FORESTRY PLANNING & DEVELOPMENT PROJECT
Government of Pakistan-USAID

REPORT #1

HOUSEHOLD-LEVEL FACTORS AFFECTING INTEREST IN PLANTING TREES AND OPERATING NURSERIES: THE PUNJAB.

Michael R. Dove

Office of the Inspector General of Forests

Islamabad
6 May 1987

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Distribution List:

Inspector General of Forests
Deputy Inspectors General of Forests (2)
Secretary of Forests, Punjab
Chief Conservator of Forests, Punjab N. Circle
Conservator of Forests, Punjab Extension Circle
Project Director, Punjab
Project Director, PFI
Project Officer, USAID
Winrock International Islamabad/Arlington

SUMMARY

I. INTEREST IN PLANTING TREES

1. Determinants:

(i) 54% of the farm households interviewed expressed interest in planting trees under the FP&D project.

(ii) Interest in planting trees is greater among farmers having: mixed barani and irrigated lands; larger landholdings; some 'wastelands'; higher education; and living in a village in which project activities have already commenced.

(iii) Sharecroppers/tenants express the same amount of interest in planting trees as other farmers.

(iv) The greatest potential for the project, in terms of both people and acres, lies with the smaller, poorer, less educated farmers, because of their numerical predominance.

2. Provincial Targets:

(i) Farmer interest should suffice to meet the Punjab's 1987-1988 planting target of 7,000,000 trees (assuming that appropriate guidelines are followed by the field staffs).

(ii) This interest should also suffice to meet similar targets in each succeeding year, for the foreseeable future.

II. NUMBER OF PLANTS REQUESTED PER HOUSEHOLD

(i) 86% of households request less than 1,000 seedlings to plant during the first year, with the average being 420.

(ii) Larger numbers of seedlings are requested by farmers with larger, irrigated landholdings.

III. FARMERS' SPECIES PREFERENCES

(i) The 6 tree species most requested by farmers are kikar 'Acacia nilotica', shisham 'Dalbergia sissoo', eucalyptus 'Eucalyptus camaldulensis', poplar 'Populus spp.', ipil-ipil 'Leucaena leucocephala', and phulai 'Acacia modesta'.

(ii) There is relatively little variation among the project districts in species preferences.

IV. INTEREST IN ESTABLISHING NURSERIES

(i) 6% of farm households express interest in establishing private project nurseries.

(ii) Interest is higher among farmers with larger, irrigated landholdings and higher education.

(iii) This interest is sufficient to meet the Punjab's target of 140 nurseries for 1987-1988, and for each subsequent year into the foreseeable future (assuming, again, that the field staff follow appropriate guidelines).

V. DATA COLLECTION BY PROVINCIAL PROJECT STAFF

The data base used for project planning can be enlarged, and its reliability enhanced, through the collection of data by project field staffs. A form for this purpose is appended.

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I. INTEREST IN PLANTING TREES

1. Determinants

54.3 % of farm households in the sample are interested in planting trees. Interest varies according to several different factors.

i. Source of Water for Agriculture:

There is a definite overall association between the availibility of water (other than rainwater) for agriculture and interest in planting trees:

		Household's Water Source	
		Barani	Some/All Irrigated
Household is Interested in Planting Trees:	No	200 hh	65 hh
	Yes	193 hh	135 hh

n = 593 households (hh).
X^2 = 18.2.
P < .001.

This association can be restated as follows:

Household's Water Source:	% Interested in Planting Trees
Completely barani:	49% of all households
Partially/wholly irrigated:	67.5% of all households

Among the farmers with irrigated lands, there is also some variation in interest, according to whether their lands are partially or completely irrigated, with the highest interest being in the former category:

Extent of Irrigation:	% Interested in Planting Trees
Mixed barani/irrigated	80.5% of all households
Completely irrigated	57.5% of all households

Despite the lower degree of interest among the farmers with only barani lands, their preponderance in the project areas means that they still compose the majority of interested farmers:

Interested Households:	59% have only barani lands. 21% have mixed barani/irrigated lands 20% have all irrigated lands.
Uninterested Households:	75.5% have only barani lands. 6% have mixed barani/irrigated lands 18% have all irrigated lands.

ii. Size of Land Holdings

There is a definite overall association between the size of the farmers' landholdings and their interest in planting trees.

