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to Improve Agricultural Marketing Systems

Prime Contractor: Abt Associates Inc.

Subcontractors: Postharvest Institute for Perishables, University of Idaho,
Deloitte Haskins & Sells,

PN-ABD-223

FINAL REPORT

**REPORT ON A VEGETABLE SEED
PRODUCTION AND MARKETING
STRATEGY FOR NEPAL**

**(WITH SPECIAL EMPHASIS ON THE
PRIVATIZATION OF THE NEPAL
SEED INDUSTRY)**

**BY MICHAEL CHILTON AND
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FINAL REPORT

**RESEARCH ON MARKETING OF
HILL CASH CROPS IN NEPAL:**

**REPORT ON A VEGETABLE SEED PRODUCTION
AND MARKETING STRATEGY FOR
NEPAL**

**(WITH SPECIAL EMPHASIS ON THE PRIVATIZATION
OF THE NEPAL SEED INDUSTRY)**

**Collaborative Research Program Between
USAID/Nepal, NO-FRILLS, and AMIS
(Agricultural Marketing Improvement Strategies Project)**

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April 1989

PREFACE

This report represents a collaborative effort between USAID/Nepal, No-Frills Consultancy and the USAID, Bureau for Science and Technology funded Agricultural Marketing Improvement Strategies Project (AMIS), Contract No. DHR-5447-Z-00-7074. These three parties are undertaking a program of applied research on marketing of high-value commodities produced in hill regions of Nepal. This program of research began in August 1988 and will continue through March 1990.

The consulting mission of Michael Chilton (October 27-November 16, 1988), vegetable seed specialist, was funded under a USAID/Nepal buy-in to the AMIS Project. Chilton worked closely with No-Frills private enterprise consultant Rajendra Shrestha in conducting this rapid reconnaissance study of vegetable seed production and marketing in Nepal.

AMIS is a five-year project which is being implemented by Abt Associates Inc. (prime contractor) in collaboration with the Post-Harvest Institute for Perishables (PIP) at the University of Idaho, and Deloitte, Haskins and Sells. It seeks to:

1. Improve diagnosis of marketing system constraints.
2. Identify and design appropriate marketing system innovations and improvements, and
3. Build local capacity in both the public and private sector to do marketing systems analysis.

The collaborating institutions invite comments and suggestions on this report. Comments may be directed to:

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1.0 Introduction

The elements of a viable and expanding private seed industry within Nepal exist for several reasons:

1. Market opportunities are felt to prevail throughout the majority of Nepal's population, a generally agrarian people, whose awareness of seed production is really just being aroused,
2. Various climatological zones prevail, creating a broad spectrum of specific growing environments for many types of seed,
3. Beyond a domestic market, a population bearing a common regional heritage numbering over a billion people (India, Bangladesh, Sri Lanka, Pakistan) offers the potential of a very large regional market,
4. Private sector sponsored production of select vegetable seed is slowly taking off in different parts of the country,
5. Labor is regionally low cost and trainable,
6. A National Seed Act has just been enacted by the Rastriya Panchayat (National Legislature) and approved by His Majesty (see Annex 4). An implementable seed law gives credence to the position of a growing and strengthening private sector.

Although many elements of the general seed sector could be discussed at length, this report will go directly to the key issues which seem to impinge most heavily upon the success or failure of a growing private seed sector. It is felt that members of the National Seed Board, working from the jurisdiction of the newly National Seed enacted Act, are generally sympathetic to an emerging private sector. How this will be borne out in fact remains to be seen. It is important for all elements of the emerging private seed sector to help the National Seed Act become operational.

2.0 Recommended Measures for Strengthening Privatization of the Nepali Seed Industry

There are several ways in which further privatization of the Nepali seed industry can be strengthened. These points are itemized and briefly discussed as follows:

1. Joint seminars and workshops between the public and private sectors. To strengthen understanding among all parties functioning under the umbrella of the new National Seed Act, a series of recurring seminars/workshops would be held jointly between public and private sector representatives. The seminars should establish and maintain a dialogue upon which a better understanding of seed law implementation would be based. Their form would need to be determined, but a reasonable approach might be one day or longer seminars occurring at intervals of six months for the indefinite future. Each would focus on a theme, such as the new seed law or research requirements and support, which would be decided upon at the previous gathering.
2. Organization of private seed companies into an association. The realization of a seed association would fulfill several objectives, the most significant of which would be a means for the private seed sector to discuss and speak with one voice on matters related to private sector seed policy. A second strength is that membership in the association would represent a commitment to certain mutually agreed upon business procedures and ethics. Third, the association could deal more effectively and in a coordinated manner with agencies or companies outside of the country. Though the nature of business among member companies would vary widely, the common forum of a seed association could serve all parties well.
3. Early and strong participation by the private sector in the implementation of the new National Seed Act would set a proper tone and precedent in favour of privatization. This could best be accomplished via several means:
 - a. Develop a strong working relationship with members of the National Seed Board,

- b. Take an active role in developing and assuring that periodic seminars/workshops are designed to further objectives of the private sector,
- c. Assume a lead role in contact with international seed companies for purposes of ultimately establishing contract production in Nepal,
- d. Request directly or via donor agencies requirements for assistance in upgrading technical capability of the seed sector, i.e., equipment, technology, research assistance, etc.

Without an assertive posture assumed by the private sector, the National Seed Act and the National Seed Board will lose their purpose and become another bureaucratic jumble, more likely to inhibit rather than enhance the needs and growth of a countrywide seed industry.

- 4. The National Seed Board should use its influence to assist the private sector in gaining access to legitimate financial support for industry expansion. While loan guarantees would appear not possible, suggestions and proposals could be made which facilitate access to otherwise unavailable financing. This means that both sides must do a thorough job of preparing their positions in order to present convincing proposals for funding.
- 5. Transportation incentives are needed for remote area production contracts. The difficulties of making timely contact and moving input and products in and out of some of the more remote production areas is well known. It would facilitate the Nepalese seed industry if the government paid transport subsidies. This matter needs careful study of resources and procedures that might be used. It should be of a given duration and not open-ended in order that economic viability of seed activities in some of the more remote areas of the country can be assessed.
- 6. Upgrade technical capabilities of the seed industry in Nepal. While the present standards of production, processing, testing and storing have been acceptable, increased demands internally and prospects for contract production for foreign companies make current technical levels inadequate. Technical capabilities could be improved by the following means:

- a. A more consistent and uniform processing capability is required over current hand-cleaning methods. Small, simple machines are available. As a beginning, one should investigate the equipment used in India. Other countries with suitably sized machines would probably include Korea, Japan and Taiwan. West European countries with likely useable equipment would include Italy and Denmark.
- b. Improved harvesting and threshing equipment primarily for radishes will be required as quantities and demand increase. Again, relatively simple hand-operated equipment is available. Sources would include machinery from India, Korea and Japan.
- c. A responsive but simple seed quality testing capability is required as a pre-condition to marketing seed at the grower level. This is a most difficult issue to resolve considering that requirements are urgently needed in the more remote areas. A simple test involving germination and purity would seem possible at each of the seed farm installations.

