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Project Office 4250 Connecticut Avenue, N.W., Suite 500, Washington, D.C. 20008 • Telephone: (202) 362-2800 • Telex: 312636

RAPID APPRAISAL OF THE VEGETABLE SEED MARKETING SYSTEM IN NEPAL

by

JOHN S. HOLTZMAN

and

RAMESH B. MUNANKAMI

MAY 1990

Prime Contractor: **Abt Associates Inc.,** 4250 Connecticut Avenue, N.W., Suite 500, Washington, D.C. 20008 • (202) 362-2800

Subcontractor: **Postharvest Institute for Perishables,** University of Idaho, Moscow, Idaho 83843 • (208) 885-6791

Rapid Appraisal of the Vegetable Seed Marketing System in Nepal

Final Report

John S. Holtzman
Research Director
Agricultural Marketing Improvement Strategies Project
Abt Associates Inc.
Bethesda, Maryland 20814

and

Ramesh B. Munankami
Research Coordinator
Hill Cash Crops Marketing Research Program
No-Frills Consultants
Man Bhawan, Lalitpur

May 1990

Preface

This report is the result of a collaboration between the Agricultural Marketing Improvement Strategies Project (AMIS), funded by the USAID Bureau for Science and Technology, and No-Frills Consultants. The collaboration is being financed by USAID/Nepal under the ongoing Hill Cash Crops Marketing Program. A basic objective of the program is to improve the quality and policy relevance of applied agricultural marketing research in Nepal. The vegetable seed rapid appraisal is an attempt to examine constraints and opportunities in the emerging vegetable seed subsector under limited time and resources.

This study was based on extensive review of the available literature, observations during field visits, and informal interviews with participants in the vegetable seed system from both the public and the private sectors. It builds on the earlier reconnaissance study of private sector opportunities and constraints in the system carried out in November 1988 by Michael Chilton and Rajendra Shrestha.

The principal authors of this report are John S. Holtzman, research director of the AMIS project, and Ramesh Munankami, research coordinator of the Hill Cash Crops Marketing Program. Prakash Mahat participated in the fieldwork and prepared some of the appended material. Rajendra Shrestha provided some appended material as well and helped in guiding the field work. Sushil Pant, Mukund Karmacharya, Ashakaji Thaku, Bimal Pradhananga and Santa R. Kayastha helped collect and compile the statistics. Paula Hirschoff, senior editor for Abt Associates, worked on the final editing of the manuscript. Kathleen Poer of Abt Associates assisted in preparing charts and tables. Tina Rutledge assisted in text editing.

Readers of this report may direct comments or inquiries to the following contacts:

Robert Thurston ARDO USAID/Nepal Rabi Bhawan Kathmandu Tel. 271916	Ramesh Munankami Research Coordinator Hill Cash Crops Marketing Research Program No-Frills Consultants Man Bhawan, Lalitpur Tel. 523237	John S. Holtzman Research Director AMIS Project Abt Associates Inc. 4800 Montgomery Ln. Suite 600 Bethesda, MD 20814 Tel. (301) 913-0500

The authors would like to thank numerous farmers, private seed traders, seed dealers, AIC officials, VDD/FAO staff at Khumaltar, managers of government farms, ADOs and JTs/JTAs. Without their frank replies to our questions, this report would not have been possible. Special thanks go to Robert Thurston, ARDO, USAID/Nepal; Badri Kayastha, Director of No-Frills Consultants; S.S. Rekhi, FAO advisor to the VDD; Dilip Karki, AIC; and Kedar Budathoki, chief horticulturist at Lumle Agricultural Center. Thanks also to J. Dahal and P. Ghimire for typing much of the draft report.

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List of Abbreviations and Acronyms

ADB/N	Agriculture Development Bank/Nepal
ADO	Agriculture Development Office/Officer
AIC	Agriculture Inputs Corporation
DFAMS	Department of Food and Agriculture Marketing Services
FAO	Food and Agriculture Organization of the United Nations
FOs	Farmer organizations
FS	Foundation seed
ha.	Hectare
HMG	His Majesty's Government
IAAS	Institute of Agriculture and Animal Sciences (Rampur)
ICIMOD	International Centre for Integrated Mountain Development
JT	Junior Technician
JTA	Junior Technical Assistant
kg.	kilogram
KTM	Kathmandu
LAC	Lumle Agricultural Center
MOA	Ministry of Agriculture
MT	metric ton
NFC	Nepal Frontier Seed Company
NS	Nucleus (or breeder) seed
NSC	Nepal Seed Company
ODA	Overseas Development Administration (U.K.)
PAC	Pakhribas Agricultural Center
RA	Rapid appraisal
rop.	ropani (equal to 0.05 hectares)
Rs.	Nepalese rupees (1 U.S. $ 1= Rs. 27.4 - 21.6 in June- July 1989
UNCDF	United Nations Capital Development Fund
UNICEF	United Nations International Children's Education Fund
USAID	United States Agency for International Development
VDD	Vegetable Development Division, Ministry of Agriculture
VFC	Vegetable, Fruit and Cash Crop Program (of the USAID- funded Rapti Development Project)
VSPP	Vegetable Seed Production Project, HMG/FAO (GCP/NEP/043/SW/1)

Definitions of Nepalese Terms

Doko	A hand-made pack used to carry heavy loads on the back
Haat bazaar	A periodic rural or small town market more common in the east and central regions than in the west
Sajha	Government-managed co-operatives
Terai	The hot, low plains of Nepal bordering India

Executive Summary

This report is based on rapid appraisal (RA) fieldwork done in June-July 1989 and desktop compilation and analysis of secondary data. It is an output of the Hill Cash Crops Marketing Research Program, a collaborative undertaking of the Agricultural Marketing Improvement Strategies Project (AMIS), USAID/Nepal and No Frills Consultants. The report draws heavily on earlier work done by the Vegetable Development Division (VDD) of the Ministry of Agriculture, with support from FAO, and by Chilton and Shrestha (1989).

Emergence of the Formal Private Sector. During the second half of the 1980s, formal private sector participation in Nepal's vegetable seed trade grew significantly. A striking finding of the RA fieldwork was the emergence of many private seed dealers, who handle a wide range of agro-inputs, in towns in the terai and lower hills. Some managers of these firms have formal training in agriculture. Despite increased formal sector activity, informal market channels continue to predominate in the Nepalese vegetable seed subsystem, as many farmers retain their own vegetable seed or purchase seed from small-scale informal dealers. Some 60% to 70% of the vegetable seed in Nepal is supplied informally, with the remainder supplied by formal participants.

There is clearly scope for further expansion of an efficient, competitive formal sector dominated by private firms as the vegetable seed subsector develops, local vegetable production expands, and farmers become more knowledgeable about seed and demanding of quality. Prospects are mixed for public sector expansion, particularly Agricultural Input Corporation (AIC) activities. AIC can continue to play a positive role in expanding vegetable seed production contracts and distribution in more isolated zones where private firms are unlikely to work in the medium term, given high transportation costs. However, AIC's market share will likely decline in established vegetable seed production zones that are increasingly well-served by private firms.

Imported Indian Vegetable Seed. Much of the vegetable seed used by farmers in the terai and lower hill production zones of Nepal is imported from India, where many firms produce (usually under contract) and market seed under their own labels. Since vegetable seed is often imported in relatively modest quantities, it can be brought across the border far more easily than bulk commodities (such as fertilizer), despite the restrictions on trade imposed during the transit crisis. Nepalese farmers generally appreciate the high quality of Indian seed, which serves as a standard for judging locally produced seed.

Demand for Vegetable Seed. Demand for vegetable seed is a derived demand, depending on the demand for fresh (and ultimately processed) vegetables in Nepal, and to a far lesser extent, in countries that import Nepalese vegetable seed, such as Bangladesh. The trade and transit crisis with India appears to have stimulated demand for locally grown vegetables, which are substituting increasingly for Indian imports. The demand for vegetables has and will continue to stimulate demand for Nepalese vegetable

seed. Prospects in foreign markets will depend very much on Nepal's ability to produce, process, package and ship high-quality seed at a competitive price. Research in regional markets suggests that Nepal can compete in Bangladesh but will have difficulty entering the Thai market (see Zaman, 1989 and Welsh and Kayastha, 1990). AMIS has proposed a pilot innovation in organization and management of the vegetable seed traders' association as a means of screening, adapting and testing improved post-harvest handling and processing techniques, and of exploring market opportunities in other countries of South Asia (see Chilton, 1990).

The Economics of Vegetable Seed Production. Economic analysis of returns to vegetable seed production has usually focused on comparing returns per hectare of growing vegetable seed to those of an alternative winter season crop, typically wheat or barley. Although this approach is suitable for production zones where the next best alternative to growing vegetable seed is growing a winter grain, it is inappropriate in areas where farmers face a broader range of alternatives within and outside of agriculture. As an example, rapid appraisal findings revealed that farmers in zones close to tourist trekking routes can earn higher returns by producing fresh vegetables or providing other goods and services for the tourist trade, such as porterage. In production zones within one or two days of major urban markets, farmers need to evaluate alternative returns to production of vegetable seed and fresh vegetables. Variables such as relative prices per unit of fresh vegetables or foregone fresh vegetables (in the case of seed), transport costs and losses, and the opportunity cost of tying up land in vegetable seed beyond the period required for production of fresh vegetables are critical in estimating returns.

Constraints to Expansion of Vegetable Seed Production and Marketing. Key constraints to expansion are as follows:

- Low level of seed sector development;
- Lack of farmer appreciation and awareness of the economic value of higher quality, commercial seed;
- Inadequate public sector support to facilitate emergence of a vibrant and competitive private vegetable seed industry;
- Production and supply orientation of formal seed subsystem firms and organizations (both public and private), to the relative neglect of medium to long term demand prospects;
- Historical dominance of Indian seed and difficulties of cutting into Indian market share in lower-lying zones of commercial vegetable production in Nepal;
- Variable and often low quality of Nepalese vegetable seed;
- Irregular and unpredictable seed supply facing private dealers of agro-inputs;

- Limited access to formal credit for emerging formal sector private firms; and,

- Lack of a well-publicized and effectively enforced national seed law.

Vegetable Seed Price Policy. Vegetable seed reference prices are set by the National Seed Board in consultation with AIC. These prices are interpreted as fixed prices, although they are intended to serve as floor prices. AIC pays contract growers the reference prices, which reinforce the notion that reference prices are fixed prices. The AIC procurement prices are pan-territorial and pan-seasonal, but vary by seed crop. The actual seed prices are based on estimated prevailing production costs. Determining production costs for a wide range of farms and production systems for many vegetable seed crops is methodologically demanding.

The disincentive effects of pan-territorial prices are well-known. They encourage private traders to buy in production zones located near centers of demand, leaving remote zones to public agencies. They also tend to discourage regional specialization in crop production along the lines of comparative advantage. To the extent that the floor prices act as fixed prices, they undermine incentives determined by the interaction of underlying supply and demand conditions. Open market pricing is preferable in that it sends the correct signals to producers in different zones (with different degrees of isolation from markets). In a country with very high transport costs such as Nepal, producers in the more isolated zones, where there are few employment opportunities outside of agriculture, are encouraged to grow the highest value seed crop (per unit of weight and volume) that they can efficiently produce in their agro-ecological zones. Producers in less remote zones who can grow bulkier, lower-value seeds profitably need to weigh alternative returns to fresh vegetable and seed production, as well as to non-farm enterprises relative to seed production.

Alternative Institutional Arrangements. AIC's dominance of formal sector vegetable seed production and distribution in Nepal has declined. As private traders and seed dealers emerge, new institutional arrangements for organizing and supervising production, managing marketing, introducing new technology, and managing risk need to be developed. Private seed dealers in several towns of the terai and lower hills in central southern Nepal are considering contractual arrangements with seed growers in Rukum District of Rapti Zone. Larger-scale seed traders negotiate formal contracts with growers in the Kathmandu Valley and nearby production zones. In order to bargain effectively with traders, producers may need to organize into formal groups.

To increase the productivity of seed growers and improve seed quality and post-harvest handling practices, producers and traders must work collaboratively with support from public agencies (in varietal development, experimentation with improved harvesting, processing and packaging techniques, and identification of market opportunities). Public and donor support to the fledgling vegetable seed traders' association is one means of fostering greater productivity, higher seed quality and a private sector capacity to experiment with and adapt new technologies and institutional arrangements. As

the Nepalese vegetable seed subsystem becomes stronger and able to produce consistently high-quality open-pollinated varieties of temperate type seed at competitive prices, foreign firms could be invited to participate in joint ventures with local firms. Joint ventures could expand market opportunities for Nepalese producers and private trading firms, as well as strengthen production and post-harvest handling techniques and transfer improved processing and packaging technology and management methods.

Policy Prescriptions. The Government of Nepal can help to promote the development of an efficient and competitive private vegetable seed subsystem in the following ways:

- Strengthen, publicize and implement the National Seed Law and encourage the National Seed Board to meet regularly to discuss how the private seed sector can be facilitated;
- Allow supply and demand conditions to determine vegetable seed prices and abandon reference prices;
- Facilitate the emergence of alternative institutional arrangements for increasing productivity in vegetable seed production and marketing;
- Strongly support the emerging vegetable seed traders' association;
- Strengthen technical training and extension in vegetable seed production and marketing to producers and traders through the Vegetable Development Division, development projects and programs, and the vegetable seed traders' association; and,
- Provide formal financial sector capital to private firms (and producer groups) involved in vegetable seed production and marketing.

Finally, the roles of public sector agencies in the vegetable seed subsystem will require redefinition. AIC will likely continue to promote vegetable seed production in new production zones but will also withdraw from zones where private traders are willing to contract with farmers. AIC could perhaps maintain a minimal market presence in the latter zones in order to provide a competitive alternative to private traders and to prevent oligopolistic behavior among traders (to the extent that this becomes a problem). AIC could also play a supportive role in extension, seed testing and management of processing equipment in areas inadequately served by the private sector or where producer groups desire such assistance.

VDD, with assistance from FAO, has shifted its emphasis from purely vegetable seed production to marketing of seed and fresh vegetables. An important issue is the extent to which private firms will be allowed to import and multiply foundation seed in collaboration with VDD, which has been the monopoly supplier. The new National Seed Board should address this issue.

Extension support for vegetable seed production is provided, in principle, by Ministry of Agriculture extension field staff. Since vegetable seed production and post-harvest handling practices are different from staple

crops and traditional cash crops, it is unrealistic to expect MOA agents to provide effective guidance to seed growers. As seed trading firms expand and rely increasingly on contracts with growers, their own extension agents will need to supervise production. Since the number of trained extension agents specializing in vegetable seed production is limited in Nepal, it will be necessary to provide additional specialized training to agents who have received general training in agriculture and extension methods. Public sector support might be quite appropriate.

Finally, the Trade Promotion Center can assist the vegetable seed traders' association by keeping traders informed of requests from prospective importers based in South Asia, as well as promoting private trade interests in public fora in Nepal.

Suggested Further Applied Research. Further applied research on vegetable seed marketing should be focused primarily on monitoring and evaluation of any experiments in seed harvesting and processing technology and of alternative institutional arrangements. An especially promising institutional arrangement to monitor closely is production contracts between traders and growers. Data on costs and returns to both parties, timeliness of input provision, extension supervision and payment, risk-sharing, performance of any farmer organizations through which contracts are negotiated, grower and trader opinions and perceptions of the equity in the distribution of returns, rights, risks and responsibilities in contractual arrangements, trader distribution of contractually produced seed and end-user opinions of the quality of such seed would prove useful in providing a balanced assessment.

Further vegetable seed market profiles in South Asian countries, such as India and Pakistan, are also merited to complement reviews done in Bangladesh and Thailand. Analysis of selected provisions of the National Seed Law is also desirable in clarifying ambiguities, particularly with respect to production and import of foundation seed. Examination of the operations of the National Seed Board might also reveal ways in which its performance can be improved.

Finally, further analysis of the economic relationship between production of fresh vegetables and vegetable seed would help to compare economic returns to these enterprises. This would supplement conventional analyses which compare a seed crop to a typical substitute crop, such as a winter grain.

1.0 INTRODUCTION

This report is a result of rapid appraisal fieldwork plus desktop research findings on the vegetable seed sector in Nepal. As such, some of the conclusions and suggestions reported here are subject to further empirical verification. There have been a few research reports on promotion of the vegetable seed sector recently (Chilton and Shrestha, 1989 and VDD/FAO Workshop on Development of the Private Vegetable Seed Industry in Nepal, March 1-4, 1989), which have provided a good base for a rapid appraisal exercise. Earlier work by VDD (annual vegetable seed production workshop proceedings, Ministry of Agriculture, 1985a, and Ministry of Agriculture, 1985b) and studies by LAC (Buchanan-Smith, 1986; Balogun, 1989) have also provided useful information that has helped orient this applied research. Since insufficient information is available about vegetable seed production and marketing, this report will describe the system in detail, focusing on selective presentation of key empirical findings to highlight constraints and support policy prescriptions.

After this introduction, selective findings are presented and constraints identified in the second section. Section three discusses vegetable seed price policy issues, and section four examines alternative institutional arrangements for promoting vegetable seed production, marketing and export. The fifth section summarizes policy prescriptions, and the sixth section discusses an appropriate role for the public sector in seed industry development. The final (seventh) section proposes foci for additional research on the vegetable seed subsector in Nepal.

2.0 RAPID APPRAISAL FINDINGS

Rapid appraisal is a method of gathering information on agricultural commodity systems under time and resource constraints. The method relies heavily on structured, informal interviews with key informants in commodity systems, including producers, input suppliers, agricultural credit agencies, collectors, wholesalers, retail dealers, research and extension agencies, policymakers and others. Before doing the RA fieldwork, the team developed informal interview guidelines for several key informants. These guidelines are appended to the report as Annex A.

There are two other important elements of RA:

- observations in the course of fieldwork in fields of farmers and government farms, periodic markets, AIC warehouses, private traders' shops and fresh vegetable markets; and
- review of available literature, secondary data and ongoing or proposed projects.

Due to the trade and transit crisis with India and consequent problems in procuring fuel and transport services, the team was unable to do as extensive fieldwork as had been originally envisioned. The field trip itinerary and names of interviewees are presented in Annexes B and C, respectively.

2.1 Organization of the Vegetable Seed Trade: Emergence of the Formal Private Sector

A flowchart illustrating the organization of the vegetable seed subsector in Nepal is shown in Figure 1. The formal subsector includes contract seed producers, VDD, AIC and its dealers, Sajha, government horticultural farms, independent donor-supported farms (such as Lumle and Pakhribas), and private seed dealers and registered seed companies. There is a subtle difference between seed companies and private seed dealers. The former specialize in the seed business, whereas seed is only one component of the latter firms' business, which includes a broad range of agro and veterinary inputs. Together these public and private participants supply some 33% to 38% of the seed purchased by vegetable producers' in Nepal. The informal subsector, supplying over 60% of Nepal's total seed requirements, includes a large number of small traders scattered throughout rural areas and farmer-to-farmer exchange. The trading activities of this subsector are quite discernible in the Haat bazaars and small townships, such as Jeetpur and Neejgahd.

The quantities supplied by the formal sector have risen progressively during the last four years and are expected to expand further in the coming three to five years. Figure 2 and Annex D show estimates of the production of foundation seed and contract seed for the major participants in the different production years. It is noteworthy that farmers produced far less seed than

Figure 1

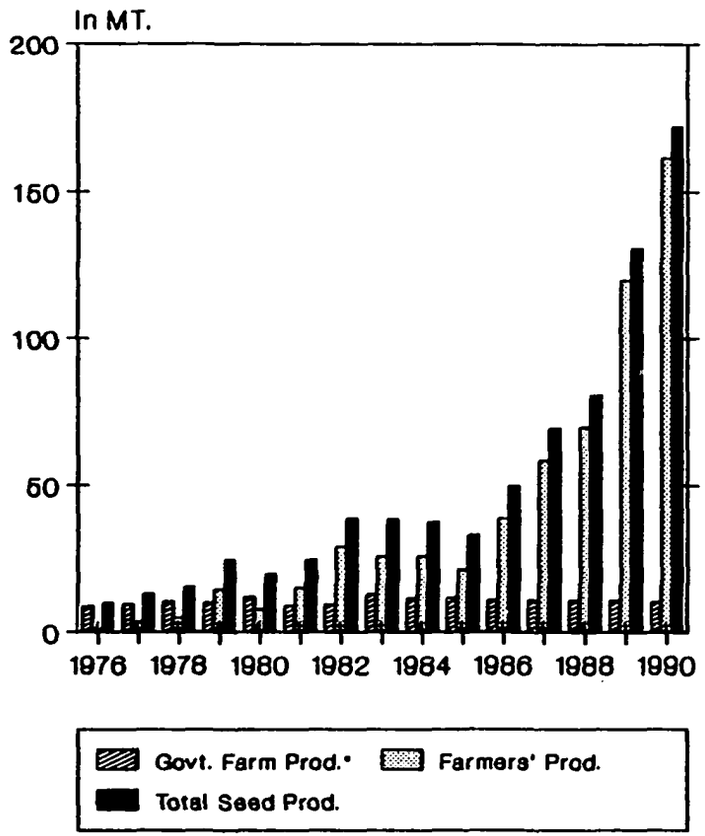
VEGETABLE SEED SUBSECTOR OF NEPAL

Functions	Formal Subsector	Informal Subsector
Foundation Seed Production and Supply	VDD, Government Farms	None
Seed Multiplication	Contract Seed Producers, Government & Private Farms	Vegetable Growers, Seed Producers
Processing*/Cleaning	AIC, VDD, Government Farms, Private Traders, & Seed Companies	Farmers, Traders
Testing for Seed Germination and Purity	VDD, STIP, Private Traders, Seed Companies	None
Wholesaling & Packaging	AIC, Private Traders & Seed Companies	Farmers, Traders
Export/Import	AIC, Private Traders & Seed Companies	Traders
Retail Sales	AIC, Sajha, Dealers Private Traders, Seed Companies	Farmers, Exchange Traders

* Initial processing of seed is done by farmers.

