching practice which serves a dual purpose: it prepares the trainee for his future work and it aids in his review of preparation.
--At Covelo the training is demanding and rigorous. The emphasis is on practice of skills rather than reading and writing reports.

Q. Obviously there is a need for further cultural conditioning before the trainee receives his or her final assignment. Is it possible systematically to link this training to the field assignment?

A. Yes, this needs to be done and it is strongly recommended.

Q. Is ultimate management of the gardening program in a developing country expected to be carried out by indigenous personnel?

A. Yes, by deep involvement, and as early as possible.

Q. What need is envisioned in the way of establishing continuing credibility of the indigenous counterpart?

A. Steps, though perhaps cautious, should be taken to ensure his recognition and possibly his certification by a responsible official arm of the government. This will serve two purposes: needed prestige for the individual and continuing support for his work. Without this, the program could later deteriorate and fail.

In the light of Group A's discussion, the following recommendations for further research are presented. L.I.F.E. should conduct research to:
1) determine and establish an ecological range for effective implementation of the Intensive/Biodynamic Gardening program
2) investigate methods of food preservation and storage in a wide range of variable conditions
3) examine the need, extent, and scope of cultural and geographical orientation at a center for further studies prior to final assignment.

Since the Family Food Production Proposal outlines four hypotheses supporting the primary objective of improving nutritional status, we recommend the following changes.

1. Substitute "methodology" for "technology" throughout the hypotheses.

2. In hypothesis 1, delete the phrase "sparing of water" because there are some areas where this does not apply. Modify the phrase "little or no cash input" to "minimal cash input". Change "less than 1/4 ha" to "as little as 1/4 ha".

3. In hypothesis 2, modify "readily transferable" to "transferable" since we cannot assume the former.

4. In hypothesis 3, change "increase their food consumption" to "increase the nutritional quality of their diet", in keeping with the primary objective of the proposal.

In Phase 2 of the Proposal, we recommend expanding the list of projects being considered for survey to include two or three indigenous projects not sponsored and directed by persons from the United States.

In Phase 3, we would like to add the Farm and Garden Project at the University of California, Santa Cruz, to the list of proposed training centers.

In Phase 4, we recommend two changes:

1. Increase the training period from 9 to 12 months. Trainees should be exposed to and involved in a complete year of seasons and cycles.

2. Choose trainees who are sponsored by but not necessarily on the staff of PVOs. The proposal provides for trainees to be "selected from the field staffs of private voluntary organizations". The recommended change in the proposal would, if adopted, require individual determination as to whether the trainee, upon completion of his basic work at a training center, would need to attend the geographical orientation center before final assignment to a program site.

In Phase 5, we recommend deleting "pre-existing".

Although some of these recommendations refer to peripheral matters, the substance of Group A's report implies positive support for the Family Food Production Proposal.

Group B

In considering Phase 1 of the Proposal, we discussed at great length an appropriate name for the intensive technique we have been analyzing in the past few days. However, due to a lack of consensus on a single most appropriate term for this form of horticulture, we have decided to adopt the generally accepted terminology of "The French Intensive/Biodynamic Approach".

With the exceptions of Messrs. Pierce, Crebbin, and Feedman, all members of the group felt that this term is overly restrictive. But we could not come up with a more suitable one.

Depending on individual site conditions, we foresee certain considerations that will have to be dealt with within the framework of the French Intensive/Biodynamic Approach. These are
1) food storage
2) seed supply
3) available plant nutrients

4) companion planting as pest and disease controls
5) choice of crops in relation to
   --nutrition
   --storage
   --acceptability
6) nutrition education
7) water availability and usage
   --water storage system
   --field trials in arid areas
8) composting
9) availability of tools
10) conservation practices
11) drainage

In Phase 2, we feel that the objectives of the survey and analysis as outlined need to be clearly defined. One objective of the survey should be an evaluation of existing training centers as well as overseas sites. We suggest this phase of the project receive much less attention than originally proposed.

In Phase 3, we recommend that the training centers should be those that have the most experience in training people in the French Intensive/ Biodynamic Approach. One training school should be located in a foreign country.

In Phase 4, we recommend that trainees should not be limited to Americans. People from foreign countries should not be excluded from the program. Trainees from PVOs should be encouraged because of their previous commitment and experience with language and cultural factors. Where possible, woman and man teams should be trained.

The period of training should be from 9 to 12 months. Nine months is a minimum and 12 months is optimal, depending on location, training center, environmental factors, and educational backgrounds of the individual. Preference should be given to those trainees who will commit themselves to more than two years service in the field.

In Phase 5, we prefer the name "Field Trial Station" to "Demonstration Site".

One hundred thousand dollars ($100,000) seems to us to be an unrealistically low figure for this most important phase of the project.

Overall we felt that this was an excellent preliminary conceptual framework for the operational plan of this project.

Group C Report

We made special efforts to refine, for purposes of discussion, a definition of the scope of the proposed program. Prior discussion and documentation

had left unanswered certain questions about "the system", the target population to be served, the means of delivering services, and the size of gardens to be developed.

An issue for continued discussion, for example, is the extent to which chemical inputs must be avoided by field personnel. Significant philosophical differences on this point exist between present practitioners of the system and some of the agencies, programs, and disciplines represented at the workshop. To some practitioners, the avoidance of chemicals is a philosophical as well as a technical matter. Others suggest that if we are promoting a family farming program, it may be necessary to accept many current farming practices, including, in some cases, chemical use practices (where they are reasonably well justified), while encouraging gradual withdrawal to a purely organic-based farming practice. This is not likely to be a problem if we are primarily talking about small gardens as supplementary food sources only, using intensive techniques as described during this workshop.

At the outset of our discussion, a broader question arose. What is the scope of the delivery system eventually needed to implement the program widely in the Third World? Some participants felt the French Intensive/Biodynamic name and specific technique tend to limit the applicability of the training provided under this program. Others questioned whether the program should be implemented in a "closed" mode, as the proposal suggests, or if a more "open" pattern of delivery systems might be desirable. Other systems of intensive gardening exist and are being propagated by PVOs, culture groups, and government agencies. An important alternative approach is the Chinese intensive garden and the Chinese and Japanese small mixed farming methods that are found throughout the Orient, and even in the United States and Latin America.

Furthermore, many individuals and organizations are engaged throughout the world in implementing in different ways the "Small Is Beautiful" philosophy and strategy of self-reliance that are elements of the intensive small gardening practice we have discussed. We also note there are many other kinds of centers for agricultural training here and in the Third World, plus extension services and government ministries that must be considered in a fully "open" program of delivery systems. This conference itself is a delivery system element to the extent that services and ideas may be propagated from here by participants and their institutions.

In view of all these related factors, it was recognized that the group of practitioners represented here have a sincere interest in service but their numbers and resources are limited, as is the amount of Third World experience with the "French Intensive/Biodynamic" system of cultivation.

We concluded that it is practical at present that the stated objectives and scope of the proposal are distinctly limited. A way of clarifying this limitation is to stress that the program is directed toward supplementary food production in small intensive gardens within the home environ-

ment — especially emphasizing the need for supplementary vitamins, minerals, and protein. The concept of the "kitchen garden" was considered appropriate but it was agreed that the term itself should be avoided because of the implication that the work should thus be done by the housewife alone.

There are side benefits of explicitly limiting the scope of the project, and avoiding any suggestion of a production-oriented activity.

1. The program can be non-threatening to existing agricultural businesses, markets, suppliers, and government agencies. It should have relative freedom to maintain a low profile.
2. Agricultural scientists in the United States and in other countries may be more willing (for reasons of professional credibility) to participate in a study of a novel supplementary food program than in an "unconventional" production system.
3. Small changes, such as decreases in Vitamin A deficiency, may be creditable as successes. Small interventions, such as container plants or "handkerchief gardens", may in some cases be seen as adequate program objectives.
4. No strong distinction need be made between rural and urban areas as suitable target areas; clients do not have to be "farmers".
5. At least at the outset of the program, minimum-scale, household-oriented gardening will allow a maximum of family attention to be given to the care of individual plants. This will tend to minimize the need for care in selecting of sites for their presumed suitability of soil, climate, and other characteristics.
6. Numerous other questions we might have about agricultural and ecosystemic consequences of even the proposed one-fourth acre family farm program can likely be deferred until further experience is gained in-country with cultural and technical factors.
7. Problems of the need for adaptive change in the system will be minimized by limiting the scale of the gardens it will undertake to develop.

In conclusion, we agreed that it is appropriate that the program proceed as originally proposed, with limited objectives that will not overextend the limited existing resource base of practitioners, recognizing, nevertheless, the vast scale of need, and a wide variety of related parallel and future opportunities for delivery of the system or for technical or social components of it. To improve the potential success of the program in any given community, we suggested that at the outset the size of gardens be limited to small ones suitable for supplying needed vitamins and minerals rather than attempting, generally, to supply caloric and full protein needs as well.