3.0 Specific Public and Private Sector Roles

This section will provide a breakdown of envisioned roles for both the public and private sectors in support of an expanded commercial seed sector. This discussion assures that clearly defined goals will help both the public and private sectors to achieve desired results. A proposed specialization of roles and functions follows:

3.1 Public Sector Role

1. Utilization of HMG agricultural research facilities to diagnose pest and physiologic (nutrients) issues of seed production. Steps for remedial action would be a logical follow-up to a very simple and necessary applied research function.
2. Suitable storage facilities under sub-tropical and tropical climatic conditions is a continuing problem. Continued research is an essential part of this program to determine economic and applicable ways that adequate storage

can be accomplished under the difficult conditions of more remote areas of Nepal.

3. Explore ways to guide and develop financial assistance in support of private sector expansion, operational costs and capital improvement expenditures.
4. Seed testing capabilities need to be decentralized in order to respond to increased production occurring in less accessible parts of the country. This will require training in simple germination and purity tests, probably to be carried out at nucleus seed farms or at the farmer association level.
5. Perhaps most important of all is to maintain an on-going dialogue with the private sector in support of problem resolution and long-term strategic planning.

3.2 Private Sector Role

1. Refine domestic marketing strategies by determining pockets of opportunity, heretofore unexploited, where seed sales could be consolidated and expanded.
2. Develop sources of financing which will allow expansion of seed company activities.
3. Develop international contacts in preparation for that time when export contract production is possible.
4. Prepare for the time in the near future when each company will have to maintain its own seed stock. The current system of seed farm seed stock maintenance will likely be inadequate as more varieties and lines are required in an expanding private seed sector.
5. Upgrade step-by-step harvesting and cleaning/processing capabilities by seed companies in order to be able to handle a higher quality seed and prepare for export opportunities. Threshing equipment would likely be purchased by groups of farmers, whereas cleaning equipment would more likely be purchased and owned by individual seed companies.

6. Evaluate package units and promotional materials in order to enhance sales. Packing containers available on the market need to be assessed with the objective of improving seed shelf life.
7. Evaluate production contracts by:
 - a. Establishing grower incentives to continually upgrade seed quality,
 - b. Eliminating contracting points of possible contention between buyers and sellers.
8. Organize the private seed industry into an association or appropriate forum.

4.0 Current Market Organization

Vegetable seed in Nepal is derived from primarily four sources, i.e., 1) farmers who grow their own seed, then barter, trade, exchange labor or sell the seed on the local market, 2) seed companies who market seed from local sources or seed produced under contract, and also market what small amount of high quality seed is imported into the country, 3) local general merchants/traders who market seed from local sources and/or imported seed (including cross-border traffic with India), and 4) government agencies, which distribute and sell through various local level offices including AIC, cooperatives, seed farms and other projects.

Most seed in Nepal is obtained via the first category, i.e., farmers who traditionally grow and save their own seed. This means that varieties of commonly grown vegetables are traditional and generally well-adapted to a local growing environment, although very little is known about the exact nature of how traditional production and distribution systems work. As farmers become aware of different types of vegetables which they can grow and utilize for market purposes, traditional values and production systems are slowly beginning to change.

The emerging vegetable seed industry, both public and private, has addressed itself to this newly found diversity of vegetable seed. The public sector has determined that it should play a role in this transformation, but a rigid and bureaucratic system in keeping vegetable seed beyond its useful life are serious constraints. Public seed stocks are often

deteriorated or improperly stored. The private sector, beyond local traders, has not yet organized to penetrate the traditional seed distribution system, particularly more remote areas of the country. It is against this backdrop that we see the beginnings of new seed distribution systems, which are expected to respond better to requirements for greater production, greater variety and more intense marketing as a result of increased domestic and international demand.

5.0 Potential Market Development

As the private seed sector emerges, domestic seed demand has expanded. With a few exceptions of very specialized vegetable production in selected areas, improved open-pollinated varieties of seed suffice in most areas of Nepal. These consist of improved quality seed which are locally produced. Slowly, improved varieties and more types of vegetables penetrate areas where traditional distribution systems existed before.

While growth of the private sector is not expected to be either rapid or spectacular, the process will stimulate expanded vegetable seed production primarily through contracts with growers. The consequence will be a base of seed production in different areas of the country that builds growing competence and consistency. This process is well underway in certain regions of the country.

With growing proficiency and promotion of their own capabilities, the Nepali seed sector will be able to attract the attention of companies in neighbouring countries which will consider Nepal for certain kinds of production. At that time, it is important that initially only those opportunities with the greatest chances of success be selected. It will be important during the first one to two years of export contract production that the finest possible results be obtained. Otherwise, there is the risk of losing the interest of foreign companies.

Presumably some of the first contract production for export would be open-pollinated varieties. If there were interest in hybrid production, it might be prudent to establish small trial plots of those inbred lines in the area where multiplication is contemplated prior to larger scale production.

Specialized seed production for buyers outside the country promises attractive returns for those local companies which persist and are patient. Conceivably, 'niche' production will develop with very specialized production requirements. Careful selection of micro-climates for seed production and building of specific organizational support will make niche production possible.

In addition, if the newly emerged private seed sector promotes itself adequately, companies from abroad will look to Nepal for specializing in production and will bring in new production technology, perhaps even bio-technology procedures. Thus, a joint venture would probably be the avenue of entry for new technology.

Other areas of possible contract production with foreign companies might consist of flower seed and herb seed. Both seed products are of a low-volume, high-value nature. The intensive management requirements of these crops could be met by interested grower groups once their abilities had been developed with vegetable seed production.

6.0 Constraints to Expansion of Vegetable Seed Production and Marketing

The matter of general constraints will be addressed in a brief way. While rugged geographic terrain coupled with limited transportation and communication facilities make most hill areas accessible with difficulty, the terrain also offers opportunities to produce a variety of seeds in several micro-climatic zones created by varied topography. Other specific constraints are as follows:

1. The logistical problems of contact with different parts of the country are significant and affect timeliness and communications. These are considerations that must be accounted for in planning seed activities in more remote areas of the country.
2. There is a likelihood of conflict and counter-productive efforts in pricing and operational procedures of a seed program in those areas of the country where activities of the public and private seed sector may overlap.
3. Agricultural inputs generally have to be imported and distributed under sometimes very difficult circumstances, so costs tend to be high.
4. Large Indian agricultural production and marketing systems to the south will continually exert demand and cost pressures on local production and marketing systems.

7.0 Rapti Zone

The Rapti Zone is one of the areas of Nepal where seed production has been emphasized. The area is suitable for onion radish and cauliflower seed, all of which are currently under production. There are, no doubt, other kinds of vegetable seed which could also be satisfactorily grown there.

7.1 Musikot Vegetable and Vegetable Seed Production Center

The Musikot Vegetable Seed Farm is located within the Rapti Zone near the Rukum district headquarters. It was established under the FAO/USAID supported program with the Ministry of Agriculture. This station has been designated as a source of foundation seed for onion and cauliflower. Assorted broad leaved mustards, some beans and other green vegetables are also grown at the station. This farm represents the only government horticultural facility in the Rapti Zone that offers guidance and assistance to seed producers within a generally very large area, most of which is reachable only by foot trails.

This farm is mandated to provide three primary services to regional seed production activities. They are 1) to serve as the focal point of extension support, 2) to provide capability to produce foundation seed, and 3) to conduct applied research on vegetable seed production problems. Extension support focuses on up-grading technical capabilities of seed production through diagnosis and offering of remedial support on pathogen and physiologic problems. Additionally, there is an opportunity for marketing extension work in seed handling, seed storage, etc.