FIGURE 2

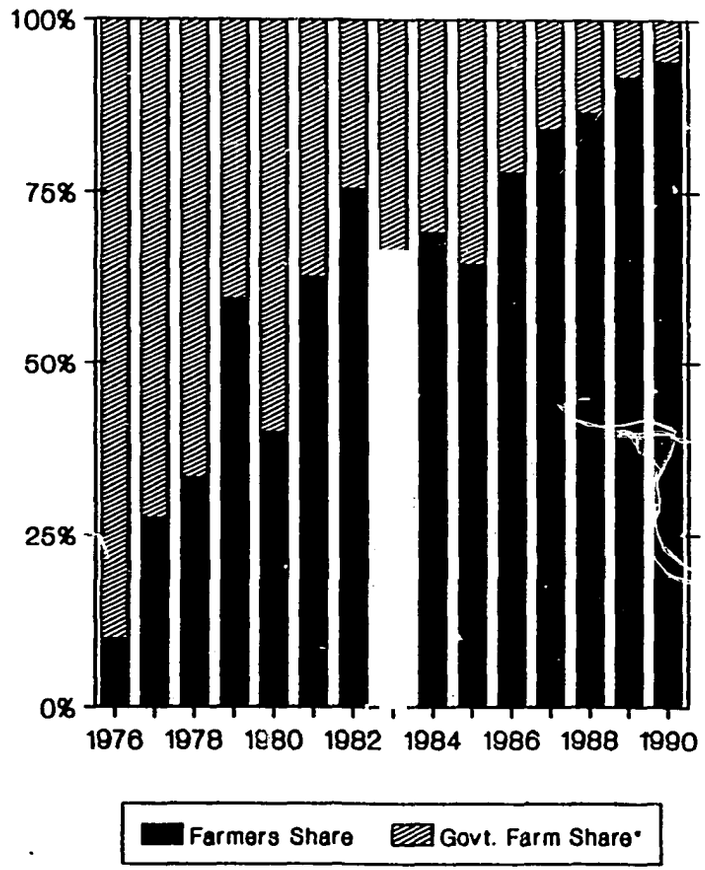
VEGETABLE SEED PRODUCTION IN NEPAL



* Includes FS and NS.
1989/90 is target.

FIGURE 2-A

SHARE OF VEGETABLE SEED PRODUCTION



government farms did during the 1970s, but this has been reversed during the 1980s (see Figure 2-A). HMG's efforts, assisted by the FAO Vegetable Seed Production Project (GCP/NEP/043/SW 1/), and the emergence of private seed companies and traders have contributed to a dramatic increase in farmers' vegetable seed production, especially since 1985-86. Production on government farms has either declined or held constant, with more emphasis placed on nucleus (or breeder) seed and foundation seed. For example, vegetable seed production at Pokhara Horticulture Farm decreased during the late 1970s and has remained almost constant during the 1980s (see Annex E). As a result, a formal private sector vegetable seed trade has been established in Nepal and is expanding with the increased involvement of private traders, including university agricultural graduates.

AIC, which until 1977-78 was the sole or major participant in the formal sector, received a declining proportion of seed produced by contract farmers during the last decade. AIC's share in total formal sector transactions (i.e. seed produced by the contract farmers and government farms) was less than 25% during all but four years during the 1977-78 to 1988-89 period. In contrast, the absolute and relative shares of private firms expanded during the latter half of the 1980s (see Table 1 and Figures 3 and 3-A). This is a promising development that provides evidence of private sector vitality in the vegetable seed industry. The strength of private firms' performance is also very much a function of the perception that AIC supplies low-quality seed to dealers and producers. On the other hand, AIC tends to be the first and preferred recipient of farmer-produced seed. In years when the quantity of seed produced by farmers substantially decreases, there is a dramatic increase in AIC's share in total formal sector transactions. This was clearly the case in 1979-80 and 1984-85 (see Table 1).

Data on the informal vegetable seed subsector do not exist, but it is clear that Nepalese vegetable producers retain much of their own seed for production of certain local, open-pollinated varieties. Some cauliflower producers in the Kathmandu Valley keep seeds of the Kathmandu local variety. Some producers reported buying seed from local seed traders and dealers every second or third year to renew their seed stock, particularly in the terai. Those traders try to procure seed from all possible channels of the formal subsector but they rely more heavily on vegetable and vegetable seed growers (informal) and India.

The potential to expand formal subsector sales of improved seed depends in large part on two factors. First, vegetable producers need to be made aware of the increasing number of private seed traders and dealers selling good quality vegetable seed and providing certain extension services. Here both the private and public sector can play a vital promotional role. The former can do so through its own business and sales promotion activities directed to the farmer producers as well as to government institutions dealing with vegetable and vegetable seed production. Private traders also should participate in the government's production program. A few seed traders have already started some promotional activities. For example, a trader in Janakpur was distributing handbags bearing the company's name and address to buyers. Government organizations such as the agriculture extension service, VDD, ADB and others that deal with vegetable production and producers could help

Table 1

Vegetable Seeds Sold by AIC, 1976-77 to 1988-89 And Relative Shares of Contract Farmer and Total Seed Production Acquired by AIC and Traders

Fiscal Year	AIC Sales (Kg)	Share of Farmers' Production 1/ (%)		Share of Total Production 1/ (%)	
		AIC	Traders 2/	AIC	Traders 2/
1976-77	3,709	..	-	28.31	71.69
1977-78	4,807	92.44	7.56	30.81	69.19
1978-79	5,344	36.60	63.40	21.72	78.28
1979-80	4,927	61.59	38.41	24.63	75.37
1980-81	7,800	50.65	49.35	31.71	68.29
1981-82	8,500	29.11	70.89	21.96	78.04
1982-83	8,520	33.28	66.72	22.13	77.87
1983-84	12,000	46.15	53.85	31.91	68.09
1984-85	15,000	70.09	29.91	45.18	54.82
1985-86	12,000	31.00	69.00	24.14	75.56
1986-87	13,400	22.91	77.09	19.28	80.72
1987-88	19,000	27.14	72.86	23.46	76.54
1988-89	18,915 3/	15.76	84.24	14.44	85.56

Source:

Central Office, AIC; Report on Survey of Vegetable Seed Marketing in Nepal, VSPP, VDD, June 1983; Planning of Seed Business in Nepal, Shyam K. Upadhyaya; Seed Program Development Strategy, MOA, SPIS Project 1983; and Basic Statistics of Agricultural Inputs in Nepal, AIC, January 1983.

1/ AIC's share would be a few percentage points higher if the quantity of seed discarded and destroyed at year end were included.

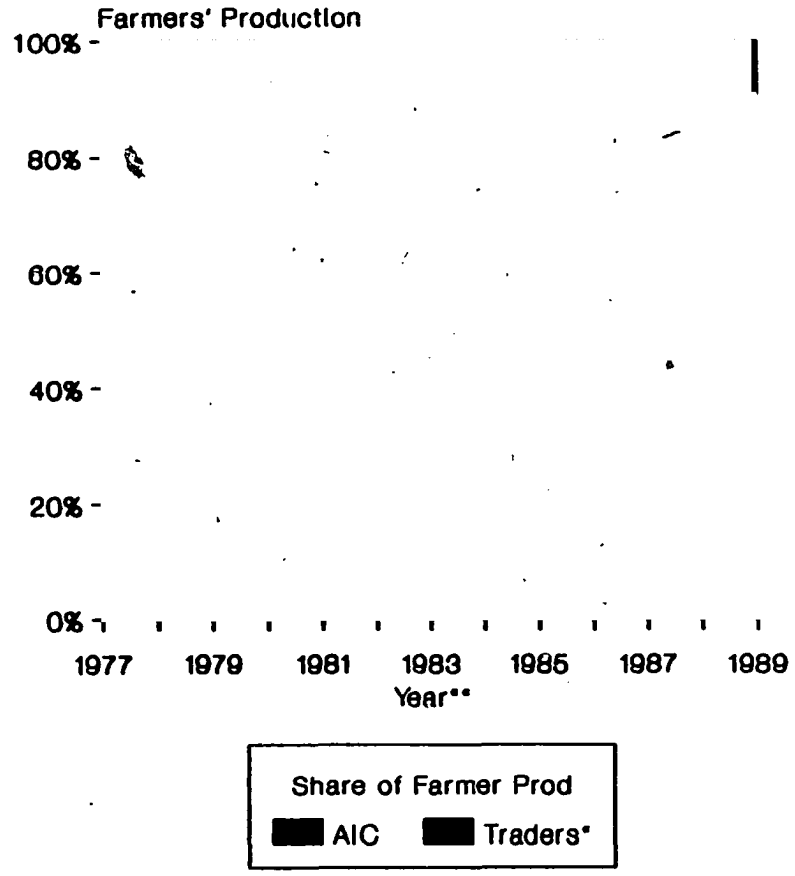
2/ Included is vegetable seed distribution by UNICEF and other NGOs.

3/ Up to June 15, 1989.

Note: Farmers' production of seed refers to contract farmers' production. Total production includes both production by contract farmers and government farms.

Figure 3

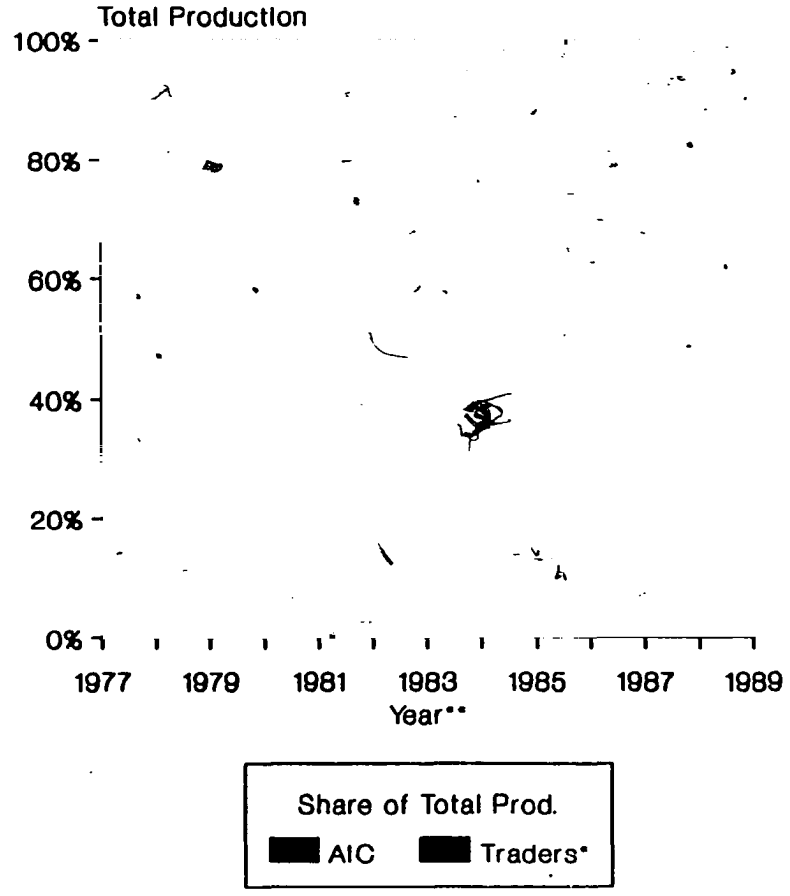
SHARE OF VEGETABLE SEED SALES



* Includes UNICEF distribution.
** Years refer to crop production years

Figure 3-A

SHARE OF VEGETABLE SEED SALES



promote the emerging private vegetable seed trade by not depending solely on the traditional input supply system but taking the private traders as formal and recognized seed suppliers, involving them in the mainstream of their production program, and also referring and introducing them to the mass of farmers. Second, farmers in general and farmers with some experience in growing vegetables with purchased seed but who also retain seed for planting in one year out of two, for example, need to be particularly convinced of the value of buying quality seed every year from commercial sources or AIC. Limited and uneven farm cash flow and low rural incomes may constrain vegetable seed purchases.

A finding from fieldwork in the terai that confirmed a working hypothesis about seed supply was the generally high proportion of all kinds of vegetable seed coming from India. A listing of Indian companies supplying packaged vegetable seeds to the Nepalese market is provided in Annex F. The seed tins, boxes and packets are attractively packaged and clearly labelled with the specific variety, seed purity and minimum germination time. Dealers and farmers agreed, with a few exceptions, that the Indian seed was superior to the Nepalese seed and had germination rates above 70% as noted on the packaging and in accordance with India's 1966 Seed Law.

A striking feature of the vegetable seed trade in Nepal is the emergence of retail seed trader-dealers, particularly in the terai and some important hill markets, where demand for seed is strongest. There are two to five seed dealers in each major town (Birgunj, Janakpur, Narayanghat, Nepalgunj, Pokhara and Kalaiya) and generally at least one in smaller towns in important vegetable producing areas, such as Tulsipur. The team was told that as many as 15 such private traders sell vegetable seeds imported from India in Bara district. The traders rarely sell AIC seeds, because in Bara district AIC has not appointed any private dealers; all inputs are supplied through Sajha. These firms do not generally specialize in seed but also import and sell agricultural and veterinary chemicals and sprays. Nearly all the dealers are self-financed. The owner-managers are often trained in agriculture and have some knowledge of vegetable seed varieties, characteristics, cultural practices, and required supplementary inputs. In some cases these firms provide limited extension oversight to farmers in their fields, but most advice is provided at the shop. Agricultural graduates of the Institute of Agriculture and Animal Sciences (IAAS) and extension agents trained to the JT level at the Paklihawa campus are increasingly involved in the seed business. Some of these traders have established their dealers in the main vegetable growing panchayats/villages within the district, but few of those interviewed expressed their intent to do so. Besides, some traders have established trade links with their peers in different districts or markets. There are an estimated 72 seed traders in 24 districts of Nepal. The list is presented in Annex G.

The sources of seed supply for the retail trader-dealers are many and varied, but Indian seed predominates. Since India prohibits vegetable seed exports, procuring seed from India poses problems, particularly in crossing the border. Gratuities of about 2-5% of the seed value are commonly paid to customs officials. Several retail firms also carry seed supplied by one or more of the larger, Kathmandu-based seed companies, such as Nepal Seed

Company, GM Enterprises, Annapurna Seed Company and Nepal Frontier Seed Company. Firms also procure generally small amounts of vegetable seed from government farms, such as VDD Khumaltar; from the ODA supported LAC and PAC; from AIC; and from government horticultural farms, such as Pokhara, Daman, Parwanipur and Nawalpur. The lack of dependable and secure access to good-quality vegetable seed clearly constrains most seed traders from expanding their seed sales and promotion. Supply sources vary from one year to the next, and traders procure seed from AIC as a last resort, though they are increasingly reluctant to do so.

Retail seed dealers and vegetable producers almost universally criticize AIC vegetable seed as low in quality. Germination rates below 50% were reportedly common, and buyers suspect that much of the seed is often at least one season old. In several cases, users of AIC seed stated that they received varieties or even types of vegetable seed different from what AIC claimed to be selling, especially in the case of radish and cauliflower seed. In defense of AIC, it has also established credibility at certain places like Trisuli where farmers will not buy any other seed except that supplied by AIC. Vegetable seed is a sideline activity of lesser importance to AIC than fertilizer and cereal seed distribution, and hence not nearly as well-funded. Furthermore, AIC is constrained to pay the floor price for seed, and private traders are able to pay more for the higher quality seed. Predictably, AIC gets left with the poorest quality seed of low purity and germination. AIC officials in areas with no vegetable seed production report that seed multiplied under contract to AIC in production pockets is usually provided too late to be effectively distributed to vegetable growers in non-seed production zones. On the other hand, few vegetable producers and retail seed traders complained about the purity of radish seed supplied by the private traders.

2.2 Demand for Vegetable Seed in Nepal

As an input into vegetable production, vegetable seed is a derived demand, that is, a function of the demand for fresh vegetables. Thus, estimates of demand for vegetable seed should be based on estimates of demand for both fresh and processed vegetables. There appears to have been no attempt to do this in Nepal, aside from disaggregated district-level vegetable production targets, which are not empirically based.

A reliable estimation of demand for vegetable seed therefore should start with the estimation of total demand for fresh vegetables. To calculate the supply to satisfy this demand, it is necessary to account for losses of fresh vegetables and to use empirically based seed to fresh produce ratios to calculate seed requirements. This has to be done on a disaggregated crop by crop basis. The Nepal Rastra Bank household budget survey of 1984-85 generated some data on fresh vegetable consumption, but only in terms of value and expenditures (Nepal Rastra Bank, 1989). Unfortunately, the commodity prices for the surveyed area and period are also unavailable, so that can actual quantities cannot be established. Another data source for fresh vegetable demand estimation could be research studies that estimate consumption of different types of food (e.g. food consumption survey and the study of demand and supply of vegetables in Kathmandu valley conducted by DFAMS). A quick

review of those studies, however, suggests that they are not useful for estimating vegetable seed demand.

In the absence of vegetable demand estimation, seed demand could be based on actual and projected production of fresh vegetables; however, it then becomes seed requirements. During the last 13 years (1975-76 to 1988-89), the area cultivated in vegetables expanded by an estimated 45.8% and is expected to increase further by 0.4% in 1989-90. Similarly, the production of fresh vegetables during the same period expanded by 59.7% and a further increase of 3.2% is the target for 1989-90. The aggregated data for different plan periods and the target for the year 2000 are presented in Annex H. The estimated seed requirements based on production data for the Seventh Plan period and for different categories of the production program are presented in Annex I. The total vegetable seed required to meet the vegetable production target for 1988-89 amounts to 891 MT (see Table 2). Note that this is purely a target and probably not attainable.

According to an estimate based on cultivated area, Nepal's vegetable seed requirement is 500 MT. "Out of this total demand (requirements), current effective demand for seed that needs to be replaced every year due to poor storability, cross pollination and specific areas required for seed production is estimated to be 300 M.Ton. The rest of the seed since [it is] easy to produce by farmers is supplied through the farmer to farmer seed exchange system." (Rekhi et al., 1989).

India's vegetable seed requirement is estimated at 20,000 tons (Rekhi, 1989). Assuming that average per capita vegetable consumption per year was the same in both countries (45 kg. in India and 45.5 kg. in Nepal: Rekhi et al., 1989), India's requirements would appear to be higher or Nepal's lower on the basis of comparative population statistics.[1] If the estimate for India is more accurate, Nepal's vegetable seed demand based on the above analogy would then fall to 350-400 MT, assuming similar vegetable cropping patterns (and per capita fresh vegetable consumption patterns), seed productivity and vegetable yields. (These are admittedly somewhat heroic assumptions).

In the absence of reliable vegetable production statistics, estimating seed requirements becomes a speculative undertaking. An alternative approach is to estimate actual vegetable shipments from major production zones, such as Palung, Dhading, Sarlahi, Bara and areas around Kathmandu and Pokhara to key urban markets. Estimates of levels of current commercial fresh vegetable production would give an idea of the demand for vegetable seed, as commercial producers are more likely to demand higher quality seed and purchase most of their requirements from the formal channel. Production of fresh vegetables by other farmers is destined mostly for their own and other local consumption and is less likely to require higher-quality, commercial seed.

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[1] The VDD estimates of vegetable seed requirements for India are forty times those of Nepal, while India's population is about fifty times that of Nepal (850 million/17 million = 50).

While the total vegetable seed required to achieve production targets in Nepal is closer to 900 MT, effective demand (or purchased seed, i.e. seed requirements backed up by purchasing power) is probably only about 350-400 MT.

Table 2

Estimated Yearly Growth Rate of Area, Production and Quantity of Required Seed of Vegetables During Seventh Plan

Fiscal Year	Area Planted to Veget. (Ha.)	Increase in Area (%)	Estimated Veget. Prod. (MT)	Increase in Production (%)	Required Seed (Kg.)	Increase in Required Seed (%)
1984-85	138,002	-	741,600	-	797,327	-
1985-86	139,498	1.08	764,200	3.05	834,729	4.69
1986-87	138,991	-0.36	789,200	3.27	855,757	2.52
1987-88	139,525	0.38	817,825	3.62	887,474	3.71
1988-89	140,000	0.34	843,000	3.08	890,858	0.38
1989-90	140,500	0.36	870,000	3.20	903,068	1.37
Increase over the Plan period		1.8		17.3		13.3
Average yearly increase		0.4		3.2		2.5

Source : Annex I

Both planned requirements and demand for vegetable seed are increasing every year, the former by about 2.5% (see Table 2). This trend is exerting pressure on the domestic supply of vegetable seed, which has been intensified by recent changes in Indo-Nepal trade relationships.

One impact of the new trade relations with India has been to reduce imports of fresh horticultural products and to raise the per unit cost of imports. This has had a positive impact on domestic production of fresh vegetables, which in turn will stimulate demand for vegetable seed. Since imports of vegetable seed from India have also been reduced, demand for domestic vegetable seed will be stimulated. This could have a positive effect on domestic vegetable seed production technology and quality, as there will be a stronger financial incentive to produce higher quality seed to compete with Indian seed. The new trade situation presents an opportunity to make domestic substitutions for Indian vegetable seed and fresh vegetable imports. Urban Nepalese demand for fresh vegetables can increasingly be met by local production. At the same time, urban incomes will decline in real terms in the short run due to a general increase in prices, which may partly offset demand for domestically produced horticultural products. In the longer term higher prices will likely induce greater domestic production, which will dampen price increases.

2.3 Sources of Supply of Vegetable Seed in Nepal

There are four major sources of supply of vegetable seeds in Nepal:

(a) contract seed producer-farmers,
(b) government horticultural farms,
(c) imports, particularly from India, and
(d) vegetable growers keeping their own seeds.