We urged that in implementing the program, maximum attention be given in every situation to the need for adaptive change in the system and the need for working closely with local traditions and environmental constraints,

while remaining open to communication with existing government agencies and other indigenous groups and enterprises. Much of this adaptation and linkage must, of course, be left to the field staff themselves. The quality of training given may be measurable in how well the trainees are able to adapt to local conditions.

Special attention should be given to resolving the problem of long-term need for supplementation of organic matter to the garden and to the role and status of women, particularly of indigenous women, in the program.

Research Topics

1. On-site input-output analysis to be done at the training sites and the field sites.
   The purpose of the input-output analysis will be to determine the quantities of food people can produce on small parcels using intensive gardening methods. We suggest that trainees could be responsible for recording the input-output data.

2. Microbial studies of the soils subjected to the intensive gardening method.
   It was suggested that biology or ecology departments of the University of California, Santa Barbara, Santa Cruz, and other universities or land grant agricultural colleges should conduct this research.

3. Documentation and research related to other intensive gardening techniques.

4. Companion planting research.
   Explanation of the apparent affinities and disaffinities among plants, families, and individual species.

Agricultural College Research

1. Research means of maximizing nutritive outputs from a small scale garden. Also explore methods of increasing income from family garden units.

2. Research variations in quality of compost.

3. Research preventive pest controls such as natural insectaries, trap planting, etc.

4. Investigate multi-story agricultural systems in tropical climates.

5. Investigate the nutritive value of crops raised according to intensive gardening methods against other methods.

Training

Duration

Regular course. 10 to 12 months. We consider that 10 to 12 months is required to prepare a trainer or trainers in all aspects of intensive family food production. Trainees must have sufficient background training at college level and with field experience. Courses should be open to all qualified and interested people, both from developing and developed countries.

Special course. For field staff of private voluntary organizations. A minimum of five months in view of the training cost in relation to the duration of volunteer's field assignment which is only two years. According to current practice, the training may be shortened to five months conducted during the summer months when the climatic conditions in California would be nearer to those in the target countries to which the volunteers are assigned. The time needed for language training is not included. Trainers should have adequate background, including field experience.

Content

Training curriculum should be developed according to the duties and responsibilities to be assigned to the trainees. Such duties and responsibilities should be precisely detailed by the sponsor.

The course should include horticulture, soil, fertilizer, water management, pest control, garden management, nutrition, food conservation and processes, health and hygiene, communications, use of inexpensive visual aids, simple carpentry, planning and evaluation (including base line data collection), and rural sociology.

It is essential that at least 60% of the time during the training period be spent in the garden. Trainees should have an individual garden plot of 400-500 sq ft and through carefully planned crop rotation, obtain maximum output in nutrients and income, keeping necessary records.

Financing and Timing

Sufficient financial aid should be provided to set up the training center, with necessary equipment and facilities to verify the practices introduced and foster efficient training.

The actual cost of training should be borne by the sponsor.

If possible, the first five month course may be started in the summer of 1977, while the 10 to 12 month course may be offered later.

Evaluation

Formation. Trainee's performance, behavioral attitudes, and changes should be evaluated in relation to the objectives set up by the course. Special attention should be paid to the design and output of the individual's garden and his ability to communicate and organize programs.

Summation. The actual performance of the trainees in the field should be evaluated in relation to duties and responsibilities assigned to them.

Follow-up. The trainees should keep in constant contact with the training staff. Refresher training may be conducted if so needed.

Discussion proceeded with a suggestion that a survey of current research and projects in intensive gardening be conducted. Dao Spencer of the American Council of Voluntary Agencies for Foreign Service indicated that her organization might begin to pull this information together. A questionnaire would be sent to various government programs, PVOs, institutes, etc.

We generally agreed with the proposal for Phase 5 (field experience by trainee in managing a demonstration project in family food production). We emphasized that collaboration with similar projects or with organizations having similar aims should be established whenever possible in a given country or region. Such collaboration and cooperation will permit faster dissemination of information about the family food production system and facilitate its wider acceptance in a shorter time.

The demonstration projects should be relatively long term, 5 to 10 years, with initial management by volunteer personnel for overlapping two year assignments. Subsequent management by local personnel trained in the methods should be planned for and implemented by project funding.

The evaluation process indicated in the proposal is a very positive part of the project and should consist of both ongoing internal review by project personnel and final external evaluation by a suitably qualified contractor.

SPECIAL REPORT FROM THE PRACTITIONERS

Richard Joos and Raymond Chavez

Under the note that we should look before we leap, for as we sow, so shall we reap, there are several remarks.

As practitioners, we are using the French Intensive/Biodynamic Approach to horticulture and agriculture. Although the name may raise some difficulties, it is our acknowledged label and we recognize a responsibility to maintain the integrity of the principles of this approach.

Our collective interest is in service. Even though these methods, because they are working in the field now, seem to be an applicable approach to the problem formulated in the L.I.F.E. proposal, we must reiterate that this is a holistic approach and much more than a method of food production. As Robert Luse pointed out earlier, when soil fertility is first, productivity is the natural result.

> There is one rule in the garden that is above all others: You must give to nature more than you take. Obey it and the Earth will provide you in glorious abundance.

This is a holistic approach and at the same time we welcome scientific documentation to assist in an even more efficient development of the techniques and their communication.

Training of people who can productively practice this approach and teach it is critical. We do not want to "market" this and prefer a small number of regional centers with well-trained people (minimum of one year's training) with long-term backup and commitments.

We sincerely thank you for the opportunity to participate here. It has been helpful to us and we hope that we have been able to indicate some of the essential aspects of the French Intensive/Biodynamic Approach. We particularly want to emphasize that the value in this approach is in the doing, not in the talking. The last line in Candide is an important note not to end on but to begin with:

> All of what has happened and what we have said was very interesting. But the critical point is that we must cultivate our garden.

Recommendations

1. A steering and evaluation committee be formed to assist L.I.F.E. in the implementation in all phases of the proposed program. We suggest this committee should represent the practitioners, the American Society of Agronomy, and the PVOs.

2. The successful implementation of the L.I.F.E. proposal is dependent on the balanced guidance of the various interests represented at this workshop, which we feel would be fairly represented by the previously mentioned committee.

3. Quality and integrity should be maintained in the training of those who will be representing and practicing this approach. We feel the formation of this committee will be of assistance in doing this as well as making
   --the most appropriate selection of the cultural/geographical location of the centers that are to serve as demonstration training and data collection centers
   and
   --the best possible technical exchange between the practitioners and the scientific community. Most particularly
   --assisting in developing the efficiency of existing practices and documentation
   and
   --expanding the range of geographic adaptability (particularly in tropical areas) and researching the applicability of certain of the existing technical approaches of the French Intensive/ Biodynamic Method that may be of great assistance, given existing limitations of current practices.

We realize the significance of this gathering and reaffirm our commitment to serving the undernourished peoples of the world and to responsible stewardship of the Earth. We express our appreciation to all who made this meeting possible.

SPECIAL REPORT FROM HUGH L. POPENOE AND THE A.S.A./L.I.F.E. COMMITTEE

Editor's Note: At the close of the workshop, the L.I.F.E. Liaison Committee of the American Society of Agronomy met and issued a statement to the participants. Subsequently the Committee reported to the A.S.A. Executive Committee in Houston, Texas, recommending that an official position be taken. The following commentary and recommendations summarize these actions.

In the opinion of this Committee, there exists in the plant and soil sciences a traditional body of knowledge directly applicable to the food production needs of disadvantaged families of the world.

We commend L.I.F.E. for its efforts in seeking sources to increase production of food by the family units of developing nations. The American Society of Agronomy policy is not to endorse specific projects. However, we firmly believe professional input from the plant and soil sciences disciplines could contribute to the transfer of small garden technology developed in temperate climates to tropical regions.

It is appropriate that members of the scientific disciplines become involved in these efforts. We strongly recommend that L.I.F.E. utilize this scientific expertise in the development and execution of the family food production project. Furthermore, the A.S.A. needs a deeper involvement in the development and application of technology which could be applied directly to the problems of low-resource agriculture. We recommend that steps be taken to encourage more involvement by A.S.A. members in these problems.

A993 A.S.A./L.I.F.E. Committee Recommendation (December 2, 1976)

1. The members present reaffirmed support for the resolution forwarded to the A.S.A. Executive Committee on November 19, 1976 by Hugh Popenoe.

2. It is further recommended that the A.S.A./L.I.F.E. Committee be available to directly and indirectly assist L.I.F.E. in any proposal development which may lead to a funded program for the assistance of small-unit food production enterprises.

   a. Direct assistance would presumably come through the activities of present committee members.

   b. Indirect assistance would be made available through other A.S.A. members called upon to assist this group.

