HILL SEED SUPPLY

IN

NEPAL

A SPIS* Project's paper for FAO Seminar

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Nepal's Hill Seed Project - Supply of Good Quality Seed in Remote Areas

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PART-I

1. Background Information

The Kingdom of Nepal is a land-locked country situated between China in the north and India in the south. It has a land area of 141,000 square kilometers a large part of which is mountaineous. The cultivated land is 22 percent or about 3.1 million ha. In the hills, however, only 14 percent area is under cultivation. The country's population of 16.5 million is growing rapidly at a rate of about 2.6 percent. A large portion (56%) of the people live in the hills, which in relation to cultivated land amounts to a high density of 660 persons per square kilometer. The percentage of population dependent on agriculture is about 94 percent.

The ecology of the country consists of three geographical regions extending from east to west: the Terai plains between about 75-300 meters above sea level, the Himalayan hills (or mid-hills) between 300-2500 meters where the seed project is operating and the Mountain region that ranges in elevation from 2500 meters upto 8848 meters i.e. the peak of Sagarmatha, or Mount Everest. The mountain areas have but little agriculture because of very cold temperatures. The southern belt of flat land is a fertile, humid region that has a good potential for

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agricultural production. The mid-hills support a large population but are under-developed and generally lack infrastructural facilities like electricity, roads, warehouses and markets. Criss-crossed by streams and rivers they are not easily accessible. Developmental efforts are hampered by lack of transportation. The high cost and difficulty of transporting bulky goods in this region underline the need for local production of agricultural commodities to a maximum possible extent.

The hills are intensively cultivated and practically every bit of land is cropped. Main crops are maize (36 percent), rice (27 percent),, wheat (14 percent), millet (12 percent) and potato (5 percent). Farming is carried out in small units on terraced slopes and hence application of modern technology is severely limited.

His Majesty's Government (HMG) attaches high priority to the development of hill agriculture. This is important for improving the peoples' economy and to stem their migration to the Terai. In the past, agricultural productivity has not been improving despite investment made in the five year plans. But there is ample scope for development through systematic exploitation of the potential and mobilization of human resources.

2. Seed Sector Overview

Organized seed production in Nepal began in the mid-seventies. In these ten years, adequate physical facilities have been created. Also available is a cadre of trained personnel who have considerable professional experience. The responsibility for carrying out seed activities is shared by the Department of agriculture (DOA) and Agriculture Inputs Corporation (AIC). While the former is charged with research, variety evaluation, variety maintenance, foundation seed production, seed quality control and certification the latter is the sole official agency for

producing and marketing commercial seed; aside from its major function of procuring and distributing fertilizer in the country. The private sector is yet to catch up although firms and individuals are free to engage in seed business if they find it worthwhile. There are three different seed projects receiving external assistance; USAID-funded Seed Production and Input Storage Project (SPIS Project) in the hills, which forms the theme of this paper, Cereal Seed Production Project of GTZ in the Terai and FAO's vegetable Seed Project.

AIC's seed production program is concentrated in the Terai where most of the cereal seed is produced. Wheat seed constitutes bulk of the production every year due probably to the fact that farmers have difficulty storing seed over the monsoon period. The high seed rate (120 kg/ha) itself tends to push the seed requirement far above that of maize or rice seed. Next in demand is maize seed in which case composite varieties are in use and they are replacing the local varieties. Hybrid maize is still at an introductory stage and more popular as a winter crop in the Terai. Only nominal quantities of rice seed are sold by the AIC because the varietal replacement is rather slow and farmers can easily keep seed for the next season. For vegetable seed production, Nepal is considered an ideal place. Besides sub-tropical conditions in the Terai and temperate environment in the hills, there is a cool and dry trans-Himalayan situation at higher elevations where high quality, disease-free seed of crops like cabbage, carrot, turnip and beet root can be produced to meet domestic demand and to build up an export enterprise.