The quantity of seed supplied by the first two sources in 1988-89 is estimated at 131 MT (see Annex D). Of this, 8 MT was exported to Bangladesh by private seed traders (see Annex J), leaving a net domestic supply of 123 MT. Data on quantity supplied by the other two sources is not available as they are unrecorded sources. Assuming effective demand of 350-400 MT, 123 MT were supplied by the formal sector and some 227-277 MT by informal sources.

(a) Part of the large gap between planned or target requirements and effective demand may be supplied through farmer-to-farmer exchange. The informal seed retailers scattered throughout rural Nepal report that about 10% of their total seed volume is procured from vegetable grower farmers.

(b) Of the 350-400 MT effective demand, 123 MT was met by domestic supply. The remaining quantity of 227-277 MT of vegetable seed was probably imported in large part from India. Seed traders in the terai and lower hills report that over 65% of their seed comes from India. Interviews with informal seed retail traders at Haat bazaar revealed that they unofficially import 85-90% of their total seed sales. Similarly, the seed trader-dealers reported importing as much as 70-75% of their seed from India. Examples of the quantities of different vegetable seeds imported by a few seed traders are presented in Annex K.

Estimated domestic seed production of 147 MT (targeted total production of 172 MT minus expected 25 MT export) will be able to meet 16.2% of the seed targets of 903 MT in 1989-90. The remaining 228 MT or 25.2% of seed required to meet effective demand of 400 MT, will be supplied informally by Indian imports and farmer-to-farmer exchange. Details of production targets of vegetable seed by seed type for 1989-90 are presented in Table 3.

The supply of vegetable seeds from domestic sources has increased over the years. The proportion of imports in total seed requirements is estimated to drop by about 3% in 1989-90 compared to 1988-89. Similarly, exports are estimated to increase from 8 MT in 1988-89 to 25 MT in 1989-90.

Since vegetable seed requirements based on targets outstrip estimated effective demand by a wide margin, there is scope for expanding production and the business of private traders. Along with the expansion in quantity, there is also sufficient scope for diversifying the seed production mix. Presently, four vegetables (radishes, peas, onions and beans) alone constitute about 70% of the total vegetable seed production in Nepal (see Table 3). Other types of

vegetable seeds (okra, eggplant, onion and cauliflower), which are imported in large quantity, could be emphasized in the production program.

Table 3

Seed Production Targets of Different Vegetables in Nepal 1989-90

S. No	Seed Type	Production Targets Kg.	Per-cent of the Total	S. No	Seed Type	Production Targets Kg.	Per-cent of the Total
1.	Radish	90,000.00	52.370	16.	Bottlegourd	1,035.00	0.600
2.	Peas	18,130.00	10.550	17.	Spinach	935.00	0.540
3.	Bean	13,520.00	7.870	18.	Cucumber	810.00	0.470
4.	Onion	10,600.00	6.170	19.	Bittergourd	755.00	0.440
5.	Cowpeas	5,405.00	3.150	20.	Spongegourd	525.00	0.310
6.	B.L.Mustard (Rayo)	5,398.00	3.140	21.	Chili	435.00	0.250
7.	Okra	4,750.00	2.760	22.	Broccoli	250.00	0.150
8.	Cress	4,538.00	2.640	23.	Squash	165.00	0.100
9.	Cauliflower	4,095.00	2.380	24.	Coriander	81.00	0.050
10.	Swisschard	2,657.00	1.550	25.	Capsicum	72.00	0.040
11.	Cabbage	1,753.00	1.020	26.	Methi	30.00	0.020
12.	Carrot	1,728.00	1.000	27.	Knolkhol	10.00	0.006
13.	Tomato	1,644.00	0.960	28.	Ashgourd	5.00	0.003
14.	Eggplant	1,400.00	0.810	29.	Pumpkin	5.00	0.003
15.	Turnip	1,115.00	0.650	30.	Watermelon	5.00	0.003
Total						171.85 MT	

Source: Compiled from Annex L

2.4 Marketing Channels for Vegetable Seed in Nepal

A flow chart illustrating marketing channels for vegetable seeds in Nepal is shown in Figure 4. The top part of the figure identifies the channels in the formal seed subsector. Within this subsector, two separate marketing channels are identified: the private sector channel and the government sector channel. The farmers producing vegetable seeds under contractual arrangements are the main seed suppliers to both channels.

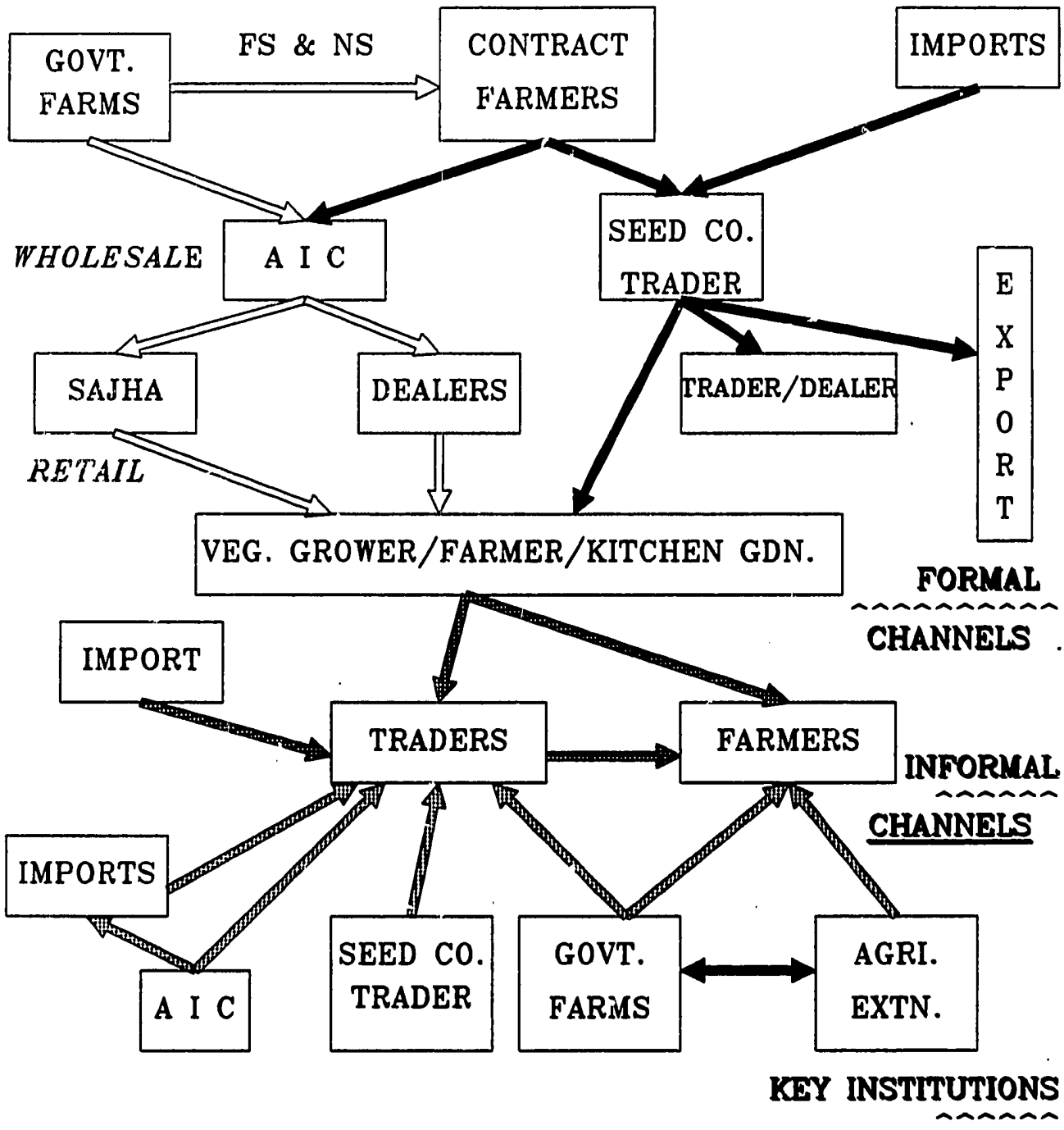
In addition, the government formal sector channel is supplied in part from the government horticultural farms and the traders/seed companies in the private sector channel through imports. AIC and private traders/seed companies function as wholesalers. They also presently assemble or collect seed and do seed processing (especially cleaning and packaging). AIC sells vegetable seeds through its dealers and Sajha. The private traders/seed companies sell either directly to the farmers and/or through the dealers. Except for the retail outlets established by the seed company, retailing of vegetable seeds constitutes only a part of the total business of the traders. Some bookstores are retailing seeds at Dhulikhel and Panchkhal. Vegetable seeds in Nepal are presently exported by the private traders/seed companies alone.

Informal marketing channels in the vegetable seed subsector are also shown in the middle of Figure 4. Here the vegetable seed moves to the farmers through farmer-to-farmer exchange and to retail sales via the small traders. These traders in aggregate import a large quantity of vegetable seed from India and also buy seed from vegetable producers.

The informal marketing channel begins where the formal channel ends. Although not all seeds marketed in the informal subsector channel are necessarily supplied by the vegetable producers who are final consumers of seeds in the formal subsector, informal subsector participants look to them for seed supplies. A major portion of the quantity flowing through informal channels consists of farmer-to-farmer exchange. The informal marketing channel of the vegetable seed subsector will become better integrated over time with the formal channel. This will not be achieved by mandatory rules and regulations but by facilitating interventions.

Figure 4 (see bottom section of figure) also shows the important institutions that should intervene in the present agricultural development system of Nepal and the recipients of their interventions. Private seed traders of the formal channel and AIC, both directly and through Sajha, should use informal seed traders as their agents and/or dealers to sell vegetable seeds. Those informal seed traders should not be viewed as unwanted competitors and exploiters of farmers. Instead, formal channel participants could use the widely scattered presence of informal traders in rural Nepal for the distribution of better quality seeds. This would not only help increase the income and employment of the poor, small-scale seed traders, but would establish a seed distribution network in interior areas at a nominal cost. The agriculture extension agents and government horticultural farms that have the most contact with farmers should try harder to persuade farmers to use improved quality seeds. They could also, along with AIC and private traders, provide seed handling and related training to small traders of the informal channel.

FIGURE 4
MARKETING CHANNELS FOR VEGETABLE SEEDS IN NEPAL



2.5 The Economics of Fresh Vegetable and Vegetable Seed Production

Because they consist mostly of water, fresh vegetables are heavy, bulky and highly perishable. They cannot be carried in a doko or by mule train for more than about one day's walk to a market or to a road without unacceptably high losses.[2] In contrast, vegetable seed has higher value to weight and volume ratios than fresh vegetables. Seed is also far less perishable than fresh vegetables. Isolated production zones that are more than one day's walk from a market or road are generally better suited to vegetable seed production.

These general principles aside, the economic returns to vegetable seed production are usually compared with the returns to foregone crops, typically cereals. Since returns are generally higher to vegetable seed production, analysts conclude that it is more profitable (J.E. Douglas, 1983, HMG/FAO, 1985, etc.) (Annex M). But the analysis should not stop at this point, as farmers have the choice of harvesting vegetables fresh or letting them go to seed. Hence, a second important determinant of the profitability of vegetable seed production that is typically ignored is the economic return to fresh vegetables as opposed to seed production. Relative returns change as infrastructure becomes better developed and as price relationships between fresh vegetables and vegetable seed change. There are four variables that are important in determining whether farmers in a given production zone would do better economically by producing for the fresh vegetable or for the vegetable seed market:

- the physical relationship between production of a fresh vegetable and its seed. That is, the number of kilograms of fresh vegetables foregone by producing one kilogram of seed.
- the additional time required to produce seed and the opportunity cost of tying up land in seed production for the longer period.
- the relative prices of vegetable seed and fresh vegetables prevailing at the time of produce sale.
- transport costs and losses for both vegetable seed and fresh vegetables from a given location to the point of sale. The points of sale may vary between seed and fresh produce.

An example illustrating these economic relationships is tomato seed versus fresh tomato production in Sarlahi. By producing one kilogram of seed, an AIC seed specialist estimates that a grower forgoes 133 kilograms of fresh tomatoes. Given this physical relationship, farmers will opt for seed production only if the price they receive for fresh tomatoes falls below 1.33 rupees per kilogram. The mid-1989 tomato seed buying price was Rs. 175 per kilogram, so there was a strong incentive to produce fresh tomatoes as opposed to seed.

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[2] Losses in transit could probably be reduced by using improved packing techniques, but this has not been established experimentally.

The case of pole beans in Trisuli, Nuwakot is another example of economic trade-offs between the production of fresh beans and seed beans. The seed production program there, in fact, was initiated after farmers found it more profitable to sell seed beans than fresh beans. Heavy supplies of fresh beans on the Kathmandu market from several competing sources at harvest-time caused prices to plummet.

The issue of alternative profitability of fresh vegetable and vegetable seed production can be determined only on a case by case basis, because the physical and price relationships between the fresh commodity and seed vary across vegetable types. Some vegetable seeds have low value relative to volume. Another factor affecting alternative profitability, especially facing isolated producers, is the weight to volume ratio, which greatly affects transport costs. Bulkier vegetables have higher transport costs per kilogram. Their price per kilogram relative to the price of seed per kilogram will likely have to be higher than for less bulky vegetables. The cost of transporting seed to farmers will also affect alternative profitability.

In addition, the economics of vegetable seed production varies from region to region, because each area is unique with respect to its vegetable crop and varietal mix, cropping alternatives, and opportunity cost of rural labor. A good example of how the alternative employment opportunities facing farmers affect incentives to produce vegetable seed is found in the area around Marpha Horticultural Farm in Mustang District. Since the going farm wage rate is Rs. 60 per day but porters command Rs. 150-200 from tourists, the number of seed producers has declined dramatically. In contrast, farmers in remote Rukum District have few alternative employment opportunities and consider radish seed production to be an attractive enterprise, even at AIC's buying prices.

2.6 Constraints to Expansion of Vegetable Seed Production and Marketing

Despite the impressive expansion in vegetable seed production and the emergence of a private vegetable seed trade in Nepal, there are several important barriers to improving the subsector's performance. Many of the problems have to do with an emerging but still immature commodity subsystem, where commercial production of seed is a departure from farmers' age-old practice of keeping their own seeds. Key constraints are listed and discussed below in no particular rank order.

<u>Underdevelopment of the Vegetable Seed Subsector</u>: The entire vegetable seed subsector in Nepal has a low profile among the seed-using farmers, traders and officials. Farmers proudly show the seed retained for replanting and for farmer-to-farmer exchange, although it has often degenerated. Both farmers and traders feel secure using/selling imported Indian seeds, which are considered better quality than Nepalese seeds. The institutional arrangements and performance of the formal public channel of the seed subsector are almost universally criticized for supplying poor quality seed and often the wrong seed type.

Private agro-input dealers typically do not emphasize vegetable seed in their product mix. Returns from sales of agricultural and veterinary chemicals and implements are reportedly substantially higher than from seed. The larger seed companies specialize in the export of two or three vegetable seed types (e.g. radishes, cauliflower and cabbage), and they are not yet prepared to expand their scope and distribution channels. Promotion of particular seed types is rare. Public sector facilitating measures could speed the development process. The low level of private sector development in the vegetable seed subsector is a constraint to rapid expansion of the subsector.

Inadequate Public Sector Support to the Private Sector and Facilitating Measures: Despite the low profile of the vegetable seed sector, it has recently expanded dramatically and progressed through the combined efforts of both the private and public sectors. However, inadequate support and effort have been extended to faciliate private sector participation in the vegetable development program. The supply of agricultural inputs, including vegetable seeds, is still considered a public sector responsibility in Nepal. Private sector vegetable seed traders and companies are not considered participants in the development program; in the informal subsector, traders are believed to be exploiting the farmers. Unfortunately, there are no policies and programs to involve the private sector in the development of the vegetable seed sector. This not only hinders rapid expansion of the sector but also portends a bleak future. In contrast, Nepal's education sector represents a classic example of supporting the private sector under the national education development plan and programs for sectoral development. Similar strategies and programs could also be followed for development of the vegetable seed sector.

Neglected Informal Subsector Channel: This channel supplies at least 60% of producers' vegetable seed requirements in Nepal. It includes the farmer-to-farmer exchange and seed supplied by informal traders (either imported or procured locally). However, the formal sector views this channel as a constraint to subsectoral expansion. From the marketing perspective, this attitude is holding back expansion of the physical distribution system for vegetable seeds. Participants in the formal sector are not utilizing informal traders to distribute the seed to farmers, yet they lack the capability to set up their own distribution system to cater to the large but geographically diffuse demand.

Supply Rather than Demand Orientation of the Vegetable Seed Subsector, Especially of the Formal Subsystem: Vegetable seed subsector development has been supply-led in Nepal. Such a strategy works for only a short period and within certain limits. On the other hand, expansion through a demand-oriented strategy is less constrained. The lack of such an orientation, in fact, is limiting the expansion of Nepal's vegetable seed sector. This is clearly discernible, for example, in the composition of the seed supply, which is weighted in favor of certain vegetables that were grown traditionally; many other types in heavy demand are produced domestically in limited quantity and imported in large quantity as well. This brings up a very basic question in the development of the vegetable seed subsector: How can this subsector, which is supply-oriented and driven by the HMG/FAO technical cooperation project, be self-sustaining after the project terminates? There are doubts that it can sustain itself and fears that its impact will fade as with many such projects

in Nepal and other developing countries. Recently, however, the project has initiated a demand-driven strategy to develop the vegetable seed sector by including additional project components to establish and improve a fresh vegetable market in Kathmandu and collection centers at certain locations (HMG/FAO, 1988). The strategy is to increase the demand for vegetable seeds by improving the market outlets for fresh vegetables. This is a longer-term, demand-driven strategy.

Insufficient Technical Knowledge about Vegetable Seed Among Producers and Traders: Producers of vegetable seed have insufficient technical knowledge on production and post-harvest handling practices and the pros and cons of different varieties. They have not fully recognized the importance of quality maintenance in seed production. Most seed dealers and traders, except a few who have received common training in agriculture, are not knowledgeable about seed handling practices. They often are unable to advise farmers effectively about the suitability of different varieties. AIC mistakes, in which farmers have been provided unsuitable varieties as well as the wrong type of vegetable seed, reveal a low level of technical expertise among AIC staff and poor or neglected post-harvest handling and quality control. The agricultural extension service allocates little or no time and energy to horticultural crops. Cereals, grain, legumes and oilseeds receive priority.

Dominance of Indian Seed: Indian seed is pervasive in the terai and lower hills and generally superior in quality to Nepalese seed. The Nepalese seed industry will be hard pressed to displace Indian seed, which includes temperate varieties that can be produced in Kashmir, Jammu and Uttar Pradesh. The new trade relations present an opportunity for domestic suppliers, however, in that seed dealers have complained of the increasing costs and difficulties of procuring Indian seed.

Variable and Often Low Quality of Domestic Seed: The quality of locally produced seed is highly variable and judged lower than that of Indian seed by traders and vegetable producers. AIC seed is especially suspect. Users of Nepalese seed complain that there are no consistent attempts to enforce minimum seed quality (for germination or purity standards, for example). Both Indian and Nepalese dealers are often accused of selling seed that has outlived its useful life, leading to low germination rates.

Irregular, Unpredictable Seed Supply: Seed dealers claim that sources of seed as well as quantities and types available from individual sources vary from one year to the next. This unpredictability makes it difficult for them to stock a consistent product line sought by vegetable producers over a period of years.

Limited Access of Private Firms to Formal Credit: Private traders, particularly smaller scale seed dealers, lack access to formal credit. Seed inventories are far lower than what traders could sell, because they cannot obtain sufficient working capital from formal sources. Informal credit is available but costly. Credit appears to be less of a problem for vegetable seed producers, since cash outlays are limited. It may be necessary to provide credit to seed producers for grain consumption, however, because some of them produce seed instead of a cereal crop, yet lack cash to buy cereals.

Absence of a Well-Publicized, Effectively Enforced National Seed Law: A National Seed Board was constituted late in 1988 but did not meet during 1989. The Board is comprised largely of senior government agriculture officials, who will likely have little time to meet or focus on clarifying ambiguous issues. A national seed law has been approved (see unofficial translation in Chilton and Shrestha, Annex IV, 1989) but not widely publicized. Provisions regarding seed purity and germination rates are not yet enforced, and no enforcement mechanism appears to be in place.

3.0 VEGETABLE SEED PRICE POLICY

Well-intentioned policymakers often set producer floor prices as a means to ensure "fair" or "acceptable" returns to growers. Typically, significant resources are used to enforce the floor prices to ensure that private traders pay at least the minimum price. Despite the good intentions of government agencies, this policing does not facilitate or support the private sector. When government agencies compel private traders to pay too much for commodities or to sell at prices that do not cover real costs, they are in fact retarding food system development. When returns are negative or barely positive, private agents will not perform marketing functions, and underfunded and understaffed government agencies will have to perform those functions themselves. Private agents need strong incentives to perform agricultural marketing functions that have real and significant costs associated with them. Setting "fair" or "acceptable" floor prices is partly a labor-intensive analytical task and partly a political activity where interest groups compete with each other.

3.1 AIC Procurement Prices: Their Misinterpretation and Effects on Producer Incentives

The government of Nepal does not fix floor prices of vegetable seeds. The National Seed Board does, however, set a government approved price for buying and selling of vegetable seeds by AIC. Vegetable seed subsector participants have misinterpreted and misused this price. Extension agents, traders, farmers, and others tend to take AIC's procurement price as the floor price. When farmers ask traders to pay more than AIC's procurement price, the traders respond that AIC's price is government-fixed. Similarly, the farmer tries to use AIC's price as the floor price when supply is high. On occasion, traders have paid the farmers more than AIC's procurement price but only after much bargaining.