3. Several steps should be taken to further appropriate interactions between the A.S.A. membership and L.I.F.E. Recommended actions include:

a. A story in Agronomy News on proposed L.I.F.E. actions in support of small-unit food production in the underdeveloped world.

b. A questionnaire to the A.S.A. membership requesting that persons interested in giving specific assistance to L.I.F.E. identify their degree of interest and availability. A special effort would be made to obtain the services of retired agronomists. The questionnaire would be developed with input from the L.I.F.E. organization.

4. It is anticipated that two or three meetings of the A.S.A./L.I.F.E. Committee will be required during 1977 if the programs of L.I.F.E. develop as anticipated.

APPENDICES

LEAGUE FOR INTERNATIONAL FOOD EDUCATION

1126 Sixteenth Street, N.W., Rm. 404
Washington, D. C. 20036 U.S.A.

Area Code 202
Telephone 331-1658

CONFERENCE FEEDBACK SHEET
Santa Barbara, California
October 24-27, 1976

General

An important part of the L.I.F.E. workshop on small scale intensive food production is information exchange The feedback you provide as a conference presenter, a grouo discussant, or an individual participant will enable us to assess the sum of our efforts and to determine the value of intensive gardening as a significant alternative for improving the nutrition of the most economically disadvantaged families. Your responses to the following questions and your reaction to the L.I.F.E. proposal on family food production, therefore, will be greatly appreciated. Kindly complete this Conference Feedback Sheet and return it to T.A. MacCalla, Room 41, before leaving the conference on Wednesday, October 27, 1976. THANK YOU.

Identification (Please check)

Voluntary Agency Representative ____ Agricultural Scientist _____
Intensive Food Production Practitioner _____ Student Observer _____

Other _____ (Please specify)

Grouo Assignment (Please check)

Participated in Group Session A _____, B _____, or C _____

QUESTIONS	RESPONSES (Please check)		
	Excellent	Good	Fair
1. What is your overall estimate of the conference?	_____	_____	_____
2. How informative for you were the following sessions:	Great Value	Sufficient Value	Limited Value
Conference Orientation (Roberts)	_____	_____	_____
The Problem (Hill)	_____	_____	_____
An Aporoach to a Solution (Joos)	_____	_____	_____
Essence of the Method (Kaffka)	_____	_____	_____
Some Results of the Method (Jeavons)	_____	_____	_____
The Techniques (Chavez)	_____	_____	_____
Site Visit (Mesa Garden Project)	_____	_____	_____
Evening Discussion Session	_____	_____	_____
Home Gardening as a Nutrition Intervention (Yang)	_____	_____	_____

Conference Feedback Sheet
Continued - page 2

	Great Value	Sufficient Value	Limited Value
Direct Relief Foundation's Development Assistance Program (Gibbens and Karzag)	_____	_____	_____
Working Group Sessions	_____	_____	_____
Summary Session	_____	_____	_____

3. Was the purpose of the conference and the problem clearly defined? Yes _____ No_____

4. Were your conference expectations met? Yes _____ No _____

5. Was the information presented a) too general _____ b) too specific _____ or c) adequate _____

6. How do you assess the intensive gardening system? _____

7. What is your opinion of the applicability or transportability of the system to Third World environments? _____

(For additional space use the reverse side of this sheet)

8. What is your estimate of the L.I.F.E. Family Food Production Proposal?

9. Apart from the group session recommendations, what specific suggestions would you offer concerning Phases 2-5 of the Proposal? _____

10. What questions remain unanswered about intensive food production technology? _____

11. What research should be conducted to answer those questions? _____

12. Do you plan or desire to become involved in an evaluation of small scale intensive food production in developing countries? Yes _____ No _____
(Briefly Explain)

International Institute for Urban and Human Development

2423 MORENA BOULEVARD · SAN DIEGO, CA 92112 · (714) 275-2820

EVALUATION SUMMARY OF CONFERENCE FEEDBACK SHEET

Santa Barbara, California
October 24 - 27, 1976

General

The following evaluation report on the L.I.F.E. sponsored conference on small scale intensive food production is divided into two parts. The first section is a profile of participant reactions to the three-day program as reported on the Conference Feedback Sheet. A total of 38 out of 45 participants receiving survey sheets voluntarily responded to the assessment instrument. A total of 6 of these were mailed to the Institute after the conference, which indicated a high degree of commitment to the meeting. The kinds of participants responding were evenly distributed between Voluntary Agency Representatives (12), Agricultural Scientists (7), Intensive Food Production Practitioners (8) and Other (8), with 3 student observers completing the form.

Two thirds (2/3) of the participants rated the conference as "excellent", while the rest thought it was good. An overwhelming number indicated that the purpose of the conference and the problems were clearly defined and that the information presented throughout the conference was adequate.

All of the conference sessions were judged by the participants to be of sufficient or great value. (See Appendix for Frequency Tally Summary).

The second section of this evaluation summary deals with a compilation of responses to questions 6 through 12, interspersed with a frequency summary of consensus comments. Singular comments of note are also reported not as counterweights but as extensions of participant views.

Question 6: How do you assess the intensive gardening system?
The French Intensive/Biodynamic Gardening system was considered to have great potential and to be applicable to third world countries. A summary sampling of frequency tally comments is as follows:

1) Quite suitable to a wide range of situations, people and climates
2) Most of these practices have been used in Asian countries for a long, long time
3) Stands on its own at this time without adulteration by other horticultural forms, and it should be practiced on that basis

4) Good system, tremendous potential for use in underdeveloped rural areas, with modifications
5) Potentials are unlimited provided that it is adapted to meet diverse environmental, cultural and economic situations
6) The methodology is excellent, but one weakness is the long training period required to get participants past the dogma stage to an understanding of principles
7) The only known viable system of helping the poor in less developed areas
8) Extremely useful for small-scale farming, especially for those economically hard pressed to adequately feed themselves
9) A method which could be more relevant, particularly in providing nutritious plant growth and employment potential where the existing idle man-power could be beneficially utilized
10) It is an excellent system to re-introduce to the world

The overall attitude of the participants can be summarized with the following two comments:

1. Stripped of mystical sensitivities, moral values, and commitment to certain life styles, the system has great practical value and likely potential for subsistance farmers in many areas.
2. If the world's poorest farmers had access to bags of fertilizer, it might be worth debating whether that approach or intensive gardening was better. Since they do not have such inputs, the method has very obvious and irrefutable value.

Question 7: What is your opinion of the applicability or transportability of the system to third world environments?

Most of the participants were in agreement that the intensive gardening system was applicable and transportable to third world environments. Members of the host country should be involved in all aspects of the system and the practitioners should be aware of cultural sensitivities. Comments included:

1) Application is unlimited if we are applying a system of training using horticulture as a basis for sensitizing field staff to integration of field crops and animals to the social and environmental realities of the site
2) Problems in traditional societies where gardening techniques are very different or in tropical zones where the system is not yet proved
3) Adaptation should be made to fit local situations
4) Transferability depends not nearly so strongly on its technical characteristics as it does on the technical expertise, cross-cultural skills, sensitivity and motivation of the practitioner, and also the level of project support
5) Great possibilities, but would have to be tested involving indigenous people, and incorporating their values and needs, their choice of crops, and use of available inputs

6) Training should be done in the region where it is to develop, leading to more local solution orientation and less western-based dependence.
7) With proper cultural sensitivity, the system could adapt to third world environments with sociological restrictions considered
8) Transferability is not dependent on technical systems but on the personnel and the system through which the information is distributed
9) System should not be sold as a religion based on "organic gardening", which is too narrow a formulation
10) Transferability will depend on climate, ecology, and cultural factors

Question 8: What is your estimate of the L.I.F.E. Family Food Production Proposal?

Conference participants indicated that the L.I.F.E. Family Food Production Proposal showed promise and had much potential. Committee groups gave recommendations concerning possible revisions in the proposal. Comments included:

1) It is a "supplemental" food production program effort, it should consider other alternatives and not limit itself to the French Intensive Biodynamic method
2) It seemed far too expensive with such an effort and budget to train only 18 - 24 people. Also, the volunteers are generally of short service duration--only 2 years in the field.
3) The proposal lacks a discussion on project organization
4) Critical areas include recruitment of participants and curriculum of training program
5) Considerably more clarification is needed regarding the training done by the centers (content and duration) and the preliminary planning and final evaluation of demonstration gardening projects
6) Needs to be sharpened in terms of the basic services, an understanding of what is intended to result from the efforts

Question 9: Apart from the group session recommendations, what specific suggestions would you offer concerning Phases 2 - 5 of the Proposal?

