

PRIVATE FARM NURSERIES IN PUNJAB AND NWFP

RAJA MUHAMMAD OMER, WINROCK INTERNATIONAL DATABASE CELL OFFICER, GOP-USAID FORESTRY PLANNING AND DEVELOPMENT PROJECT, ISLAMABAD

SHAUKAT ALI KHAN, ASSISTANT MANAGER MARKETING, NWFP, FOREST DEVELOPMENT CORPORATION, ABBOTTABAD

CHARLES R. HATCH, CHIEF OF PARTY, WINROCK INTERNATIONAL AND PROFESSOR, DEPARTMENT OF FOREST RESOURCES, UNIVERSITY OF IDAHO, USA

ABSTRACT

Since 1989 2,057 private farm nursery contracts have been issued in four forest divisions of Punjab and two forest divisions of NWFP. A sample survey of approximately 10 percent of these contracts was undertaken in 1993. This study describes attributes of private farm nursery operators, estimates the supply, demand and direct sale of tree seedlings from private farm nurseries, identifies limitations which prevent the marketing of tree seedlings, and suggests changes in forest department policies which could increase seedling sales.

Over the past four years, nearly 69 million tree seedlings were produced in private farm nurseries and distributed free of cost to 148,000 individuals in the Punjab and NWFP. Farmers have also directly purchased another 3 million tree seedlings from the farm nurseries. Farmers in these areas have demanded an additional 100 million tree seedlings.

In Punjab, over the four year period, women were issued a total of 42 nursery contracts; 2.4 percent of the total number of contracts issued in that province. No nursery contracts were issued to women in NWFP during the same period.

INTRODUCTION

One of the goals of the Forestry Planning and Development (FP&D) Project is to reverse the process of deforestation. One means of reversing the process of deforestation is through tree crop management on private lands. To encourage the planting of trees on private lands, farmers were given tree seedlings free of cost. The seedlings were raised in private farm nurseries under contracts with the provincial forest departments. The free and widespread distribution of tree seedlings on a large scale has resulted in the reclamation of marginal lands, particularly in barani areas. Omer *et al.* (1993) undertook a detailed review of farm nurseries to evaluate their progress over the four year period 1989 to 1992.

Objectives

The primary objective of this study is to evaluate the success of FP&D Project supported farmer nurseries in terms of the likelihood that they might continue as private businesses. In this context, the study attempts to indicate the extent to which private nurseries have become self-sustaining businesses, to identify limitations which prevent the marketing of tree seedlings, and to outline suggestions which could increase seedling sales. This study can serve as a guideline for similar schemes which may be initiated in the future.

Location

The study is restricted to the FP&D Project's operating areas within the Punjab and NWFP provinces. In Punjab province this included the Attock, Gujrat, Jhelum and Rawalpindi forest divisions. In NWFP the Project's operating area included the D.I. Khan and Kohat forest divisions.

METHODS

Collection of Nursery Files

The Punjab and NWFP project directors maintained a separate file for each contract issued to a farmer to raise tree seedlings under the FP&D Project. Office orders given in the nursery contract files were used to construct a list of nurseries by tehsil for the four divisions of Punjab and the two divisions in NWFP for the last four years. Within this list the number of seedlings raised in the nursery was recorded separately by species. If a farmer received more than one nursery contract to raise seedlings during different growing seasons, the farmer would appear in the list separately for each contract. Table 1 indicates the distribution of the 1,742 farm nursery contracts in Punjab and the 315 farm nursery contracts in NWFP by tehsil. The nurseries associated with these contracts formed the population of farm nurseries that were used in this study.

Selection of Sampled Nurseries

Because of time constraints and financial limitations, it was not possible to interview all the farmers associated with the 2,057 nursery contracts. Therefore, approximately 10 percent of the farmers with nursery contracts were randomly selected from each tehsil. In Punjab 208 farmers were sampled and an additional 32 were sampled in NWFP (Table 1). The probability that a farmer was selected was proportional to the total number of seedlings raised in that tehsil. Thus, farmers who raised larger nurseries, or raised nurseries under several contracts, had a greater chance of being selected than farmers who had smaller contracts or participated in the program only one time.

In a few cases the selected farmer was not available but an employee or family member who

had been actively involved in the nursery's operation was present. In this case that individual was interviewed in place of the selected farmer. If the selected farmer, or a knowledgeable representative no longer resided in the community or could not be located, the sample was rejected and an alternative sample was used.