During the 1988-89 season, frost and winter rain damaged the radish seed crop in Bhaktapur; as a result, the supply was an estimated 15-20% less than expected. Realizing the decreased supply and the continuing devaluation of the Rs. against the US dollar, farmers asked to be paid more than AIC's procurement price. Farmers had to bargain hard and long with the traders and submit revised cost estimates for the production of radishes (with decreased production per unit of land) and wheat to convince extension agents and officials. Even then, only a few farmers succeeded in receiving about Rs. 5 per kg. more than AIC's procurement price.

AIC's buying price, which clearly is not a floor price, is not subject to any enforcement when the supply situation tends to depress the price below the buying price. On the other hand, since those prices are taken informally as government-fixed prices, they tend to become rigid even when the supply situation is tight. When the AIC price is interpreted as a ceiling or fixed price in a market of tight supplies, returns to vegetable seed growers are diminished. As a result, AIC's buying price on vegetable seed set by the National Seed Board tends to reinforce price rigidity in the vegetable seed market. Clearly, this rigidity does not stem from a quasi-oligopsonistic

market structure or AIC taking a price leadership role. AIC cannot change buying prices depending on the supply-demand situation and play the leadership role. Its buying price has to be changed by the Board, so AIC cannot independently become the leader in the market. Since 1983, buying and selling prices have been revised only once a year (see Appendix N).

3.2 Determining Vegetable Seed Prices Based on Cost of Production Estimates

In a developing country such as Nepal, estimating the cost of producing vegetable seed is a difficult task. A major cost component is household or farm labor. Most seed-producing farm households rely principally on their own household labor and do not hire wage laborers, except for peak period operations. One methodological issue is whether this household labor should be valued at the prevailing market wage rate or at the opportunity cost of household farm labor, which is usually thought of as the return to a competing agricultural enterprise. The prevailing wage rate may vary within a cropping season, so that farmers who hire laborers pay more for some operations than others.[3] Not all vegetable seed production activities are performed during peak seasons when seasonal wage laborers command the highest premium. A somewhat more realistic means of determining these farm labor costs is to value labor performed during different periods of the growing season at prevailing intra-seasonal wage rates. The cost of wage and household farm labor will also vary from area to area, depending upon alternative income-generating employment opportunities.

An approach to valuing farm labor that avoids the problem of choosing a daily wage rate is to calculate returns to household labor for an enterprise, such as vegetable seed production, as a residual, after netting out all other costs from gross returns. This allows analysts to compare returns to competing enterprises without tackling the thorny issue of valuing farm labor during different periods. This approach does not, however, account for intra-seasonal variation in implicit agricultural wage rates, which can swing widely and represent a binding constraint on effective performance of key peak season operations.

In estimating returns to a cropping enterprise as a residual or in trying to value labor, returns to labor are likely to vary significantly for producing a particular vegetable seed crop across the diverse range of agro-ecological zones and production systems in Nepal. Attempts have not been made in this study to calculate costs of production for a wide variety of vegetable seed and fresh vegetable crops. This effort could, however, be made in the future depending on time and resources.

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[3] Rural households also provide wage laborers with food, which needs to be valued and incorporated in the prevailing wage rate. Food provided in kind may be an important part of the total payment to labor. Note that food prices may vary seasonally, particularly in grain deficit areas.

3.3 Disincentive Effects of Pan-Territorial Pricing

To the extent that AIC's buying and selling prices are interpreted as fixed prices, they are pan-territorial prices, meaning that they are fixed across all geographic zones. Pan-territorial pricing encourages private traders to buy vegetable seed or any other commodity from those areas that minimize marketing costs and maximize profits. These areas are typically close to centers of demand, whether urban areas or production zones where the seed will be sold, or near road and airport infrastructure for ease of shipment to domestic or international markets.

In the case of vegetable seed, pan-territorial pricing is a disincentive to traders to buy seed from growers in remote production zones. This is particularly true for exporters, who will concentrate their efforts in the Kathmandu Valley and surrounding areas, close to the airport. From the farmers' standpoint, pan-territorial pricing puts remote hill farmers at a competitive disadvantage vis-a-vis producers in more accessible areas. Since private traders will buy seed in the more accessible areas, government agencies such as AIC will have to buy seed in remote areas and will likely assemble, condition, store and sell it at a loss. AIC cannot incur losses indefinitely, even with government subsidies.

If pan-territorial prices are set too high for private traders to earn profits even in accessible areas, government agencies will be the only available buyers. Clearly, this is not sustainable from a budgetary standpoint, and the private sector will be forced to look for other opportunities.

3.4 Perverse Effects of Fixed Prices

AIC is forced to pay fixed prices for vegetable seed, while private traders are able to pay more. Private traders are paying more and in some cases offering higher prices for seed that has had a preliminary cleaning. Since AIC lacks the flexibility to offer premia for higher quality seed, it often buys lower quality seed with more foreign matter than seed procured by private traders. Farmers using AIC or a government farm as their sole buyer have no incentive to improve seed quality and hence post-harvest handling and processing practices. At a minimum, AIC and government farms should be allowed to offer premia for higher quality seed. This policy would be difficult to implement because of the equipment requirements and high costs of testing small individual lots of seed. Organizing farmers into groups and training them to carry out preliminary cleaning under AIC or government farm supervision might be a first step in improving and testing seed quality. Establishing clear and objective grades of seed, which could be used in testing and classifying seed, would also help.

3.5 Possible Effects of Open Market Pricing

Although growers in remote production zones will receive lower prices for vegetable seed than growers in accessible zones, open-market pricing will create an incentive for them to produce the highest value (per unit of weight/volume) vegetable seed that can be grown in their agro-ecological zone.

This is desirable from several standpoints. First, growers in remote zones will specialize increasingly in those commodities, including high-value vegetable seed, in which they have an agro-ecological advantage and which yield the highest possible returns. This specialization will increase their incomes and allow them to purchase lower-value crops, particularly grain, in which lower-lying, more accessible zones have a comparative advantage. Second, the highest value commodities tend to command the highest prices in urban and foreign markets and typically have the largest markups or potential profit margins. Thus, private traders will be encouraged to come to remote areas to buy seed. Over time, they may also enter into contracts with growers and send their own extension agents, who ensure that producers follow prescribed production and harvesting practices in order to attain the highest quality output and avoid the risk of losses due to pest attacks or improper cultural practices.

4.0 ALTERNATIVE INSTITUTIONAL ARRANGEMENTS

The term, "alternative institutional arrangements," refers to ways in which agricultural production and marketing can be organized to guarantee that sellers identify a buyer and buyers a seller, to set output prices at a certain level or within a certain range, to specify product quality, quantity, and timing/location of delivery, and to spread or share the risks of production shortfalls and gluts. Institutional arrangements need not involve government agencies but can be entirely private. Examples of such arrangements include trader or processor contracts with individual farmers or farmer organizations, input distribution and product marketing by farmer organizations, joint ventures between local and foreign companies, contracts between parastatal agencies (such as AIC) and either private traders or farmers, and other possibilities. This section will discuss the advantages and disadvantages of several institutional arrangements.

4.1 Producer Groups

Producer groups or farmer organizations (FOs), if properly organized and managed, can effectively represent the interests of vegetable seed growers. Potential advantages of FOs include the following:

- greater bargaining power vis-a-vis private traders;
- an ability to serve as a focal point for government and donor aid, as well as private sector extension efforts;
- procurement and management of investments in harvesting and processing equipment that an individual grower could not afford to buy; and
- coordination of selection of the varieties of vegetable seed crops, production practices, harvesting, and preparation of seed for market.

This latter advantage is especially important in production of open-pollinated varieties of vegetable seed, because it is critical that farmers in a given area all grow the same variety in order to maintain varietal purity.

Organization of farmers into groups can also be advantageous for private traders, despite the group's increased bargaining power over individual growers. Dealing with one entity rather than many dispersed producers would lower transactions costs for traders. If farmer organizations began to use improved production and post-harvest handling practices, and better technologies were introduced for sorting, grading, cleaning and packing seed at the farm level, private traders could procure higher quality seed that is ready for market. It might cost traders less to pay farmers for adding this value than to pay hired (urban) labor to sort, clean and package or to invest in costly equipment. Processing in production zones would also lower transport costs per unit of final product.

4.2 Forward Integration of Producer Groups to Marketing

Farmer organizations in countries such as the U.S. often perform marketing functions for producers. They typically provide processing services and facilities so that producer groups can add value to commodities and capture a greater proportion of consumer expenditure on agricultural products. Farm organizations will hire specialists to perform these marketing functions. It may be premature to expect producer groups in Nepal to perform marketing functions, as most of them are informal and poorly funded or managed. In addition, they need to master other functions, such as input and credit procurement and coordination of farm production, before taking on functions such as marketing management.

Several examples of producers' efforts to market their own produce illustrate potential difficulties in Nepal. Informal interviews during RA fieldwork revealed that vegetable producers near Pokhara faced predatory price cutting by traders based in Pokhara when they tried to sell their produce directly in town markets. Apparently, collusive traders sold vegetables at a loss for short periods to force the producers out of the urban market.[4] Similarly, vegetable producers in Aghor, south of Daman on the road to Hetauda, reported that their net returns were generally lower when they accompanied produce to Hetauda and Birgunj than when they sold it at the farm-gate (roadside).

Direct marketing of vegetable seed by farmers is a less viable option for producers, because it is more specialized, requiring processing, packaging, cool storage, promotional activities, and retail outlets (agro-input shops) in towns or vegetable production zones. Representatives of producer groups are probably not generally suited to perform all these marketing functions. The isolation of many vegetable seed production pockets from potential markets is another constraint.

Despite potential difficulties in marketing vegetable seed, producer groups could invest in and collectively operate seed processing and storage units. In this way they would capture some of the value added to vegetable seed products. As these FOs gained experience and expanded production, they could consider taking on selected marketing functions, such as transporting vegetable seed to market and selling the seed wholesale to retail dealers.

Farmers' decisions to undertake marketing functions usually performed by specialists are largely based on their perception of the potential net benefits to be gained from doing the marketing. If traders are viewed as collaborators who perform necessary functions at reasonable returns, farmers may not feel compelled to bring their produce to urban markets. As an example, we interviewed a terai trader selling vegetables produced by terai

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[4] Similar allegations of unfair practices and traders defending their vested interests have arisen in the defeating of the DFAMS proposal to construct an urban horticultural marketplace in Pokhara. Apparently, some traders do not wish to see competition promoted in the fresh vegetable trade in Pokhara.

farmers at Kalimati wholesale market in August 1988 who was effectively coordinating fresh vegetable marketing to his own and the farmers' benefit. The trader was telephoning terai farmers from Kathmandu with instructions to assemble a truckload quickly and ship it to Kathmandu when price prospects were favorable. This is a good example of how coordination between a trader who has won the farmers' trust and producers can be mutually beneficial.

4.3 Organization of Private Traders into a Trade Association

Vegetable seed traders in Nepal have taken the initiative to form an association to promote their interests. The association is likely to have numerous advantages, including the following:

- representating traders with an association that can discuss seed sector policies and regulations with government agencies, particularly the National Seed Board, VDD and AIC.
- sharing investments in processing and testing equipment, thereby lowering costs and achieving scale economies.
- pooling resources to invest in more effective market intelligence, including surveys in foreign markets.
- encouraging government agencies, such as TPC, to help evaluate market opportunities and to argue on their behalf for policy and regulatory reforms.
- improving bargaining power vis-a-vis foreign importers and prospective joint venture partners.
- serving as a useful information sharing network for traders, which could identify and screen new seeds and technologies that might be suitable for Nepalese growing conditions.

A trade association could be disadvantageous for farmers if it became oligopolistic and set prices unduly low, discriminated in its offer prices, or insisted on dealing with growers on an individual versus group basis. Any potential collusion could be offset by AIC or another government agency standing ready to buy vegetable seed at higher prices than private traders offered. This assumes that AIC could sell the seed at a profit, however. Nevertheless, AIC should not intervene in the market and buy at higher than open market prices simply to give growers higher returns. This would be unsustainable subsidization that would send producers the wrong signal.

4.4 Contracts with Individual Farmers

High-value agricultural products are often produced under contract in both developed and developing countries. Contracts are typically negotiated between processors or trader-exporters and producers to reduce risks for both parties. Processors and traders are assured of supplies and protection against excessive price increases, while producers are guaranteed a buyer and a minimum price. Contracts may also be designed to offer premium payments to

growers for preliminary processing, effective harvesting and post-harvest handling practices, and higher grade produce.

There are many variants of production/marketing contracts. Forward deliverable contracts specify minimum quantities that growers must provide and prices or some formula (based on spot market prices) for calculating prices. In this case, growers have to procure their own inputs and credit. At the other end of the spectrum are resource-providing contracts, which not only set quantities and prices but specify that processors or traders provide inputs, typically on medium-term credit, and carefully supervise the production process. In this latter case, growers become in essence wage laborers (on their own land) who must closely follow recommended production practices.

Problems often arise when one party wishes to break a contract, and there are no legal mechanisms for enforcement. This becomes an issue when open market prices diverge widely from contract prices negotiated before the growing season. When there is a shortfall in production and prices rise to levels well above those specified in the contract, producers have an incentive to break the contract and sell on the open market. One way to avoid this problem is to guarantee a minimum grower income in the contract, so that producers do not bear the full risk of a production shortfall. This type of contract is reportedly used in vegetable seed production in India. In such an arrangement, the processor or trader bears relatively more risk than the grower in a production shortfall. Another scenario is when a bumper crop encourages processors or traders to buy produce on the open market below the price specified in the contract. That is, they fail to honor the higher price that they negotiated with producers. They may insist on re-negotiating the price or buy less than specified in the contract. The best deterrents to this behavior are probably an effective legal system that guarantees the inviolability of contracts and strong farmer organizations whose members include most if not all producers of the contract commodity in a given area.

Many vegetable seed production contracts in Nepal are in the forward deliverable category. Traders agree to buy seed from growers at a negotiated price. In a few cases traders negotiate resource-providing contracts through which they provide inputs on credit, including extension supervision, and agree to buy the crop at a set price. The success of the latter type of contract depends heavily on good will and trust between the contracting parties. It is usually negotiated only after the seed buyer and producers have built good rapport after working together for several years.

In addition to price, contracts can specify minimum quantities supplied per farmer, quality levels (grades), preliminary processing and packaging requirements, timing of delivery, place of delivery, means of financing producer inputs or trader purchases of output, timing and method of payment, penalties for non-compliance, and arbitrators in case of disagreement or non-compliance. Contracts between processors and producers in industrial countries typically have many of these features. Additional specifications are likely to emerge in Nepal's vegetable seed subsector as Nepalese traders increasingly target international markets or negotiate joint ventures with foreign firms.

A potential problem for processors and traders with individual (as opposed to group) grower contracts is that traders are not likely to be willing to bear the costs of pressing charges against producers who fail to comply with contract terms and conditions. The transaction costs associated with prosecuting individual non-compliers are simply too high. Hence, processors and traders may prefer to negotiate contracts with farmer organizations, despite the considerable bargaining power that these represent, in order to minimize the risk of non-compliance and financial loss associated with providing inputs on credit and receiving nothing in return. Well-managed FOs are generally able to discipline producers who fail to comply with contracts by threatening to drop their memberships. If the FOs are able to procure inputs at attractive prices, provide processing and storage services, bargain effectively for fair output prices, and provide financial and other services, members are not likely to defect to go it alone.

4.5 Joint Ventures with Foreign Partners

Joint ventures are a means for local firms to procure foreign capital, technology and access to international markets relatively quickly, although significant costs may be associated with this access. By creating a joint venture, local traders do not have to invest heavily in market intelligence nor to spend much money visiting prospective buyers and negotiating contracts. Probably more importantly, a foreign partner can provide costly technology to which the local firm lacks access. As a result, products of the highest quality can be produced and exported to compete effectively in the international marketplace. The opportunity to gain access to such technology is appealing to entrepreneurs in countries where high quality products are difficult to produce under local technological and management conditions and where the international market requires a particular variety or brand produced and marketed by an international company using proprietary technology.

Joint ventures in the Nepalese vegetable seed subsector would provide an avenue for producing hybrid varieties and marketing seed in highly competitive third country markets outside South Asia, such as Western Europe. As Chilton and Shrestha point out, Nepal is advised to promote development of production, domestic marketing and selective export of open-pollinated varieties in the short to medium run. This would allow Nepalese farmers to improve their skills and production practices with known varieties and technologies. Nepal would thus become more attractive to foreign investors, who examine both the cost and quality/skill of farm labor in deciding whether to invest resources in hybrid vegetable seed production.

The main disadvantages of joint ventures are that foreign expertise, technology and market access are expensive, and local entrepreneurs may sacrifice much control in the production and marketing process. Much depends on how the joint venture is structured, and whether local producers and traders acquire new skills, knowledge of market requirements and conditions, and technology that they can use on their own once the joint venture is terminated. It is necessary to negotiate an orderly transfer of skills, knowledge and technology and a terminal date to the joint venture and to phase out foreign participation, although international partners are likely to

oppose such a transfer over the medium run. Another important issue to negotiate is how the vegetable seed produced in Nepal is packaged and marketed. If the seed is presented as the product of a multinational corporation, Nepal may not have the right to promote it as a Nepalese product recognized for particular characteristics. That is, exporting seed under the aegis of a multinational will not likely allow Nepal to develop, promote and exploit a particular market niche over the long run.

One way to offset the market power of a multinational firm is to negotiate a joint venture through the trade association. This could prevent any divide-and-conquer negotiating strategy on the part of the foreign firm. International legal expertise is probably needed to ensure that all important and relevant contract provisions are clearly delineated and that legal means exist to press for damages locally and in countries where the foreign firm is based in case of non-compliance with specific provisions. Given their isolation, limited information about the international market, and financially weak position, Nepalese exporters will be at a disadvantage in negotiating with foreign firms. The HMG and donors could offset these disadvantages by funding improved market intelligence and study/promotional trips by experts and private exporters to foreign countries to discuss potential investment opportunities and contractual relationships. Donors might also subsidize visits to Nepal by prospective foreign joint venture partners or buyers of Nepalese seed.

5.0 POLICY PRESCRIPTIONS FOR PROMOTION OF THE VEGETABLE SEED SUBSYSTEM

5.1 The National Seed Law and Seed Industry Development

The National Seed Board needs to play a more active role in fostering a truly productive public and private partnership in seed industry development. The Board needs to meet regularly, include representatives of the private seed industry other than Kathmandu-based traders and clarify ambiguous aspects of the National Seed Law. In addition, the Board must develop a program with the capacity to enforce workable elements of the seed law. This could contribute greatly to building producer and seed dealer confidence in the quality of commercial vegetable seed.

5.2 Remove Price Controls on Vegetable Seed

The prices set by the Board serve as fixed prices for AIC and may constrain private traders as well. If AIC is allowed to purchase seed at above the reference price, it can compete effectively in the vegetable seed trade, which will benefit farmers. Trying to fix national seed prices on the basis of universal cost of production estimates is not recommended, given the diversity of production systems, costs and economic opportunities in different rural areas. Scarce analytical resources would be far better allocated to formulating and implementing policies, programs and projects that facilitate development of the vegetable seed industry.

5.3 Promote Alternative Institutional Arrangements for Vegetable Seed Production and Marketing

HMG agencies, particularly VDD and AIC, have played a positive, leading role in developing the vegetable seed industry since the late 1970s. As the private sector develops its capacity to multiply and distribute vegetable seed, the role of HMG agencies will need to be continually evaluated and redefined, where necessary and appropriate.

The legal monopoly that AIC once shared with selected government farms on contract seed production is no longer appropriate. The private sector is willing and able to negotiate contracts with producers and should be encouraged to do so, rather than being viewed as disruptive and counterproductive competition (as AIC officials tend to view private traders). AIC can continue to have seed produced under contract as a means of ensuring adequate competition with private traders (to the benefit of farmers) and in remote areas where private traders are unwilling to go. Promoting vegetable seed production in remote zones will require subsidies in early years, which in principle can be removed once production of the highest value seed types in remote areas is well-established and private agents show an interest in buying seed. The danger is that until infrastructure improves, remote production zones will require long-term subsidies that may be unsustainable.

The VFC (Vegetable, Fruit and Cash Crop) Program of the USAID-funded Rapti Development Project has subsidized introduction, supervision and marketing of Mino early variety radish seeds in Rukum district, which was once considered too remote and inaccessible to interest the private sector. The project held a vegetable seed marketing workshop in Tulsipur in May 1989, which was attended by the vegetable seed traders from the terai towns of Narayanghat, Butwal, Tulsipur and Nepalgunj as well as by Rukum producer representatives. An informal association of five seed dealers has formed and was negotiating radish seed production contracts with growers in Rukum district for the 1989-90 production season at the time of the RA fieldwork. Although HMG and USAID initially subsidized radish seed production, private traders are now taking the initiative and should be able to sustain the development of vegetable seed production in Rapti. Rukum's Mino early variety radish seed has an excellent reputation and is highly valued by private traders and vegetable growers. There is also significant potential for expansion of cabbage, cauliflower, and broad-leaf mustard seed production in Rukum. A remaining obstacle to self-sustaining seed industry development in Rukum is effective production supervision. Seed dealers will probably eventually need to hire agents who will remain in production zones during the growing season to supervise seed production. Assistance from the Agricultural Development Office (ADO) and VFC will be necessary for several more years as the private seed dealer association gains financial strength and until it can afford to invest in private production supervision. A gradual change in mentality from passive shopkeeper in a fixed place of business to agro-entrepreneur willing to take risks and spend time in the production zones will also be required.

A related issue that will very much affect the viability of private investment in contract seed production in remote areas is contract enforceability. Private traders will be unwilling to make costly investments in extension and inputs for seed production if they have no assurance that contract growers will provide them with quality seed. The strength of the relationship between the contracting parties and legal mechanisms for enforcing production contracts are the only guarantees of contract inviolability. As discussed in section four, private traders will find that attempting to enforce production contracts with reluctant individual growers who sell to the highest bidder will involve prohibitively high transaction costs. Hence, it will be in the traders' interest to negotiate contracts with producer groups, who can more effectively enforce contracts (or compensate for the defection of a few individuals) and decrease the costs of input distribution, seed cleaning and collection.