Seed is produced by AIC's contract growers. They are paid a premium price 25 to 30 percent above the market price. Raw seed delivered by the growers is cleaned and processed in five different processing plants. Seed samples are drawn from individual lots and examined for germination, moisture content and purity. Most seed is packed in 40 kg bags though the seed produced under SPIS Project is supplied in smaller bags. Hessian bags with 250 gauge polyethylene

liners have proved effective in preserving the seed quality over the usual storage period of 6-8 months. AIC has more than 70 offices throughout the kingdom and these are utilized for marketing of seed. For retail selling, it uses Sajhas (cooperatives) as its dealers and allows them a sale commission of 6 percent. Private dealers only fill the gap where Sajhas do not operate. Some seed is sold by AIC from its own sale counters directly.

Foundation seed produced by DOA is handed over to AIC for multiplication. For quality control and research purposes, DOA runs a unit known as Seed Technology and Improvement Program (STIP). Under it there are five seed testing laboratories and a seed certification unit.

Table - 1

National Seed Requirement (Cereals)

Crop	Approximate Area m. ha 1981-82	Seed requirement m.t.	Desirable target for seed supply (m.t.)
Rice	1.30	50000	4000
Maize	0.48	10000	2000
Wheat	0.40	48000	9000
Total	2.18	108000	15000

Table - 2

Hill Seed Requirement (Cereals)

Crop	Approximate Area m. ha 1981-82	Seed Requirement m.t.	Desirable target for seed supply m.t.	*Seed Supply Projections of SPIS Project m.t.
Rice	238000	9000	1000	500
Maize	304000	6000	1500	500
Wheat	134000	16000	2500	1500
Total	676000	31000	5000	2500

* The Project covers 20 districts out of 40.

Table - 3

AIC sale of seed by region (m.t.)

Year	Hills	Terai	Total
1980-81	900	2210	3100
1981-82	537	2059	2596
1982-83	1423	4566	5989 *
1983-84	493	2365	2858
1984-85 (estimated)	950	1800	2750

* The sale increased under a special program.

3. Need for Hill Seed Production

In the past, hill farmers' access to improved seed used to be inadequate. All seed was produced in the Terai and the flow of seed through mountain terrain was (and still is) severely hampered due to constraints such as rugged topography, transport difficulties, high cost, lack of seed storage facilities in target areas and the logistic problems generally faced in remote areas. As a result, old inferior crop varieties held ground in the hilly areas despite the fact that the agricultural research system has been generating and testing varieties that significantly outyielded the traditional ones. Clearly, something needed to be done to improve the situation.

Unlike fertilizer and other expensive inputs that are hard to supply in hilly areas seed of superior varieties is a handy and cheap commodity. It ought to be made use of extensively. Production can possibly rise 30 percent with the adoption of this measure alone. Moreover, good seed can be provided by local effort and need not be imported from abroad. Also, new seeds induce the farmers to use better technology. Clearly, it is desirable to promote the use of good seed in suitable cropping patterns so that even with moderate dozes of fertilizer and application of compost hill farmers achieve higher levels of production.

PART - II

4. Project Description

Started in January 1980, the Seed Production and Input Storage Project is due for completion in August 1985. It is funded by a 4-million dollar grant from the government of the U.S.A. together with a significant contribution of His Majesty's Government of Nepal and some support from american Peace Corps.

As to its implementation, the primary responsibility lies with the Agriculture Inputs Corporation. Technical assistance under a host country contract is provided by IADS (International Agricultural Development Service). The working of the Project is overseen and guided by a Coordination Committee and a Project Director. There is a whole-time Project Coordinator to facilitate day-to-day working and he represents the Seed Division of AIC. At the field level, the Project sites are integrated with AIC's branch offices in the districts. These offices are used for backstopping and channeling developmental assistance.

The Project also draws on the support of the Department of Agriculture which provides seed testing and quality control services as well as foundation seed for multiplication. Several other agricultural projects operating in the same areas coordinate their activities with the SPIS Project and the resulting fruitful cooperation helps whereever joint effort is needed.

5. Aims and Objectives

The main objective is to assist the Ministry of Agriculture to establish in the mid-hills a responsive and labour-intensive system of producing, testing, processing, storing and supplying seeds of major food crops; and for stocking and distributing all the inputs (used in the production of these crops) to the small hill farmers as cheaply and effectively as possible.

