

No.

NEPAL AGRICULTURAL DEVELOPMENT PROJECT

SURVEY REPORT ON THE EXTENSION

AND

EFFECT EVALUATION

MAY, 1984

JAPAN INTERNATIONAL COOPERATION AGENCY

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G I S T

This Survey on the Extension (Diffusion, hereinafter Extension) and Effect Evaluation has been conducted in order to clarify how the agriculture development based on the object of JADP influenced the operation, economy and life of farmers.

The Survey was made on the 3 project areas under JADP and 1 non-project area to measure the degree of extension and its effect by examining the conditions before and after this Project and by comparing the situations of these four areas.

The Survey results are as follows:

- 1) In all these areas, farmers' durable goods increased. Their house building (construction) also showed much improvement from miscanthus-thatched roofing to tile roofed, brick construction, the latter two occupying 80 ~ 90%.
- 2) No remarkable change was seen with their land-area per farmer, however those non-irrigating cultivatable more than 90% before Project were improved to be irrigatable, 50 ~ 60% of their cultivatable, after Project.
- 3) As planted area by crops, improved Variety of paddy and wheat respectively showed as much increase as 5 ~ 6 times those of before Project. Former cropping intensity (percentage) of 120 ~ 130% was raised to 160 ~ 170% now.
- 4) Yield per ha in Project area was also raised to 1.5 ~ 1.6 times for paddy and 1.5 ~ 2.2 for wheat. However, the non-project area remained unchanged (not increased).
- 5) Farmers utilizing chemical fertilizer and pesticide increased to 70 ~ 90% from former 30%. Amount of

Fertilizer applied per ha was also raised to as much as 2 ~ 3 times.

- 6) Gross income of project area was also raised as high as 2 ~ 4 times that of non-project area.
- 7) With every project areas, more than 95% of farmers replied that they found the agricultural development conducted under JADP "very useful" and 96% of farmers in the non-project area hope to have JADP assistance for agricultural development.

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1) Purpose

According to the Agreement effective from Nov., 7, 1974, the purpose of Janakpur Zone Agriculture Development Project (J.A.D.P) was "To raise income and living standard of farmers through the diffusion of improved agricultural technology which conforms to the local conditions." This Survey on the Extension and Effect Evaluation has been conducted in order to clarify how the agriculture development based on the object of this JADP influenced the farming, economy and life of farmers.

2) Outline of Janakpur Zone

Janakpur zone is proud of occupying as high as 13.3% of the total paddy production of Nepal (1,290,000 ton).

Janakpur zone located about 100 Km to the east of Kathumandu, Capital of the Kingdom of Nepal. This zone (or Prefecture, hereinafter Zone) is divided into six districts, i.e.

Dhanusha, Mahottari, Sarlahi (Terai Three districts) and Sindhuli, Ramechhap, Dolakha (Mountain Three districts).

The area and population of these six districts is in Table 1.

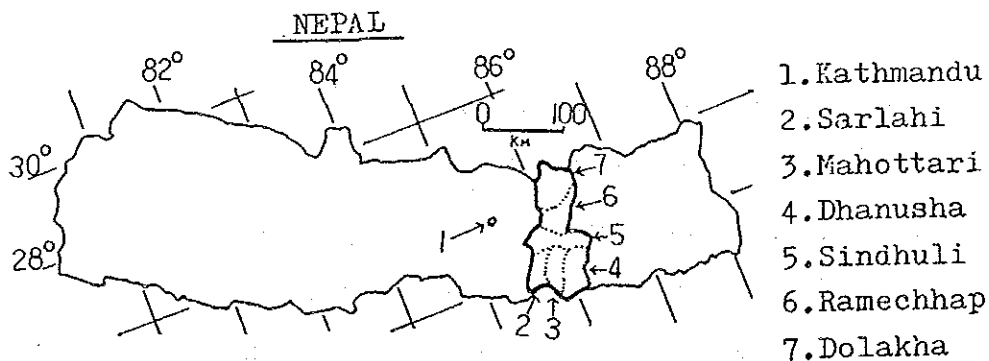


Table 1 AREA AND POPULATION OF JANAKPUR (1976)

	Area(ha)	Population
Nepal	14,106	12,837
Janakpur	976	1,410
%	6.9%	11%
.....		
Dhanusha	119	376
Mahottari	125	362
Sarlahi	138	194
Sindhuli	259	164
Ramechhap	137	175
Dolakha	198	139

Unite : 10^3

Source : Consus Bureau of Statsitics.