		Household's Landholdings (acres):					
		0	>0-5	6-10	11-20	21-30	>30
Household is Interested in Planting Trees:	No	14	140	80.5	29.5	6	7
	Yes	6	79.5	82.5	83	28	53

n = 609 farm households.

$\chi^2 = 91.0$

$P < .001$

These findings can be restated as follows:

Household's Landholdings:	% of Households Interested in Planting Trees:	% of Households Not Interested:
0 acres	30%	70%
>0 < 5 acres	36%	64%
6 -10 acres	51%	49%
11 -20 acres	74%	26%
20 -30 acres	82%	18%
>30 acres	88%	12%
Average interested farmer: 22.5 acres (2.8 parcels). Average uninterested farmer: 8.3 acres (1.8 parcels).		

In short, interest in planting trees increases as landholdings increase. However, even among small landowners (and even among the landless), there is still <u>significant</u> interest in planting trees. Moreover, since the small landowners greatly outnumber the large ones, it is the former that ultimately present the greatest opportunities for project

development - whether measured in terms of households or acres. For example:

	Total Households in Punjab *	% Interested in Planting Trees	Total Households Potentially Interested
Landholdings			
< 50 Acres	713,481 hh	52% hh	371,010 hh
> 50 acres	14,151 hh	94% hh	13,301 hh

* As of 1980 Census of Agriculture in: Attock, Rawalpindi, Sargodha, Sialkot, Gujrat, & Jhelum.

Household Landholdings	Total Acres: *	% Households Interested in Planting Trees:	Total Acres Potentially Available:
< 50 Acres	6,132,572 acr	52% hh	3,188,937 acr
> 50 acres	1,173,126 acr	94% hh	1,102,738 acr

* As of 1980 Census of Agriculture in: Attock, Rawalpindi, Sargodha, Sialkot, Gujrat, & Jhelum.

iii. Land Use

Farmers owning some uncultivable lands (for example, due to salinity or flooding) were found to have greater interest in planting trees than farmers whose lands were 100% cultivable:

	Household's Lands:	
	All	Some/All

		Household's Land Sharecropped or Leased by Others: No	Yes
Household is Interested in Planting Trees:	No	253 hh	10 hh
	Yes	292 hh	34 hh

n = 589 households (hh).
X^2 = 9.17.
P < .005.

Farmers who sharecrop or lease others land (whether exclusively or in addition to their own land), however, were <u>not</u> found to have either higher <u>or</u> lower interest in planting trees than other farmers:

		Household Sharecrops or Leases Others' Lands: No	Yes
Household is Interested in Planting Trees:	No	230 hh	47 hh
	Yes	277 hh	55 hh

n = 609 households (hh).
X^2 = .017.
P < .90.

The significance of this finding is to demonstrate that sharecroppers are as interested in planting trees as other farmers and thus they should not be ignored by the project field staffs. [illegible]

iv. Education of Household Head

There is an association between the level of education of the household head and interest in planting trees:

		Household Head's Education:				
		None 0	Prim. 1-5	Midd. 6-8	Matric 9-10	Interm 11-12+
Household is Interested in Planting Trees:	No	199	26	19	12	1
	Yes	210	49.5	54	27.5	11

$n = 609$ households.

$X^2 = 21.7$.

$P < .001$.

These findings can be restated as follows:

	Household Head's Education:				
	None	Prim.	Midd.	Matric	Int. +
% of Households Interested in Planting Trees:	51%	66%	74%	70%	92%

Although the farmers with less education have comparatively lower interest in planting trees, most are still interested. Thus, literacy is not a prerequisite to 'tree-mindedness'. Moreover, the predominance of illiterate farmers in the population makes them the primary target for the project - a fact that must incorporated into outreach strategies:

	Education:				
	None	Prim.	Midd.	Matric	Int. +
% of All Interested Households:	60%	14%	15%	8%	3%

v. Prior Commencement of Project Activities

At the time of this study, 9 out of the 33 study villages in the Punjab had received some project plants, while 24 had not. There was a significant difference between the two groups of villages in expressed interest in planting trees, suggesting that the initiation of project activities has a motivational/demonstration effect on the farmers:

	Village Already Received Project Plants:	
	YES	NO
% of Households Interested in Planting Trees:	66% of all households	50% of all households

2. Provincial Targets

The data available on the size of the rural population and the extent of interest in the project indicate that existing demand is far in excess of the 1987-1988 provincial target of 7,000,000 trees planted.