Following are the related objectives:-

- to establish a seed production and supply system for the hills,
- to pave the way for the development of private seed producing and marketing enterprises,
- to create seed processing, treating, packaging and storage facilities at selected sites,
- to promote greater use of improved seeds in the hills,
- to support manpower development for future needs,
- to work towards qualitative improvement in seeds supplied to farmers,
- and to assist HMG/N improve other facets of the national seed program.

6. Project Components

Construction, technical assistance, commodity procurement, out-of-country training, in-country training, social and physiological research are the main components of the Project. The construction work includes: mini-seedhouses for seed production activities, small warehouses for storage of fertilizer, seeds pesticides & tools, a central seed testing laboratory and a conditioned storage unit for long term storage of genetic material. Under technical assistance IADS have provided a seed program management specialist and a field supervisor. The Project has a provision to invite technical consultants and so far 12 consultants have served for 16 person months in accordance with the identified need. The overseas training consists of masters degree program, and non-academic training. Under the line item "research" funds are set aside for socio-economic surveys, testing innovations and carrying out studies on field problems for which solutions need to be found. Also there is a broad-based in-country training program.

It aims at improving the skills of a variety of junior and middle level personnel and covers training of farmers in seed production and handling aspects.

7. Mini-Seedhouse

As is obvious from the term, a seedhouse is a physical facility in the midst of an isolated hill area.. It is essentially a seed centre from where plans for seed production are launched with local farmers' participation. Even more than that, a seedhouse reflects a new concept for meeting the seed needs of hill farmers through a decentralized system.

A seedhouse consists of a small building with three sections. In one, simple equipment for seed handling is installed, in the other wooden pallets are provided for seed storage and the third section upstairs is used for office and supplies. Outside the building is a concrete platform for sun-drying. The double-storey design enables the storage area stay cool and dry for better seed preservation.

It is visualized that, eventually, a seedhouse will perform the following functions (see diagram showing district-wide seed coverage):-

a. Every year, a small quantity of foundation seed of the recommended varieties will be portered from the Terai to a seedhouse.

b. AIC will use the seed to produce certified seed near and around the seedhouse with the help of trained seed growers.

c. Bulk of certified seed will then be given to satellite seed producers throughout a district who will further multiply and sell improved seed in the neighbourhood.

d. A small quantity of certified seed will, however, be multiplied and sold by a farmers' organization utilizing the facility of a seedhouse. Such organizations in the private sector are being promoted and supported so they may serve Panchayats close to seedhouses.

8. Implementation Strategy:-

The Project work has proceeded in phases. First, steps were taken to create physical infrastructure, procure equipment and train the manpower. Then, at the earliest opportunity, plans for seed production were launched.

At the outset, selection of sites for the purpose of investing resources was the main goal. It was felt that in the hills of Nepal that extend 800 kilometers east to west identifying locations based merely on macro data could be misleading. It was necessary to conduct socio-economic surveys to obtain detailed information. For this purpose, trained teams of enumerators under an experienced socio-economist had to be mounted. They went out on extensive district tours walking in the hills for days to test a questionnair and to collect data from the key informants. The result of this basic exercise revealed the complexities and limitations for a seed venture. It was concluded that a viable strategy must take into account many unique characteristics such as:

a. Mules and porters are the chief means of transportation in mountainous areas and so carrying bulky equipment or material is unpracticable.

b. At most places, use of electrically-powered seed cleaning equipment is out of question and slow sun-drying is the only possibility of achieving a safe moisture content in seeds.

c. Among the small hill farming communities seed quality consciousness is yet to permeate. The result: most planted seed comes from farmer to farmer exchange.

d. In food deficit areas the land for seed multiplication is very limited.

e. Due to high default rate, bank credit is scarce and lack of capital is usually overcome through barter among the villagers themselves.

f. To induce competent agronomists, extension workers, technicians or seed technologists to live and work in remote areas is by itself a difficult proposition to contend with.

g. The cooperatives (Sajhas) are beset with problems and hence not in a position to give a lead to seed program activities.