The area and population respectively occupies 6.9% and 11% of the whole country. The population density of the whole country is 91 heads/Km² and that of this Zone is 145 heads/Km² which is next higher than that of Bagmati Zone where the Capital ia located.

Same as the principal industry of Nepal is agriculture, this Zone's principal industry is also agrichlture. As other industry, Nepal's only and biggest Tobacco Factory is is this Janakpur City which holds District Government Office, and smaller plants such as saw (lumber) mills and rice mills are seen here and there, not other remarkable ones. Commerce is also being centered in this Janakpur City and some 50 general shops are in other districts where local government offices are located. In Terai, Field Open Markets are seen here and there, trade of agricultural products and daily necessities is being taken by these field open markets.

3) Agriculture of Janakpur Zone

As shown in Table 2, in Terai, farming land occupies 64.1% of the total area, but only 5.4% in the hilly district. However, on the area of Janakpur is 6.9% of the whole country, 11.9% of farming land is high enough to be an important agricultural belt.

The principal crops of this Zone are paddy, wheat, maize and others are millet, beans and oils etc.

As cash crops, sugar cane and tobacco are much cultivated.

As fruit(s) (tree), tropical fruits are widely cultivated in Terai district and citrus are cultivated in the hill area.

There made many artificial ponds for fish farming intended for Kathmandu market.

Table 2 CULITIVATION AREA OF JANAKPUR

	Area	Cultvated Area
Nepal	14,106	2,326
%	100	16.5
Janakpur	976	277
%	100	28.4
.....		
Terai Area	382	245
%	100	64.1
Hill Area	594	32
%	100	5.4

Uuite : 10 Ha

Source : Agricultural Statistics of Nepal

As shown in Table 3, Janakpur is one of the principal agricultural production belt and its production against the nation's total production is high as 13.3% for rice, 12.4% for wheat and 7.7% for maize.

So high total production of Janakpur Zone is ascribable to its comparatively larger of farming land area, but its yield per unit is not so different from that of other Zones. Also this high production is centered in Terai and its production difference from that of hill district is very big.