A final set of institutional issues concerns production or multiplication of commercial seed by government farms under VDD/FAO leadership. While this arrangement may have been necessary and desirable five years ago, it should be phased out in favor of private or AIC contracts. Government farms should focus on production and distribution of foundation seed, which is then multiplied under the supervision of other organizations.

5.4 Provide Further Technical Training in Vegetable Seed and Fresh Vegetable Production and Marketing to Producers and Traders

VDD, with support from FAO, has provided significant training to contract vegetable seed producers and vegetable growers in selected production pockets. These commendable efforts need to be continued and expanded. Training of seed dealers should also be a priority for public sector support. Seed traders have expressed an interest in learning more about seed production and processing technology, as well as the suitability of specific varieties for different production zones. The VDD/FAO workshop on private sector seed industry development in March 1989 and the USAID/Rapti Development Project workshop in May 1989 were important first steps in this process, but they need to be supplemented by more focused and specific training programs.

5.5 Provide Capital for Promotion of Private Investment in Vegetable Seed Marketing

Few of the entrepreneurs interviewed during the RA fieldwork had ever obtained loans from formal sector financial institutions, particularly the ADB/N. One reason is that ADB earmarks most of its funds for agricultural production activities. Production activities receive priority; marketing is regarded as a second generation problem, which unfortunately reflects a production bias.

When commercial agricultural production activities are viewed in a marketing context, an approach is taken that emphasizes the development of production and marketing enterprises simultaneously. The decision to produce an agricultural commodity for the market is a production as well as a marketing decision, and market demand and arrangements need to be considered early in the process. If they are not, and marketing is viewed as something to deal with in the "second generation," production activities have a high risk of failure. For example, many producers of Nepal are abandoning apple production due to inadequate attention to marketing arrangements and infrastructure in promoting production in remote areas. The ADB/N preference for production loans reflects the common perception among HMG officials and analysts of agricultural marketing as a sort of necessary evil in the food system. Many view marketing agents as exploitative middlemen or intermediaries who take a disproportionately large cut in moving produce from farm to consumer. In fact, some schemes seek to eliminate the middleman by encouraging direct farmer or farmer organization marketing of agricultural products. Large gross margins are invariably perceived as evidence of unfair marketing practices, including use of market power to pay producers low prices or contrive scarcities to force up consumer prices. There is rarely an appreciation of the costs and risks of performing agricultural marketing services, the investments that marketing agents need to make in order to achieve scale economies, and the time, place, form and possession utilities that marketing agents provide. Finally, it should be noted that certain lower castes in Nepal are more likely to participate in agricultural marketing and that negative perceptions of marketing agents are often at least partly related to their caste.

In informal interviews with vegetable seed dealers, most respondents reported never having approached ADB/N for a loan. They cited unnecessary harassment and delays on the part of ADB/N officers designed to elicit under-the-table payments of 5-7% of the loan value for access to ADB funds. Collateral requirements can also be a barrier to prospective borrowers. One seed dealer reported that various members of his family obtain loans for agricultural production projects, from which funds are diverted to the agricultural inputs business. Credit is fungible and will be allocated to the enterprise with the highest returns, however much bank and government officials strive to channel it to "desired" or "priority" uses.

The working capital requirements of the trade in seed and other agricultural inputs are highly concentrated at two or more times during the year in the months before crop planting. Traders need working capital to procure their seasonal stock on a timely basis, just as farmers prepare to sow vegetable seed. Loans for working capital purposes could be short or medium-term, varying from four to eight months in duration. Loans would be shorter for traders who sell principally on a cash basis and longer for traders who provide inputs on credit to farmers facing the cash flow problems that are quite common among Nepalese producers.

In fact, providing working capital credit to private traders might be an efficient means of extending input credit to producers. This would lower administrative and transaction costs for financial institutions. It would also help to expand production of higher value commodities, for which improved production inputs involving a significant cash outlay are necessary.

Planned innovations that could help rural agro-entrepreneurs procure needed working and investment capital are a proposed UNCDF funded venture capital program of U.S.$2.8 million to be administered by ADB/N. The venture capital "window" would be managed by a specialized management firm (or NGO) under contract with ADB/N. Field personnel and central-level technical support would be provided by ADB/N. A second venture capital fund would be jointly managed by the MOA, the Nepal Rastra Bank, two commercial banks and the Fund. This fund would have an initial capital of U.S.$2.4 million. Applications would be channeled through the MOA, which would provide technical review, appraisal of the proposed project's viability and market surveys. This second fund appears more likely than the ADB/N fund to be targeted to larger-scale entrepreneurs, many of whom are likely to be urban-based. Although the proposal is experimental, such a program would help agro-entrepreneurs obtain needed capital.

6.0 THE ROLE OF THE PUBLIC SECTOR IN SEED INDUSTRY DEVELOPMENT

6.1 Defining an Appropriate Role for Public Agencies

Private enterprise promotion gathered momentum in developing countries during the 1980s, as donor support for subsidizing money-losing parastatal agencies dried up, and governments in developing countries recognized that indefinite subsidization of parastatals out of limited public sector funds was not sustainable. Private sector ideologues argue that developing country governments need to withdraw from the food system, leaving the field to private entrepreneurs. Their strong advocacy for private sector development often relegates the public sector to the rather passive role of establishing a favorable investment climate and economic/policy environment. This section lays out a more interventionist approach in which the public sector actively facilitates private sector development and performs useful and necessary functions that the private sector has no incentive to perform.

6.2 Redefining the Role of the Agricultural Inputs Corporation (AIC) in the Vegetable Seed Sector

The extreme view is that AIC should completely withdraw from the vegetable seed business. Currently AIC provides foundation seed to growers in areas that the private sector could service in many cases and competes with private traders in procuring certified (multiplied) seed. We envision a role that falls somewhere between these two extremes.

As an agency with offices and storage facilities in all 75 districts of the country, AIC has a vast national network that can and should be tapped. AIC should actively engage in contracts with growers in remote zones where the emerging private seed industry cannot afford to go. AIC should not concentrate on areas where the private sector is willing and able to work with farmers. In these more accessible areas AIC can help to enforce the Seed Act and regulate (and perhaps compete with) the private sector if there are farmer complaints and any evidence of unfair marketing practices.

Farmers are likely to be far more perceptive than government concerning what is fair and competitive in private sector prices and contract terms and conditions. In many developing countries, government officials think that private traders reap monopoly or oligopoly profits. Careful accounting of all the direct and indirect costs of private firms typically reveals that profits are not excessive. A useful function of economic analysis is to document marketing costs and margins, thus demonstrating that returns to most private trading are likely to be modest.

As part of its regulatory task, AIC could stand ready to buy vegetable seed at prices higher than the private sector if there is evidence of private sector abuses, such as unfair pricing. AIC could also collaborate with the VDD to be the principal seed testing organization, guaranteeing seed purity and germination rates. If private traders or farmer organizations are unwilling to invest in and manage seed testing equipment, AIC could make this

investment (with assistance from donors) and do the testing at some of its field stations. AIC, in cooperation with the agricultural extension service, could also work closely with farmer organizations to introduce mechanized processing (cleaning/grading).

6.3 Vegetable Development Division (VDD) of the Ministry of Agriculture

VDD has played a critical pioneering role in launching the vegetable seed industry in Nepal. VDD produces foundation seed through government farms and provides seed cleaning and testing services at several locations under an FAO-funded project. Its role is evolving from promoting vegetable seed production to facilitating development of vegetable product marketing with DFAMS. The FAO project, VDD, and DFAMS are collaborating in the construction and management (over the first five years) of the Kalimati wholesale market for fresh fruit and vegetables in Kathmandu.

An important issue for the private seed industry is whether VDD will continue to maintain a monopoly, along with government farms, in foundation seed multiplication. Private traders assert that the supply of foundation seed is inadequate for multiplication of certain seed types, such as radish seed. Several private importers would like to supplement VDD-produced foundation seed with foundation seed from other countries. According to the Seed Act, the National Seed Board should approve all new and imported seed varieties before they are released to farmers for multiplication. Since the Board will probably meet only once or twice a year, it is unlikely that import permits will be granted quickly for foreign foundation seed. This issue should be resolved by joint public and private sector discussions. In seeking to facilitate the emergence of a private seed industry, it is imperative that HMG support the private traders.

6.4 Agricultural Extension Service

The extension service in Nepal is charged with many tasks and activities that are difficult to perform well under the best of circumstances. In a country such as Nepal that has enormous transport costs and difficulties, it is unfair to expect extension agents to provide effective supervision for all crops in all areas. Clearly, the private sector has an important role to play in providing extension services in areas where it has organized or contracted with growers. The higher the value of the vegetable seed crop and the more costly the inputs used in its production, the more incentive a private seed entrepreneur has to ensure the best and most diligent extension support. In fact, several seed traders have already placed resident agents in villages where contract growers are concentrated. As private firms employ more extension agents, the supply of well-trained extension agents, with some special training in vegetable seed production and handling methods, will need to expand. The public sector could consider providing additional support to general agricultural extension training programs in Nepal. Selected extension generalists, wishing to pursue careers with private firms in the emerging private vegetable seed industry, could receive supplemental, specialized training.

As in the case of AIC, and perhaps in collaboration with AIC, the agricultural extension service should concentrate its efforts in more remote areas where the private sector will not initially venture. In order to effectively provide such support, public extension agents may need some training in specific types of vegetable seed production, as well as access to seed, fertilizers, agro-chemicals and equipment such as sprayers.

6.5 The Trade Promotion Center (TPC)

TPC has recently expressed an interest in promoting vegetable seed exports from Nepal by consulting representatives of the Seed Traders' Association. TPC has no vegetable seed specialists on its staff, but it has asked the exporters for specific suggestions on how to assist private export of vegetable seed. This is a promising initiative.

The TPC can probably most effectively assist the private seed industry by arranging study trips to foreign markets for private exporters, perhaps in collaboration with private traders. TPC also claims to have received telex inquiries about vegetable seed export opportunities, which it can and should pass along to the Seed Traders' Association. Last, TPC can assist the private sector in supporting positions and recommendations of the Traders' Association in public fora, such as the National Seed Board.

7.0 Suggestions for Further Applied Research on Vegetable Seed Marketing in Nepal

Rapid appraisal of a commodity system is a useful tool for illustrating production, marketing and policy constraints and identifying under-exploited market opportunities. It is also typically the first step in a longer term applied research process. RA can raise key issues for further empirical investigation and suggest promising avenues of additional research.

This RA exercise has focused on policy, institutional and regulatory issues, in part due to the professional training and interests of the authors, but also because while these issues are very important for the development of Nepal's vegetable seed industry, they have received scant attention. Further research could involve monitoring experiments in institutional arrangements, such as the contracts between terai-based seed dealers and Rukum producers. The monitoring of the privatization of LAC contracts with farmers in its command area is another area worthy of further applied research. The operations and performance of the Vegetable Seed Traders' Association, based in Kathmandu, could also be tracked and will probably provide interesting lessons in private sector self-promotion and public-private collaboration.

Monitoring contractual arrangements between seed traders and farmers should include collection and analysis of data in the following areas:

- prices and incomes received by producers;
- timing of payment relative to seed delivery to traders;
- costs and timeliness of inputs provided to farmers, such as foundation seed, pesticides, fertilizer and credit;
- costs of post-harvest handling and seed cleaning/processing, and how they are shared by farmers and traders;
- the sharing of risks associated with crop shortfalls and seed prices diverging widely from contractually agreed upon prices;
- producer use of revenues from seed production;
- performance of any farmer organizations, formal or informal, in negotiating with seed buyers, procuring credit and inputs, and investing in village-level seed storage and processing infrastructure;
- opinions of growers and traders on the fairness of the distribution of returns, rights, risks and responsibilities in contract production of seed;
- trader distribution channels for contractually produced seed and the use of improved packaging and promotional efforts to sell this seed; and

- end-user (domestic vegetable producers, foreign importers) opinions of the quality of contractually produced seed.

As detailed in Annex O, an additional market profile (to supplement the Bangladesh study) is strongly recommended for the Indian vegetable seed industry. Indian seed is imported in large quantities by Nepal, and there is much to learn from a critical review of the development of the Indian vegetable seed industry. Contract arrangements with farmers and the role of the public sector in facilitating or promoting the emergence of a private vegetable seed industry are worth studying. Monitoring the recent Indian experience in liberalizing import policies that affect vegetable seed and investment opportunities for foreign firms would also be instructive for Nepal in considering future joint venture opportunities with prospective foreign partners. Besides, assessment of the probable impact of the changed trade relations with India on fresh vegetable and vegetable seed trading in Nepal would be very timely and helpful for developing future strategies.

Further study of the Seed Law and the operations and performance of the National Seed Board are recommended. It is one thing to legislate a seed law, yet quite another to implement seed regulations effectively in a country such as Nepal, with such dispersed seed and vegetable production areas. Effective yet flexible implementation of a seed law is critical, however, in building seed dealer and vegetable producer confidence in the quality and reliability of Nepalese seed. This would seem to be a key institutional precondition for the emergence of a viable vegetable seed industry in Nepal and for any foreign investment.

Finally, we recommend further analysis of the economic relationship between production of fresh vegetables and vegetable seed. To do this analysis, it is necessary to establish the following relationships:

- vegetable seed produced per foregone kilogram of fresh vegetables;
- vegetable seed prices (per kilogram) relative to the fresh vegetable prices (per kilogram); and
- transport costs (per kilogram) for fresh vegetables and vegetable seed. This would account for losses and weight/volume relationships.

This information would be useful in comparing economic returns of producing fresh vegetables and of letting the fresh vegetables go to seed. This analysis would complement conventional analyses of the opportunity cost of producing vegetable seed rather than a typical subsitute crop, such as wheat or barley.

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ANNEX A

Rapid Appraisal Informal Interview Guidelines for Key Informants

ANNEX A-1

Vegetable Seed Traders (Formal Sector)

Location

1. Brief history of involvement in trade

   - o Date and place it began
   - o Initial product mix and change over time

2. Description of business

   - o Collect seed from farmers?
   - o Sell seed to other traders, exporters?
   - o Sell seed purchased from other traders, firms at retail level?
   - o Itinerant collection/sale?
   - o Collection/sale from fixed place of business (shop)?

3. Seed purchases during last two crop seasons (Winter and Summer)

Seed Type	Quantity	Price	Seller type	Location

4. Use of contracts

Seed Type	Loc.	# Frmrs	Qty.	Price	Dlvry	Inputs	Qty.	Credit	Date	Loc.	Supp.

5. Do you offer premia/discounts for quality differentials? If so, describe.

6. Do you provide extension/supervision services? Describe number of visits (per crop) and types of extension input.

7. Do you hire your own extension/supervision agents to provide supervision? If so, describe their training/experience. How long are they in your employ? How much do you pay them? Are they effective in working with local farmers? How do you supervise them?

8. Non-contract purchases: Do you use spot markets or purchase directly from the farm-gate?

Location	# Sellers	Seed Type	Quantity	Price	Quality

9. Seed sales during last crop season

Seed type	Quantity	Price	Buyer type	Location	Credit

10. Sales potential: Could sales be expanded? Do some potential customers go unsatisfied? Are there shortages of particular types of seed (varieties, hybrids)?

11. Describe any promotional efforts.

12. Processing: Do you clean, sort and grade vegetable seed?

Location	Type/Technology	Cost	Observations

13. How do you package seed for wholesale and retail sale?

- o Wholesale: types, costs and effectiveness of packaging
- o Retail: types, costs and effectiveness of packaging
- o Repackaging? Costs, methods

14. Storage

Seed Type	Location	Method	Period	Cost	Losses

15. Have you experimented with improved storage methods? If so, describe whether you were satisfied with the results.

16. Transport: methods, costs of transporting to different locations, losses. Have you experimented with improved packaging or bagging to reduce losses in transport? If so, describe.

17. Relationship with suppliers: Who, where, length of relationship, volume commitments, price negotiation, mode of shipment and packaging. Are you satisfied with the relationship? Have you ever considered alternative suppliers?

18. Buyer types and relationships: farmers, other traders, retail seed dealers, AIC. Informal contracts, long-standing relationships. Percentage distribution of sales by buyer type, prices received, other services rendered.

19. Feedback, if any (how and what) from buyers/growers about seed quality, purity, germination rates, etc.

20. Marketing costs and margins

    - o Most covered above. Note other costs.
    - o Trade license or export fees
    - o Handling costs not included in above costs
    - o "Informal" fees, payments

21. Place trader's problems in rank order and ask him to propose solutions.

22. Perceptions/opinions of roles of AIC and VDD in their areas. How could their services be improved? Does AIC floor price for vegetable seed impose a constraint? Are they able to use AIC facilities (cleaning, storage)? Does AIC provide extension to their growers?

23. Describe export/import operations (including cross-border trade with India):

    - o Buyers/sellers (established?)
    - o Costs of export/imports
    - o Communications and knowledge of prices in export markets
    - o Export/import share in total seed business
    - o Problems

24. Note opinions/perceptions of farmer organizations.

Annex A-2

Vegetable Seed Traders (Informal Sector)

Location

1. Trade involvement

   - o When started?
   - o Share of seed in total business?
   - o Trade every season?

2. Description of business

   - o Collect seed from farmers?
   - o Store for sale during season?
   - o Sell seed to other traders?
   - o Sell seed purchased from other traders/AIC?
   - o Sell seed imported from India/elsewhere?
   - o Sell from fixed place of business?

3. Seed sales

   - o Quantity and price

     Winter last season

Type	Purchaser	Quantity	Price

     Summer last season

Type	Purchaser	Quantity	Price

   - o Normal sales? Below normal? Above normal?

     Comments/notes

   - o Do you plan to sell more? Reduce sales? Give up?

     Comments/notes

   - o Do some potential customers go unsatisfied?

- Do you have shortages of particular types of seed (varieties, hybrids)?

- Describe promotional efforts, if any.

4. Seed purchases

Type	Source	Quantity	Price	Observation

5. Processing

Do you clean, sort, grade, package, repackage vegetable seeds?

Describe and note costs (per unit).

6. Storage

Type	Location	Method	Period	Cost	Losses

7. Have you experimented with improved storage methods? If so, were you satisfied with the results?

8. Transport

Method	Locations	Cost	Losses

9. Other marketing costs/margins: handling cost, import tax, license, other payments, etc. not included above.

10. Relationship with suppliers: who, where, length of relationship, volume commitments, price negotiations, mode of shipment and packaging. Satisfied with relationship? Ever consider alternative suppliers?

11. Buyer types and relationships

- o Farmers
- o Other traders
- o AIC
- o Others

(Note whether informal contract, long-standing relationship, other services rendered, etc.)

12. Feedback, if any, from buyers/growers about seed quality, purity, germination rates, etc.

13. List trader problems/solutions in rank order.

14. Note your perceptions/opinions on roles of AIC, VDD, Sajha, farmer organizations.

15. Export/import

- o Describe import operations.
- o Do you export?

Type	Quantity	Destination	Price

Describe export operations and costs.

Annex A-3

Vegetable Seed Producers

1. Basic farm data

   - o Farm size
   - o Laborers' availability (full-time, seasonal)
   - o Principal crops by season

2. Vegetable seed production history

   - o When did commercial production begin?
   - o Describe how it happened: AIC or trader contract?
   - o What have been the changes in area cultivated and crop mix over time?

3. Vegetable seed crop mix, 1989 and 1988

Year	Crop	Area	Prod.	Quantity Sold	Sales Price

4. Input use (including hired labor) 1989 and 1988 seed crop

Crop	Input Qty.	Price	Source	Qual.	Timely Avail.	Applic. Rate	Time Avail.

Observations about problems

5. Production practices and production problems:

   - o Preparing seed bed
   - o Transplanting
   - o Rouging
   - o Irrigating, controlling pests
   - o Harvesting

6. Post-harvest handling practices and problems

   - o Harvesting methods
   - o Drying
   - o Transport to storage place
   - o Sorting/grading/cleaning
   - o Storage methods (packaging)

7. Contracts

o Inputs provided

Crop	Input	Cost	Credit	Delivery	Date	Applic.Date

o Production supervision: number and timing of visits, information conveyed, assessment of value of information conveyed

o Output supplied

Crop	Quantity	Price	Delivery date	Place	Post-harvest reqs.

o Grower observations on advantages/disadvantages of contracts

- Quality, timely availability, usefulness of inputs
- Quality, timely availability, usefulness of extension
- Fairness of price
- Timely payment
- Provision of inputs in credit

o Recommended changes for future

8. Sales not on contract

Crop	Location	Date	To whom	Quantity	Prices	Credit to Buyer

9. Intentions for 1990

Crop	Area	Contract	Inputs	Output	Price

10. Evaluation of AIC and VDD

o AIC: contract price, quality/availability/timeliness of inputs

o VDD

11. Use of revenues from vegetable seed sales. Projected use of 1990 revenues.

12. Other revenues

- o Grains: quantity sold, sales revenue
- o Seasonal labor
- o Livestock sales
- o Fruit and vegetable sales

13. Perception/opinion of farmer organizations (FOs)

- o Feasible?
- o Desirable? Perceived advantages.
- o How best to organize?
- o Who would manage?
- o Role of such FOs.
- o Could FOs effectively manage improved harvesting and processing equipment?
- o Contracts between traders and FOs? Perceived advantages and disadvantages.

Annex A-4

Fresh Vegetable Producers

1. Vegetable Production: 1988 and 1989

Year	Type	Var.	Source /seed	Price /seed	Qty. /seed	Qual.	Prod. /seed	Price Range	Rev. qty.
1988									
1989									

2. Assessment of different types of seed (purity, germination, quality of vegetables produced, availability, price)

   - o AIC
   - o Government farm (name)
   - o Private trader (name, location)
   - o Dealers (name, location)
   - o Other producers (location)

3. Are you able to obtain enough seed for your vegetable production needs? If not, specify types of seeds and the extent to which they fall short of your needs (quantity difference between what you want and what you get).