Considering the high cost of production and the government's current policy, it may be desirable to have the Center focus more of its effort on production of foundation seeds. Foundation seed production capability now exists at the Farm, although costs are likely very high relative to equivalent production costs under local contract. Therefore, it is conceivable that foundation seed production in the future could be phased out as other more economical foundation seed sources become available as companies would establish their own sources. Distribution of seed may be continued but seed farm sources cannot be considered economically sound. Rather, it might be desirable to distribute vegetable seeds purchased from known outside sources or local contract producers.

The requirements for applied research will grow with intensification of seed production activities. Such research will include matters relating to seed handling and

seed storage, insect control in storage, field pathogenic problems, micro-nutrient deficiencies and basic fertility problems. The seed farm could serve as the research center for these problems within and around the Rapti Zone.

7.2 Support to Vegetable Seed Producers

Support to farmers involved in seed production will come from two primary sources: (1) governmental offices, and (2) private contractors in seed production. Governmental support will most likely, at this stage, originate from the agricultural offices at Musikot and the nearby vegetable seed farm. Interaction with farmers will focus on issues relating to seed production, such as pest problems, storage procedures, transportation issues, and marketing systems.

The second source of support to farmers will be contractors or their representatives. It is expected that the manager of a village production contract would/could catalyze various sources of local government assistance, depending upon the nature of the issues to be faced.

It will be in the interest of the private sector to assure that each issue is resolved to the complete satisfaction of all contracting parties. Difficulties, quite naturally, could be expected because of varying degrees of facility and commitment. The ultimate outcome will be influenced highly by the perseverance of the seed buyers and sellers in ensuring production of seed of the highest possible quality.

7.3 Seed Production Issues in Rapti

There are some very good examples of recently initiated seed production projects in the Rapti Zone. In November 1988 radishes were newly emerged seedlings in farmers' fields. Onion seeds had just been established and germination had occurred. Farmers were also planting bulbs which had been generated from seedlings during the previous growing season. The bulbs will generate this year's seed heads, which will be harvested prior to the advance of the monsoons in June/July 1989. Farmer performance in establishing the seed production was judged to be very competent. Good seedbeds had been prepared and fields were free of weeds. Gravity irrigation is available as the dry season advances. Soils were not heavy and very workable.

Certain problems in seed production of both radish and onion can be anticipated. However, if farmers are made aware of potential problems in advance, they are not

considered to be unmanageable. Leaf-eating insects and possibly root maggot will likely affect radish. Aphid infestation will probably follow. All insect problems could be controlled if simple insecticides were made available. The major problems affecting onions will probably be mildews (powdery), which are recognized as ever-enlarging necrotic spots on the leaves both before and after seed head development. The best control for mildews is prevention by applying early fungicidal spray with such material as Dithane M-45, which has been seen on the local market.

Based on observations during a visit to the Rapti Zone (30 October-06 November), farmers appear to be interested in problems of seed production. It is essential that their interest be maintained. The best way for growers to remain convinced of the need to address problems is the expectation that they will be able to do well on the crop and that their efforts will pay off.

Some of the best prospects for seed crops appear in the village of Kholagaon. However, seed crops have been planted without contracts, and growers are concerned that they may not be able to sell their seed. There is sufficient time to plan for marketing requirements prior to harvest; some effort needs to be made to assure that at least part of the seed crop grown by farmers in that area does have a market. Much, if not all of the seed could be marketed with coordination among private companies and perhaps AIC. Someone will need to accept the lead role in assuring that it does occur. The important consequence of assuring markets for this seed is that farmers will be encouraged to produce seed in a subsequent year. If farmers are discouraged by the results of their first attempt at seed production, it is very unlikely that they will be willing to participate in seed production schemes in succeeding years.

8.0 Recommendations

The following is a summary of recommendations for promotion of the private vegetable seed industry:

8.1 Public Sector/National Seed Act

8.1.1 Short-Term Measures

- Emphasize development of a good working relationship between public and private sectors through personal contacts and seminars/workshops.

- Conduct applied research in support of field production in the areas of pest control, seed storage and seed testing.
- Promote domestic private sector seed production and marketing.

8.1.2 Long-Term Measures

- Implementation of procedures that assure "truth in labelling," including minimum purity and germination quality of seed marketed throughout Nepal and in foreign countries.
- National variety testing and national variety lists will not likely serve either the seed industry or Nepali farmers well under presently available resource levels.
- Guide financial assistance to long term development of the seed industry.
- Government promotion and support of international relationships which expedite development of the emerging private seed sector.
- Improve transportation and communication in remote areas.

8.2 Private Sector

- Define company goals.
- Develop a written workplan within each company.
- Be assertive in actions within the seed trade.
- Take a leadership role in policy decisions relating to the seed industry.
- Develop a strong working relationship with the National Seed Board.
- Maintain a reputation for strong ethical values.
- Organize a seed association of private companies.
- Establish and expand relationships with international seed companies.
- Build strong, reliable technical base for domestic seed production.

- Upgrade seed handling capabilities through investment in harvesters, processing, testing and storage.

8.3 Rapti Zone

- Anticipate pest and disease problems during the current production cycle and establish procedures for remedial action.
- Develop a marketing program for current non-contracted production now in the ground.
- Encourage and guide local seed marketing capabilities.
- Determine seed testing capability suitable for the Rapti Zone.
- Expedite transportation of seed to outside markets.

9.0 Development Projects in Support of Private Seed Sector

The following are projects that support the emerging private seed sector in Nepal, presented in order of considered priorities. They are projects which will need some, but not a large amount of outside support. They will be essential stepping stones in the development of Nepal's seed sector.

1. Policy Dialogue on Emerging Relationships of the Seed Sector

Organize policy dialogue workshops among members of HMG, business, and donor agencies to discuss emerging roles in developing the seed industry of Nepal. The sessions should be held every six months, lasting no more than a day on each occasion. Themes for different sessions could include the new seed law, export markets in regional countries, and forging a working relationship between public and private sectors.

2. Analysis of Traditional and Existing Seed Marketing Systems

Traditional marketing systems would be analyzed at representative locations throughout the country. It is also important to gain a better understanding of Indian seed

sources and marketing affecting Nepali villages. It is estimated that as much as 90-95% of the seed available in Nepal is acquired through traditional systems, yet very little is understood as to the way these systems work. If the private seed industry is to develop successfully, knowledge of these basic systems is essential. The study would be designed with the support and participation of interested participants in the vegetable seed subsectors. It could involve 3-5 persons and take from 3-6 months to carry out.

3. Technological Improvement in the Seed Sector

Arrange for demonstration and use of techniques which would improve seed quality and the methods for handling seed in Nepal. Examples of techniques which could be introduced might include simple germination and purity tests for villager's use, simple storage techniques applicable at the village level, simple threshing equipment and procedures, cleaning systems to provide uniformity and upgrade seed quality, and pest control. Introduction of these techniques require some equipment and materials. Areas selected for extension would be those with ongoing production currently in the field. Materials and equipment would be demonstrated and made available to village producers, and their use evaluated under farmers' production conditions. Demonstrations would include the use of sprayers and pest-control chemicals, simple germination and purity systems, plastic bagging or enclosed containers for village storage, a thresher used in the village, and a simple cleaner.