Participants felt that the group sessions successfully handled the recommendations of Phases 2 - 5 of the Proposal. Certain individual comments were:

1) My own concern is to teach intensive urban farming to young children; this awareness/skill must begin early (5 - 12 years old)
2) Phase 3 and 4 should be accelerated and not held to wait for Phase 2 to be completed
3) Suggest a 5 month training period and 1 year practice in the field; if committed and interested, 5 months of additional training and 2 more years in the field

4) A training center on intensive food production technology using all available resources should be established, and the sponsorship, or close cooperation, with faculty of agriculture of a reputable university would be desirable
5) Phase 2 is an expensive proposition and may utilize people who lack complete understanding of culture and customs of respective countries
6) People should be selected on the basis of experience and demonstrated commitment. Initial 15 - 20 people should be selected from three continents (Latin America, Africa and Asia) on basis of their ability to reconvene occasionally for group feedback
7) A 9-month training period is not sufficient if success is expected
8) Formation of an Advisory Board for assistance in further development of grant proposal, training curriculum, etc.
9) For future application, program needs to eventually be accepted by and become part of operations of food production and nutritional programs of host countries
10) The education-training must be thorough, rigorous, and it must integrate all phases of gardening, nutrition, food preparation and storage
11) Other individuals, not the trainees, should be involved in data collection and analysis because this impairs their effectiveness in developing a garden and working with people
12) More communication among those agencies having garden projects in the third world, and relations should be established among international research centers

Question 10: What questions remain unanswered about intensive food production technology?

Questions about intensive food production technology included:

1) How seriously can we affect grass-roots culture?
2) Will we ever offset multinational corporations?
3) What is the range of climates and soils that the system needs?
4) Can the system actually "close the circle," that is, become self-sufficient without outside inputs?
5) What are the results of the system in tropical and sub-tropical soils?
6) What is the nutritional value of the production?
7) What about storage in tropical areas?
8) What kinds of food can be grown?
9) What is the initial source of organic matter?
10) What is the extent of it's geographical application and the best order of introduction?
11) Is it productive of grains and grain legumes?
12) How can it be environmentally more efficient?
13) Is large square footage necessary?
14) How can the system be best introduced into poor areas of developing countries?

15) How do you convince the non-practitioner that now is the time to start the field sites?
16) What about project management and training?
17) What is the systems applicability in different environments and cultural settings?
18) How is the whole process of the relationship between man, soil, societal values, production, etc., involved within the system?

Question 11: What research should be conducted to answer those questions?

Suggestions of research needed to answer questions:

1) Pilot projects in selected developing countries
2) Identify specific needs in specific countries with specific socio-cultural belief systems
3) Scientific principles need to be determined and articulated with alternative methods and techniques
4) Careful followup with volunteers to gain from their practical experience in the field
5) Well-supported empirical field trials
6) Test the entire system in the rural sector of the third world to determine its feasibility and applicability
7) Study data presently available
8) More research, a-la-John Jeavons
9) Test centers should be established in various climates and soils
10) Testing is needed with sustainable organic matter amounts, minimal and excessive water conditions, and minimal fertilizer amounts
11) Strategy formulation in partnership with management experts from the host country is needed in order to spread acceptance of successful pilot projects over a wide area

Question 12: Do you plan or desire to become involved in an evaluation of small scale intensive food production in developing countries?

Almost all participants indicated that they plan to become involved in some way with an evaluation of small scale intensive food production in developing countries. Methods of their involvement included:

1) Writing and publishing on the subject
2) As an active practitioner and by doing research on this problem at the university
3) Report to the Rockefeller Foundation
4) By continuing to communicate with individuals using the system
5) Through continued work at the International Center for Tropical Agriculture in Columbia
6) As a professional agronomist I will continue to support these efforts
7) From my involvement as a volunteer
8) Will continue work as a soil scientist with membership in several agricultural societies

APPENDIX

FREQUENCY TALLY ON CLOSED-END CONFERENCE FEEDBACK SHEET

N = 38

I. Identification: Voluntary Agency Rep. - 12; Agricultural Scientist - 7; Intensive Food Production Practitioner - 8; Student Observer - 3; Other - 8

II. Group Assignment: Group Session A - 10; B - 11; C - 10

III. Questions:

Questions	Responses		
1. What is your overall estimate of the conference?	Excellent 19	Good 13	Fair -
2. How informative for you were the following sessions:	Great Value	Sufficient Value	Limited Value
Conference Orientation (Roberts)	11	21	-
The Problem (Hill)	20	6	3
An Approach to a Solution (Joos)	9	24	1
Essence of the Method (Kaffka)	17	18	1
Some Results of the Method (Jeavons)	18	17	1
The Techniques (Chavez)	12	19	6
Site Visit (Mesa Garden Project)	17	13	4
Evening Discussion Session	30	4	3
Home Gardening as Nutrition Intervention (Yang)	23	10	-
Direct Relief Foundation's Development Assist. Prog. (Gibbens and Karzag)	12	15	8
Working Group Sessions	22	8	1
Summary Session	13	5	-
3. Was the purpose of the conference and the problem clearly defined?	Yes 31	No 6	
4. Were your conference expectations met?	30	4	

5. Was the information presented a) too general - 7; b) too specific - none; c) adequate - 27

12. Do you plan or desire to become involved in an evaluation of small scale intensive food production in developing countries? Yes - 33; No - 3; No Response - 2

LIST OF PARTICIPANTS

Wilson S. Adams
Planning Administrator
Project Concern
Post Office Box 81123
San Diego, California 92138

Jeffrey Ashe
Associate Director
Accion/AITEC
10-C Mt Auburn Street
Cambridge, Massachusetts 02138

Joseph Cain, Ph.D
Director Relief Foundation
Post Office Box 1319
Santa Barbara, California 93101

Raymon Chavez
The Institute for Man and
Nature
Covelo, California 94528

Wilbur S. Claus
League for International
Food Education
2706 West Appalachian Court
Westlake, California 91360

Dan Crebbin
The Institute for Man and
Nature
Covelo, California 94528

Frank Dobyns
Executive Director
Arca Foundation
100 East 85th Street
New York, New York 10028

Donald C. Engstrand
Route #1
Dawson, Minnesota 56232

Henry Esbenshade
University of California-Davis
Davis, California 95616

Mark Feedman
Federacion Desarollo
Juvenil Comunitario
Edificio "La Urbana"
Post Office Box 688
Tegucigalpa DC, Honduras

James Ford
VITA
3706 Rhode Island Avenue
Mt. Rainer, Maryland 20822

Tom Fricke
Farralones Institute
1516 Fifth Street
Berkeley, California 94710

Janice Gallagher
c/o Cuadrado
Volunteer Mission
Post Office Box 5113
Guayaquil, Ecuador

Stephen Gibbens
Direct Relief Foundation
Post Office Box 1319
Santa Barbara, California 93101

Joan Gussow
Chairperson, Program in Nutrition
Teachers College
Columbia University
New York, New York 10027

Dale D. Harpstead, Ph.D
Chairman
Department of Crop and Soil
Science
Michigan State University
East Lansing, Michigan 48824

Richard Harwood, Ph.D.
Associate Professor
Loma Linda University
4601 Pierce Street
Riverside, California 92505

Stuart Hill, Ph.D.
Major Professor of Zoology
McGill University
(MacDonald College)
Post Office Box 86
Quebec, Canada HOA 1CO

Bernard P. Hosie, Ph.D.
Director of Operations
The Foundation for the
Peoples of the South Pacific
721 Georgina Avenue
Santa Monica, California 90402

John C. Jeavons
Director of Agricultural Research
Ecology Action of the Midpeninsula
2225 El Camino Real
Palo Alto, California 94306

Arthur Jokela
Agricultural Missions, Inc. and
California State Polytechnic
University-Pomona
Pomona, California 91768

Richard Joos
Executive Director
The Institute for Man
and Nature
Covelo. California 95428

Steven Kaffka
Garden Project
University of California-
Santa Cruz
Santa Cruz, California

Dennis G. Karzag
Executive Secretarv
Director Relief Foundation
Post Office Box 1319
Santa Barbara, California 93101

Frank Koch
Public Affairs
Vice President
Syntex Corporation
3401 Hillview Avenue
Palo Alto, California 94304

Robin Leler
Ecology Action of the
Midpeninsula
2225 El Camino Real
Palo Alto, California 94306

Lawrence Lesh
Peace Corps/ACTION
1333 Westwood Boulevard
Los Angeles, California 90024

Philip Leavenworth
Save the Children Federation
48 Wilton Road
Westport, Connecticut 06880

Chela Lightchild
Federacion Desarollo
Juvenil Comunitario
Edificio "La Urbana"
Post Office Box 688
Tegucigalpa DC, Honduras

Robert A. Luse, Ph.D.
Biochemist
International Institute of
Tropical Agriculture (IITA)
Oyo Road
P M B 5320
Ibadan, Nigeria

Rufi Macagba, M.D.
Associate Director
Health Care Delivery Systems
World Vision International
919 West Huntington Drive
Monrovia, California 91016

Thomas A. MacCalla, Ed.D.
Executive Director
International Institute for
Urban and Human Development
2423 Morena Boulevard
San Diego, California 92110

Michael McFadden
Asia Program Director
Meals for Millions Foundation
1800 Olympic Boulevard
Santa Monica, California 90406

Terence Mulkerin
Catholic Relief Services
1011 First Avenue
New York, New York 10022