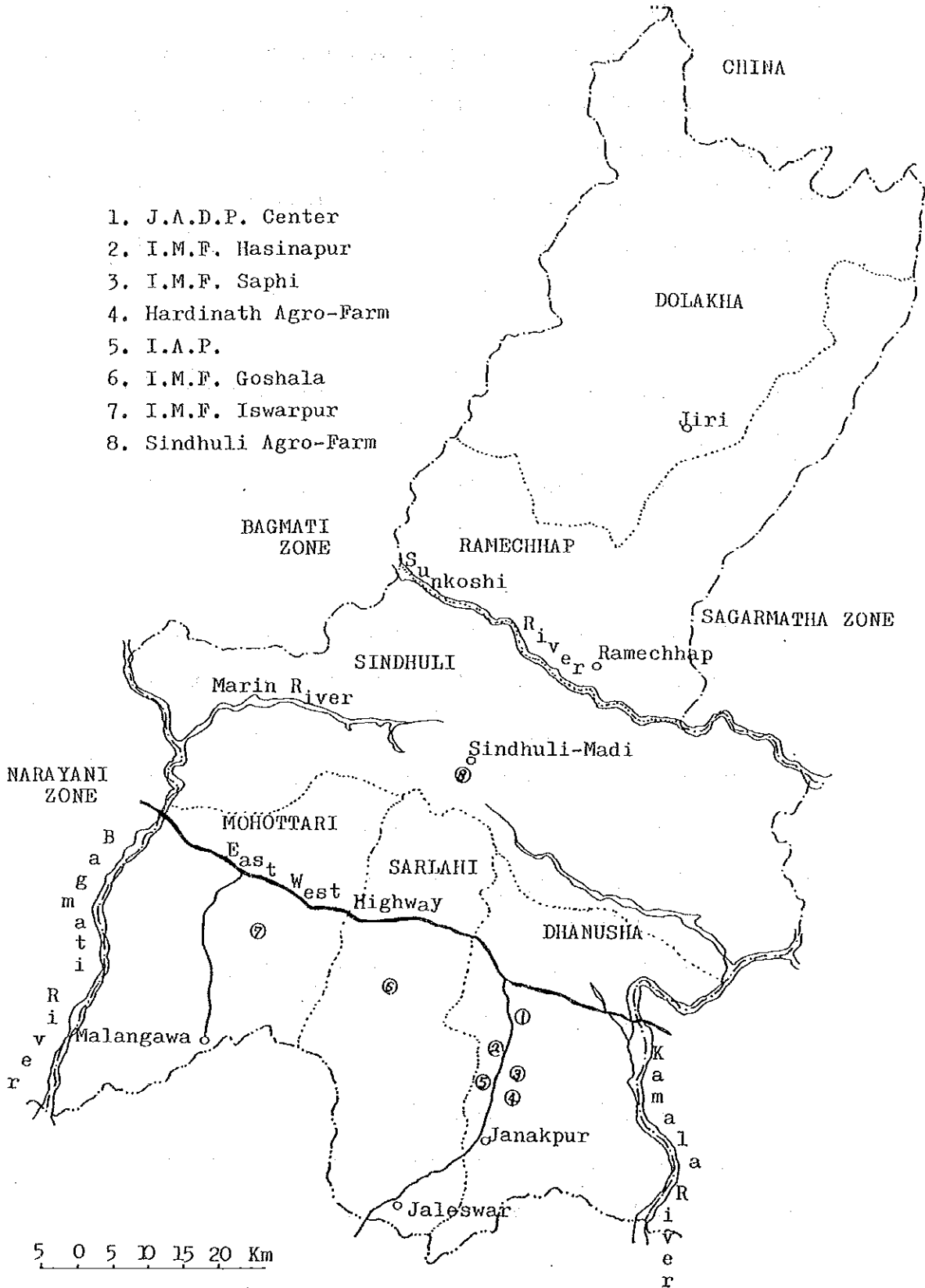
Table 3 PRODUCTION AND REQUIREMENT OF MAIN CEREAL CROP

	Edible Rice		Wheat		Maize	
	Production	Requirement	Production	Requirement	Production	Requirement
Nepal	1,288,206	889,089	271,626	184,735	708,845	659,522
%	100	69	100	68	100	93
Janakpur	171,048	114,316	33,574	8,065	54,690	48,058
%	100	67	100	24	100	88
.....						
	Edible Barley		Edible Millet			
	Production	Requirement	Production	Requirement		
Nepal	21,342	27,186	120,387	110,714		
%	100	127	100	92		
Janakpur	740	764	8,234	5,186		
%	100	103	100	63		

Unit : Metric Ton

Source : Department of food and Agricultural Marketing Services.

Map JANAKPUR ZONE



1. J.A.D.P. Center
2. I.M.F. Hasinapur
3. I.M.F. Saphi
4. Hardinath Agro-Farm
5. I.A.P.
6. I.M.F. Goshala
7. I.M.F. Iswarpur
8. Sindhuli Agro-Farm

4) Outline of J.A.D.P.

Process of Project

For three years from Nov., 26, 1971, based on "R/D"; for five years from Nov., 7, 1974 based on "Agreement"; for three years from Nov., 7, 1979 based on "R/D", J.A.D.P. was executed for total 11 years. Thereafter, from Nov., 7, 1982, cooperation by "Follow-up" is being carried out for expected two years based on "R/D".

Basic Scheme

Agriculture development is being executed consistently for the raise up of farmers' income of Janakpur Zone and their standard of living as the basic scheme or target.

Project area under J.A.D.P.

In Dolakha District, north of this Zone, development, mainly of diary farming, agriculture and medical treatment has been carried on by cooperation given from Switzerland early from the time before the start of J.A.D.P.

Hence excluded from J.A.D.P. and remaining five districts are in the scope of J.A.D.P. cooperation.