4. Seed Export Possibilities and Procedures

A short study of export possibilities is important to determine how effectively Nepalese seed could compete in the markets of neighboring countries of South/Southeast Asia. This could best be done by members of the Nepali seed sector visiting nearby countries in order to determine the nature and extent of demand, as well as the mechanisms and procedures of export trade. This should be accomplished before completion of the current growing seasons (i.e., before the onset of the monsoons) in order to see first-hand each country's production capabilities.

5. Sources of Project Support

Each project would be supported as a separate entity and from different sources. The cost per project would have to be established in a detailed project work plan.

However, it is estimated that each study could be conducted with the currency equivalent of \$10,000-\$15,000 US.

Sources of simple equipment under the "Technical Improvement in the Seed Sector" project are likely to be India, Korea, and Japan. This is based on past experience and observations in the international seed trade and not on any knowledge of specific company equipment lines. Sourcing each item could begin with the commercial officer in the embassy of each country located in Kathmandu. A reasonable idea of what is available could be attained.

Another avenue of sourcing would be through the personnel of both the Vegetable Seed Development Division at Khumaltar and the Seed Technology Improvement Project. Sources of equipment should be selected to assure uninterrupted availability of materials and maintenance parts. Sourcing from neighboring India might be most practical, at least in the short run.

10.0 Collaboration with International Companies

As private companies develop to the point that collaboration with international seed companies becomes desirable, the following points would be considered in making a decision to establish a working relationship with a Nepali company:

1. Suitability and variety of available climatic conditions.
2. Seed company organization and manpower competence.
3. Grower capability and reliability.
4. Technical competence, including:
 - Ability to diagnose pest problems and take remedial action.
 - Processing of uniform products.
 - Reliable performance.
 - Ability to organize growers and maintain their confidence.

5. Security of plant materials in the case of hybrids.
6. Communication systems, including reliable telex, FAX, postal, and telephone systems.

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Annex I

Findings from Field Trips

The following field trips were made to vegetable and vegetable seed producing areas between October 29 and November 6, 1988:

1. Trip to Daman, October 29

This trip was undertaken by Mr. Michael Chilton (AMIS Consultant), Mr. Alex Dickie (USAID/Nepal), and myself. On our way to Daman, we stopped at a private nursery in Khnaikhola operated by a local entrepreneur, Mr. Brahma Lal Shrestha (he was recently awarded a prize on the World Food Day 1988 by the RAPA office of FAO, Bangkok). We observed saplings of different types of sub-tropical fruits, including those of citrus saplings, mango, and guava. He has been in the nursery business for the last 12 years and also deals in agricultural inputs. We were told that he cultivates vegetables on about two hectares.

Our next stop was at Tistung along the Tribhuvan highway, where we observed cauliflower, peas and radishes being brought for onward shipment to Kathmandu and Hetauda. Vegetables brought by farmers are weighed, repacked in doko (a bamboo basket) or gunny bag with about 60 kgs and forwarded to Kathmandu or Hetauda by truck. We noted the prices of cauliflower as Rs.12/- per kg. and peas as Rs.10/- per kg. Freight to Kathmandu was said to be about Rs.30/- per doko or bag or Rs.1800 per truckload. According to knowledgeable farmers and traders, proportions of vegetables and fruits marketed from Tistung/Palung areas is as follows:

	<u>Kathmandu</u>	<u>Terai</u>
	%	%
Radish	60	40
Cauliflower	80	20
Peas	40	60
Apples	40	60
Pears		100
	District(%)	Outside(%)
Fruit saplings	5	95

We visited one apple orchard, one fruit nursery and a couple of vegetable farms in the Daman and Palung areas with the farm manager of the Horticulture Farm, Daman, Mr. Krishna B. Shrestha. We were told that these newly cultivated vegetables (such as cauliflower, radish, peas, etc.) are changing the traditional cropping patterns. This area supplies these vegetables early in the season in Kathmandu and Terai, hence fetching good prices.

2. Field Trip to Rukum, October 30 - November 6

Michael Chilton and I, accompanied by the VFC program site coordinator, Mr. Dal B. Budhathoki, undertook this trip. Rukum has been identified and developed as one of the warm temperate seed production centers in the Kingdom. The HMG/Nepal/FAO Fresh Vegetable and Vegetable Seed Production Project is supporting production of vegetable seeds in various areas as follows:

Temperate vegetables	Dolpa, Mustang
Warm Temperate vegetables	Dhankuta, Khumaltar (Lalitpur), Rukum and Dadeldhura
Tropical vegetables	Sarlahi

In addition, the project is organizing farmer level vegetable seed production in Bhojpur, Bhaktapur, Lalitpur, Nuwakot, Kapilvastu, Mustang, Rukum, and Dadeldhura districts. The project has supported establishing seed processing facilities in the horticulture farms of Khumaltar, Sarlahi and Marpha (Mustang). In addition to these facilities, the project has also supported AIC with the processing, storage, and packaging facilities in Itahari (Sunsari), Kathmandu, Bhairahawa and Nepalganj.

We stopped at Kholagaon along Jari Khola where fruit, vegetable and cash crop (VFC) program is implemented. This area, according to the VFC program site coordinator, is newly extended seed growing areas for onion (Red Creole variety) and radish (Mino early variety). Besides other farmers under the AIC contract, some 24 farmers are growing seed crops of onion and radish in this area under the VFC program. The farmers under the VFC program do not seem to have procurement contracts. We observed that the farmers were anxious about the sale of seeds. Although the farmers will be growing less than two tons of seed, an awkward situation could arise if they are not able to sell seeds on time at reasonable prices.

On our way to Musikot, we stopped at Sannichaur. Along the trek we observed quite a number of demonstration plots of vegetables. Chhibang is one of the major onion seed producing areas in Rukum. Major seed producing areas in Rukum are as follows:

<u>Panchayat</u>	<u>Village</u>
1. Chhibang	Sannichaur, Chhibang, Kaulichaur Machme, Thadadhunga, Solabang, Pipalmeta, Bohragaon, Chhera, Bahunechaur, Sherpu
2. Khalanga	
3. Kholagaon	
4. Pipal	
5. Peogha	
6. Khara	
7. Bhalacha	

According to some knowledgeable persons, production of cauliflower seeds (Kathmandu Local variety) was discontinued after a few years of implementation due to some technical problems. Now these seeds are produced in Palpa District. The current year (1988-89) AIC seed production program for this area is as follows:

<u>Crop</u>	<u>No. Farmers</u>	<u>Quantity Kgs.</u>	<u>Purchase Price Rs./kg.</u>
Radish: Mino Early	116	4646	40.00
Onion: Red Creole	126	6425	95.00
Turnip: PTW	19	475	30.00
Mustard: Khumal BL	17	320	30.00
Squash: Zucchini	3	15	not fixed yet

Most of vegetable seeds produced in this area are forwarded to Tulsipur in Dang for onward shipment to Ghorahi (Dang) and Kathmandu. Freight on mule track to Tulsipur is about Rs.7.00 per kg. According to the farm manager of the Musikot Horticulture Farm, Mr.GS Niraula, area under onion seed crop could be increased provided there is market outlet. According to him, one reason for discontinuing seed production of cauliflower was to avoid competition between cauliflower and onion crops.