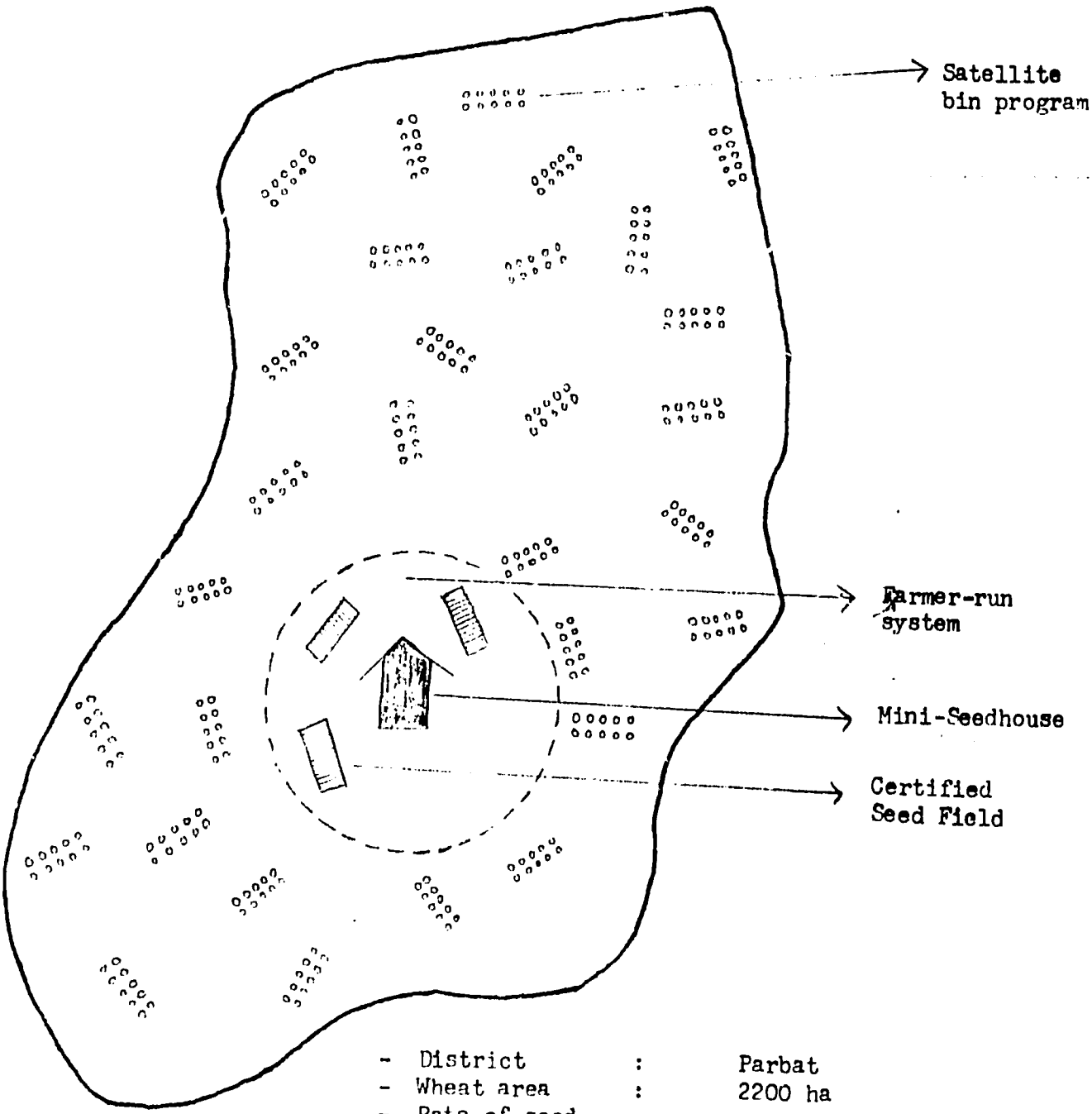
h. A privately managed system is possible but has to wait because the small farmers with limited resources have neither the initiative nor motivation to attempt a commercial proposition. In the beginning such farmers usually prefer a no-risk plan by being contract growers of the AIC. They do have an interest in a farmer-managed seed program provided successful working is first demonstrated by an official agency.

i. Saving seed from insect and rodent attack is a critical problem for small farmers. This is especially true for vulnerable wheat and maize seeds that need to be handled and stored through the rainy season. Therefore, organized seed production, processing and storage is essential in the hills if the traditional varieties are to be replaced by improved ones.