William Murphy
Professor of Agronomy
University of Missouri
Mumford Hall
Columbia, Missouri 65201

Warren Pierce
Community Environmental Council
109 E. de la Guerra Street
Santa Barbara, California 93101

Hugh L. Popenoe, Ph.D.
Director
Center for Tropical Agriculture
University of Florida
2001 McCarty Hall
Gainesville, Florida 32611

Paul Relis
Direct Relief Foundation; and
Director Community Environmental
Council
109 East de la Guerra Street
Santa Barbara, California 93101

Hugh J. Roberts, Ph.D.
Executive Director
League for International
Food Education
1126 Sixteenth Street, N.W.
Room 404
Washington, D.C. 20036

Milton Salomon
Professor
Department of Food Science
and Technology
University of Rhode Island
Kingston, Rhode Island 02881

William C. Senn
Vice President
Department of International
Development
MAP International
Post Office Box 50
Wheaton, Illinois 60287

Dao Spencer
Assistant Executive Director
American Council of Voluntary
Agencies for Foreign Service, Inc.
200 Park Avenue South
New York, New York 10003

Dick Stanley
Arusha Appropriate Technology
Project
17A Escondido Village
Stanford, California 94305
(After Jan. 1, 1977:
P.O. Box 764/Arusha, Tanzania)

Edwin W. Thomas
Program and Planning Officer
Direct Relief Foundation
Post Office Box 1319
Santa Barbara, California 93101

D. Keith Whigham
INTSOY Agronomist
University of Illinois
Urbana, Illinois 61801

Pearl Yang
500 University Avenue, Apt. 918
Honolulu, Hawaii 96814

Y.H. Yang
Research Associate
The Food Institute
East-West Center
1777 East-West Road
Honolulu, Hawaii 96814

Students of Direct Relief Foundations Intensive Garden Farming Course: Sylvia Blanchet, Jamie Kerr, Tom Koehler, M. Martin, Mac McBee, Lesley Miles, Greg Rydquist, Monica Rydquist, David Sang, David Small, and Carol Turinski

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Food and Agriculture

Introducing an issue about the world food problem. The situation is hopeful, with one proviso: that the development efforts of agrarian countries be concentrated less on industry and more on agriculture

by Sterling Wortman

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Thus there are two components to the solution of the food problem: increased production of food, primarily in the developing countries, and widespread increases in family incomes, particularly among the poor. The higher incomes will have to come primarily from the increased productivity and profitability of agriculture, from the development of industry (primarily labor-intensive industries and particularly in the rural areas where most people live), from employment in construction and public works and from the generation of the diverse services that will be in demand as rural areas become more prosperous.

The bulk of the food supply of most agrarian countries is produced by individual farmers with tiny family-operated holdings. Improvement of the productivity and income of these people will require the introduction of new high-yielding, science-based crop and animal production systems tailored to the unique combination of soil, climate, biological and economic conditions of individual localities in every nation [see "Agricultural Systems," by Robert S. Loomis, page 98]. Needed now are concerted campaigns to move into the countryside not only with knowledge of new techniques and new varieties of crops and animals but also with roads and power systems, with inputs such as fertilizers, pesticides and vaccines for animal diseases and with arrangements for credit and for marketing agricultural products.

All of this is aimed at generating the main ingredient for rural development: increased income for large numbers of farm families. Until their purchasing power is increased through on-farm or off-farm employment there can be no solution to the world food problem. Extending science-based, market-oriented production systems to the rural masses can enable the developing countries to substantially expand their domestic markets for urban industry. As farm families attain larger disposable incomes through increased agricultural profits they can become buyers of goods and services, providing more jobs and higher incomes not only on farms but also in rural trading centers and in the cities. What I am suggesting, in other words, is that the improvement of agricultural productivity is the best route to economic advancement for the agrarian developing countries.

Let me mention three nonsolutions to the problems of food and hunger that are often proposed. Larger harvests in the few remaining surplus-production countries, notably the U.S., Canada and Australia, are not a solution. Those countries do need to improve their productivity to create surpluses for export, to maintain their balance of payments and to respond when necessary to emergency needs for food caused by calamities anywhere in the world. To continue to allocate free or low-cost food to governments that neglect their own rural areas, however, is counterproductive. It simply allows governments to put off the tedious and unglamorous task of helping their own people to help themselves.

The introduction into developing countries of Western-style, large-scale mechanized farming is also not a solution. Such methods may be appropriate for thinly populated areas in some countries and may help governments to get food supplies under national control quickly, but there remains the problem of getting food from large farms even to nearby individual families that have no money to pay for it. Even if the product of such farms were destined solely for urban consumers, it would deprive the smaller farmers of such markets for their own produce. Perhaps more important, most large-scale mechanized agriculture is less productive per unit area than small-scale farming can be. The farmer on a small holding can engage in intensive, high-yield "gardening" systems such as intercropping (planting more than one crop in the same field, perhaps in alternate rows), multiple cropping (planting several crops in succession, up to four a year in some places), relay planting (sowing a second crop between the rows of an earlier, maturing crop) or other techniques that require attention to individual plants. The point is that mechanized agriculture is very productive in terms of output per man-year, but it is not as productive per unit of land as the highly intensive systems are. And it is arable land that is scarce for most farmers in many countries.

Finally, the advent of synthetic foods, single-cell proteins and so on will not be a solution. These products may prove to be valuable additives, but they have to be bought before they can be eaten. The hungry have no money, and the manufacture of novel foods does not provide any increase in income for the poor. The only real solution to the world food problem is for poor countries to quickly increase the production of crops and animals—and incomes—on millions of small farms, thus stimulating economic activity.

LEAGUE FOR INTERNATIONAL FOOD EDUCATION

1126 Sixteenth Street, N.W., Rm. 404
Washington, D. C. 20036 U.S.A.

Area Code 202
Telephone 331-1658

FAMILY FOOD PRODUCTION

A Proposal Prepared
by
League for International Food Education

Hugh J. Roberts, Ph.D.
Executive Director

August 16, 1976

DRAFT COPY - FOR REVIEW ONLY

LOGICAL FRAMEWORK

Project Title: Family Food Production and Utilization

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Program Goal: To provide the means and the motivation whereby rural poor in LDC's can and will improve their nutritional status by producing and consuming the necessary food.	**Measures of Goal Achievement:** Improved nutritional status of target population. Food produced and consumed by target population.	Food production and nutrition surveys	**Assumptions for Achieving Goal:** Much of the existing malnutrition among the rural poor in LDC's can be reduced by increased consumption of appropriate family-produced food
Project Purpose: To test four hypotheses: a. There is a body of technology that is labor intensive, requires little or no cash input, is sparing of water, and can yield an adequate diet for a family of six on less than ¼ hectare of land; b. That body of technology is transferable to rural areas in LDC's; c. Given that technology, families at the subsistence or survival level will adopt it; d. Adoption of the technology will increase the food consumption of the family	**End of Project Status:** Hypotheses tested using as indicators: a. Consensus of qualified agricultural scientists and voluntary agency field personnel b. Successful demonstration plots developed by trained voluntary agency personnel c. Utilization of the technology by LDC subsistance/survival families d. Increased consumption by families of self-produced food	Proceedings of workshop and review of project documentation	**Assumptions for Achieving Purpose:** Cooperation of American Society of Agronomy, PVO's, and practitioners of biodynamic intensive gardening will be obtained
Outputs: a. Workshop proceedings, both written and videotaped b. Motion picture film based on the workshop and explaining the project (to be used to support proposal for funding phases 2-5) c. World survey of non-commercial food production projects d. Trained voluntary agency personnel able to demonstrate the technology e. Strengthened centers of training in intensive biodynamic gardening g. Evaluation of impact of project on local food production/consumption patterns	**Magnitude of Outputs:** a. 200 copies of written proceedings; master videotape with five copies b. Two prints c. Ten copies of final report. d. Ten copies of final report e. 5 centers f. 15-20 demonstration sites g. Ten copies of final report	Review of Project documentation	**As related to Outputs:** a. Use of visual recording will have no effect on course of workshop b. The expertise of the membership of the American Society of Agronomy can be tapped to conduct the survey c. Sufficient PVO projects will be available in a wide variety of locations
Inputs: a. Workshop Funding ($35,000) b. Survey Funding (est. $100, 000) c. Funding for training centers (est. $250,000) d. Cost of training (est. $60,000) e. PVO personnel, 18-24 @ two years each f. Cost of evaluation (est. $50,000)	**Implementation Target:** October, 1976 June, 1977- Dec. 1978 June, 1977 Sept. 1977-June 1978 Sept. 1977-Sept. 1979 June 1979-Dec. 1980	Review of project documentation	**As related to Inputs:** Funding will be available for the entire project.