3. Trip to Bhaktapur, November 7

In Bhaktapur we visited radish seed production areas in Katunje panchayat ward 1 and Sipadol panchayat ward 1 in Suryabinayak. The crop of Mino Early radish was still in nursery and will be transplanted in the next two weeks. Farmers of this area produce some 10 tons of radish seed under contract with private seed companies. Yield per ropani (approximately 50kg./ropani) of radish seed is slightly higher than that of Musikot.

Besides radish seed, farmers in this area also grow seed crops of cress, coriander and spinach. We also observed farmers growing a seed crop of pole bean on a trial basis.

We also visited one local farm inputs dealer in Nagdesh who took us to intensive vegetable growing areas along the bank of Manahara River. Farmers in this area are known for highly intensive cultivation of vegetables throughout the year. We observed three crops (namely spinach, cress and garlic) grown on the same patch of land. We also noted that the farmers in this locality have switched to hybrid varieties of cabbages and high quality carrots. This is a clear indication that commercial farmers prefer high quality seeds of certain vegetables like cabbage, cauliflower and carrots.

Annex II

A. List of Officials and Entrepreneurs Interviewed*

1. Dr. SS Rekhi
Chief Technical Advisor
Fresh Vegetable & Vegetable Seed Production Project
HMG/N and FAO
Khumaltar, Lalitpur, Nepal
c/o UNDP, P.O. Box 107, Kathmandu Nepal
Phone: 523701
2. Mr. Surat Babu Aryal
Acting Chief
Vegetable Development Division
Dept of Agriculture
Khumaltar, Lalitpur, Nepal
Phone: 521619
3. Mr. Bharat P. Parajuli
Division Chief (Seeds)
Agricultural Inputs Corporation, Head Office
Teku Kuleswar, Kathmandu, Nepal
Phone: 211541
4. Mr. Dilip Karki
Senior Agriculture Officer
Seed Division
Agriculture Inputs Corporation
Kuleswar, Kathmandu Nepal
Phone: 211541
5. Dr. BB Mathema
Seed Specialist
Koshi Hill Development Project
Dhankuta
c/o BTC Office
Lainchaur, Kathmandu
Phone: 412655
6. Mr. SS Bal
Agriculture Research & Production Project
Agriculture Botany Division
Khumaltar, Lalitpur
Kathmandu, Nepal
Phone: 521614
7. Mr. Krishna K. Gyawali
Managing Director
Nepal Seed Company Pvt. Ltd.
Pulchowk, Lalitpur, Nepal
Phone: 521292

*Note: Telephone numbers are work numbers unless otherwise noted.

B. Other Agencies Involved in Seed Activities

1. Mr. Kedar Budhathoki
Horticulturist
Lumle Agriculture Center
Post Box 1
Pokhara, Nepal
2. Mr. Badri Sitaula
Seed Technologist
Pakhribas Agriculture Center
Dhankuta, Nepal
3. Agricultural Mini Project
Panchkhal
Kavre Palanchok, Nepal
c/o Japanese Overseas Cooperation Volunteers
Sanepa, Pulchowk
Lalitpur, Nepal
4. Dr. D. Boetchher
Team Leader
Seed Production and Marketing Project (SPMP)
(HMG/Nepal - GTZ project)
Agricultural Inputs Corporation
Teku Kuleswar
Kathmandu, Nepal
Phone: 214587
5. Cereal Seed Production Project
(HMG/Nepal-GTZ project)
Agricultural Inputs Corporation
Teku Kuleswar,
Kathmandu, Nepal

C. Other Companies/Firms Involved in Seed Activities

1. Himalayan Seed Company
Babar Mahal
Kathmandu, Nepal
2. Mitra Agro Pharma
Dhamboji Chowk
Nepalgung, Nepal
Phone: 20094
3. Mr. Jay Prakash Subedi
Agro Concern & Services
Dharan Road, Biratnagar
Phone: 23116

8. Mr. Laxman Pun
Vegetable Development Division
Dept of Agriculture
Khumaltar, Lalitpur, Nepal
Phone: 521619
9. Mr. Indra R. Pandey
Farm Manager
Vegetable & Vegetable Seed Production Center
Khumaltar, Lalitpur, Nepal
Phone: 521619
10. Mrs. Kamlesh L. Rajbhandary
Chief
Seed Technology Improvement Program
Khumaltar, Lalitpur, Nepal
Phone: 523040 Home: 212317
11. Mr. Jeevan Lal Shrestha
Annapurna Seed Store
Ason, Kathmandu, Nepal
Phone: 221888
12. Mrs. Jamuna Kayastha
NFC Seed Company
Man Bhavan, Jawlakhel
Lalitpur, Nepal
Phone: 523237
13. Mr. GS Niraula
Acting Farm Manager
Vegetable & Vegetable Seed Production Center
Musikot, Rukum district, Nepal
14. Mr. DB Chand
Acting Agriculture Development Officer
Agriculture Development Section
Musikot, Rukum district, Nepal
15. Mr. Werner Wirz
Deputy Director
Swiss Development Cooperation/Nepal
P.O. Box 113
Ekanta kuna, Jawalakhel
Kathmandu, Nepal
Phone: 521205 Home: 523629
16. Mr. Rajendra P. Shrestha
GM Enterprises
Post Box 1155
Ka 1-29 Tripureswar,
Kathmandu, Nepal
Phone: 214660

4. Mr. Bhirn Subedi
Pokhara Krishi Samagri Bhandar
Chipledhunga (Near New Road Chowk)
Mahendrapul, Pokhara, Nepal
5. Mr. DP Dahal
Dahal Trading Concern
Bhanu Chowk, Janakpur, Nepal
Phone: Shop: 20877 Home: 20692
6. Pokharel Agro Concern
Nagar Panchayat Gate
Butwal-8, Nepal
7. Mr. Gyan Bahadur
Jai Kisan Beej Bhandar
Bhotahity, Kathmandu, Nepal
8. Mr. Nanda Lal Joshi
Ganesh Seed & Farm
Kasthamandap,
Kathmandu, Nepal

Annex III

Historical Perspective on Exported Seeds from Nepal

The official export of vegetable seeds from Nepal goes back to 1981 when 500 kilograms of radish seed were exported by the Agricultural Inputs Corporation (a government owned enterprise).

The following year, 1982, 2,000 kilograms of radish seed were exported by the Himalayan Seed Co. Subsequently no further seeds were exported until 1987, as shown below:

<u>Exporting Firm/Vegetable Seed Type</u>	<u>1987</u>	<u>1988</u>
<u>Nepal Frontier Seed Company Pvt. Ltd.</u>		
Radish (Mino Early)	500 kg.	6 MT (against order for 10 MT)
Cauliflower (Snowball)	-	37 kg. (against order for 300 kg.)
Cabbage (Copenhagen Market)	-	23 kg (against order for 200 kg.)
<u>Nepal Seed Company Pvt Ltd</u>		
Radish	-	2 MT

NEPAL SEED ACT, 2045

Preamble: Whereas it is desirable to use high quality seed of improved varieties to increase the crop production by multiplication, processing and laboratory testing of the seed as well as to maintain the convenience and economic interest of the public.