Type	Variety	Desired Seed	Actual Seed

4. Do you produce any off-season vegetables? Which ones? If not, why?

5. Are you using any varieties that allow you to harvest and sell vegetables earlier or later than when most farmers harvest? Which ones? If not, why?

6. Which vegetables do you think will be most promising during the next few years? Where do you plan to get seed to meet your increased seed requirements to produce these promising vegetables?

Type	Variety	Required Seed	Current Seed	Potential Source

7. Seed Production

o Do you produce any of your own vegetable seed? If so, specify:

Type	Variety	Qty Produced	Qty. Sold	Reasons for Production

o Do you produce vegetable seedlings? If so, specify:

Type	Variety	Qty Produced	Qty. Sold	Reasons for Production

o Further observations

Annex A-5

Agricultural Extension Agents

1. Vegetable Seed Production

   Estimates of area and production of vegetable seeds last season. (Collect if time-series data available)

Winter Vegetables			Summer Vegetables		
Types	Area(Rop.)	Production(Kg.)	Types	Area(Rop.)	Production(Kg.)

   o Area where seed is produced

Panchayat	Ward No.	Seed type	Area	Production	No. Farmers

What are the cultural practices of vegetable seed growing? List in detail including the periodic of cultivation for major seed types.

   o Major production costs for key cultural practices?
   o Where and how do farmers get foundation seed?
   o What extension services are provided to the vegetable seed growers?
   o How is the extension program linked/integrated with programs of AIC and VDD in relation to input supply, technology and marketing?
   o What are the problems/solutions of vegetable seed production?
   o What are the programs?

2. Selling of vegetable seeds

   o Buyers

Type	Selling points	Quantity Sold	Price	Distance	Trans.Cost

   Note if any contractual arrangement and what price received.

3. Fresh vegetable production

- o Where do farmers get vegetable seed?

Type	Source	Proportion

- o How are the seeds marketed by different sources/agencies (wholesaling, retailing, agents, packaging, changing, etc.)? Also note the prices.
- o Are the seed quality and supply arrangements satisfactory? If not, why?

  AIC

  Sajha

  Private Traders

  Dealers

  Others
- o Is availability of seed sufficient? If not, how would you resolve the situation?
- o What are the problems farmers encounter in getting vegetable seed? How are these problems resolved? If not resolved, what solutions do farmers propose?
- o What extension services are provided to fresh vegetable growers?
- o Describe vegetable production program.

Annex A-6

AIC/Sajha Field Level

1. Selling of seeds

   o Seeds sold (last season or recent years, if time-series available)

Type	Quantity

   o Selling method

Type	Purchaser	Quantity	Price	Type

   o Dealers: number, location, commission, credit.

   o Do AIC/Sajha supply total required seed?
   ____Yes ____ No How much?

   o Are private traders selling seeds? ____ Yes ____ No

   o Do you receive feedback (regarding seed quality, germination, priority, etc.) from the seed buyers? How? What type?

2. Buying of seeds

   o Seeds bought

Type	Source	Quantity	Price

   o Note details of what they do and how they do it.

Annex A-7

Informal Seed Producers' Groups

1. When was the group formed?

2. How is the group managed (single leader, committee, best/most progressive farmer(s))?

3. Number of members.

4. Reason for forming the group.

5. Present functions of the group.

   - o Input procurement?
   - o Credit?
   - o Marketing arrangements (including storage and transport)?
   - o Savings deposits?

6. Describe the nature of any contracts with traders/VDD.

   - o Financial arrangements/credit
   - o Specifications as to quantity, price, grade, delivery point and time
   - o Production supervision (flow, number, supervisor)
   - o Inputs supplied
   - o Degree of cleaning/processing
   - o Advantages/disadvantages

7. Plans for coming years.

   - o Expansion?
   - o New functions?

8. How does the organization learn about marketing alternatives?

9. Has the organization made any investments in agriculture (e.g. irrigation) or other enterprises (e.g. dehulling, cleaning, processing, storage, etc.)?

Annex B

Field Trip Itinerary

June 20	Kathmandu-Trisuli (Nuwakot) - Kathmandu
June 21	Kathmandu
June 22	Kathmandu-Naubise-Dumre-Damauli-Pokhara
June 23	Pokhara-Lumle-Pokhara
June 24	Pokhara-Kathmandu
June 25	Kathmandu
June 26	Kathmandu-Palung-Daman-Aghor-Hetauda
June 27	Hetauda-Kalaiya-Birgunj
June 28	Birgunj-Parwanipur-Jitpur-Neezgad-Chandranighapur-Janakpur
June 29	Janakpur-Mahendranagar-Natkajhij-Dhalkebar-Lalbandi-Nawalpur
	Horticulture Farm-Chandranighapur-Bagmati-Hetauda
June 30	Hetauda-Narayanghat-Rampur-Kathmandu

Annex C

List of People Visited During Vegetable Seed Marketing Study

1. Tuladhar, Manager, AIC, Trishuli
2. Chandra M. Palikhe, ADO, Trishuli
3. JT, Horticulture Farm, Trishuli
4. Keshab Sharma, Chief, DFAMS, Trishuli
5. Shakya, ADO, Damauli, Tanahu
6. Barry Pound, Director, LAC, Lumle
7. Paul Galigan, Economist, LAC, Lumle
8. Kedar Budhathoki, Chief Horticulturist, LAC, Lumle
9. Bhim Subedi, Pokhara Krishi Samagri Bhandar, Pokhara
10. Tara Prasad Koirala, Nurseryman, Pokhara
11. Bishow Nath Parajuli, Ganesh Krishi Samagri Sewa, Pokhara
12. Dr. Ram K. Rawat, Chief, Horticulture Farm, Pokhara
13. Janardan Adhikari, Chief, DFAMS, Pokhara
14. Dadhi Ram Poudel, Group Organizer, SFDP, Tistung, Deurali
15. Prem Kumar K.C., Nurseryman, Palung
16. Ram Kumar Adhikari, Nurseryman-Farmer, Palung
17. Ganesh B. Bhujel, Farmer, Fedigaon, Palung
18. Krishna B. Shrestha, Farm Manager, Daman Horticulture Farm
19. Chaudhari, J.T. Daman Horticulture Farm
20. Lal Bahadur Rumba, Farmer, Aghor, Makwanpur
21. Gan B. Pakharin, Farmer, Aghor, Makwanpur
22. Mohan Singh, Farmer, Aghor, Makwanpur
23. Jaya B. Bal, Aghor, Makwanpur
24. Dhruba Kohiri, Farmer, Bishomvarpur, Bara
25. Ram Babu Prasad Kusbha, Farmer, Bishomvarpur, Bara
26. Harishamiya Ansari, Farmer, Bishomvarpur, Bara
27. Ambika Prasad, Kisan Beej Bhandar, Cinema Road, Kalaiya
28. Dev Narayan Prasad Sah, Krishi Beej Bhandar, Loharpatti, Kalaiya
29. Manoj Gupta, Shree Krishna Khad Bhandar, Mahavir Road, Kalaiya
30. Bikash Acharya, Nepal Seed Concerns, Machha Bazaar, Kalaiya
31. Chandra Kumar Kyastha, ADO, Kalaiya
32. Ganesh Sharma, Regional Office, AIC, Birgunj
33. Keshab Kandel, Regional Office, AIC, Birgung
34. Pitambar Bhandari, Nepal Agro. Marketing and Services, Birgunj
35. Ram Krishna Agrawal, Jaikishan Seed Center, Birgunj
36. Chaudhari, Horticulturist, Parwanipur Agri, Farm, Parwanipur

37-38 Two road side seed sellers in Neejgadh

39-40 Two seed sellers in Dhalkebar

41. Ishor Kumar Jha, Roshan Medical Center, Bhanuchowk, Janakpur
42. Yugal Kumar Jha, Roshan Medical Center, Bhanuchowk, Janakpur
43. D.P. Dahal, Dahal Trading Concern, Station Road, Janakpur
44. Bisheswor Yadav, Sajha Sanstha, Mahendra Nagar, Dhanusa
45. Amrita Nanda Vaidya, JADP, Naktajhija, Dhanusa

46. Bisho Nath Jha, AIC, Branch Office, Dhalkebar
47. Bhola Mahoto and Others, Farmers, Dhalkebar
48. Ramesh Kumar B.C., Sajha Sanstha, Lalbandi,
49. Sarju Mahato and others, Farmers, Lalbandi
50. Kritynanda Gupta, Vegetable Seed Section, Nawalpur Horticulture Farm
51. Bramha Dev Yadav, Farmer, Tin Ghare, Nawalpur,
52. Sita Ram Chaudhary, Farmer Tin Ghare Nawalpur
53. Ramesh B. Pradhan, Chief, AIC, Chandranigahapur, Rautahat
54. Mrs. Poudel, Chitwan Agro Farm, Ratna Nagar, Tandi, Chitwan
55. Hari Basnet, Nepal Agro-Processing, Bharatpur, Chitwan
56. Padam Lal Shrestha, Asst. Agricultural Officer, ADO, Bharatpur, Chitwan
57. Chandra Kanta Devkota, ADO, Bharatpur
58. Ramkrishna Bhattarai, Farmer, Narayanpur, Chitwan
59. Durga Mani Gautam, Working Dean, AAS Rampur
60. Dawadi, Dawadi Agro Concern, Sangamchowk, Narayangadh
61. Shanker K.C., Vinayak Agro-Vet Sangamchowk, Narayangadh
62. Raj Kumar Tamang, Vinayak Agro-Vet, Sangamchowk, Narayangadh
63. Toya Nath Neure, Vinayak Agro-Vet, Sangamchowk, Narayangadh
64. Poudel, Poudel Trading Center, Sangamchowk, Narayangadh
65. Om Bahadur Lamsal, Farmer, Dumkibas, Nawalparasi
66. S.S. Rekhi, Chief Technical Advisor (FAO) to VDT, Khumaltar
67. Mangal Das, Farmer, Suryabinayak, Bhaktapur
68. Sharma, ADO, Bhaktapur
69. Benjamin Stoner, USAID, Nepal
70. Robert Thurston, Chief, ARD, USAID, Nepal
71. Bindu D. Adhikary, GM, TPC, Pulchowk, Patan
72. Sri K. Upadhya, Chairman, ADB/Nepal
73. George Truitt, private enterprise consultant to NCBA
74. Gerard J. Gill, Winrock International Kathmandu
75. Santa B. Gurung, Executive-Director, Centre for Economic Development Administration, Tribhuvan University
76. Arjun J. Shah, Economist, Centre for Economic Development Administration, Tribhuvan University
77. Dr. Ballabh Sharma, Economist, Centre for Economic Development Administration, Tribhuvan University
78. Dr. Badri N. Kayastha, Executive Director, No-Frills
79. Dilip Karki, Seed Division, AIC, Kathmandu

Annex D

Vegetable Seed Production in Nepal

In MT

Year	Production by Farmers	Foundation & Improved Seed on Govt. Farms	Total	Share of Total Production	
				Farmers %	Govt. Farms %
1975-76	1.0	9.0	10.0	10.00	90.00
1976-77	3.6	9.5	13.1	27.48	72.52
1977-78	5.2	10.4	15.6	33.33	66.67
1978-79	14.6	10.0	24.6	59.35	40.65
1979-80	8.0	12.0	20.0	40.00	60.00
1980-81	15.4	9.2	24.6	62.60	37.40
1981-82	29.2	9.5	38.7	75.45	24.55
1982-83	25.6	12.9	38.5	66.49	33.51
1983-84	26.0	11.6	37.6	69.15	30.85
1984-85	21.4	11.8	33.2	64.46	35.54
1985-86	38.7	11.0	49.7	77.87	22.13
1986-87	58.5	11.0	69.5	84.17	15.83
1987-88	70.0	11.0	81.0	86.42	13.58
1988-89	120.0	11.0	131.0	91.60	8.40
1989-90*	161.5**	10.4	171.9	93.95	6.05

* Targeted.

** Out of this an estimated 50.9% is for private entrepreneurs.

Source:

"Vegetable Development in Nepal: Present Status, Future Strategy and Constraints," S.S. Rekhi, B.B. Shah and S.B. Aryal, Paper presented at International Expert Meeting on Horticulture and Bee-Keeping in the Hindu-Kush Himalaya, ICIMOD, Kathmandu, Nepal, June 1989.

Annex E

Production of Vegetable Seeds at Pokhara Horticulture Farm

Year	Quantity/Kg.
1961-62	2.545
1962-63	6.730
1963-64	4.130
1964-65	27.300
1965-66	94.400
1966-67	255.300
1967-68	327.000
1968-69	404.830
1969-70	327.000
1970-71	470.210
1971-72	1029.200
1972-73	1126.260
1973-74	1000.000
1974-75	500.800
1975-76	801.000
1976-77	688.200
1977-78	801.695
1978-79	969.000
1979-80	635.750
1980-81	500.000
1981-82	503.900
1982-83	547.200
1983-84	501.000
1984-85	535.300
1985-86	531.020
1986-87	536.950
1987-88	953.599
1988-89	610.000
Total (28 Yrs)	14690.319

Annual Average: 524.7

Details of 1988-89 Production

Type/Variety	Qty/Kg.
Radish	250.0
Bean	135.0
Okra	90.0
Spinach	45.0
Egg plant	8.0
Peas	60.0
Cucurbits	16.0
Cauliflower	6.0
	610.0

Source: Pokhara Horticulture Farm

Annex F

Indian Companies Whose Vegetable Seed Is Being Sold in Nepal

During the course of RA fieldwork, the team observed vegetable seed of the following Indian companies being sold by Nepalese private seed traders:

Durga Seed Farm
SCO 49, Sector 26
Chandigarh 160026

Terai Beej Vegetable Seeds
Continental Seeds and Chemicals Ltd.
Plant: Ramraj P.O. Bazpur
Distt: Naintal, U.P. 262401
Tel. 227 (office) 122 (residence)
Sales Office: B-1/23A

National Organic Chemical Industries Ltd.
Mafatlal Center
Nariman Point
Bombay

National Seeds Corporation Ltd.
A Government of India Undertaking
Beej Bhavan, Pusa Complex
New Delhi 110012

Sungro Seeds
39, Kewal Park Extension
Azadpur, Delhi 110033

Pahuja Seeds Pvt. Ltd.
C-26, Indra Market
Delhi 110007

Malav Seeds Pvt. Ltd.
5, Sahu Bavdi, Manek Chowk
Ratlam 457001 M.P.

Ankur Seeds Pvt. Ltd.
27, New Cotton Market Lay-out
Nagpur 440018

Ramchandra Bhageloram Maurya (Regd.)
Station Road
Jaunpur 222001 U.P.

Gopal Farms
Library Road
Gurdaspur 1453521
Punjab

Sutton and Sons (India) Pvt. Ltd.
P.O. Box 9207
Calcutta 700071
Sales offices in Bangalore, Delhi, Srinagar, Vadodara

United Seed Co.
P.O. Box 8491
Delhi 110052

The Punjab Seed Co.
PO Hajipur 844101
Bihar

Pocha Seeds
Pune 411040
Delhi 110033

Maharastra Hybrid Seeds Co. Ltd.
P.O. 27, Sardar Patel Rd.
Jalna 431203

Nath Seeds Ltd.
P.O. 318, Adalat Rd.
Aur

Avon Beej Co.
116 Indra Market
Delhi

Ganga Kaveri Seeds Pvt. Ltd.
8-2-674/B-3-3, Road No. 12
Banjara Hills
Hyderabad 500034 A.P.

Indo American Hybrid Seeds
17th Cross, 2A Main K.R. Road BSK II Stage
Bangalore 560070
Tel: 604940, 606479

Annex G

Private Seed Traders in Nepal (Formal Sub-sector)

Name of the Firm	Address
District: Kathmandu	
1 Annapurna Seed Store	Ason, Kath.
2 Bishnu Manandhar	Mahankalsthan, Kath.
3 Fipest Stores	Bhimsensthan, Kath.
4 Ganesh Seed & Farm	Kasthmandap, Kath.
5 GM Enterprises	Ka 1-29, Tripureswor, Kath.
6 Hakey Rai & Sons	Budhanilkantha, Kath.
7 Himalayan Seed Co.	Babar Mahal, Kath.
8 Jaya Kisan Beej Bhandar	Bhotahity, Kath.
9 Khanal Trading Co. P. Ltd.	Mahankalsthan, Kath.
10 Kisan Beej Bhandar	Kathmandu - 30
11 Krishi Banya Beej Bikash Farm	Gagal Phedi V. P., Ward no. 5
12 Nepal Agro Traders	Basantpur, Kath.
13 Nepal Agrochemical Trading	Kalimati, Kath.
14 Nepal Pesticides & Chemicals P. Ltd.	Kha 1-165, Kalimati, Kath.
15 Sabha International P. Ltd.	Bhimsensthan, Kath.
16 Temple of Trade P. Ltd.	Tripureswor, Kath.
17 Maharjan Biu Co.	Nardevi, Kath.
District: Lalitpur	
1 Nepal Seed Co. P. Ltd.	Pulchowk, Patan
2 NFC Seed Co. P. Ltd.	Man Bhavan, Patan
District : Bhaktapur	
1 Bishnu Bhakta Ghaju	Nagdesh, Bhaktpur
2 Krishna Bahadur	Nagdesh, Bhaktpur
District : Kavrepalanchowk	
1 Krishna Bahadur Hwana	Panchkhal
2 Krishna Bahadur Karmacharya	Nala Bazar
3 Panchkhal Pustak Bhandar	Panchkhal
4 Saraswoti Pustak Bhandar	Dhulikhel
District : Nuwakot	
1 Bikash Nursery and Seeds Farm	Kakani, Kaulethana
2 Narayan Dongol	Bidur

District : Dhading

1 Raktakali Devi Centre	Dharke Bazar
2 Shree Parewatar Krishi Udyog P. Ltd.	Malekhu
3 Tarkari Biu Bhandar	Khanikhola

District : Kaski

1 Pokhara Krishi Samagri Bhandar	Chipledhunga, Pokhara
2 Ganesh Seed Co.	Malepatan, Pokhara

District: Tanahu

1 Pashupati Seed Co.	Damauli

District: Gorkha

1 Gorkha Seed Co.	Gorkha

District : Dolakha

1 Vegetable Seed Bhandar	Charikot

District: Chitwan

1 Dawadi Agro Concern	Sangamchowk, Narayanghat
2 Poudel Trading Concern	Sangamchowk, Narayanghat
3 Nepal Agro Processing Industris P. Ltd.	Bharatpur
4 Chitwan Agro Farm	Ratna Nagar, Tadi
5 Nepal Agro Marketing Services	Bharatpur
6 Binayak Agro. Vet.	Samgamchowk, Narayanghat

District: Parsa

1 Nepal Agro Marketing Services	Birgunj
2 Jay Kisan Seed Centre	Birgunj
3 Krishi Beej Bhandar	Birgunj

District: Bara

1 Kisan Beej Bhandar	Cinema Road, Kalaiya
2 Krishi Beej Bhandar	Loharpatti, Kalaiya
3 Shree Krishna Khad Bhandar	Mahavir Road, Kalaiya
4 Nepal Seed Concerns	Machha Bazar, Kalaiya
5 Shree Bajarang Seed Centre	Machha Bazar, Kalaiya

District : Rupandehi

1 Pokharel Agro Concern	Nagar Panchayat Gate, Butwal
2 Lumbini Beej Bhandar	Sidharthanagar
3 Laxmi Hariyali Kisan Pasal	Sidharthanagar
4 Annapurna Agro Vet.	Butwal

District : Dang	
1 Navin Agro Centre	Ghorahi
2 Poudel Agro Centre	Lamahi
District : Banke	
1 Mitra Agro Pharma	Khajura Road, Nepalgunj
2 Rashmi Agro Farm	Nepalgunj - 17
3 Airways Krishi Samagri Udyog	Nepalgunj - 2
District : Kailali	
1 Kisan Agro Center	Dhangadi
District : Morang	
1 Shivani Seeds Farm	Babiyabirta - 8
2 Koshi Bij Utpadan Kendra	Biratnagar - 1
3 Agro Concern Seed Co.	Biratnagar
4 Shivani Biu Company	Biratnagar
District : Sunsari	
1 Janakalyan Krishi Bhandar	Inarwa - 2
District : Mahottari	
1 Mishra Krishi Farm	Dhabauli, Pipra V. P.
District : Dhanusha	
1 Dahal Trading Concern	Station Road, Janakpur
2 Manju Shree Trading Concern	Station Road, Janakpur
3 Roshan Medicine Centre	
District : Jhapa	
1 Udesh Nursery Biu	Bhadrapur - 3
2 Sapkota Krishi Bhandar	Birtamode
District : Siraha	
1 Kisan Sewa Kendra	Lahan - 1
District : Saptari	
1 Khad Beej Bhandar	Rajbiraj - 7

Source: Inventory of Agro-enterprise prepared by No-Frills Consultants and field visits.

Annex H

Planned Area, Production, Productivity and Growth Rates of Vegetables in Different Plan Periods

	FIFTH PLAN 75/76-79/80		SIXTH PLAN 80/81-84/85		SEVENTH PLAN 85/86-89/90		EIGHTH PLAN 2000 AD	
	Area (ha.)	Prod. (MT)	Area (ha.)	Prod. (MT)	Area (ha.)	Prod. (MT)	Area (ha.)	Prod. (MT)
1. Production Program								
a. Special program			3,200	32,000	4,800*	*72,000*	15,000	225,000
b. General Program			18,000	126,000	24,000**	228,000**	126,000	1.129 m
c. Low Priority Program			117,000	585,000	111,700	670,200		
Total	96,000	528,000	138,200	743,000	140,500	970,200	141,000	1.515 m
2. Productivity (MT/Ha.)		5.5		5.37		10.17		10.74
3. Growth Rate (%)				4.8		6.0		6.2
4. Per capita consumption (Kg.)				44.8		50.9		65.0

Notes : * Program in 30 districts
** Program in 75 districts

Source: "Production of Vegetables and Marketing Needs of Farmers," Laxman Pun, Proceedings of Small Farmer Marketing Extension Training Workshop September 8-10, 1987, Pokhara, Sponsored by DFAMS & FAO.