FAMILY FOOD PRODUCTION

I. INTRODUCTION

How much land does a family need to provide an adequate diet for themselves? Obviously the answer will be determined by a number of variables; principally the number of people in the family, the fertility of the soil, the climate, and the availability of inputs. In general, however, it is agreed that in the developing nations of the tropics and sub-tropics the rule-of-thumb is that the subsistence farmer needs at least one hectare (2½ acres) to feed his family.

If the land available to the family is from 2 to 5 hectares, it is considered to be a small farm; and it may become the target for one of the growing number of rural development projects aimed at linking the small farmer to a market economy. But strategies for assisting the subsistence farmer are much more difficult to devise, and the case of the landless laborer seems almost hopeless. Furthermore, to obtain an adequate diet from one hectare of land a family must have access to seeds, fertilizers, and plenty of water. Unfortunately these inputs are seldom available. As a result, the subsistence farmer is frequently a survival farmer.

Now, imagine a technology that is labor intensive, requires no capital investment or purchased inputs other than a few simple hand tools, is adaptable to areas where water supply is limited, and requires only one-tenth of a hectare to provide adequate nutrition for a family. What would such a technology mean? It would suddenly make every subsistence farmer a potential cash farmer, and enable the landless laborer to provide the family's food from a backyard or kitchen garden plot.

There is evidence to suggest that such a technology can be developed. In fact, the initial development has already reached the point at which it is ready for a critical evaluation of its technical soundness and its applicability as a means for reducing malnutrition among the rural poor. The urgent needs of the rural poor and the lack of strategies for helping them to help themselves demand that such an evaluation be made. This proposal responds to that demand.

II. HISTORICAL BACKGROUND

A. Technology

A definitive history of family food production technology has yet to be written. The best that can be done at this point in time is to identify a few of the threads that must be woven into the historical tapestry. The origins of the technology are obscured by the thousands of years that have passed since the ancient Chinese and Greeks first practiced it. It was undoubtedly used in the Hanging Gardens of Babylon. In seventeenth century Europe a major development in intensive gardening occurred. A craft guild of mini-farmers was formed near Paris, and they further modified the technology to produce an abundance of high quality vegetables and melons for the city residents. Characteristic of the French technology were the unusual depths to which the planting beds were prepared (18 inches), the use of enormous volumes of manure from the

horses of Paris, and high density planting. In the 1920s Rudolf Steiner added to the technology by demonstrating the value of compost and companion planting (interplanting various species selected for their positive effects such as enhanced growth and insect control), and reviving the ancient practice of planting in raised beds. In the mid-1960s following many years of study in Europe, Alan Chadwick, an English horticulturist, brought Steiner's "bio-dynamic" techniques, the French intensive methods, and the best of British horticulture to the U.S. On a poor clay hillside on the campus of the University of California-Santa Cruz he and his students combined them into a new technology (and philosophy) of food production. Chadwick, now at the Round Valley Institute for Man and Nature at Covelo in Northern California, continues to teach the technology while the work at Santa Cruz is directed by a former Chadwick apprentice, Steven Kaffka. In 1972 with guidance from Chadwick and Kaffka a research and education project was initiated in Palo Alto, California by Ecology Action of the Mid-Peninsula. Under the direction of John Jeavons, the project aims at determining how much land is required to adequately nourish a person. In Santa Barbara, California, the Community Environmental Council has established a training facility in intensive/biodynamic gardening based on experience with several community garden projects between 1970 and 1975. Direct Relief Foundation, a private voluntary organization, has recently utilized the facilities of Community Environmental Council to train several volunteers who have explored transferring the technology to the developing world.

B. Applicability to Nutrition

The production of food on small plots of land is a well-known nutrition intervention strategy. From the days when the only international technical assistance was provided by missionaries, people have been urged to plant home gardens, kitchen gardens, backyard gardens, school gardens, community gardens, and (in wartime) victory gardens. In this proposal such activities are termed "family food production" to emphasize the distinction between the production of food for auto-consumption and the production of food for the marketplace.

In the mid-1950s in discussions among several UN agencies and national personnel the idea evolved of combining (1) efforts to show rural communities how to grow and use the foods needed to improve their diets, (2) nutrition education, and (3) supplemental feeding programs. By 1958 five such Applied Nutrition Programs were underway (in Tunisia, Philippines, Chile, Guatemala and Mexico) with UN assistance. As the Applied Nutrition Programs spread to other countries, the private voluntary agencies already engaged in school feeding activities (CARE, CRS, and others) frequently extended their assistance to school gardens. Other attempts to improve nutrition through family food production include a World Bank project in Mauritius and the Green Revolution Program of Mrs. Imelda Marcos in the Philippines. In spite of considerable experience, however, the question of whether family food production is an effective means for improving nutritional status has yet to be answered.

II. DESCRIPTION OF THE PROJECT

The League for International Food Education (L.I.F.E.) proposes a five-phase, four-year project to establish whether, utilizing a recently developed body of agronomic technology based on intensive biodynamic gardening, family food production is an effective strategy for reducing malnutrition among the rural poor. (Note: Although the same technology could be helpful to the urban poor, frequently not even garden-sized plots of land are available in their communities.)

A. Objectives

The ultimate objective of the project is the improvement of the nutritional status of the poorest families in rural areas of developing countries. A strategy for accomplishing that objective can be built upon the following set of hypotheses:

1. there exists a body of food production technology that is labor intensive, requires little or no cash input, is sparing of water, and can enable a family to fulfill its own nutritional requirements on a garden-sized plot of land (less than ¼ hectare for a family of six);

2. such technology is readily transferable to the rural poor in developing countries;

3. provided with such technology, poor rural families will utilize it to increase their food consumption; and

4. as a result of such utilization the family's nutritional status, and thereby its well-being, will be improved.

The immediate objective of the project is to test the validity of that set of hypotheses.

The project has several indirect or hidden objectives which provide an added rationale for its implementation. One of those indirect objectives is to increase the voluntary participation of members of the American Society of Agronomy (one of the members of the L.I.F.E. consortium) in international development assistance activities. Another is to increase the interaction between the agricultural science community and the private voluntary agencies involved in development assistance.

It is a basic conviction of L.I.F.E. that the scientific community and the private voluntary agencies engaged in international development assistance have something to gain from each other. The scientists seek an opportunity to donate their expertise in the cause of international assistance; and the agencies need technical input for their projects. One of L.I.F.E.'s objectives is to serve as the broker to effect that mutally beneficial exchange.

Finally, it is doubtful that any food production strategy will ever be implemented on a global scale without the strong backing of the agricultural science community. At the present time an overwhelming majority of that community regard the practitioners of "organic" farming (of which intensive biodynamic gardening is a special case) as impractical idealists or quasi-religious zealots. Unless this view of what could be a scientifically sound, complementary food production system is altered, unless the technology is legitimized in the eyes of a significant group of agricultural scientists, mere demonstration of its validity will not be enough to overcome the resistance to its adoption. By involving agricultural scientists in this project in the first two phases, it is expected that a supportive constituency will be formed among them.

B. An Overview of the Project

The project will be conducted in five interdependent but not necessarily consecutive phases. The first phase will test hypothesis 1 (above). Assuming that the hypothesis proves true, the first phase will also achieve recognition of the validity of the technology among a representative group of U.S. agricultural scientists, and will assess the potential of family food production for improving the nutritional status of the rural poor in developing countries. Those objectives will be accomplished during a three-day workshop involving agricultural scientists, voluntary agency personnel, and practitioners of the technology.

In the second phase worldwide experience with efforts to increase food consumption through non-commercial (family and community) food production systems will be collected and analyzed to identify determinants of success and failure.

The third phase will involve selecting 3-6 centers with experience in and capability for training volunteers in family food production technology, and strengthening their training capabilities.

In the fourth phase 18-24 trainees selected from the field staffs of private voluntary organizations will be trained at the selected centers. Trainees will be expected to return to the field in an assignment that will permit them to demonstrate family food production technology.

In the fifth and final phase each trainee will prepare and manage a demonstration site as part of a normal field assignment. Demonstration sites will be located in widely scattered parts of the rural world, but in each case will be highly visible to a rural community. Evaluations will be made of the success of the plot in terms of food production (transferability of the technology), and the reactions of the community (expressed interest, desire to replicate, requests for assistance, actual replications). Where the technology is adopted, changes in family food consumption and nutritional status will be determined.

C. Detailed Proposal for Phase 1

The League for International Food Education (L.I.F.E.) proposes to organize and implement a 3-day Family Food Production Workshop with the cooperation of the Community Environmental Council in Santa Barbara, California, October 24-27, 1976.

The Council will present the results of its Mesa Garden Project where it has trained a limited number of volunteers for Direct Relief Foundation, and will open the Mesa site to a field visit by workshop participants. Other practitioners of French intensive and biodynamic gardening techniques will describe their technology and results. Members of the American Society of Agronomy and other competent agricultural scientists will evaluate the practitioners' experiences with regard to the scientific basis for the technology and the validity of the results.