1. Short title and commencement:

- 1.1 This law may be called "Nepal Seed Law" 2045."
- 1.2 It shall come into force for specific areas on such a date by His Majesty's Government by notification in the Nepal Rajpatra (Nepal Gazette).

2. Definitions:

- 2.1 Unless and otherwise meant with reference to the subject or context in this act.
 - 2.1.1 The term "seed" means an embryonic plant, food matter and resource inside the protective seed coat or plant structure used in agriculture whether the mode of reproduction be sexual or asexual. In contract, the substance used for sowing or planting is called seed.
 - 2.1.2 The term "Crop" means fruit, food, vegetable cash crop, fodder and forage crop.
 - 2.1.3 "Notified seed" means as mentioned in the clause 11 is called notified seed.
 - 2.1.4 "Agriculture work" means food, fruit, legume, oil seed, vegetable, cash crop, forage and fodder production.
 - 2.1.5 "Board" means National Seed Board.
 - 2.1.6 "Laboratory" means Central Seed Testing laboratory and is recognized to mean other laboratories under this laboratory as established according to clause 9.
 - 2.1.7 "Container" means box, tin box, bottle, bag, jute bag, bin, barrel or other seed storage bin.

- 2.1.8 "Breeder" means person, institution or organization who select or introduce new varieties of any crop for the first time.
- 2.1.9 "Kind" means any one or several close species or sub-species, or group of species individually or collectively known and useful of the varieties of plant for agriculture.
- 2.1.10 "Variety" means a fruit, seed multiplication or easily identifiable product collectively known as useful of the varieties of plants for agriculture.
- 2.1.11 "Labelling" means, monitoring the seed description on the bin or tag is called labeling.
- 2.1.12 "Prescribed" means prescribed or in the manner prescribed in the rules formed under act.
- 3.1 There shall be a National Seed Board to advise His Majesty's Government in order to ensure seed policy and implementation of the program.
- 3.2 The Board shall consist of the following members:
- | | | |
|--------|--|----------|
| 3.2.1 | Secretary, Ministry of Agriculture | Chairman |
| 3.2.2 | Director General, Department of Agriculture | Member |
| 3.2.3 | Chief, National Agricultural Research & Services Center (NARSC) | Member |
| 3.2.4 | General Manager, Agriculture Inputs Corporation | Member |
| 3.2.5 | General Manager, Agriculture Development Bank | Member |
| 3.2.6 | Chief, Seed Division, Agriculture Inputs Corporation | Member |
| 3.2.7 | Those nominated members from HMG from Agriculture, Livestock and Scientist (Three) | Members |
| 3.2.8 | Seed Specialist from Institute of Agriculture and Animal Science. Tribhuvan University | Member |
| 3.2.9 | Two nominated members from among private producers, seed sellers (seed entrepreneurs) | Member |
| 3.2.10 | HMG nominated person | Member |

- 3.3 HMG nominated members are entitled to hold office for three-year terms. After termination of membership, he/she can be renominated.
- 3.4 Whatever it has mentioned in the sub-clause 3.3, nominated members under sub-clause 3.2.7 and 3.2.9 could be terminated before their term.
- 3.5 HMG could add or subtract members of the Board by notification of the Nepal Gazette.
- 3.6 Board could invite any local and foreign technician and advisor to the board meeting as an observer.

4. Board Meeting and Decision:

- 4.1 Board meeting, time, place and date shall be as instructed by the Chairman of the Board.
- 4.2 At least 50% of total members should be present to conduct a meeting.
- 4.3 Board Chairman will chair the meeting. If the Chairman is absent, a Chairman should be elected among the members of the Board to chair the meeting.
- 4.4 Decision of the meeting shall be the majority vote. If a vote is equal, vote will be decided by the Chairman.
- 4.5 The decision of the Board shall be certified by the Member Secretary.
- 4.6 The procedure of the Board meeting shall be according to decision of the Board itself.

5. Functions, Duties and Authority of the Board:

- 5.1 To advise HMG on formulation of national policies regarding seed matters.
- 5.2 To coordinate between the private and public sectors for production and distribution of seed.
- 5.3 To encourage the private sector to invest in the seed industry.
- 5.4 To regulate or control the quality of seed produced by private or public seed industries.
- 5.5 To confirm, release and register in a prescribed way new varieties of seeds.

- 5.6 To experiment specialty, similarity and ownership of the new varieties of seed and to provide the breeder with authority to own new varieties of seed in a prescribed way.
 - 5.7 To identify and standardize the quality of the seed.
 - 5.8 To approve local and foreign standardized quality seed.
 - 5.9 Other necessary action and work to carry out in connection with seed.
6. Constituting Sub-Committees:
 - 6.1 Board can constitute different sub-committees as per requirement for seed production, processing, and distribution of good quality seed.
 - 6.2 The functions, duties, authorities of the sub-committees will be as prescribed.
7. Establishment of Seed Certification Office:

HMG can establish a seed certification office to work for seed certification by notice in the Nepal Gazette.
8. Functions, Duties, Authorities of the Seed Certification Office:
 - 8.1 The functions, duties and authorities of the seed certification office are as follows:
 - 8.1.1 The seed certification office will prepare the necessary infrastructure for developing seed certification and submit it to the Board.
 - 8.1.2 Seed certification shall be issued as per approved standard format by the Board.
 - 8.2 The other functions, duties, and authorities of the Seed Certification Office can be as prescribed.
9. Establishment of Central Seed Testing Laboratory:
 - 9.1 HMG, by notification in the Nepal Gazette, could establish a Central Seed Testing Laboratory to carry out the functions and duties of seed testing.
 - 9.2 It can recognize other laboratories established according to sub-clause 9.1 in different parts of Nepal.
 - 9.3 HMG may recognize or authorize non-government or private seed testing laboratory for testing seed in their laboratory as mentioned in this Act.

10. Functions, Duties, and Authorities of Laboratory:
11. Notification authority of variety and kind of the seed: HMG may publish notification in the Nepal Gazette after consultation with or advice by the National Seed Board, the variety or kind of seed which is going to be used in HMG Ag. farms/stations. There is a need to specify variety foundation seed or certified seed and location.
 - 12.1 HMG may publish the following subject by notification in the Nepal Gazette with consultation of the Board.
 - 12.1.1 Among the notified seed variety, any seed variety must meet minimum germination and purity standards and;
 - 12.1.2 Other description needs to be mentioned.
13. Restriction on the labeling, distribution and selling of notified seed:
 - 13.1 No person shall, himself or by any other person on his behalf, carry or sell, keep for sale, offer to sell, barter or otherwise supply any seed of a notified kind or variety, unless:
 - 13.1.1 Unidentified kind or variety.
 - 13.1.2 Unidentified kind or variety, and purity as per sub-clause 12.1.2.
 - 13.1.3 Without dealing in the kind as per prescribed in the sub-clause 12.1.2.
 - 13.1.4 Other terms which are not according to those mentioned.
 - 13.2 Notified variety and kind of seed recommended for specific area and should not be sold or distributed other than that area.
14. Pesticide-treated seed is not authorized to be sold. Pesticide-treated seed cannot be used or sold other than for prescribed agriculture work.
15. Approval of the notified seed for export and import:
 - 15.1 To export and import notified seed, one needs to submit an application for permission to the specified officer as per prescribed form with detailed description of the seed.
 - 15.2 Authorized officer can give permission or permit as per sub-clause 15.1 only after he/she receives the application.