After carefully considering all these aspects, an operational strategy could be formulated. With passage of time it was further refined based on working experience. The accepted strategy has the following elements:-

SPIS Project

Plan for wheat seed supply in a hill district



- District : Parbat
- Wheat area : 2200 ha
- Rate of seed multiplication : 1:15
- Total seed used : 265 m.t.
- Annual seed supply under mini-seedhouse system.
  - a. Certified - 8 m.t.
  - b. Improved - 20 m.t. (by SGA)
  - c. Improved -100 m.t. (by satellite producers)
- Foundation seed required every year -500 kg.

a. For a start AIC should launch seed production with the help of newly trained seed growers and also undertake storage and marketing operations to serve areas adjoining the mini-seedhouses.

b. Later, convert as many sites as possible from AIC-run to farmer-run system if feasible. For this purpose farmers' own organizations be set-up through motivation and demonstration. (A farmer-run system is described elsewhere).

c. In the long-run, expand the scope and impact of a mini-seedhouse to cover an entire district with improved seed by organizing a satellite bin program. In pursuit of this concept, individual farmers in a district will be identified, trained and registered with the seedhouse as partners in progress. They would receive subsidized storage bins, source seed and recognition enabling them to grow seed for pocket areas. In essence, the concept would lend support to farmer-to-farmer seed exchange already popular in the hills.

For the purpose of implementation the Project first established two pilot sites to test ideas and technologies and to gain working experience. One site was managed by AIC in line with its usual policies and the other was privately managed by a group of farmers themselves. Both have proved to be successful. However, AIC recognizes that being a commercial organization it cannot afford to manage a number of widely-dispersed small seed production sites in the hills. Private management by local farmers on the other hand could be more economical and efficient and hence all efforts have to be made to encourage the same.