Data Collection and Analysis

Each farmer selected in this study was interviewed at his or her place of residence. Questionnaires were developed to structure and standardize the interviews of farmers and forest officers involved in the project. Since the samples were randomly selected from a known population, data from these interviews were used to estimate attributes for individual farm nurseries and for the total farm nursery population. Means, totals and 95% confidence intervals were estimated using statistical procedures associated with stratified random sampling of populations with known strata size (Mendenhall *et al.* 1971).

RESULTS AND DISCUSSION

This section reports on the results obtained from the sample of farm nursery operators. Supply of and demand for tree seedlings by farmers, number of seedlings sold directly to farmers, physical and financial resources required to raise tree seedlings, factors which constrain production and sale of seedlings, description of farm nursery operators, and farmer and forest officer suggestions on ways to improve the farm nursery program are each addressed separately.

Supply of and Demand for Tree Seedlings

In both provinces, the forest departments and farm nursery operators played significant roles in identifying farmers who desired tree seedlings (Table 2). However, in NWFP forest officers

alone identified 63 percent of the recipients of tree seedlings while forest officers alone in the Punjab identified 43 percent of the recipients.

Over the past four years, it is estimated that nearly 110,800 persons were supplied a total of 56,483,200 tree seedlings in the four divisions of the Punjab plus 36,100 persons demanded an additional 79,511,200 seedlings (Table 3). In per person terms, the 110,800 farmers, on average, each received 510 seedlings and the 36,100 farmers are now demanding, on average, an additional 2,200 seedlings per person.

The demand for seedlings per person in Gujrat division was 5,900. This was the highest per person demand of all divisions and may be due to the following reasons:

1. effective motivation of farmers to raise trees by both the Forest Department and Faruki Pulp Mills staff; and
2. expectation of a steady market for trees based on the proposed establishment of the Faruki Pulp Mill in Gujrat.

In NWFP, it is estimated that over the past four years nearly 36,900 persons were supplied a total of 15 million tree seedlings plus over 50,300 persons have demanded an additional 20 million seedlings (Table 3). In per person terms, the 36,900 farmers, on average, each received 409 seedlings and the 50,300 farmers are now demanding, on average, an additional 397 seedlings per person. Unlike the Punjab, the total number of farmers demanding seedlings is increasing.

Increased interest in the planting of tree seedlings in Kohat might be related to the total ongoing farm forestry activity in that area. Three projects, other than the FP&D Project, were in

operation. Each had a component which encouraged the raising of nurseries and the distribution of tree seedlings to farmers. These were:

1. a UNHCR "Income Generating" project which provided polythene bags free of cost to Afghan refugees so they could raise and distribute tree seedlings;
2. a GTZ FECT Project which used women motivators to advertise fuel efficient cooking stoves and persuade women to plant trees that were supplied from FP&D Project nurseries; and
3. a FP&D Project NGO Grant to SRSC to raise nurseries. Furthermore, SRSC acquired the services of a FP&D project official to serve as a resource person.

In both provinces, individuals were demanding seedlings under the assumption that they would be available free of cost. No attempt was made to estimate the number of seedlings farmers would demand if they were only available at some price.

Direct Seedling Sales

In Punjab, over the past four years, it is estimated that only 6 percent of the farm nurseries sold seedling directly to farmers (Table 4). Of the total seedlings supplied from project nurseries, about 4 percent were sold directly to farmers. Poplar (*Populus* spp.) and Simal (*Bombax cieha* Linn.) were the main species which were sold and they demanded the highest prices, in part, because there is a ready market for mature trees and very few cuttings are available free of cost. Eucalyptus (*Eucalyptus camaldulensis* Dehn.) seedlings were sold on a very limited scale, in part, because they are presently available free of cost throughout the

project area.

In NWFP, over the past four years, it is estimated that 28 percent of the farm nurseries sold seedlings directly to private individuals (Table 4). Nearly 4 percent of the total number of trees produced were directly sold to farmers.

A delay in contract payment by the Forest Department to farm nursery operators during the 1991-92 season was a major reason that farm nursery operators directly sold their trees. Under these conditions farm nursery operators made every possible effort to at least capture their initial investment through the direct sale of seedlings. Farm nursery operators in D.I.Khan were able to sell seedlings to farmers in adjoining areas of Punjab where no social forestry project was operating.

Physical and Financial Resource Requirements

Training

Project staff in both provinces successfully trained nearly 100 percent of the farmers who were contracted to raise nurseries. Between 80 and 90 percent of the farm nursery operators felt that they did not need additional training.