Also, during the "Follow-up" term started from Nov. 6, 1982, The activities of Japanese experts are mainly limited to three districts in Terai aiming at introductions of irrigated farming technology.

Project (outline)

J.A.D.P. is, as stated in the above "Process of Project", is divided into four terms by "R/D" and "Agreement" and its outline by term is given in Table 4.

Table 4 Outline of J.A.D.P. Activities

Term	Construction Division	Irrigation Division	Agronomy Division	Extension Division
1st Term "R/D" Nov., 26, 1971 ~ Nov., 6, 1979	Purchase of land(site) for J.A.D.P. Center and construction of building facilities Transfer and arrangement of Hardinath Farm from FAO.		Start of practical trial and seeds production at Hardinath Farm	Start of training of J.T., J.T.A. and farmers
2nd Term "Agreement" Nov., 7, 1974 ~ Nov., 6, 1979	Seeting and construction of Sindhuli Farm Construction of 14 agricultural storehouses	Design and construction of I.A.P. Development start of small water-supply source	Start of practical test at Sindhuli Farm Entry of Repti Farm, Start of Vegetables seeds production	Extension Activity start of I.A.P. irrigating farming. Start of hill area survey and guidance Publication start of "Farmers News"
3rd Term "R/D" Nov., 7, 1979 ~ Nov., 6, 1982	Construction of I.M.F Construction of Extension Sub-station Construction of pump and pump house in IAF area.	Execution start of S.T.W.P programme Start of I.A.P. water control	Establishment of cultivation standard for main ceneal crops Start of practical trial at I.M.F. Practical trial of irrigating farming at I.M.F. Demnstration of farmers field at S.T.W.P area	Strengthening of agricultural training Editing of Local Language text Start of farming machine training Start of production programme for "Junar", hill area Extension work to S.T.W.P area Strengthening of training Preparation of lecture standard Guidance start of I.A.P. group cultivation
4th Term "R/D" (Follow-up) Nov., 7, 1982 ~ Nov., 6, 1984				

FUNCTIONS OF PROJECT

1. J.A.D.P. Center (15 ha)

As the general center, the following divisions are under managerial control.

- a. Administrative Div.: Management of J.A.D.P.
- b. Account Div.: Accounting business of J.A.P.D. and accessory farms.
- c. Store & Procurement Div.: Materials control of J.A.P.D. and accessory farms.
- d. Construction Div.: Design, working and control of buildings of J.A.D.P.
- e. Irrigation Div.: Plan, working for small scale water source development of I.A.P. and local areas
- f. Boring Div.: Finding of underground water source and boring of deep/shallow wells.
- g. Agro-Machinery Div.: Control of farm machines and implements, vehicles.
Development of farm tools
- h. Agronomy Div.: Practical trial of crops cultivation, demonstration farms.
- i. Economic Div.: Bench mark and study survey of I.A.P., S.T.W.P. areas
- j. Horticulture Div.: Practical cultivation test of tropical, temperate fruit trees and vegetables.
Production of seedlings.

k. Extension and Training, extension work
training Div.: to I.A.P., S.T.W.P. areas.
Support to A.D.O. of each
district.

2. Hardinath Agro-Farm (45 ha)

Seeds production of paddy, wheat, and maize.

Production of seedlings of tropical fruit tree.

Introductory test of improved agricultural techniques.

3. I.A.P. Area (420 ha)

Development of underground water by deep tube wells.

Development and extension activities for intensive
irrigation agricultural techniques.

4. I.M.F. Area

Development of underground water by shallow tube wells.

Land consolidation by farmers and demonstration of
intensive irrigated agriculture.