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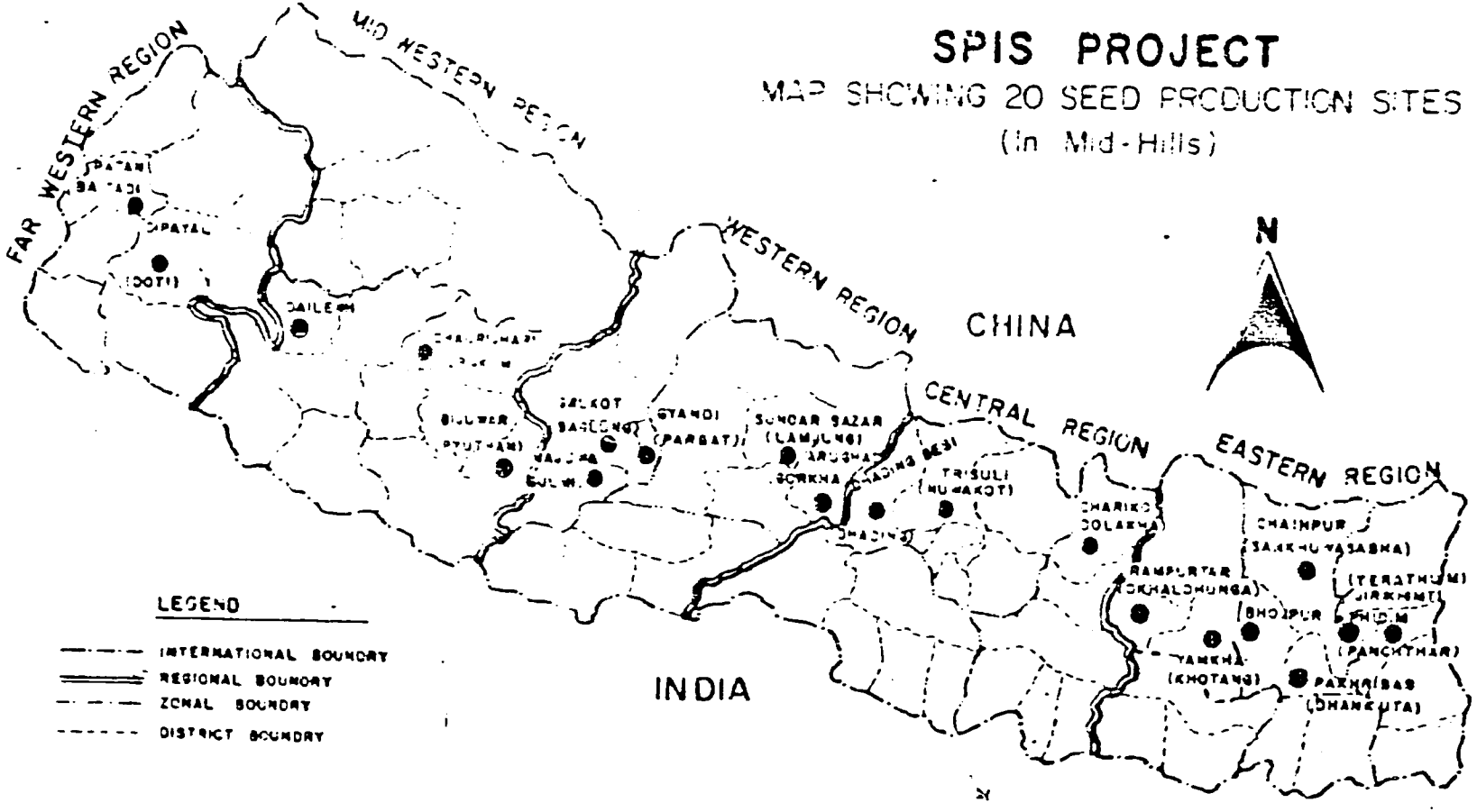
SPIS PROJECT

MAP SHOWING 20 SEED PRODUCTION SITES

(In Mid-Hills)



9. Seedhouse Operation

In each of the selected sites a mini-seedhouse facility for processing and storage of seed is created. It is equipped with the simplest of tools and machines because sophisticated equipment can neither be operated nor maintained in remote areas. In the beginning, Burrows Model-30 seed cleaner was introduced. It is a hand-operated machine. As seed quantities have increased, Clipper M2B cleaner powered by a 2.5 KVA kerosene generator is being added for more output and better seed quality.

For seed multiplication purposes, farmers surrounding a seedhouse are identified and given practical training so that they acquire the skill for growing and handling of seed crops. These farmers participate in seed production. The participating seed growers receive a small quantity of foundation seed, which they multiply in their fields following recommendations as to land requirement, isolation, agronomic practices, roguing, harvesting, threshing and handling. The raw seed they produce is collected at the seedhouse where it is dried, fumigated, cleaned, graded, treated, weighed, bagged and labelled. The seed is also sampled for laboratory testing to determine its planting value. Finally the approved seed lots are moved to a safe storage chamber. With the onset of planting season several months later, the farmers of neighbouring areas can buy the seed from the seedhouse or from a Sajha.

The Project continually makes arrangements for source seed, treatment material, chemicals and bags according to need. A junior Technician (JT) manages the affairs at each of the seed-houses and he is continually assisted and backstopped to do his job well. The JTs have been trained not only through in-country training sessions but also by way of observation tours of the seed operations in a neighbouring country. They are responsible for implementing seed production plans.

In NSC-run sites, seed is procured from the contract growers and sold to farmers after processing and storage. The collection price is determined by a local committee based on the market price of grain. The premium is paid in two installments, at collection time and after a satisfactory seed analysis report is received.