Size of Rural Population*	% Interested in Planting Trees	No. Trees Asked Per Household	Total Demand for Trees
535,795 households	54.3% of all households	420 trees	122,309,780 trees

* As of 1981 Population Census, in high priority tehsils of: Attock, Fateh Jang, Rawalpindi, Gujar Khan, Jhelum, Chakwal, Khushab, Pasrur, Gujrat.

These data indicate that the 1987-1988 planting target can be easily met, assuming also the following:

(i) The farmers are not required to plant some minimum number of seedlings (for example, farmers requesting a few dozen or a few hundred seedlings are also served).
(ii) The farmers are not required to make block plantings (for example, scattered and linear plantings are also permitted).
(iii) The farmers are provided with the species that they want.
(iv) The farmers are provided with seedlings at the proper time of year, with respect both to the climate and their own work schedules (for example, not in the middle of the wheat harvest).
(v) The farmers are provided timely and accurate advice on planting and caring for the trees.
(vi) All project regulations, especially regarding the provision of free plants and advice, are strictly adhered to.

Assuming that the percentage of farmers interested in planting trees does not change, and that the number of plants requested per household also does not change, the interest is sufficient to meet a yearly FD target of 7,000,000 plants for the foreseeable future (16.5 years). In fact, the percentage of interested farmers is likely to increase, and many of the farmers that participate in the project are likely to request

plants on more than one occasion, so the actual future demand for plants is likely to be many times greater than this.

II. NUMBERS OF PLANTS REQUESTED PER HOUSEHOLD

1. Pattern

i. Number of Plants Requested Per Species

The number of plants requested per species per household is not a constant: the species that are requested by the most households, also tend to be requested in the greatest numbers by each individual household:

Species	Rank Order of Overall Popularity	Average Size of Request
kikar	1st	338 plants
shisham	2nd	203
eucalyptus	3rd	192
poplar	4th	231
ipil-ipil	5th	158
phulai	6th	138
ohrake	7th	97
toot	7th	81
sumbal	8th	105
'any'	9th	129
kawan	10th	105

ii. Number of Plants Requested Per Household

The number of plants requested per household averages 420, with the following distribution:

Number of Plants Requested Per Household:	% of Households Requesting:
< 100 plants	39% all hh
100 - 999	47% all hh
1,000-2,000	11% all hh
> 2,000	3% all hh

2. Determinants

i. Source of Water for Agriculture

Access to a source of water for agriculture other than rain is positively associated with the number of trees requested:

		Household's Water Source	
		All Barani	Some/All Irrigated
Number of Trees Requested By Household:	100	88 hh	25 hh
	100-999	71 hh	71 hh
	1000-2000	17 hh	19 hh
	>2000	2 hh	7 hh

n = 300 households (hh).

χ^2 = 28.6.

P < .001.

ii. Size of Landholdings

There is also a definite overall association between the size of the farmers' landholding and the number of trees that they request from the project:

		Household's Landholdings (acres.):					
		0	>0-5	6-10	11-20	21-30	>30
Number of Trees Requested by Household:	< 100	4	48.5	36	23.5	2	3
	100-999	1	24.5	33	39.5	17	29
	1000-2000	1	.5	8.5	10	6	12
	> 2000	0	0	1	0	1	5

n = 306 households.

χ^2 = 80.0.

P < .001

The increases are not completely proportional: the average farmer in the 21-30 acre category has over 10 times as much land as the average farmer in the 0-5 acre category, but he is requesting only 3.3 times as many plants (738 plants vs. 226 plants).

III. SPECIES PREFERENCES

The species listed here are those that the <u>farmers themselves</u> have requested. The fact that the farmers requested them does not <u>necessarily</u> mean that they are the optimal species from either (e.g.) biological or economic

standpoints. (The abundant requests for eucalyptus, in areas for which the market for this wood is as yet uncertain, is one example of a farmer preference that may be ill-advised.) It is expected that the species preferences of farmers in the project areas will also change as the project progresses, and as new species and cultivation techniques are introduced.