Representatives of private voluntary agencies selected for their interest in food and nutrition in international development and for their field experience will assess the potential of such a food production system for improving nutrition among the rural poor. Some of the questions to be raised are:

- What are the potential political and economic constraints, if any, to improving nutritional status through family food production?

- What are the sociocultural considerations within the community?

- What are the sociocultural considerations within the family? Who will produce the food? If it is the woman, how will her workload be affected? Will the food be consumed by the family or used to procure non-food items?

- What is the cost of such an intervention relative to other approaches to improving nutrition; e.g., distribution of supplemental foods?

- How valid is the assumption that in most rural areas families have access to ¼ hectare of land?

The output of the workshop, in addition to achievement of the objectives as described above, will include a recommendation concerning the desirability of continuing with the other four phases of the project either as planned or in a modified form.

The workshop will involve 40-50 persons, and an attempt will be made to include several participants from outside the U.S. in addition to U.S. personnel with experience in developing countries.

D. Proposals for Phases 2-5

Detailed proposals for each of the second through fifth phases will be developed as each phase is presented for funding. All are dependent upon the outcome of the first phase. Phases 3 and 4 are closely related and could be combined for implementation. The output of phase 2 will be needed to reach a sound conclusion in phase 5. In the following, each phase is described in as much detail as is possible at this time.

The second phase constitutes a survey and analysis of non-commercial food production experience in developing countries. It is proposed that the American Society of Agronomy undertake the project with funding from the Office of Nutrition, Technical Assistance Bureau, AID, through L.I.F.E. Some of the experiences to be included in the survey are:

- CARE school gardens
- USAID school garden project in Morocco
- Peace Corps experiences, e.g. Nigeria
- World Bank project in Mauritius
- First Lady's Green Revolution Program in the Philippines
- Rockfeller Foundation ICTA project in Guatemala
- CRS school garden project in Uruguay
- Direct Relief Foundation activity in Ecuador
- Food Production component of UN Applied Nutrition Program

One method of analysis would be to develop a framework within which various projects could be compared, together with criteria for their evaluation. The analysis would identify factors contributing to both the success and failure of the food production projects and, wherever possible, estimate their impact on food consumption. An 18-month duration is anticipated for phase 2, with an estimated budget of $100,000.

Phase 3 involves the identification and strengthening of 3-6 training centers. The following three centers have been visited by the Executive Director of L.I.F.E.; each is already engaged in a limited way in training individuals in intensive biodynamic gardening:

Community Environmental Council
Santa Barbara, California
Director: Paul Relis

Ecology Action of the Mid-Peninsula
Palo Alto, California
Director: John Jeavons

Round Valley Institute for Man and Nature
Covelo, California
Executive Director: Richard Joos

A fourth existing training facility is:

Frank P. Graham Experimental Farm and Training Center
Anson County, North Carolina (Greensboro)
Manager: Charles Dixon
Owned by National Sharecroppers Fund
Executive Director: Jim Pierce

Other potential training sites exist in New England; for example:

Total Environmental Action
Harrisville, New Hampshire
Trainers: Gretchen and Leandre Poisson

New Alchemy Institute
Woods Hole, Massachusetts
Director: Dr. John Todd

An estimate of the cost of phase 3 (5 centers @ $50,000 each) is $250,000.

In phase 4, 18-24 people selected from the field staffs of private voluntary organizations (PVOs) will be trained in family food production technology. It is anticipated that a 9-month training period will be required. Trainees will be selected with a view to a post-training assignment in a specific agency program and will receive a stipend from their agency during the training period. Actual training costs will be borne by this project, and are estimated at $50,000 total.

In the final (5th) phase, 15-20 trained voluntary agency field workers will take up their assignments in as many pre-existing development projects in a wide variety of geographic locations, enabling demonstration sites to be developed over a broad range of climate, soil, and cultural conditions. Each trained worker will develop a site that is highly visible to the community to provide maximum exposure of the technology to the residents. Concurrently an evaluation program will be implemented to measure the impact of the demonstration site on each community and its food consumption patterns. A suitable disinterested contractor will be engaged prior to the completion of the training phase to design the evaluation, ensure that the necessary baseline data are available, and ultimately to conduct the evaluation. A reasonable figure for the cost of phase 5 is $100,000.

IV. PARTICIPATION OF PRIVATE VOLUNTARY OGRANIZATIONS

This proposal has grown out of the desire of L.I.F.E. to increase its collaboration with and support of the private voluntary organizations (PVOs) in development assistance. It also stems from a desire to provide opportunities for increased participation of the members of the L.I.F.E. consortium societies (the American Society of Agronomy in particular) in international development assistance. And it is a response to the discovery that one small PVO, Direct Relief Foundation, had independently arranged for the training of three volunteer workers in intensive biodynamic gardening and had sent them to demonstrate the technology in Ecuador.

The objectives of the project have been discussed with the leaders of a number of PVOs, all of whom expressed a strong interest in participating in an effort to determine the effectiveness of this alternative food production technology for improving nutrition in developing countries. Organizations that have specifically asked to be included in phase 1 of the project are:

Asia Foundation
International Voluntary Services
Meals for Millions
Save the Children Federation/Community Development Foundation
World Vision International

In addition, individuals in the following PVOs have expressed an interest:

CARE
Catholic Relief Services
Church World Service
Volunteers in Technical Assistance (VITA)

There are also a number of PVOs with food production activities that have not yet been approached, but are expected to participate.

The role of L.I.F.E. will be to implement phase 1, and to serve as facilitator and overall project coordinator for the entire project.

LEAGUE FOR INTERNATIONAL FOOD EDUCATION

1126 Sixteenth Street, N.W., Rm. 404
Washington, D. C. 20036 U.S.A.

Area Code 202
Telephone 331-1658

Dr. Hugh J. Roberts, Executive Director

THE FACTS OF L.I.F.E.

L.I.F.E. Begins

"How can I help?" That was the question being asked in the mid-1960s by individual members of several US scientific societies in response to their increasing awareness of world hunger and malnutrition. The US Agency for International Development (AID) responded by identifying a need for better dissemination of technical information on food and nutrition to the developing countries.

To provide a mechanism whereby US professionals might help solve this problem, a unique structure was formed in June 1968: a consortium of scientific and professional organizations comprising the American Association of Cereal Chemists, the American Chemical Society, the American Institute of Nutrition, the American Oil Chemists' Society, the Institute of Food Technologists, and Volunteers for International Technical Assistance (now Volunteers in Technical Assistance). As the League for International Food Education (what better acronym than L.I.F.E.?), the consortium entered into an agreement with AID to provide information and assistance in solving technical problems in nutrition, food technology, and child feeding programs overseas.

Under a two year initiating grant from AID, L.I.F.E. set up a small office in Washington, DC, with Dr. Samuel M. Weisberg as executive director and a staff of two. The first task was to identify members of the consortium societies who were willing to donate their time and talents to responding to requests for technical information. Soon the requests that had been arriving at the AID Office of Nutrition were being assigned by the L.I.F.E. staff to appropriate experts. In September 1968 the first monthly Newsletter was published to provide a further means of disseminating information on food and nutrition to the developing world.

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AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS

L.I.F.E. Today

Now in its eighth year, L.I.F.E. is a consortium of nine scientific and professional organizations with a combined membership of almost 200,000. Naturally not all of these members are in food related fields or have the time to serve as L.I.F.E. volunteer experts. Even so, the 10-15 requests that L.I.F.E. receives each month provide opportunities for only a fraction of those who have expressed an eagerness to help.

Various ways have been sought for increasing the opportunities for member involvement. One of the more successful has been to encourage the formation of committees within the societies to identify major problems to which the societies can make a contribution. The L.I.F.E. liaison committees have a number of significant accomplishments:

- development of a roster of cereal scientists and technologists willing to accept short term overseas consulting assignments without remuneration
- design and implementation of a project to identify ways of increasing the impact of food technology in Latin America on food supply and nutritional status
- preparation of a monograph on the potential contribution of concentrated wheat protein to the world food supply
- design and implementation of a project to demonstrate the potential for converting food wastes in developing countries from pollutants to food or feed sources
- preparation of a proposal to develop a methodology for measuring post-harvest grain losses in the Third World
- establishment of free analytical services to assist field workers in determining the protein quality of indigenous crops.

Another function of L.I.F.E. is the publication of a monthly Newsletter which covers recent developments in nutrition, food production, processing, and distribution, conferences and training opportunities, sources of published information, and projects and programs in developing countries. The Newsletter is sent to 2500 overseas readers as well as to L.I.F.E. experts, Sustaining Associates, and others in the developed world who are working on problems in international development assistance. Opportunities to utilize the unique communication network represented by the mailing list of the L.I.F.E. Newsletter are only beginning to be explored.