Note: Production data for 1989-90 under General and Low Priority Program here is different from the production estimates drawn from plan documents in Annex I.

Annex I

Planned Area, Production, and Quantity of Required Seed of Vegetables During Seventh Plan

Fiscal year	Area to be covered (Ha)	Estimated production (MT)	Productivity (MT/Ha.)	Required seed (Kg*)	Seed required per ha.* (Kg/Ha.)
A. Special Program					
1984-85	3,200	32,000	10	20,628	6.45
1985-86	3,500	38,500	11	32,464	9.28
1986-87	3,800	45,600	12	37,073	9.76
1987-88	4,125	52,625	13	43,156	10.46
1988-89	4,400	61,600	14	44,290	10.07
1989-90	4,800	72,000	15	45,296	9.44
B. General Program					
1984-85	17,800	124,600	7.0	137,283	7.71
1985-86	19,998	137,700	6.9	155,681	7.78
1986-87	20,491	151,600	7.4	166,729	8.14
1987-88	22,000	167,200	7.6	187,392	8.52
1988-89	23,000	179,400	7.8	194,276	8.45
1989-90	24,000	192,000	8.0	198,496	8.27
C. Low Priority Program					
1984-85	117,000	585,000	5.0	639,416	5.465
1985-86	116,000	588,000	5.1	646,584	5.574
1986-87	114,700	592,000	5.2	651,955	5.684
1987-88	113,400	598,000	5.3	656,926	5.793
1988-89	112,600	602,000	5.3	652,292	5.793
1989-90	111,700	606,000	5.4	659,276	5.902

Source: Seventh Plan.

*Note: The authors estimated total seed requirements for the low priority program based on the average seed per ha. required to attain the productivity of general program during the plan period 1984/85-1989/90.

Annex J

Exports of Vegetable Seed from Nepal

Year	Quantity	Kind	Destination	Exporter
1981	500 Kg.	Radish	Bangladesh	AIC
1982	2000 Kg.	,,		Himalayan Seed Co.
1987	500 Kg.	,,	Bangladesh	NFC
1988	6000 Kg.	,,	,,	NFC
	37 Kg.	Cauliflower (Snowball)		NFC
	23 Kg.	Cabbage Copenhagen		NFC
	2000 Kg.	Radish	,,	Nepal Seed Co.

Source: Concerned Companies

Annex K

Imports of Vegetable Seeds from India by Some Private Seed Traders, 1988/89

Seed	Seed Trader A Birgunj Quantity (Kg.)	Seed Trader A Birgunj Price * (Rs./Kg.)	Seed Trader B Kalaiya Quantity (Kg.)	Seed Trader B Kalaiya Price * (Rs./Kg.)	Seed Trader C Kalaiya Quantity (Kg.)	Seed Trader D Janakpur Quantity (Kg.)
Onion	500	120	100.00	165	40.00	50
Bittergourd	50	200	2.00	140	NA	NA
Bottlegourd	50	150	2.00	160	NA	NA
Spongegourd	30	150	-	-	NA	NA
Carrot	50	250	-	-	NA	NA
Turnip	10	150	-	-	NA	NA
Cucumber	30	400	2.00	300	NA	NA
Radish(P.C + T.B)	50	150	130.00	NA	NA	80
Radish (Japanese W.)	200	100	40.00	NA	40.00	NA
Cauliflower (Katki)	-	-	0.75	500	2.00	NA
Cauliflower (Poosi)	100	500	1.00	500	NA	NA
Cauliflower (Agani)	-	-	1.00	500	NA	NA
Brinjal	100	200	1.10	250	2.00	NA
Tomato (Pusa Ruby)	50	400	2.00	400	1.00	NA
Tomato (Honey Maker)	-	-	-	400	0.50	NA
Cabbage	30	400	3.00	400	1.50	NA
Peas	500	30	50.00	35	120.00	NA
Bean (Bodi)	100	40	4.00	40	-	NA
Chilli	50	200	1.00	250	0.50	3
Okra	1000	40	80.00	40		40
Watermelon	-	-	-	-	-	5
Total	2900	-	419.85	-	207.50	178

Source: Field survey

* = Average Selling Price

Vegetable Seed Production Targets of Nepal
1989-90

Kg.

S.No.	Crop/Variety	Production at Govt. Farms			Contract Production				Total
		NS&FS	Im.Seed	Total	AIC	UNICEF	Pvt. Tra	Total	
1	Cauliflower- KTM Local	25.00	445.00	470.00	200.00		550.00	750.00	1220.00
	" Deepali	3.00	22.00	25.00	200.00		100.00	300.00	325.00
	" Snowball 16	10.00	40.00	50.00	400.00		2100.00	2500.00	2550.00
	Sub-Total	38.00	507.00	545.00	800.00		2750.00	3550.00	4095.00
2	Radish-Chetki	10.00	340.00	350.00	200.00		50.00	250.00	600.00
	" H. Early	705.00		705.00	25900.00	750.00	50500.00	77150.00	77855.00
	" Whiteneck	100.00	45.00	145.00	2000.00		2000.00	4000.00	4145.00
	" 40 days			0.00	4000.00		2800.00	6800.00	6800.00
	" Tokineshi	10.00	40.00	50.00	500.00		50.00	550.00	600.00
	Sub-Total	825.00	425.00	1250.00	32600.00	750.00	55400.00	88750.00	90000.00
3	Cabbage-LLDH			0.00	100.00		130.00	230.00	230.00
	" P.O.I	6.00	155.00	161.00	500.00	50.00	230.00	780.00	941.00
	" C.M	5.00	15.00	20.00	200.00		330.00	530.00	550.00
	Chinese Cabbage ASVEG (p)	0.50		0.50					0.50
	" " ASVEG (h)		1.00	1.00	30.00			30.00	31.00
	Sub-Total	11.50	171.00	182.50	830.00	50.00	690.00	1570.00	1752.50
4	Cress-local	76.00	252.00	328.00	1300.00		575.00	1875.00	2203.00
	Cress-Unspecified	60.00	100.00	160.00	1600.00	50.00	525.00	2175.00	2335.00
	Sub-Total	136.00	352.00	488.00	2900.00	50.00	1100.00	4050.00	4538.00
5	Spinach-true	20.00	30.00	50.00	300.00		110.00	410.00	460.00
	" Allgreen	70.00	80.00	150.00		100.00	225.00	325.00	475.00
	Sub-Total	90.00	110.00	200.00	300.00	100.00	335.00	735.00	935.00
6	Rayo-khumal C.P	25.00	125.00	150.00	700.00	50.00	575.00	1325.00	1475.00
	" Marpha C.P	10.00	183.00	193.00	1750.00		560.00	2310.00	2503.00
	B.L. Mustard-Red leaf	10.00	90.00	100.00	200.00			200.00	300.00
	" " unspecified	10.00	110.00	120.00	300.00		600.00	900.00	1020.00
	Rayo- KTM cp			0.00	100.00			100.00	100.00
	Sub-Total	55.00	508.00	563.00	3050.00	50.00	1735.00	4835.00	5398.00
7	Okra-Pusa sawani	72.00	1148.00	1220.00	2200.00		1300.00	3500.00	4720.00
	" Unspecified	5.00	25.00	30.00					30.00
	Sub-Total	77.00	1173.00	1250.00	2200.00	0.00	1300.00	3500.00	4750.00
8	Chilli-Pusa jwala	10.00	105.00	115.00	250.00		65.00	315.00	430.00
	Sweet Pepper-Ca.wonder	5.00		5.00					5.00
	Sub-Total	15.00	105.00	120.00	250.00	0.00	65.00	315.00	435.00
9	Tomato-Pusa-Ruby	10.00	50.00	60.00	400.00	100.00	200.00	700.00	760.00
	" Roma	10.00		10.00	200.00		150.00	350.00	360.00
	" PED	10.00	50.00	60.00	50.00		50.00	100.00	160.00
	" Monprecos	19.00		19.00	150.00		80.00	230.00	249.00
	" Chinese	2.00	18.00	20.00					20.00
	" CI-1131	2.00	8.00	10.00	50.00			50.00	60.00
	" CL 591	2.00	8.00	10.00	25.00			25.00	35.00
	Sub-Total	55.00	134.00	189.00	875.00	100.00	480.00	1455.00	1644.00
10	Cow-pea - Local (Blackseeded)	50.00	200.00	250.00	3000.00	400.00	550.00	3950.00	4200.00
	Coupea Black Seeded-NSCFS			0.00			1000.00	1000.00	1000.00
	" Red Seeded	20.00	80.00	100.00					100.00
	" KTM Local	5.00		5.00	100.00			100.00	105.00
	Sub-Total	75.00	280.00	355.00	3100.00	400.00	1550.00	5050.00	5405.00
11	Peas-Arkel	500.00		500.00	3000.00		4200.00	7200.00	7700.00
	" NLP	800.00	425.00	1225.00	1500.00		500.00	2000.00	3225.00
	" BV	500.00		500.00	1500.00		500.00	2000.00	2500.00
	" SIKKIM	605.00		605.00	2100.00		2000.00	4100.00	4705.00
	Sub-Total	2405.00	425.00	2830.00	8100.00	0.00	7200.00	15300.00	18130.00

12 Bean-Polebeabn Kentwonder	355.00		355.00	6900.00		3000.00	9900.00	10255.00
" Dwarf Contender	25.00		25.00	500.30		1000.00	1500.00	1525.00
Broad Bean local	10.00	20.00	30.00	1000.00			1000.00	1030.00
Bush bean-contender	60.00	500.00	560.00	100.00			100.00	660.00
Bush-bean-carbs favouret	25.00	25.00	50.00					50.00
Sub-Total	475.00	545.00	1020.00	8500.00	0.00	4000.00	12500.00	13520.00
13 Eggplant- nurki	5.00	165.00	170.00	200.00		70.00	270.00	440.00
" PPL	10.00		10.00	100.00	150.00	115.00	365.00	375.00
" Kranti	5.00		5.00	50.00		525.00	575.00	580.00
" Sar-green	1.00	4.00	5.00					5.00
Sub Total	21.00	169.00	190.00	350.00	150.00	710.00	1210.00	1400.00
14 Turnip-PTWG	40.00	225.00	265.00	850.00			850.00	1115.00
15 Capsiscum (unspesified)	11.00		11.00	60.00			60.00	71.00
" Cal. Wonder	1.00		1.00					1.00
Sub-Total	12.00	0.00	12.00	60.00	0.00	0.00	60.00	72.00
16 Spongegourd - P. Chikni	10.00	15.00	25.00	500.00			500.00	525.00
17 Bittergourd-Cl. long	10.00		10.00	300.00		70.00	370.00	380.00
" Domausami	15.00	110.00	125.00	200.00		50.00	250.00	375.00
Sub-Total	25.00	110.00	135.00	500.00	0.00	120.00	620.00	755.00
18 Bottlegourd- PSPL	10.00	25.00	35.00	1000.00			1000.00	1035.00
19 Ashgourd-Local	5.00		5.00					5.00
20 Cucumber-long green	5.00	20.00	25.00	300.00	300.00	25.00	625.00	650.00
" KTM local green	5.00		5.00	100.00			100.00	105.00
" Unspesified	5.00		5.00	50.00			50.00	55.00
Sub-Total	15.00	20.00	35.00	450.00	300.00	25.00	775.00	810.00
21 Pumpkin	5.00		5.00					5.00
22 Swiss chard-FHgiant	30.00	10.00	40.00					40.00
" (unspecified)	20.00	80.00	100.00	1300.00		927.00	2227.00	2327.00
" FHJ		90.00	90.00	200.00			200.00	290.00
Sub-Total	50.00	180.00	230.00	1500.00	0.00	927.00	2427.00	2657.00
23 Onion (unspesified)			0.00	1000.00		1900.00	2900.00	2900.00
Onion-Red circle	300.00		300.00	6000.00		1400.00	7400.00	7700.00
Sub-Total	300.00	0.00	300.00	7000.00	0.00	3300.00	10300.00	10600.00
24 Brocauli			0.00	250.00			250.00	250.00
25 Corriender-Local		21.00	21.00	50.00			50.00	71.00
" (Unspecified)	10.00		10.00					10.00
Sub-Total	10.00	21.00	31.00	50.00	0.00	0.00	50.00	81.00
26 Carrot-New kuroda	3.00		3.00	50.00			50.00	53.00
" kuroda			0.00	75.00			75.00	75.00
" Nantes Forto	20.00	30.00	50.00	1000.00		550.00	1550.00	1600.00
Sub-Total	23.00	30.00	53.00	1125.00	0.00	550.00	1675.00	1728.00
27 Knokohl-white view	10.00		10.00					10.00
28 Water melon - Sugarbaby	5.00		5.00					5.00
29 Methi - (Unspecified)	5.00	20.00	25.00					25.00
" Kasuri	2.00	3.00	5.00					5.00
Sub Total	7.00	23.00	30.00	0.00	0.00	0.00	0.00	30.00
30 Squash (unspecified)	10.00		10.00	75.00			75.00	85.00
" Greyzuccini	25.00	5.00	30.00	50.00			50.00	80.00
Sub-Total	35.00	5.00	40.00	125.00	0.00	0.00	125.00	165.00
Total	4841.00	5558.00	10399.00	77265.00	1950.00	82227.00	161452.00	171851.00
Percentage of Total	2.82	3.23	6.05	44.96	1.13	47.85	93.95	100.00

Source: VDD, Khumaltar, Kathmandu.

Annex M

Economic Returns on Vegetable Seed Production Compared to Other Crops

A. Comparative income from cereal and vegetable crops, Marpha

Crop	Gross Income Per Ropani (Rs)	Time Taken by Harvesting (Month)	
Naked Barley	1,850	6	
Buckwheat	1,000	3	
Cabbage - Drumhead	3,375	13	takes 1 Naked Barley Buckwheat crops)
Cabbage - Others	3,100	13	" "
Carrot	3,200	15	(takes 1 Naked Barley & 2 Buckwheat crops)
B. L. Mustard	1,500	10	(takes 1 Naked Barley & 1 Buckwheat crops)
Radish	1,050	10	" "

Source: The Vegetable Seeds Production and Export Potentiality in Nepal (in Nepalese), 2044/45.

B. Comparative economics of major cereals and vegetable crops

Crop	All Figures in RS./Ha Total Cost of Prod.	Gross Income	Net Profit
Paddy (Chitwan)	1520	4117	2597
Wheat (Chitwan)	1865	3596	1731
Maize (Chitwan)	841	1451	610
Mustard (Chitwan)	976	2938	1962
Potato (Mustang)	9964	12466	2502
Vegetables (Mustang)	5425	10125	4700

Note: (i) The vegetable seed gives 1 to 2 times more income than the fresh vegetables in the hills.
(ii) The general cost of production was worked out at prices prevailing in 1989.

Source: J.E. Douglas, IADS Consultant, Document on National Seed Programme and Consultancy Report, SPISP/AIC, Feb. 21-March 12, 1983. Quoted from S.M. Ali, Feasiblity Report on the Expansion of Vegetable Seed Programme in Nepal, July 1982.

C. Income between vegetable seed and cereal crops.

Crop/District	Net Income Per Ropani (Rs)	
	Veg. seed	Cereal crop
Bhaktapur		
Radish	-1222.9	
Wheat		-367.6
Dhankuta		
Cauliflower	938.9	
Radish	-274.0	
Turnip	-533.0	
Pea	-399.6	
B.L. Mustard	-240.0	
Bean	27.5	
Wheat		-118.0
Rukum		
Cauliflower	1647.9	
Radish	-272.0	
Pea	-245.0	
Onion	-824.1	
B.L. Mustard	-494.8	
Wheat		-39.2
Mustang		
Cabbage	-5101.0	
Turnip	-5168.0	
Carrot	-5469.0	
B.L. Mustard	-5100.8	
Cress	-1593.9	
Bean	-1529.5	
Buck Wheat		-278.6
Sarlahi		
Pea	75.5	
Tomato	-124.0	
Horsegram	-51.0	

Source: Report on Survey of Cost of Vegetable Seed Production in Nepal, VSPP, VDD, June 1985

Note: The negative returns in cases listed in C were due to the inclusion of land value in the cost calculations. Most analysts consulted feel that this is methodologically debatable or that included land values were too high.

Annex N

Buying and Selling Prices of Vegetable Seeds Distributed by AIC
in Different Years

(Rs./Kg.)

Vegetable Seeds/Year	1983 * Buying	1983 * Selling	1984 * Buying	1984 * Selling	1985 Selling	1986 Selling	1987 Selling	1988 Buying	1988 Selling	1989 Buying	1989 Selling
Cauliflower	100.0	157.9	120.0	175.9	190	195					
- Snowball	100.0	155.7	120.0	172.2				120	195	200	315
- KTM Local	100.0	151.5	120.0	166.2				120	195	120	210
- Pusa Diwali							260	175	260	175	275
Cabbage	40.0	66.6	60.0	73.5	100	120					
- MLDH							140	75	140	80	170
- POI/Cop. Market							160	90	160	110	205
Radish	25.0	38.2	30.0	40.4	60	74					
- White Neck	25.0	43.4	30.0	45.1				35	74	35	85
- Mino Early	25.0	39.4	30.0	40.9			95	40	95	40	95
Turnip	20.0	45.9	20.0	52.3	60	65				25	70
- WG Purple Top	20.0	38.2	20.0	45.4				25	65		
Carrot	35.0	55.4	45.0	61.0	60	120	135	80	135	100	165
Pea	8.0	17.5	12.0	20.5	25	30					
- NL Perfection	8.0	16.0	12.0	15.0				12	30	15	25
- Archale/Assamese										20	30
Onion	50.0	87.9	75.0	98.5	120	135					
- Red criol								90	135	90	150
BL Mustard	25.0	44.0	25.0	51.8	60	65					
- Marpha							85	30	85	30	85
- Khumal								25	65	25	70
Spinach (Local)	15.0	42.4	20.0	43.3	40	40		20	40		
- Patane										20	45
Cress (Local)	20.0	44.9	20.0	50.9	60	65		30	65	30	74
Tomato	120.0	163.5	145.0	175.0							
- NonPex/Coldsat					215	400				300	430
- Pusa Rubi/PED					215	250		175	250	175	280
Chilli	40.0	100.7	40.0	84.0	90	100				65	110
Sweet Pepper	160.0	200.0	350.0		450	900					
- Cali. wonder										800	1100
Brinjal	70.0	102.2	80.0	104.2	135	155		100	155	100	185
Okra	10.0	14.7	12.0	17.6	30	40		20	40		
- Pusa Sawani										20	44
Cowpea	5.0	33.6	12.0	30.9							
- Local										15	25
Pole Bean	10.0	21.0	10.0	21.0	30	60					
- Kentucky Wonder										50	100

Bittergourd	40.0	55.2	100.0		190	215	120	215		
- Coimbator Long									120	210
Bottlegourd	35.0	51.4	40.0	45.0	90	100	50	100		
- PSPL									50	122
Ridgegourd	30.0	36.4	50.0							
Pumpkin			40.0	55.9	90	90	40	90		
- Local									40	110
- Jukini									100	185
Cucumber			200.0	254.5	310	310			200	310
Tanabodi					30	50				
- Sarlahi White									50	100
- Kathmandu White									50	100
Broccoli					100	105	60	105	120	212
Swiss Chard					60	80			40	90
- Fordlook giant							40	80		
Water-melon						215				
Spongegourd					110	125	70	125		
- PC									70	150
Palak									15	40
Amaranths									15	40
Lettuce									55	108
Coriander									45	100
Soup									65	115
Fenngreek									50	95
Snakegourd (Local)									70	150
French Bean										
- Contender/Giant									20	30
Bakulla (Local)									15	25

Source: * = Report on Survey of Cost of Vegetable Seed Production in Nepal, FAO/VSPP, Khumaltar, 1985, and AIC.

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Annex O

Terms of Reference for
A Vegetable Seed Marketing Profile: India

Regardless of formal trading relationships with India, it would be useful for Nepalese policymakers and the vegetable seed industry to learn more about vegetable seed production, marketing and trade in India. Even if the trade and transit crisis suppresses Nepalese vegetable seed imports from India, Nepal may learn several significant lessons for the development of its own vegetable seed industry.

Key elements of a vegetable seed marketing profile would be as follows:

- o assessment of the vegetable seed supply situation in India, including increased imports in vegetable seeds under the recently liberalized trade regime (tariff reduction from 100% to 25%).
- o agribusiness profiles of three to five Indian seed companies that produce their own seed or seed under contract. These profiles would include firm histories, information on sources of finance, data on seed sales and prices by seed type and variety, a description of quality control procedures (seed testing, cleaning, storage and packaging), promotional efforts, distribution channels, and an evaluation of their experience with joint ventures.
- o review of Indian seed legislation and its relevance for Nepal.
- o review of the recent experience in forming joint ventures between Indian seed companies and foreign partners, especially for the production of high-value hybrid seed.
- o description of market channels and estimation of the volume of informal (illegal) exports of vegetable seed to Nepal.
- o examination of the terms and conditions of contract farming schemes and distillation of significant lessons for Nepal.

It is proposed that a two to three person team travel to Delhi to visit the sales offices of several Indian seed companies. Information on the operations of companies without sales offices in Delhi could be obtained by written inquiry. Research on the cross-border trade in vegetable seed could be carried out by one or more research assistants. The output of the profile would be

a paper like the Zaman paper on the Bangladesh seed industry, though considerably more detailed and analytical.