Manpower

On average, one individual was hired on an hourly basis by farm nursery operators to work in the farm nurseries in Punjab while farm nursery operators in NWFP, on average, hired three individuals (Table 5). The remainder of the labor was provided by the farm nursery operator's family. The use of various types of family members as laborers in nursery operations varied by province (Table 5). In Punjab, on average, two men and one woman labored in family farm nurseries with very limited involvement of

children. In NWFP, on average, one man, two women and one child labored in the family's farm nursery.

Production Costs

In Punjab the average cost a farmer spent raising nursery seedling was Rs. 0.45 per plant as compared to Rs. 0.50 in NWFP. Land rent, hourly labor charges to family members, and water charges are not included in these estimates.

In D.I.Khan, nurseries were raised using a greater proportion of hired labor and it was necessary to purchase good quality polythene bags in Peshawar or Lahore, hence elevating their cost. In Karak tehsil of Kohat division, the majority of the farm nursery operators had taken loans from the Agricultural Development Bank of Pakistan to buy tractors or to construct tube wells. They were paying Rs. 25,000 to 30,000 in yearly installments to the bank. Almost every family member assisted in the nursery operations plus simple mechanical procedures were used to fill polythene bags and water seedlings to reduce labor costs.

Factors Influencing the Production and Sale of Seedlings

Insects were the leading problem encountered by farmers raising nurseries. White ant attacks on Eucalyptus in nurseries were reported by 13 percent of the farm nursery operators in the Punjab and 19 percent of them in NWFP (Table 6). This was particularly a problem in those areas where water was limited. Seedling losses resulting from poor germination averaged less than 10 percent in both the Punjab and NWFP. Seedling losses due to hailstorms and frost was less than 5 percent in both provinces.

Description of Farm Nursery Operators

In both Punjab and NWFP, over 80 percent of the farm nursery operators resided on farms (Table 7). The average farm size of these individuals in Punjab was 60 acres as compared to 40 acres in NWFP (Table 7). In both provinces, about 25 percent of the farm nursery operators relied on non-farm sources of income to sustain their livelihoods (Table 7). In both provinces farm nursery operators, on average, had been awarded two contracts by the forest department (Table 7). Over the four year period, in Punjab, women were issued a total of 42 nursery contracts which is 2.4 percent of the total number of contracts issued. No nursery contracts were issued to women in NWFP during the past four years.

Farmer and Forest Officer Suggestions for Project Improvement

During the interview process, farmers were asked to comment on the project and make suggestions for its improvement. The two issues of greatest importance to farmers in both provinces were contracts with the forest department which would allow for the direct sale of seedlings and a simplified contract payment procedure. Not unexpectedly, farmers in both provinces would also like the contracted rates per seedling to be increased.

Forest officers accompanied the individuals who interviewed the farmers. Between interviews and during periods of travel to farms, forest officers were asked to comment on the project and make suggestions for its improvement. Forest officers in both provinces were concerned that farmers do not meet department targets in a timely manner nor do farmers follow their advice.

Forest officers in Punjab, like farmers, believe that the contract payment procedure should

be simplified. They also believe that farm forestry would be strengthened if the facilities available to officers posted in farm forestry projects were comparable to those of the territorial staff. Two issues of importance to forest officers in NWFP were the desire that project staff have priority for project training opportunities and that project staff positions be increased.

CONCLUSIONS

The primary aim of this study was to evaluate the success of FP&D Project supported farm nurseries in terms of the likelihood that they might continue as private businesses. One aspect of this question deals with factors which effect the production and distribution of seedlings from private farm nurseries. With respect to these factors, the study determined that:

1. Forest department staff successfully trained farmers to raise tree nurseries.
2. The demand for nursery seedlings is increasing in the Punjab but fewer individuals are demanding a greater number of seedlings. In NWFP, both the demand for nursery seedlings and the number of individuals requesting seedlings is increasing. The demand for nursery seedlings from FP&D Project nurseries also increased where other farm forestry project activities were in progress.
3. The final evaluation of nursery seedlings that is used to certify contract payment by the forest department is done after the seedlings have been planted in the field. This procedure frequently causes lengthy delays in contract payments to farm nursery operators and tends to discourage their participation in future nursery contracts.

4. In some cases, the interest of farmers in raising nurseries has decreased because of inadequate guidance, infrequent visits, and lack of cooperation including the demand of commissions by forest department staff.
5. Women have actively participated in nursery raising activities along with other family members, and have been awarded a limited number of nursery contracts by the forest department in Punjab.