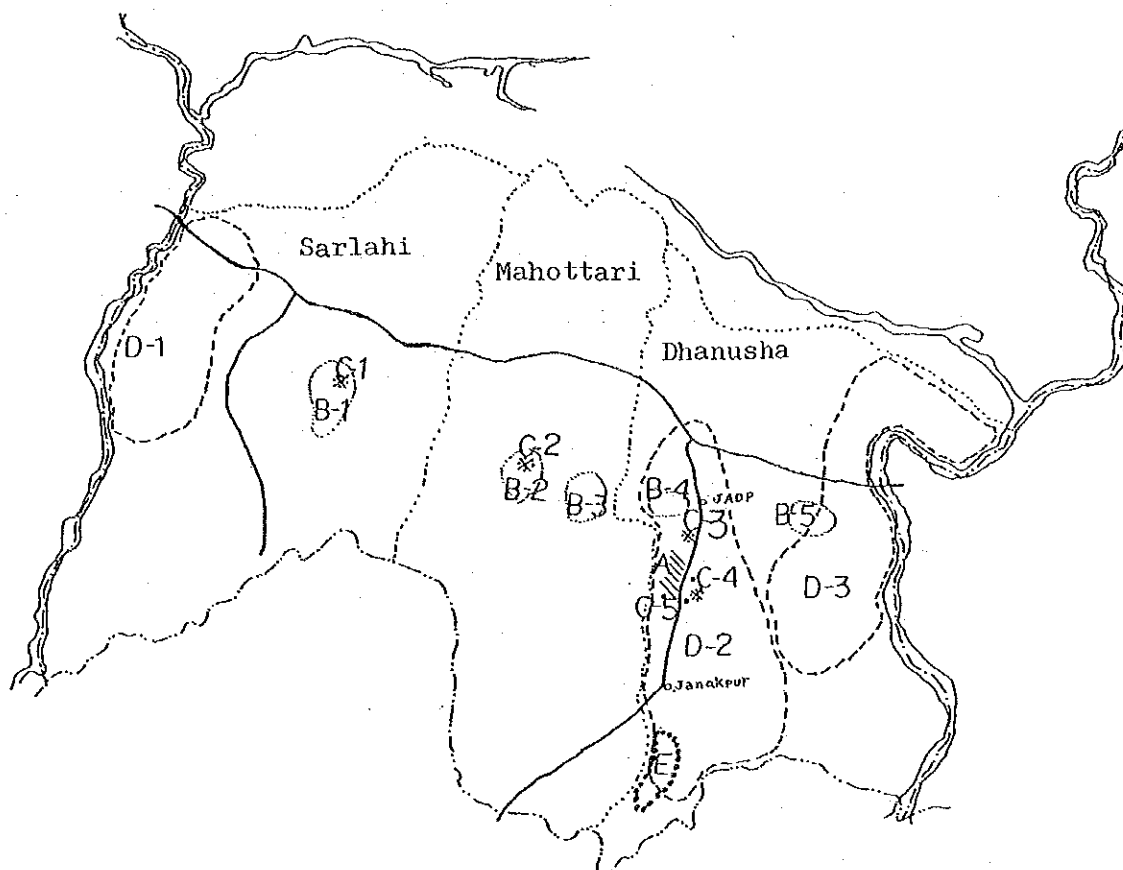
5. S.T.W.P. Area

Development of shallow underground water source in Terai
area and extension of intensive irrigated agriculture.

6. Sindhuli Agro-Farm

Development of appropriate farming method for hill area
and crop trial. "Production Programme of Junar".

Extension Effect Evaluation Area



- ▨ A. ----- I.A.P. Evaluation Area
- B. ----- S.T.W.P. Evaluation Area
 - B-1 *** Iswarpur Area and Babargunji Area
 - B-2 *** Goshala Area
 - B-3 *** Aurahi area and Bijalpur Area
 - B-4 *** Bateswar Area and Santypur Area
 - B-5 *** Yogyabhumi Area
- * C. ----- I.M.F. Evaluation Area
 - C-1 *** I.M.F.-Iswarpur
 - C-2 *** I.M.F.-Goshala
 - C-3 *** I.M.F.-Hasinapur
 - C-4 *** I,M,F.-Saphi
 - G-5 *** I.A.P. No5
- D. ----- A.A. Evaluation Area
 - D-1 *** Barathwa Area
 - D-2 *** Janakpur Area
 - D-3 *** Yadukuwa Area
- ⊙ E. ----- Comparison Area (Fulgama Village)

5) Farms in areas survey and its outline

As stated already, the areas under J.A.D.P survey is broad and wide covering five districts and the development activities are much diversified. In consideration of "R/D" taken this time is limited to Terai three districts under most active J.A.D.P of the survey conducted this time; irrigated farming of Dhanusha, Mahottari and Sarlahi districts and A.A. of these districts were main survey objects.