10. Project Output

Achievement under the Project is encouraging. Targets have been fulfilled or exceeded. There is a visible impact as farmers are beginning to have timely access to seed. A total of 20 seed-houses are operating against a target of 16. In addition, more than a dozen small warehouses of 125 m.t. capacity each have been established to complement the seedhouses. The central seed laboratory set-up with Project assistance has a capacity of more than 5000 samples a year. It is equipped with walk-in germinator rooms. Attached to the laboratory is a genetic storage unit for germ plasm storage by research workers. It is designed to maintain 8-10°C temperature & 45-50 percent RH. In order to improve mobility of staff in the national seed program a number of vehicle have also been made available.

Area under seed production is increasing in line with the demand for seed. Already, each seedhouse, on an average, is producing 10-15 m.t. of superior quality seed annually and the entire network has the capability of pumping 1000 m.t. of improved seed in the hilly region. The tonnage will be more than doubled if the satellite bin program is taken into account. Seedhouses are working with 800-1000 seed growers. The better-managed seed fields of these farmers, besides producing seed, are a source of demonstration for the farming community. The mini-seedhouse system is helping the introduction of new varieties that are superior to the existing ones and this indeed is an important benefit by itself.

Under the Project, 11 participant trainees have obtained post-graduate degrees abroad. 60 officials availed a variety of non-academic training opportunities in other countries. The in-country training sessions held thus far have improved the technical skills of 275 officials and 1200 seed growers. Since women play an important role in hill agriculture they are encouraged to enroll in the training courses.

Efforts made towards privatizing some of the seedhouses are slowly bearing fruit. Four out of 20 seedhouses are being managed by farmers directly; one by a group of women farmers.

Other notable contributions include, (1) a water-turbine run by a mountain stream to produce 8 kilowatts of power for running seedhouse equipment, (2) a solar-cum-kerosene dryer for seed drying @ 500 kg/day and (3) installation of walk-in type germination rooms in the central seed testing laboratory.

11. Farmer-run System

Motivated farmers in close proximity to a seedhouse are identified for this purpose. They are given necessary training in seed production. They are also exposed to a successful pilot site where they share others' experience. There is often a period of hesitation but finally the farmers may form a body called Seed Growers Association (SGA). This then becomes the institutional base for program planning and implementation. The SGA forms a small managing committee and nominates a leader among themselves. He is called co-Manager and receives a suitable remuneration. The co-Manager, after special training, assumes responsibility for executing seedhouse activities. He is regularly backstopped by a Manager who is a technician provided by AIC or DOA. The co-Manager begin a farmers' representative can look after their collective interest. By working hand-in-hand with the official Manager he gains working experience for

eventual takeover of the operation independantly. The agreed arrangement allows SGA to make use of the seedhouse facilities at no cost while technical guidance is provided by AIC or DOA staff.

The SGA is assisted to implement a demand-oriented seed production program by supplying source seed and ensuring availability of fertilizer and chemicals. The Association members are helped in obtaining individual production loans from Agriculture Development Bank.

After harvesting and threshing the seed growers deliver the seed at the seedhouse. At this time the SGA secures a collective loan and pays its members an amount equivalent to grain value. Additional payment is possible after the seed has been processed, tested and approved.

At the time of planting season, the seed is sold through direct effort and through small dealers in the surrounding areas. If the seed is surplus to local needs it is purchased by AIC for deficit areas. The sale proceeds are finally passed on to seed growers after clearing bank loan and other collective dues. Since the product (seed) is SGA property and its reputation is at stake the members are conscious of maintaining quality unlike a system in which the seed may be produced on contract basis for a commercial organization.

Summing-Up

The task of ensuring improved seed supply to small hill farmers is a challenge which is unique in many ways. Because of no scope for a large-scale commercial enterprise, the hills need an appropriate seed program of their own. The problem of moving seed from the Terai to hills or within hilly areas from one place to another must be taken into account. A low-cost,

low-tech, decentralized system of seed production as designed under the SPIS Project is a step in the right direction because it bypasses many a stumbling blocks. It has the potential to deliver the goods if pursued to a logical end over a period of time.

It is heartening to see in the pipeline a follow-on on the current project through continued future assistance. This indeed is a recognition of the usefulness of the on-going hill seed production system. In the coming years it should be possible to consolidate the gains and provide a dependable service to the farming community.

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