- 15.3 To export and import seeds, any seed export and import industrialist can export/import with notification of the authorized officer even though sub-clause 15.1.
16. Appointment of Seed Inspector/Analyst:
HMG may appoint a seed inspector and seed analyst as needed to implement this Act. If no seed Inspector/Analyst is assigned, HMG may authorize another available employee.
17. Functions, Duties, and Authorities of Seed Inspector/Analyst:
Inspector/Analyst's functions, duties and authorities as per prescribed.
18. Recognition by His Majesty's Government:
HMG may, on the recommendation of the NSB, recognize any foreign or international institution for the purpose of seed testing and certification by notification in the Nepal Gazette.
19. Penalty and Punishment:
19.1 Any person who sells or distributes seed in violation of clause 13 shall be fined up to Rupees 3,000. In violation of clause 14, such person shall be fined up RS. 2,000 and the seeds will be confiscated.
19.3 Any person who exports and imports notified seed in violation of sub-clause 15 shall be fined up to Rs. 1,000.
19.4 Besides the above sub-clauses of this Act and formed by the rules under the Act, anyone convicted for violating this Act shall be fined up to Rs. 5,000.
20. HMG Offender:
HMG shall be an offender of the case under this Act.
21. Investigation and Filing of the Cases:
21.1 All investigation into offences punishable under the Act shall be conducted by the seed inspector. On completion of such investigation, the inspector shall file a case before the appropriate authority.
21.2 While filing the case before the authority competent to bear cases under sub-section 21.1, the appropriate officer may consult a government lawyer. A public prosecutor shall define the cases to the court.

22. Power to Hear the Case:

22.1 The power to hear or dispose of a case under this Act shall be treated in the prescribed authority.

22.2 While disposing of any case under the sub-section 22.1, the prescribed authority shall follow the same procedures as adapted by a special court act 2031.

23. Protection of Official Taking Action in Good Faith:

Seed Inspector/Analyst or other authorized employees under this act shall not be individually responsible for doing their duties and action in good faith. But necessary torcher or burden if given to the individual, the authorized person shall be responsible.

24. Power to Frame the Rules:

HMG may frame the rules for the purpose of implementation of the objectives of this Act.

Annex V

Map of Country-Wide Seed Activities

Annex VI

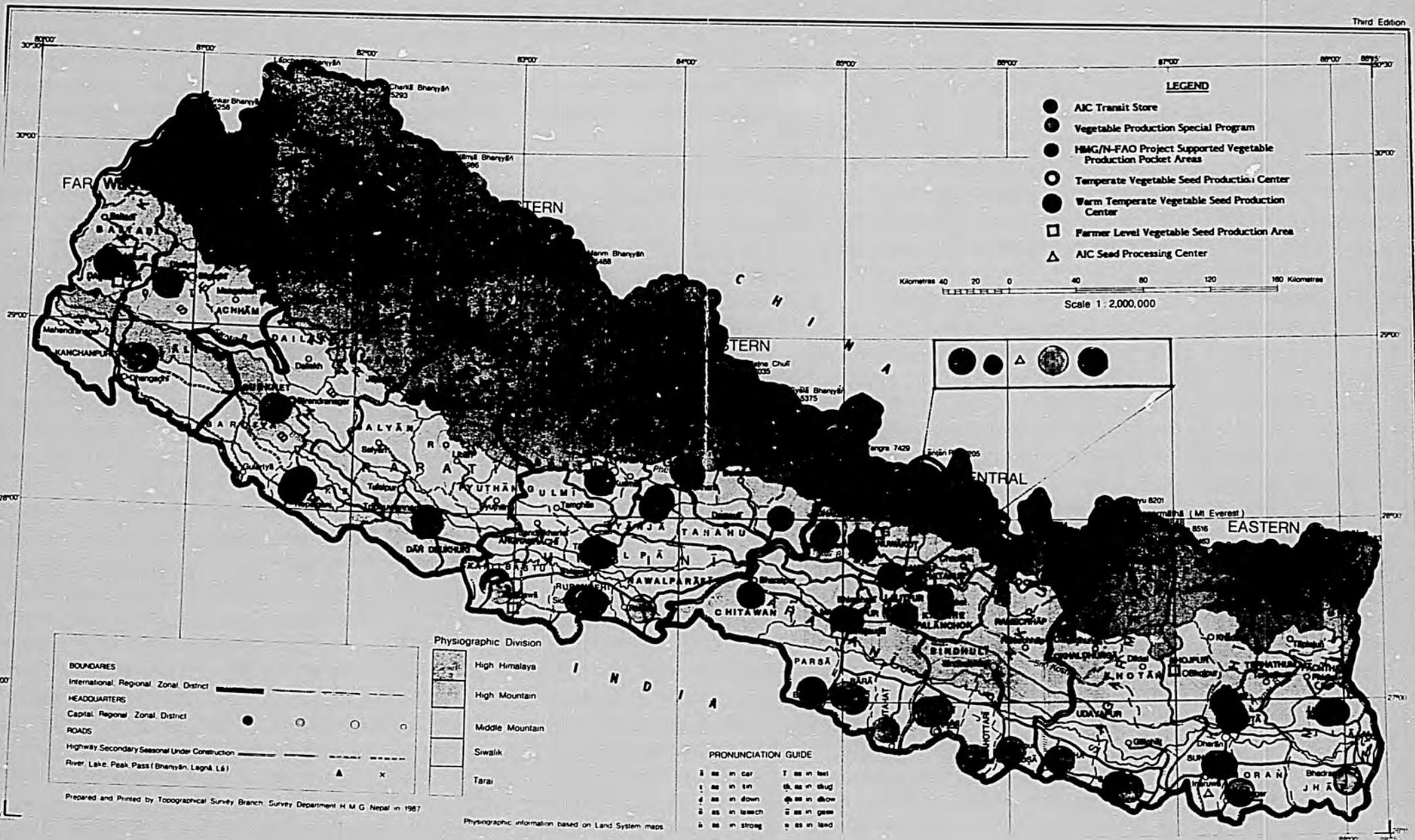
Seed Prices in Kathmandu Market, October 1988
(Price in Nepal Rupees per Kg.)