Farmers surveyed:

- a. I.A.P. Areas
 - b. S.T.W.P. Areas
 - c. A.A. Training
 - d. I.M.F Areas
 - e. Non-Project Area
- a. I.A.P. Area

The activities executed based on the Agreement concluded in 1974.

I.A.P. Area was set selected with an aim to diffuse the improved farming technology toward Terai Plain by making, as a demonstration base, an irrigation canal after digging Nine deep tube wells on a paddy field of 420 ha along the Highway about 18 Km north of Janakpur. These Nine deep wells were digged during 1975 ~ 1977, and an irrigation canal of 11,153 m construction work began to be executed at the same time, of which 9,300 m length was completed and still construction is being carried on. Also, Main Road of 1700 m long was already constructed. The initially planned water supply quantity

was 153¢/s/9 wells, but not obtained. By the measurement made in December, 1981, it was 113.4¢/s/9 wells, and was 71.6¢/s/9 wells in June, 1982. Hence, for the purpose of increasing the water quantity and of uniform and even water distribution, from 1981 downward, as a model, pumping up by No. 5 well and water sale system were taken. This system, as seen from the Survey Results of this time, was accepted by farmers with much favour, and thereafter all the Nine wells began to be controlled by the system of No. 5 well.

The above mentioned water sale system is that the irrigation water is supplied to each farm, by the request of farmers, at a rate of 1 hour Rs16 pumping up by three pump operators stationed. Together with this irrigation project activities, extension activities in this area is an important part of J.A.D.P. From the start of this Project, demonstration farm, meeting, round trip guidance, training, pamphlets distribution, water management committee and group faming guidance etc have been organized, given and carried out.

Table-5 Outline of I.A.P. Activities

Village		Agreswar . Saphi . Ramdaiya
Area	Total area	4 4 7 ha
	Benefited area	4 2 0 ha
	Road, canal area	2 7 ha
Benefited farmer		5 5 0
Irrigation canal		9,3 0 0 m
Main road		1,7 0 0 m
Artisan well		9
Pump house		9
Control house		3

b. S.T.W.P. Areas

On deep tube wells of I.A.P. Areas, this S.T.W.P. started from 1981 with its object to make development and extension of irrigated farming by making use of shallow underground water in Terai.

Its necessary materials, machines, implements were introduced on the grant aid cooperation from 1979, and actual digging, pumping water management guidance have been taken by J.A.D.P. As of Feb., 10, 1984, boring of total 745 well was completed.

On the other hand, other Divisions of J.A.D.P. also, together with this digging work, began their activities of crops cultivation experiment and extension by use of shallow tube wells as the present day important factor.

c. A.A. Training

As shown in Table-6, so many kinds of training have been conducted at J.A.D.P. Center, Hardinath Farm, Sindhuli Farm etc. out of these trainings, the most important and

useful were A.A. Training and Follow-up Training.

The duty or role of this A.A. is to act as an assistant of J.T./J.T.A. (extension worker) in his own village for farmers' consultation, demonstration farm, public information etc.

J.A.D.P. gives Follow-up training according to the necessity after one month general training on agriculture and trained as many as 627 persons up to present.

Table-6 J.A.D.P. Training Data

Type of Training	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83	83/84
Leader Farmers	111	231	123	546	502	396	367	327	331
Agri-Asstt	-	122	94	71	85	45	54	61	95
A-A Follow-up	-	-	67	42	152	287	297	124	40
JT/JTA Inservice	56	124	17	25	85	61	130	81	40
Agri-Officers	-	46	-	28	-	-	-	-	-
farmers Seminar	-	46	-	-	38	47	-	-	-

d. I.M.F. Areas

As a preceeding model farms of S.T.W.P., 5 demonstration farms were set at farmers fields in three Terai Districts to let farmers understand the importance of S.T.W.P.

Also, this Area is being utilized for extension materials toward S.T.W.P. as a model farm.