In general, it was concluded that farmers had been adequately motivated and trained to operate farm nurseries. The seedlings which were produced met forest department quality standards and were in demand by farmers. From a technical standpoint, the farm nurseries have been a success.

To determine the likelihood that farm nurseries might continue as private businesses the study needed to evaluate factors which effect the direct sale of seedlings from private farm nurseries. With respect to these factors, the study determined that:

1. Emphasis was placed on raising Eucalyptus seedlings whereas farmers want to have a wider variety of choices which, preferably, included species with known markets.
2. The private sale of nursery seedlings from farm nurseries was generally not encouraged and frequently not allowed by forest department staff. Furthermore, free distribution of seedlings by the forest department, in areas surrounding the farm nurseries, restricted the farmer's chances of directly selling seedlings in the open market.
3. Increasing demand for tree seedlings and the availability of trained farm nursery

operators make a network of decentralized nurseries possible.

4. Forest departments policies and administrative procedures need to more actively support the establishment of private farm nurseries and markets for farm grown wood including the purchase of seedlings for planting on state lands from private farm nurseries.

Technically, it is possible for farm nurseries to continue as private businesses. Significant demand for tree seedlings continues to exist in farming communities of the Punjab and NWFP. Whether or not farm nurseries are sustained on a large scale depends of the establishment of stable markets for farm grown wood and the institutionalization of forest department policies and actions which strongly support their continuation.

ACKNOWLEDGEMENT

This study was made possible through technical and financial support provided by the Government of Pakistan and the United States

Agency for International Development. Farmers who participated in the study deserve special thanks for their cooperation, suggestions and insights. Interviews with farmers would not have been possible without the dedicated efforts of forest department staff in the FP&D Project. Mr. Nasrullah Khan Aziz, Deputy Inspector General Forests, Islamabad assistance made it possible to access forest department nursery records which were a critical starting point for this study.

REFERENCES

- Mendenhall, W., L. Ott and R.L. Scheaffer. 1971. Elementary Survey Sampling. Duxbury Press, Wadsworth Publishing Company, Inc. 247 p.
- Omer, R.M., S.A. Khan and C.R. Hatch. 1993. A study of Farm Nurseries in Punjab and NWFP. Forestry Planning and Development Project, Research Report No. 5, 27 p.

TABLE 1. Number of farm nursery contracts by forest division.

<u>Province</u>	<u>Division</u>	<u>Tehsil</u>	<u>No. of Nurseries</u>	<u>No. Sampled</u>
Punjab	Attock	Attock	393	40
		Fateh Jang	73	8
		Pindi Gheb	143	14
		Subtotal	609	62
	Gujrat	Daska/Gujranwala	9	1
		Gujrat	101	14
		Kharian	67	9
		Narowal	59	7
		Pasrur	44	6

	Phalia	16	2
	Shakargarh	116	13
	Sialkot	16	3
	Subtotal	428	55
Jhelum	Chakwal	173	24
	Jhelum	76	11
	Khushab	132	15
	Noorpur	10	1
	P.D. Khan	120	15
	Sohawa	18	2
	Talagang	52	10
	Subtotal	581	78
Rawalpindi	Islamabad	5	1
	Gujar Khan	57	6
	Rawalpindi	33	3
	Taxila	29	3
	Subtotal	124	13
TOTAL		1,742	208
NWFP	D.I. Khan	143	14
	Kohat	23	2
	Banda Daud Shah	20	2
	Hangu	56	7
	Karak	73	7
	Subtotal	172	18
TOTAL		315	32

TABLE 2. Individuals responsible for identifying recipients of tree seedlings in Punjab and NWFP.

Prov.	Division	Forest Dept.	Farm Nursery	Both
		Staff	Operators	
		Percent		
PUNJAB	Rawalpindi	0.0	47.5	52.5
	Attock	30.7	4.7	64.6
	Gujrat	66.8	3.8	29.4
	Jhelum	48.2	12.4	39.4
	Average	43.2	10.1	46.7
C.I. Half-width		5.9	3.5	6.3

NWFP	D.I.Khan	64.3	0.0	35.7
	Kohat	61.4	0.0	38.6
	Average	62.7	0.0	37.3
C.I.	Half-width	18.1	0.0	18.1

TABLE 3. 1989-1993 Seedling Supply and Demand in Punjab and NWFP.