Similar study trips to Thailand and Pakistan would be useful.[5] In addition to examining the above issues, the team should evaluate market opportunities for Nepal in these countries. The evaluation should include examining alternative sources of supply and quantifying (to the extent possible) local seed production and imports by seed type and supplier. Data on prices of locally produced and imported seed would also be gathered. Finally, the team would attempt to obtain estimates of vegetable seed requirements by seed type. The team would gather information from available secondary sources, site visits and informal interviews with government officials, private traders, and farmers or farm organizations.

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[5] Vegetable seed exporter Jamuna Kayastha, Dr. Ramesh Munankami, and PIP consultant Timothy Welsh, based in Thailand, did a review of the Thai vegetable seed industry in January 1990, focused on opportunities for Nepal and how Thai processing technology could be adapted to Nepalese conditions (see forthcoming reports.)

ANNEX P-1

Types of Vegetable Seeds Handled by AIC in the Eastern Development Region (1988/89)

Crop/District	Taple.	Panch.	Ilam	Jhapa	Sankhu.	Tehrath.	Bhojpur	Dhankuta	Sunsari	Morang	Solukhu.	Okhaldh.	Bhotang	Udayapur	Saptari	Siraha	-
1 Radish		18.500	1.000	2416.650	191.125	94.500	15.500	79.350	5.820		3.800	97.500	9.475	27.700	116.150	206.050	3283
2 B.L. Mustard			8.000	112.800	12.880	11.665	25.575	7.450	32.720	69.500	1.380	5.000		7.200	23.660	23.780	341
3 Cauliflower	0.850	2.000	1.000	23.560	17.490	9.325	17.080	14.550	5.820	12.020	2.240	0.540		1.510	14.950	12.000	134
4 Cow Pea	2.025	0.100	1.500	5.600					49.400	8.000	1.000	1.900	0.500	3.550	2.550	11.100	87
5 Okra	2.225	1.800	10.100	22.950	2.000		1.925	5.625	26.300	15.000	1.500	8.200		6.850	6.500	27.250	138
6 Brinjal		0.570	1.650	0.640	0.500		0.470	0.675	0.100	3.500	0.750	2.310	0.500	0.050	0.005	1.650	13
7 Carrot						3.495		6.990	2.644		1.000		4.000				18
8 Pea				10.500	20.000	35.200	73.500	2.000		5.000	2.850	2.000		0.090			151
9 Tomato	0.580	0.325			0.500		2.210	4.765	0.100			0.200		1.600	1.500	1.540	13
10 Turnip				4.700	5.060	5.825	5.500	9.650	0.290	4.020	0.350		1.150	0.500	1.020	1.300	39
11 Cabbage						1.330	120.200	3.860	3.296		0.840		0.250		2.000		131
12 Broccoli				6.050	0.040	2.445		12.660	0.200								21
13 Onion				5.000	30.000	10.000	22.900	29.500	65.050	67.500	1.000	5.000		16.400	32.000	81.000	365
14 Bean			1.500			4.400	3.000		2.000	2.000				2.190			15.
15 Cress			1.000	10.150	3.075	9.885	4.000	11.450	0.290	10.475	0.480		0.800		1.525	2.080	55.
16 Pole Bean																	0.
17 Pumpkin						0.125		0.050									0.
18 Spinach		0.050						11.650	0.230		1.000						12.
19 Hot Pepper		0.075			0.500	0.125	0.625	0.900		6.000							8.
20 Bittergourd	0.370	0.125	3.265	1.000	0.500	0.125	0.850		2.070	3.900		0.585		0.140	0.185	0.425	13.
21 Cucumber	0.335	0.165	1.015	0.900		0.500		1.125	5.520	1.300				0.085	0.275	0.220	11.
22 Bottlegourd		0.050					0.250	0.450	0.050								0.
23 Spongegourd	0.490	0.180	0.960	1.460	0.500		0.560	1.125	3.430	1.500	0.200	0.530	0.500	0.460	0.050	0.410	12.
24 Swisschard						5.825		12.650	0.050								18.
25 Snakegourd																	0.
26 Tane Bodi																	0.
27 Squash							2.230										2.
28 Gyathgobi																	0.
29 Chaulai																	0.
30 Coriander																	0.
31 Bakulla																	0.
32 Watermelon																	0.
33 Methi																	0.
Total	6.875	23.940	30.990	2621.960	284.170	194.770	296.375	216.475	205.350	209.715	18.390	123.765	17.175	68.325	202.470	368.805	4889.

Note: Information for other years has also been compiled by No-Frills Consultants.
The vegetable seed distribution figures mentioned above do not include the vegetable seed distribution data of Asadh of 2045/46 FY.

ANNEX P-2

Types of Vegetable Seeds Handled by AIC in the Central Development Region (1988/89)

Crop/District	Rame.	Sindhu.	Sarlahi	Mahotta.	Dhanusha	Rasuwa	Nuwakot	Dhading	Kathman.	Makawan.	Chitawan	Parsa	Bara	Rautahat	Kabhre	Sindhupa.	To
1 Radish	45.550	54.050	119.800	75.000	180.400	4.250	86.575	122.525	33.500	253.850	251.000	210.000		81.350	90.800	2.000	1610.
2 S.L. Mustard		8.000	5.960	2.000	16.300	2.990	4.800	37.000	0.080	57.980	59.000	9.550		2.670	10.000	0.500	216.
3 Cauliflower		1.000	0.230		0.100	2.650	13.620	20.000	2.290		5.500	0.300		0.500	1.860	0.500	48.
4 Cow Pea		4.500	5.000	2.500	59.375	0.250	26.975	3.250	238.230	3.200	20.700	0.200		6.850			371.
5 Okra		2.300	16.250	2.100	36.250		58.875	1.750	308.230	14.275	28.200	1.550		7.400			477.1
6 Brinjal		0.5[illegible]	2.010	0.840	5.230		1.950	0.190	107.010	1.430	3.500	5.500		2.720		0.100	130.9
7 Carrot			1.960	1.120	2.695		0.300	3.040									9.1
8 Pea		5.000	9.550		4.550		3.850	7.500				2.000					32.4
9 Tomato		0.200	1.650	1.000	15.175		2.280	13.000	63.360	0.020	2.50	3.000		4.340		0.100	106.6
10 Turnip			4.9[illegible]0		1.520	0.260	4.520	2.000	3.890								17.0
11 Cabbage			1.440	1.000	2.550	1.080	1.840	3.760	3.418						3.460	0.300	18.8
12 Broccoli		1.000	1.200		1.100	0.010	0.200	1.010	0.850								5.3
13 Onion			43.950	70.000	173.600			13.000	0.800	1.500	9.000	44.100		108.100			464.0
14 Bean		0.500		1.400	2.600		7.300	18.900	359.830	5.500		2.000		2.020			400.
15 Cress		4.225	4.460	2.000	3.480	0.550	1.400	2.060	2.500						5.000		25.
16 Pole Bean																	0.
17 Pumpkin							3.000		4.810								7.
18 Spinach		0.500	2.800	2.000	1.550		1.350	4.150	23.810	1.500	8.000			2.000			47.
19 Hot Pepper		3.250		2.000	1.000		0.600	1.000	55.870	1.430							65.
20 Bittergourd		0.200	2.000	0.468	3.354		2.000		105.535	2.600	1.250						117.
21 Cucumber		0.150	0.100		1.675		1.000	0.500	106.350	1.055	1.500			0.570			112.
22 Bottlegourd		0.340	0.200	0.260	1.900		7.000	1.000	105.821	1.050				0.500			118.
23 Spongegourd		0.200	0.030	0.240	2.060		4.020	1.000	110.630	1.460		0.500		1.000			121.
24 Swisschard									0.020								0.
25 Snakegourd																	0.
26 Tano Bodi																	0.
27 Squash																	0.
28 Gyathgobi																	0.
29 Chaulai																	0.
30 Coriander																	0.
31 Bakulla																	0.
32 Watermelon																	0.
33 Methi																	0.
																	0.
Total	45.550	85.915	223.490	163.928	516.464	12.040	233.455	256.635	1636.834	346.850	390.150	278.700	0.000	220.020	111.120	3.500	4524.6

ANNEX P-3

Types of Vegetable Seeds Handled by AIC in the Western Development Region (1988/89)

Crop/Dist	Manang	Gorkha	Lamjung	Kaski	Syangja	Tanahu	Mustang	Myagdi	Baglung	Parbat	Gulmi	Arghakha.	Palpa	Kapil.	Rupan.	Nawal.	Total
1 Radish	18.050	85.850	175.700	455.225	126.450	269.450	14.650	66.050	100.500	7.000	168.400	108.075	99.775	48.730	125.100	120.800	1989.805
2 B.L. Must	7.240	12.700	3.120	57.840	19.390	48.995	2.100	2.540	3.700	15.000	5.840	13.100	20.520	7.140	34.810	15.760	269.735
3 Cauliflow	2.360	5.500	5.040	29.150	15.950	13.780	42.760		10.650	6.500	16.160	6.070	10.460	5.520	26.030	7.950	203.880
4 Cow Pea		5.850	5.500	25.750	19.000	2.950		7.400	11.000	17.000	5.000	8.900	23.350	0.500	3.550	2.000	141.750
5 Okra		8.825	11.125	13.450	18.875	2.700		16.525	5.700	30.000	7.875	15.404	23.050	4.890	37.750	34.500	224.669
6 Brinjal		3.000	0.500	6.570	2.390	0.500		0.640	2.040	3.000	3.000	4.100	10.390	0.285	3.500	0.100	40.015
7 Carrot	1.950			18.800	2.000	0.500	6.100	3.000				0.500	0.840	0.040	0.800		34.530
8 Pea		1.000	11.150	12.000	12.000	4.700		30.000			2.000	4.000	3.000	0.500			80.350
9 Tomato		0.950	0.500	2.150	0.750	0.100		0.420	1.090	3.000	2.390	2.080	8.215	0.617	10.390	3.000	35.652
10 Turnip	3.840	0.700	2.360	3.120	2.000	2.100		0.500	1.700		2.700	2.680	2.000	0.967	3.030	1.000	28.697
11 Cabbage	3.320	2.000		8.400	7.130	7.000		7.500	4.480				35.350	0.200	0.020	2.080	77.480
12 Broccoli						7.980					1.000	1.050	1.800	1.940		1.000	14.770
13 Onion		45.000	11.000	15.000	30.250	10.350		22.200	17.875	20.000	31.075	38.150	30.150	10.925	39.955	14.000	335.910
14 Bean		9.100	1.500	65.000	5.500	1.850		6.750	4.950	13.500	9.550	10.850	40.750	0.900	11.400	1.000	176.600
15 Cress	1.800	2.600	3.200	11.450	3.550	4.975	0.200	6.335	1.000		3.000	2.000	4.500	2.770	1.000	0.800	49.180
16 Pole Bean																	0.000
17 Pumpkin		0.500	0.250	0.500											0.100		1.350
18 Spinach			2.000	24.000	3.750	3.000			2.000		3.200	4.950	4.200	0.850	20.390	4.000	72.340
19 Hot Pepper																	0.000
20 Bittergourd		1.950	1.050	4.750	1.000	1.430		1.690	0.350	6.500	0.925	2.765	3.200	1.290	4.575	3.875	35.350
21 Cucumber		0.990	0.500	3.300	0.800	1.500		2.060	0.490	2.000	0.210	0.990	1.355	0.180	2.385	0.500	17.260
22 Bottlegourd					0.080						0.770	1.100	5.230	0.480	2.060	2.150	11.870
23 Spongegourd		3.180	0.800	3.900	1.000	1.800		2.490	0.480	3.000	0.390	1.000	5.310	0.480		3.200	27.030
24 Swisschar	3.790			21.500			0.625						3.900			1.000	30.815
25 Snakegourd																	0.000
26 Tara Bodi																	0.000
27 Squash							2.000										2.000
28 Gyathgobi																	0.000
29 Chaulai																	0.000
30 Coriander																	0.000
31 Bakulia																	0.000
32 Watermelon																	0.000
33 Methi																	0.000
																	0.000
Total	42.350	193.695	235.295	781.855	271.865	385.640	68.435	164.100	168.005	126.500	263.485	227.764	337.345	89.204	326.845	218.655	3901.038

ANNEX P-4

Types of Vegetable Seeds Handled by AIC in the Mid-Western Development Region (1988/89)

Crop/District	Rukum	Rolpa	Salyan	Pyuthan	Dang	Dailekh	Jajarkot	Surkhet	Bardiya	Banke	Humla	Mugu	Dolpa	Jumla	Kalikot	Total
1 Radish	101.635	16.000	30.340	43.325	304.570	58.550	30.815	216.300	90.025	54.250	37.500	2.000	3.250	24.200	26.600	1039.360
2 B.L. Mustard	6.450	3.000	4.110	8.330	28.970	15.000	4.500	44.880	15.590	8.150	5.000		4.420	11.050	8.820	168.270
3 Cauliflower	5.070	3.000	7.010	5.000	39.720	18.000	2.620	16.190	20.590	17.900	5.000		0.510	12.130	4.300	157.040
4 Cow Pea	9.725	6.200	4.250	10.450	80.875		1.750	8.625	11.600	0.500			0.025	1.250	2.300	137.550
5 Okra	2.575	11.500	11.825	17.050	227.425	13.350	7.650	55.000	113.700	7.250			0.100	4.100	10.000	481.525
6 Brinjal	1.930	0.700	1.450	1.250	4.460		0.200	2.955		0.100				3.360	0.800	17.205
7 Carrot								6.570	1.500	0.100	3.000		2.490	5.690	2.200	21.550
8 Pea	4.850				15.300	11.750	0.450	30.000	1.500	180.000				1.100	7.000	251.950
9 Tomato	2.140	5.200	3.300	3.040	16.170		0.610	5.900	6.610	2.600			0.010	6.100	4.000	55.680
10 Turnip	6.180		4.900	9.000	22.610	0.800	2.800	9.370	6.220	4.000	7.000		0.020			72.900
11 Cabbage	0.710	10.000	4.590	4.000	32.400	0.800	1.420	25.340	12.720	7.000	5.000		1.640	7.880	2.500	116.000
12 Broccoli	1.120		3.000		10.600		0.500		2.770					0.170		18.160
13 Onion	129.175	10.000	7.075	16.000	159.145	16.300	27.960	165.050	54.450	147.250	10.000		2.050	18.750	14.500	777.705
14 Bean	2.550	7.350	7.650	10.150	70.550		0.750							1.900		100.900
15 Cress	3.500				24.125		1.375							3.150		32.150
16 Pole Bean																0.000
17 Pumpkin	0.080		0.300	1.260	7.070		1.000	1.955	2.950							14.615
18 Spinach	2.500	10.000	10.000	2.500	25.710		0.450	27.850	21.850	1.250	2.950			4.500	5.000	114.560
19 Hot Pepper					1.775				1.200					0.900		3.875
20 Bittergourd	0.400		0.400	0.960	30.785	0.450	0.400	2.618	9.000	0.250		0.010		0.145	0.700	46.118
21 Cucumber	0.635	0.895	0.405	1.770	12.550	0.465	0.400	3.240	1.215	0.350				0.495	0.500	22.920
22 Bottlegourd	0.610	0.900	0.300	0.500	7.580			2.000	4.695							16.585
23 Spongegourd	0.870	0.700	0.300	0.280	10.785		0.300	1.363	1.845	0.500					1.200	18.143
24 Swisschard		1.000			5.320									1.000		7.320
25 Snakegourd																0.000
26 Tane Bodi																0.000
27 Squash	2.000															2.000
28 Gyathgobi																0.000
29 Chaulai																0.000
30 Coriander					2.200											2.200
31 Bakulla																0.000
32 Watermelon																0.000
33 Methi																0.000
Total	284.705	86.445	101.205	134.865	1140.695	135.465	85.950	625.206	380.030	431.450	75.450	2.010	14.515	107.870	90.420	3696.281

ANNEX P-5

Types of Vegetable Seeds Handled by AIC in the Far Western Development Region (1988/89)

	Crop/District	Bajhang	Bajura	Doti	Achham	Kailali	Darchu.	Baitadi	Dedel.	Kanchan.	Total
1	Radish	20.975	5.500	55.900	36.650	475.950	50.800	59.900	83.965	276.300	1065.940
2	B.L. Mustard	4.900	3.000	7.000	4.000	20.580	5.980	8.000	3.000	17.600	74.060
3	Cauliflower	0.800	2.330	0.930	6.000	29.930	3.260	4.100	1.860	10.510	59.720
4	Cow Pea		1.500	2.850	2.000	11.900	0.850	3.100	1.475	26.675	50.350
5	Okra		1.325	2.350	5.200	18.400	4.020	15.000	10.175	106.325	162.795
6	Brinjal		1.810	2.500	3.170	4.190	2.130	2.200	2.980	6.060	25.040
7	Carrot	0.460	1.120	1.500	2.000	5.650	1.440	1.000	3.500	4.620	21.290
8	Pea	1.600	2.000	5.000	10.600	21.750	2.000	6.100	6.150	7.800	63.000
9	Tomato		1.900	1.150	2.850	5.110	2.825	2.600	3.050	6.380	25.865
10	Turnip					9.490	0.342			12.300	22.132
11	Cabbage	0.500	1.000	1.220	5.180	43.180	3.000	2.000	2.920	14.260	73.260
12	Broccoli			1.100	2.000	4.440	1.000	1.000	1.000	4.950	15.490
13	Onion	9.650	2.000	6.450	5.650	97.120	4.175		1.050	22.450	148.545
14	Bean		0.500	0.650	0.750	2.825	0.075	0.500	1.000	1.750	8.050
15	Cress	0.950	1.000	0.850	2.000	8.420	2.570	2.000	0.890	5.705	24.385
16	Pole Bean										0.000
17	Pumpkin	0.050		0.050		0.030		0.050			0.180
18	Spinach	1.975	3.500	1.000	2.000	15.250	1.190			4.175	29.090
19	Hot Pepper					0.010				5.250	5.260
20	Bittergourd		0.850		0.600	4.645	0.530	0.830	0.980	7.250	15.685
21	Cucumber		1.050	0.810	0.565	2.830	1.010	1.320	1.475	5.250	14.310
22	Bottlegourd		0.200	0.270	0.180	0.210	0.580	0.100	1.020	2.160	4.720
23	Spongegourd		2.270	1.270	0.750	1.390	0.850	1.000	3.060	2.980	13.570
24	Swisschard			1.250	1.000	7.270	1.500	0.500	0.800	7.675	19.995
25	Snakegourd										0.000
26	Tane Bodi										0.000
27	Squash										0.000
28	Gyathgobi										0.000
29	Chaulai										0.000
30	Coriander										0.000
31	Bakulla										0.000
32	Watermelon										0.000
33	Methi										0.000
											0.000
	Total	41.860	32.855	94.100	93.145	790.570	90.127	111.300	130.350	558.425	1942.732

Annex Q

Main Commercial Types and Varieties of Vegetable Seed in Different Districts

S. No.	District	Main Commercial Types	Varieties	Remarks
1.	Ilam	Pea, Cabbage, Radish, Onion, Garlic, Tomato, Chilli, Cucumber, Pumpkin, Rayo, Bean and Chayote	Sikkim Perfection New Line Perfection Pride of India Local or undetermined varieties in all these cases	For export to India For local (weekly) market
2.	Makawanpur	Radish	Mino Early, Local/undetermined	For urban off - season market
		Pea	Local or "	"
		Cauliflower	Kathmandu Local	"
		Broad Leaf Mustard	Khumal Broad Leaf	"
		Cabbage	K.K. Cross, Pride of India	"
3.	Nuwakot (K)	Radish	Mino Early for Summer White Neck for Winter	For urban market in KTM
4.	Nuwakot (B)	Cauliflower	Kathmandu Local	Local market in Trishuli
		Radish	Mino Early, White Neck,	"
		Onion	Nuwakote,	"
		Garlic	Local	To sell in KTM
		Broard Leaf Mustard	Local	Local sale KTM
5.	Dhading	Cauliflower	Kathmandu Local	Local sale
		Radish	Mino Early and undetermined	"
		Onion	Red Creole	" and KTM
		Tomato	Pusa Ruby	Urban sale in KTM
		Brinjal	PPL, PP Round,	"
		Sweet Pepper	California Wonder,	"
		Cucumber	Local	"
6.	Pokhara	Cauliflower	Kathmandu Local	Local sale
		Cabbage	Pride of India, LL Drum Head	"
		Radish	Mino Early	"
		Tomato	Local	" and distance sale
		Brinjal, Okra Cucumber	Undetermined	Local sale

S. No.	District	Main Commercial Types	Varieties	Remarks
7.	Kathmandu Valley	Cauliflower	Kathmandu Local, Undetermined	Urban sale in the Valley
		Cabbage	Drum Head, K.K., Cross	"
		Radish	Phyuthane, White Neck, Mino Early	"
		Turnip	Local Red, Purple Top	"
		Carrot	Undetermined	"
		Broad Leaf Mustard	Local	"
		Onion, Cress, Garlic and Spinach	Local	"
		Sponge gourd	Local	
		Sweet Pepper	California Wonder	"
		Cucumber	Local	
		Squash	Undetermined	
		Chilli	Local	
8.	Terai:			
	Saptari, Sarlahi, Bara, Dang and Banke	Cauliflower	Deepali, Katki Kathmandu Local, Snow Ball,	For early season For late season
		Cabbage	Pride of India	
		Onion	Nasik Red, Pusa Red, Patna Red,	
		Radish	Mino Early, White Neck	
		Tomato	Pusa Ruby, Pusa Early Dwarf	
		Eggplant	Pusa Purple Long, Nurki, Sarlahi, Green	
		Sweet Pepper	California Wonder	
		Okra	Pusa Sawni	
		Bitter Gourd	Pusa do Mausami	
		Bottle Gourd	Pusa Summer Profilic Long	
		Cucumber	Local	
		Yard Long Bean	Local	

Source: Vegetable Seed Marketing Survey, B. S. 2040/41, VDD, HMG + VSPP, FAO/Khumaltar

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