The Sustaining Associates, mentioned above, are a group of generous individuals and corporations that make annual contributions to help support the work of L.I.F.E. Their gifts are truly appreciated, and are used primarily as reserve funds. They have amounted to about 5% of L.I.F.E.'s total income. At present most of the operating budget is derived from a contract to provide services to the Office of Nutrition of the Technical Assistance Bureau of the US Agency for International Development. The contract calls for L.I.F.E. to function as a nutrition information clearinghouse, to provide advice and technical services, to identify experts for short or long term nutrition related assignments in less developed countries, and to promote the development of a technical assistance network among the consortium societies, the private voluntary organizations, and the developing world.

Requests to L.I.F.E.

From the student to the major food industrialist, an astonishing variety of people seek help from L.I.F.E. United Nations offices in New York, Rome, and Vienna write frequently, with UNIDO in Vienna transmitting requests on behalf of many nations.

Letters have come from Ministries of Health in nations as scattered as Korea, Argentina, Honduras, and Ghana. The Government of Sikkim and the nutrition commissions of Zambia and Guyana have asked for information.

Voluntary agencies such as CARE, Catholic Relief, Church World Service, International Executive Service Corps, and VITA (one of L.I.F.E.'s consortium societies), relay L.I.F.E.'s advice throughout their own information dissemination systems. As a result individual voluntary service workers begin to write directly to L.I.F.E.

There is correspondence with industrial development boards in Sri Lanka, Nepal, Panama, and Jamaica; with technology information centers in Israel, Denmark, and Burma; with research institutes in the Philippines, Costa Rica, India, Ireland, Pakistan, Ethiopia, and New Zealand. Professors and students write from universities around the world.

Requests from foreign industry make up a large segment of the correspondence. They range from those of major enterprises to one-man prospective ventures.

The nature of the inquiries reveals the many ways in which the world is seeking to utilize its indigenous crops through the application of modern food technology to make more food available and raise the level of nutrition in its communities.

Ingenious methods of fortification are being studied. India asks L.I.F.E. if tea can be fortified with iron, and if pickles and chewing gum would make good carriers of nutrients. A Japanese producer of supplements wants to know of potential markets in South America. The Nepalese government fears its children have become too addicted to western sweets and wants to understand the production of high protein confections.

The potential of sunflower seeds engages research in Colombia, Haiti, Malaysia, and Thailand...work that is speeded by references from L.I.F.E. Mexico asks about the nutritive composition of chaya leaves and the juice of the maguey plant. Ethiopia wants information on the food value of cassava leaves. Many nations are experimenting with the production of bread from combinations of imported wheat and native cereal flours.

There are requests for assistance in building plants for the production of weaning foods in Ceylon and Guyana, for the processing of fishmeal in Bangladesh, and for raising poultry in Turkey. There are questions about toxicity, about the psychological acceptance of new foods, and about strategies for marketing them. Finally, L.I.F.E. helps to locate needed personnel: a private food producer in South Africa finds its new Nutrition Director in India through the help of the L.I.F.E. office in Washington, DC.

Expertise Available from the L.I.F.E. Consortium

Members of the AMERICAN ASSOCIATION OF CEREAL CHEMISTS provide professional assistance and expertise in grain production, storage, transportation and processing; standards, specifications, analysis, quality control and regulatory aspects of cereals and oilseeds; information retrieval and dissemination; training courses; baking technology; product development and marketing; and nutrition.

The AMERICAN CHEMICAL SOCIETY, through its divisions of Agricultural and Food Chemistry and Microbial Chemistry and Technology, offers expertise in the areas of food additives and flavors, meat analogs and extenders, chemical processing of foods, fermentation, and single cell protein. Laboratory analyses of indigenous foods for nutritive value is also available.

The AMERICAN INSTITUTE OF CHEMICAL ENGINEERS provides technical assistance with problems of environmental pollution through its Food, Pharmaceutical and Bioengineering Division and its Environmental Division. Conversion of by-products to food or feed is a major area of expertise.

The AMERICAN INSTITUTE of NUTRITION, of which the American Society for Clinical Nutrition is a division, offers expert advice in all areas of human and animal nutrition.

The AMERICAN OIL CHEMISTS' SOCIETY is a group of scientists who are experts in the production, processing, and chemistry of oils, fats, and waxes, their constituents, and related materials. Its membership, like that of all of the consortium societies, is international; AOCS members reside in some 65 countries.

The AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS responds to the technical needs of engineering in agriculture. Of particular value to L.I.F.E. are its Food Engineering Division, its committees on aquacultural and bioengineering, and its task force on energy in agriculture.

AMERICAN SOCIETY OF AGRONOMY members provide assistance in the areas of crop production, soil management, development of new crop varieties, plant breeding and genetics, weed control, and cultural practices relative to production, harvesting, and processing food crops.

The INSTITUTE OF FOOD TECHNOLOGISTS, with affiliate organizations in Argentina, India, Brazil, Chile, Finland, Israel, New Zealand, Philippines, and Spain, provides expertise in the broad field of food science and technology. Its areas of specialization are represented in the titles of its divisions: carbohydrate, food engineering, food service, microbiology, muscle foods, nutrition, packaging, quality assurance, refrigerated and frozen foods, and sensory evaluation.

VOLUNTEERS IN TECHNICAL ASSISTANCE, a private non-profit organization, is similar to L.I.F.E. in that its objective is to export technical knowledge and expertise, given freely and voluntarily. VITA differs from L.I.F.E. in that it focuses on the problems of rural poverty in general, and specializes in devising new technical solutions or adapting existing technology to highly specific situations.

International Institute for Urban and Human Development

GENERAL INFORMATION

The International Institute for Urban and Human Development (IIUHD) is a non-profit California corporation established for the purpose of advancing the ideal of the interdependence of people and the interrelatedness of knowledge in a culturally pluralistic society. The institute is an outgrowth of the United States International University Center for Urban Development which was established in 1968 to marshal the resources of the academic community, public service agencies, and international development planning organizations to meet the pressing needs of an urbanizing world community.

On July 1, 1975, the International Institute for Urban and Human Development was incorporated as a fiscally independent organization. Its goal is to demonstrate the relevant relationship between theory and practice and the importance of an holistic approach to international community development, community environmental management, cross-cultural studies, and community education. As such, the major functions of the Institute are research, training, and technical assistance in the social and behavioral sciences, including research and development tasks undertaken for and in cooperation with schools, colleges, and related educational and community service agencies. The scope of interest of the IIUHD is both domestic and international. Institute activities are task-oriented and focus on comprehensive planning and management, educational leadership, and training for urban public service.

To carry out its commitment to improve the quality of life within the reality context of economics, politics, sociocultural dynamics, and human behavior, the Institute has a nucleus staff of professionals and practitioners based in San Diego, California. This interdisciplinary team is augmented by a network of staff associates, international scholars, and graduate interns who participate in the various urban and human development activities of the IIUHD or through its professional associations in higher education, government, business, public service and international organizations.

A recent accomplishment of the International Institute for Urban and Human Development has been the formulation and conduct of an experimental manpower training and applied research program in community environmental management (CEM). During the period from 1971-1975, over forty trainees received graduate fellowships through the National Institute of Mental Health, HEW, to complete a practitioner-oriented degree program leading to Master of Arts in Social Sciences at USIU with a specialization in urban development. The CEM project also developed and field tested a community research and training prototype for use in colleges and universities throughout the United States.

During the past five years, the Institute, functioning through its former role as a University Center, established working relationships with numerous publics within the San Diego regional community, the State of California, and in various parts of the United States, Mexico, and the Caribbean. Some of the training and technical assistance tasks included 1) the San Diego Model Cities Research and Demonstration School Project, 2) the San Diego Community College and Model Cities Educational Cultural Complex Project, 3) the San Diego Urban Observatory sponsored program for community leadership development, 4) staff development training for school district personnel in bilingual and cross-cultural education, 5) comparative urban and rural development field studies and workshops, and 6) training and research projects for the United States Agency for International Development, the United Nations, the Public Health Service, HEW, the National Coalition for Cultural Pluralism, the World Council on Curriculum and Instruction, and the United States Office of Education.

The latest development at the International Institute for Urban and Human Development has been the establishment of a program for international interns in urban and rural studies and the opening of a Special Collections Resource Center for work in international community development and cross-cultural studies.

INSTITUTE ACTIVITIES

Selected services of the International Institute for Urban and Human Development include:

- International Training and Technical Assistance Programs
- Staff Development Training in Public Adminstration and Urban Educational Systems
- Social Planning, Community Research, and Community Environmental Management Training
- International Food Education and Community Health Education
- Applied Research in Cross-Cultural Studies and Urban Affairs
- Feasibility Studies, Publications, and Special Reports on Comparative Urban and Human Developments
- Professional Workshops and Conference Management

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For further information contact

Dr. Thomas A. MacCalla, Executive Director
International Institute for
Urban and Human Development
2423 Morena Boulevard
San Diego, California 92110
(714) 275-2820

International Institute for
Urban and Human Development
2423 Morena Boulevard
San Diego, California 92110

International Institute for Urban and Human Development

2423 MORENA BOULEVARD
SAN DIEGO, CALIFORNIA 92110