Table-7 I.M.F. Activities

Area	Isuwarpur	Goshala	Saphi	Hasinapur
Benefited area ha	5.6	4.1	4.6	7.2
Number of beneficiary	2	2	20	17
Amount of discharge l/s	5.5	13	19	46
Irrigation canal m	Main 135	142	249	498
	Branch 470	370	550	
Farm road m	135	142	249	498
Leveling	No	No	No	Yes
Exchange of land	No	No	No	Yes

e. Non-project Areas

J.A.D.P. covers five District of Janakpur Zone, but insufficient spread areas are seen to certain degree.

Fulgama area was selected for non-project area.

Fulgama area is located about 6 Km south of Janakpur City.

Scale or condition of village are similar to those

Which are seen in Terai.

Activities so far carried out by J.A.D.P up to present are only the construction of extension Sub-Center (1983) and the test Boring (from Nov. 1983).

6) Method of survey and items

Method of survey

Counterparts of extension, Agronomy, Agricultural Economic of J.A.D.P and five other students (junior college graduates) conducted the interview survey by visiting farmers. Also, for reliability check of data, interviewed 45 persons for reconfirmation.

Furthermore, in accordance with characteristics varied with activities of J.A.D.P, the method of survey has also been taken as subdivided as mentioned hereunder.

I.A.P. Area

For this Area, Bench-mark survey was given to 107 farmers in 1972 before irrigation programme. The survey conducted this time was also for these 107 farmers to compare their present situation with that of 12 years ago.

S.T.W.P. Area

For this Areas also, Bench-mark survey was conducted with 107 farmers in 1981, and same as with the case of I.A.P. survey was given with the same farmers to examine the change during three years of S.T.W.P survey carried out.

A.A.

This activities differ from others. Survey was given in order to know the situation of farming before and after Training and of their extension activities.

Also, by giving them Agricultural test, their change in knowledge and information before and after Training was also surveyed for reference.

I.M.F. Area

In this area, more detailed survey has been given

continuously also for the development of extension materials. This time, these results were divided into the before and after I.M.F. for the effect evaluation of this Area.

Non-project Area

For the purpose of comparing non-project area on the above four project Areas, Survey was also devised considering convenient purpose of comparison.

Number of farmers surveyed.

Numbers of farmers classified by survey and area are shown in Table-8.

Table-8 Survey number of farmer

I.A.P Area (Farmer: 550)	1972 Survey		Present (1983) survey	
	Total sample number	Valid number	Total sample number	Valid number
	107	105	107	101

S.T.W.T Area (Farmer: 530)	1981 Survey		Present (1983) survey	
	Total sample number	Valid number	Total sample number	Valid number
	107	107	107	101

A.A (Farmer: 532)	Present (1983) survey	
	Total sample number	Valid number
	97	97

I.M.F Area (Farmer: 41)	Survey number of family	
	Total sample number	Valid number
	41	41

Non-project area (Farmer: 613)	Present (1983) survey	
	Total sample number	Valid number
	110	110

With I.A.P. Area, Valid sample number of farmer of 1972 Survey is less than total Sample number of farmer, which shows that the farmers did not respond the Survey.

With 1983 Survey also, decreased 6 farmers likewise by the following reasons.

Householders (heads) before 1972 of five farmers (houses, family) were dead and their respective farm-land was distributed among their children.

The remaining one farmer moved to other villages and its farm land was sold.

Six farmers were not taken for sampling in S.T.W.P. area, because interview was not available due to travelling to Kathmandu, India, etc. at the time of survey.

Period of Survey

Nov., 10, 1983 ~ Jan., 10, 1984

Items of Survey

As shown in Table-9, general items and sub-items classified by activities. For I.M.F, refer to other items specified in the Chapter(s) mentioned later.

Items of Survey

1. General survey

1-1 General conditions of farmers

1-1-1 Family constitution and situation,

1-1-2 Farm implements, livestock, furniture and

household goods etc., owned, 1-1-3 Kind of house-
building.

1-2 Area of farm-land

1-2-1 Number of farmers by farming area (by scale
of farmer), 1-2-2 Number of farmer by land-owned farming
type (owner and tenant)

1-2-3 Land area per farmer and per head.