1. Overall

i. According to Percentage of Households Requesting

Species	% of Households Requesting
kikar 'Acacia nilotica'	48% of all hh
shisham 'Dalbergia sissoo'	46% "
eucalyptus 'E. camaldulensis	44% "
poplar 'Populus spp.'	17% "
ipil-ipil 'L. Leucocephala'	8% "
phulai 'Acacia modesta'	8% "
dhrake 'Melia azedarach'	6% "
toot 'Morus alba'	6% "
sumbal 'Salmalia malabarica'	6% "
'any species'	4% "
kawan/kahoo 'Olea cuspidata'*	3% "

* Tentative identification.

ii. According to Percentage of Plants Requested

Species	% of Total Plants Requested
kikar 'Acacia nilotica'	37% of all plants
shisham 'Dalbergia sissoo'	21% "
eucalyptus 'E. camaldulensis	19% "
poplar 'Populus spp.'	9% "
ipil-ipil 'L. Leucocephala'	3% "
phulai 'Acacia modesta'	2% "
willo 'Salix spp.'	1.5% "
kawan/kahoo 'Olea cuspidata'	1.5% "
sumbal 'Salmalia malabarica'	1% "
dhrake 'Melia azedarach'	1% "
'any species'	1% "
toot 'Morus alba'	1% "

2. By District

i. Attock:

i. eucalyptus 'Eucalyptus camaldulensis': 25-35%
ii. shisham 'Dalbergia sissoo': 21-31%.
iii. poplar 'Populus spp.': 14-24%.

iv. ipil-ipil 'Leucaena leucocephala: 0-10%.
v. willow 'Salix spp.' 0-10%.
vi. dhrake 'Melia azedarach': 0-8%.
vii. kikar 'Acacia nilotica': 0-8%.
viii. toot 'Morus alba': 0-6%.
ix. sumbal 'Salmalia malabarica': 0-4%.
x. phulai 'Acacia modesta': 0-4%.

ii. Chakwal:
i. kikar Acacia nilotica': 13-23%.
ii. shisham 'Dalbergia sissoo': 13-23%.
iii. eucalyptus 'Eucalyptus camaldulensis':12-22%.
iv. poplar 'Populus spp.': 9-19%.
v. kawan 'Olea cuspidata': 4-14%.
vi. ipil-ipil 'Leucaena leucocephala': 4-14%.
vii. phulai 'Acacia modesta': 2-12.
viii. berri 'Zizyphus spp.': 0-6%.
ix. 'Any species': 0-10%.

iii. Rawalpindi·
i. eucalyptus 'Eucalyptus camaldulensis': 18-38%.
ii. shishum 'Dalbergia sissoo': 14-34%.
iii. phulai 'Acacia modesta': 4-24%.
iv. kikar 'Acacia nilotica': 1-21%.
v. poplar 'Populus spp.': 0-17%.
vi. 'Any species': 0-17%.
vii. kawan/kahoo 'Olea cuspidata': 0-8%.
viii. toot 'Morus alba': 0-2%.
ix. dhrake 'Melia azedarach': 0-2%.

iv. Khushab: Include the following, but data incomplete:
i. eucalyptus 'Eucalyptus camaldulensis.
ii. ipil-ipil 'Leucaena leucocephala'.

v. Sialkot:
i. kikar 'Acacia nilotica': 62-72%.
ii. shisham 'Dalbergia sissoo': 20-30%.
iii. eucalyptus 'Eucalyptus camaldulensis': 1-11%.

vi. Gujrat:
i. kikar 'Acacia nilotica': 25-45%.
ii. eucalyptus 'Eucalyptus camaldulensis': 21-41%.
iii. shisham 'Dalbergia sissoo': 12-32%.
iv. sumbal 'Salmalia malabarica': 1-21%.

vii. Jhelum:
i. kikar 'Acacia nilotica': 76-100 %.
ii. eucalyptus 'Eucalyptus camaldulensis': 0-22%.