		SUPPLY			DEMAND		
Prov.	Division	No. Seedlings	No. Farmer	Seedl/Farmer	No. Seedlings	No. Farmer	Seedl/Farmer
PUNJAB	Rawalpindi	4,379,599	5,923	739	2,933,333	1,558	1,883
	Attock	17,877,288	32,313	553	56,606,803	16,846	3,360
	Gujrat	14,483,337	30,570	474	5,936,318	1,002	5,924
	Jhelum	19,742,954	41,988	470	14,034,727	16,693	841
	Total	56,483,178	110,794	510	79,511,181	36,099	2,203
C.I.	Half-width	2,733,987	30,842		24,790,436	20,198	
NWFP	D.I.Khan	6,097,950	7,707	791	8,738,321	7,354	1,188
	Kohat	9,003,576	29,179	309	11,232,134	42,950	262
	Total	15,101,526	36,886	409	19,970,455	50,304	397
C.I.	Half-width	1,722,932	18,512		6,131,271	53,698	

TABLE 4. Direct seedling sales in Punjab and NWFP.

		% Nur. Selling Seedl.	No. of Seedlings Sold	Percent Euc.	Rs. Value of Seedlings Sold	Percent Euc.
PUNJAB	Rawalpindi	8.9	880,000	0.0	220,000	0.0
	Attock	3.2	6,926	100.0	17,317	100.0
	Gujrat	14.6	1,417,108	35.9	3,962,902	19.3
	Jhelum	1.2	1,802	80.0	3,604	80.0
	Avg./Total	5.8	2,305,836	22.4	4,203,823	18.7
C.I.	Half-width	3.0	2,045,536		3,729,283	
NWFP	D.I.Khan	14.3	122,571	16.7	326,857	6.3
	Kohat	39.7	426,029	90.2	550,964	92.4
	Avg./Total	28.2	548,600	73.8	877,821	60.3
C.I.	Half-width	14.9	447,993		804,203	

TABLE 5. Farm nursery labor in the Punjab and NWFP.

		FAMILY LABOR				No. of Hired Laborers
Prov.	Division	No. Adult Males	No. Child Males	No. Adult Females	No. Child Females	
PUNJAB	Rawalpindi	0.1	0.5	0.2	0.0	0.9
	Attock	1.2	0.6	0.1	0.0	0.9
	Gujrat	3.2	1.4	0.2	0.1	1.4
	Jhelum	2.4	0.7	0.4	0.3	1.7
	Average	2.0	0.8	0.2	0.1	1.3
C.I. Half-width		0.3	0.3	0.1	0.1	0.2
NWFP	D.I.Khan	1.0	1.4	0.0	0.3	3.3
	Kohat	1.4	2.3	0.7	0.8	2.6
	Average	1.2	1.9	0.4	0.6	2.9
	C.I. Half-width	0.3	0.6	0.3	0.4	0.7

TABLE 6. Production and distribution factors in Punjab and NWFP.

		% Production Problems			
Prov.	Division	Germ.	Insect	Frost	Hail
PUNJAB	Rawalpindi	0.0	8.9	0.0	7.7
	Attock	4.8	14.6	1.7	3.2
	Gujrat	7.4	10.5	0.0	1.7
	Jhelum	4.3	14.3	3.6	3.7
	Average	4.9	13.1	1.8	3.3
C.I. Half-width		2.8	4.3	1.7	2.3
NWFP	D.I.Khan	7.1	21.4	0.0	0.0
	Kohat	10.7	17.4	6.1	0.0
	Average	9.1	19.2	3.3	0.0
	C.I. Half-width	10.0	14.4	6.3	0.0

TABLE 7. Characteristics of nursery farmers in Punjab and NWFP.

Prov.	Division	Income Sources			Reside Farm		No. of Contracts
		Farm	Farm+ Other	Non Farm	on Farm	Size in Ac.	
PUNJAB	Rawalpindi	28.4	47.2	24.4	83.3	21.6	2.3
	Attock	45.0	34.1	20.9	74.3	100.6	2.7
	Gujrat	41.8	20.6	37.6	85.0	28.3	2.1
	Jhelum	31.4	47.9	20.7	90.8	44.4	1.3
	Average	38.5	36.3	25.2	83.1	58.5	2.1
	C.I. Half-width	6.4	6.0	5.7	5.1	34.1	0.1
NWFP	D.I.Khan	28.6	50.0	21.4	85.7	70.0	2.0
	Kohat	45.9	23.2	30.9	100.0	10.9	2.1
	Average	38.0	35.4	26.6	93.5	37.7	2.1
	C.I. Half-width	15.5	17.0	15.0	8.4	17.6	0.4