Vegetable Type	Packing Unit	AIC Price	Packing Unit	GME Price	Packing Unit	ANNAPURNA Price	Packing Unit	NFC Price	HMG/VDD Per Kg. Buying Rate
Cabbage: Drumhead	1 kg.	160		-	5 g.	600	-	-	80
Cauliflower: Kath Local	1 kg.	195	1 kg.	250	5 g.	600	1 kg.	220	120
Cress	1 kg.	65	1 kg.	70	20 g.	100	1 kg.	100	30
Coriander	-	-	1 kg.	80	-	-	1 kg.	100	15
Carrot: Early Nantes	1 kg.	135	500 gm(*)	576	5 g.	400	1 kg.	300	100
Brinjal: Nurki	1 kg.	155	1 kg.	300	-	-	1 kg.	400	100
Brinjal: PPL	-	-	100 gm(*)	280	-	-	-	-	-
Chill : (Hot Pepper)	1 kg.	100	50 gm(*)	120	-	-	1 kg.	120	65
BL Mustard	1 kg.	65	1 kg.	70	20 g.	100	1 kg.	85	25
Broccoli	1 kg.	105		-	1 kg.	600	1 kg.	-	120
Onion : Red Creole	1 kg.	135	1 kg.	240	-	-	1 kg.	240	90
Peas	1 kg.	30	1 kg.	40	20 g.	100	1 kg.	50	20
Radish : Whiteneck	1 kg.	74		-	-	-	1 kg.	-	35
Radish : Mino Early	1 kg.	95	1 kg.	80	1 kg.	100	1 kg.	85	40
Radish : 40 Day	-	-	1 kg.	90	-	-	1 kg.	140	40
Spinach	1 kg.	80	1 kg.	80	5 g.	400	1 kg.	100	15
Swiss Chard	1 kg.	80	1 kg.	125	-	-	1 kg.	85	40
Tomato : Pusa Ruby	1 kg.	250	50 gm	320	-	-	1 kg.	400	175

Notes : AIC- Agriculture Inputs Corporation (a fully govt. owned enterprise)
VDD- Vegetable Development Division, Dept of Agri, HMG/Nepal
GME- GM Enterprises
Annapurna- Annapurna Seeds Store
BL Mustard- Broad leaf mustard
NFC- Nepal Frontier Seed Company Pvt. Ltd.
PPL- Pusa Purple Long
* = Seed imported from India.

VEGETABLE SEED PRODUCTION, INPUT AND PROCESSING ACTIVITIES IN NEPAL

Third Edition



Prepared and Printed by Topographical Survey Branch, Survey Department H.M.G. Nepal in 1987

Physiographic information based on Land System maps

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Annex VII

Seed Related Associations of Selected Asian Countries

India (Seed Associations)

ALL INDIA SEED GROWERS,
MERCHANTS AND NURSERYMEN
ASSOCIATION LTD.

L. C. Vajravaradan
14 Thanikachalam Chetty Road
Madras 600-017
India

INDIA CROP IMPROVEMENT AND SEED
PRODUCERS ASSOCIATION

Mr. B. R. Barwale
c/o 19 Raj Mahal
84 Veer Nariman Road
Bombay 400 020
India

INDIA CROP IMPROVEMENT AND SEED
PRODUCERS ASSOCIATION

F2, South Extension, Part I
New Delhi
India
Phone: 78939

INDIAN SOCIETY OF SEED TECHNOLOGY

Indian Agricultural Research Institute
K. R. Chopra, President
New Delhi 110012
India

SEED TRADE ASSOCIATION OF
MAHARASHTRA LTD.

Post Box no. 27
Sardar Patal Road
Jalna
431203 (Maharashtra)
India
Phone: 2584/284-2/4-4

Indonesia (Seed Regulation Information)

AGENCY FOR AGRICULTURAL RESEARCH AND DEVELOPMENT

Dr. Ir. Gunawan Satari
Pasar Minggu, Jalan Ragunan 29
Jakarta
Indonesia

BPP-JEMBER (TOBACCO, COFFEE AND COMMERCIAL CROPS)

Research Station
Jalan Moh Seruji 2
Jember
Indonesia

NATIONAL SEED CORPORATION

Mr. Soemartono
Perum Sang Hyang Seri
JI Dr. Saharjo 313
Jakarta 12810
Indonesia

NATIONAL SEED BOARD

Mr. Sarawono
Jalan A.U.P., Pasar Minggu
Jakarta Selatan
Indonesia

HORTICULTURE AND VEGETABLE SEED TESTING OFFICE

Department of Agriculture
Jalan Suropati
Bandung
Indonesia

MARIHAT RESEARCH STATION

Marihat ULU, P. O. Box 37
Pematang Siantar
North Sumatra
Indonesia

PLANT SEED QUARANTINE CENTER

Ir. Hamzah Purakusumah M.SC.
Jalan Salemba Raya 16
Indonesia

RESEARCH STATION FOR ESTATE CROPS (TOBACCO, COTTON AND COMMERCIAL CROPS)

Cimanggu 1,
Bogor
Indonesia

Japan

JAPAN SEED TRADE ASSOCIATION
Nobuo Enomoto, Executive Vice President
11-26, 2-chome, Hongo
Bunkyo-ku, Tokyo 113
Japan
PHONE: TOKYO 811-2654

Korea

Korea (Seed Regulation Information)

MINISTRY OF AGRICULTURE & FISHERIES (MAF)
Grass and Feed Division
Livestock Bureau

MINISTRY OF AGRICULTURE
& FISHERIES (MAF)
Vegetable Division, Special Crops and Sericulture Bureau

Korea (Seed Associations)

KOREAN SEED ASSOCIATION
Dr. In Hwan Kim, President
Room 1014, Songnam Buil
San 4-1, Seucho-dong
Kangnam-Ku
Seoul, Korea
PHONE: 568-1821,2034

KOREA FLORICULTURE ASSOCIATION
772-2, Bangbae-dong
Kanguam-Ku
Seoul, Korea
PHONE: 590-0898

Pakistan

Pakistan Seed Regulation Information

Anwar Kabir Sheikh
Managing Director
Punjab Seed Corporation
4 Lytton Road
Lahore/Pakistan

Mr. Hasham A. Memon
Managing Director
Sind Seed Corporation
State Bank Building
Hyderabad, Pakistan

Pakistan Seed Associations

FEDERAL SEED CERTIFICATION DEPARTMENT

Syed Irfan Ahmad
Managing Director
Mauve Area G-9/4
Islamabad
Pakistan

Muhammad Siddique Khan
Director
Agricultural Research Institute
Tarnab, Peshawar
Pakistan

Dr. Manzoor Ahmad Bajwa
Director General
Ayub Agricultural Research Institute
Rasalwala, Faisalabad
Pakistan

Syed Ahmad Pasha Jagirdar
Director
Agricultural Research Institute
Tandojam, Hyderabad
Pakistan

Naik Muhammad
Director
Agricultural Research Institute
Sirabb, Quetta
Pakistan

Singapore (Seed Regulation Information)

AGRICULTURAL RESEARCH SECTION

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Source: International Seed Directory, 1987, Seed Trade News, Deon Enterprises, Inc., Publishers, 7535 Office Ridge Circle, Eden Prairie, MN 55344, USA. Phone (612) 941-5822.

Annex VIII

National Seed Industry Development Schematic

Marketing

Domestic Distribution
International Marketing
Promotional Efforts
Distribution Systems
Transportation
Market Intelligence
Strategic Planning
Market Niche Identification
Input Marketing

Institutional/Policy Preconditions

Seed Legislation
Import/Export Controls and Regulations
Ability to Enforce Contracts
Availability of Finance/Credit
Truth in Labelling Legislation
Environment Encouraging Private Sector Development

Basic and Adaptive Research

Cultivar Selection
Agronomic Research
Seed-Borne Pathogens
Improved Seed Handling

Multiplication

Isolation of Seed Production
Agroecological Niche Selection
Soil Type & Quality
Disease Control
Weed/Insect Control
Predator Control
Harvesting
Quality Control
Contracts: Farmer Selection/Supervision & Incentives

Seed Handling

Conditioning
Packaging
Labelling
Certification
Warehousing
Quality Control