IV. INTEREST IN ESTABLISHING NURSERIES

1. Determinants

6.0% of the farm households in the sample are interested in establishing project nurseries. Interest is positively associated with larger landholdings, access to sources of water for agriculture other than rain, and higher education:

	Average Landholding	% with some Irrigation	HH Head's Education
Households Interested in Establishing Nurseries	59.4 acres	89% of all hh	7.1 years
All Households Interested in Planting Trees	22.5 acres	41% of all hh	3.1 years
All Households	16.0 acres	33% of all hh	2.5 years

2. Provincial Targets

The data available on the size of the rural population and the extent of interest in the project indicate that existing demand is far in excess of the 1987-1988 provincial target of 140 nurseries (calculated by dividing the provincial target of 7,000,000 plants by 50,000 plants per nursery per year):

Size of Rural Population *	% Interested in Establishing Nurseries	Total Interest in Nurseries
535,795 households	6% of all households	32,148 households

* As of 1981 Population Census, in the high priority tehsils of: Attock, Fateh Jang, Rawalpindi, Gujar Khan, Jhelum, Chakwal, Khushab, Pasrur, Gujrat.

These data indicate that the 1987-1988 nursery target can be easily met, assuming also the following:

(i) Nursery operators are provided timely and accurate technical assistance and guidance.
(ii) No agreements to establish nurseries are made and then broken with farmers, and there are no delays in purchasing their plants when they are mature: either circumstance would result in bad publicity for the nursery program and could appreciably lower farmer interest in establishing nurseries.

Assuming that the percentage of farmers interested in establishing nurseries does not change (and in fact it is very likely to increase, based on the demonstration effects of successful nurseries), the interest is sufficient to meet a yearly FD target of 140 nurseries for the foreseeable future.

V. SAMPLING

1. Sample

This study is based on interviews with 648 farm households in 43 villages. This sample was carefully selected from a larger sample of 63 villages, containing approximately 21,000 households, and 125,000 people.

2. Re. Nursery and Planting Targets

The fact that the figures on farmer interest in establishing nurseries and planting trees exceed targets by factors of tens or even hundreds makes any sampling error in these particular figures irrelevant.

3. Re. Species Preferences

Since these data are aggregated at the district as opposed to provincial level, the sampling error is accordingly higher. This is dealt with, in part, by presenting ranges of variation for each species.

4. Data Collection by Provincial Field Staff

The problem of sampling error can be further reduced through the enlargement of the sample by the regular project field staff, using the attached pro-forma.

The key to the use of this pro-forma is to select a random sample. The beat foresters can do this, for example, by addressing the village men following evening prayers at the village mosque, and asking who is interested in receiving seedlings for planting. The forester can then administer the pro-forma to everyone who replies in the affirmative. This should take no more than 3-5 minutes per person.

PROSPECTIVE PROJECT PARTICIPANT PRO-FORMA

Sheet #_____

Village Name:_____ Tehsil Name:_____

Project Officer Name:_____ Date:_____

1. Name:_____
   Father's Name:_____
   Acreage:_____
   Water Source: barani___well___tubewell___canal___floody___
   Trees desired: sp._____no.____sp._____no.__
   sp._____no.____sp._____no.____sp._____no.__
   Desired use of trees: fuel___ fodder___ timber___ market__
   Other_____
   Desired planting pattern: scattered___linear___block___

2. Name:_____
   Father's Name:_____
   Acreage:_____
   Water Source: barani___well___tubewell___canal___floody___
   Trees desired: sp._____no.____sp._____no.__
   sp._____no.____sp._____no.____sp._____no.__
   Desired use of trees: fuel___ fodder___ timber___ market_
   Other_____
   Desired planting pattern: scattered___linear___block___

3. Name:_____
   Father's Name:_____
   Acreage:_____
   Water Source: barani___well___tubewell___canal___floody___
   Trees desired: sp._____no.____sp._____no.__
   sp._____no.____sp._____no.____sp._____no.__
   Desired use of trees: fuel___ fodder___ timber___ market_
   Other_____
   Desired planting pattern: scattered___linear___block___

4. Name:_____
   Father's Name:_____
   Acreage:_____
   Water Source: barani___well___tubewell___canal___floody___
   Trees desired: sp._____no.____sp._____no.__
   sp._____no.____sp._____no.____sp._____no.__
   Desired use of trees: fuel___ fodder___ timber___ market_
   Other_____
   Desired planting pattern: scattered___linear___block___

5. Name:_____
   Father's Name:_____
   Acreage:_____
   Water Source: barani___well___tubewell___canal___floody___
   Trees desired: sp._____no.____sp._____no._
   sp._____no.____sp._____no.____sp._____no.__
   Desired use of trees: fuel___ fodder___ timber___ market_
   Other_____
   Desired planting pattern: scattered___linear___block___