1-3 Agricultural production

1-3-1 Planting area per farmer by crops, 1-3-2 Change
of cropping intensity, 1-3-3 Yield per ha, 1-3-4
Production per farmer, 1-3-5 Number of farmer by
crops, 1-3-6 Condition of utility of farming in-put.

1-3-7 Amount of Fertilizer applied per ha.

1-4 Economy of farmers

1-4-1 Income per farmer (income by sale of
agricultural products), 1-4-2 Non-Agricultural income,

1-4-3 Fund on loan.

1-5 Consciousness of farmers

1-5-1 Self-supply of food, 1-5-2 Change of production
(by consciousness survey of farmers), 1-5-3 Contact
with extension worker (JT, J.T.A.), 1-5-4 Utility of
training, meeting, demonstration farms and newspaper
(for farmers).

Training, Farmers meeting, Demonstration field and
Utility of Farmers Newspaper

2. Specific Survey by Activities

2-1 Farmer's opinion on IAP

2-2 Farmer's opinion on S.T.W.P.

2-2-1 Conditions of well (shallow) and pump, 2-2-2 Effect
of S.T.W.P.

2-2-3 Pump trouble and repairing method, 2-2-4 Sale of
water

2-2-5 Irrigating condition to each crop, 2-2-6 Trial
balance (sheet) by S.T W.P.

2-3 Farmer's opinion on AA Training

2-4 Farmer's understanding on JADP of the areas surveyed.

7) Survey results and method of examination

As started in "Method of Survey", for I.A.P., S.T.W.P., areas, A.A. surveyed, present survey was conducted for the purpose of extension effect evaluation. However, for I.M.F. area was not given any specific survey as being continued. Hence, for concluding results, difficult items were found when surveying with other items together and, therefore, a separate report will be made only of I.M.F. For examination, the following materials were taken for reference.

.....

Economic analysis on shallow tube well irrigation of Terai Pain, Janakpur Zone, Nepal

J.I.C.A., Agriculture Development Cooperation Dep. 1981

As Respective Survey Material, Tables and Figures are only outlined in the Test, and detailed are given as the "Attached Materials" at the end. This Text contains "Attached Table- " in each item for indexes.

1 Survey results and examination on I.A.P., S.T.W.P., A.A
and non-project area surveyed

For concluding survey results, the following abbreviations
are given by area, survey and year of survey.

I.A.P. → I.A.P. Area and farmers who own farm-land
in I.A.P. Area

I.A.P.-1972 → Survey 1972 to farmers of I.A.P.

I.A.P.-1983 → Survey 1983 to farmers of I.A.P.

IN I.A.P.-1972 → Survey 1972 to farmland of farmers under
I.A.P.

IN I.A.P.-1983 → Survey 1983 "

OUT OF I.A.P.-1972 → Survey 1972 to farmland of farmers not
under I.A.P.

S.T.W.P. → S.T.W.P. Area and farmers under S.T.W.P.

S.T.W.P.-1981 → Survey 1981 to farmers under S.T.W.P.

S.T.W.P.-1983 → Survey 1983 to farmers under S.T.W.P.

IN S.T.W.P.-1981 → Survey 1981 to farmland of farmers under
S.T.W.P.

IN S.T.W.P.-1983 → Survey 1983 to farmland of farmers under
S.T.W.P.

OUT OF S.T.W.P.-

1981 → Survey 1981 to farmland of farmers not
under S.T.W.P.

OUT OF S.T.W.P.-

1983 → Survey 1983 "

A.A. → Trained farmers

BEFORE TRAINING Before participation of training

AFTER TRAINING After participation of training

Non-project Areas and farmers not so much benefited by J.A.D.P. (comparison)

Irrigation area Non-project of irrigatable farm-land

Non-irrigation area Non-project of not irrigatable farm-land

Classification method of farmers

As shown in Table 9, classification by scale of farmers for I.A.P., S.T.W.P. Non-project, and classification by year of training for A.A.

Table 9 Survey Results Classification Method and Number of Farmers Surveyed

I.A.P.

Division	Scale of farmer	Number of farmer	
		1972	1983
0 1	$0 \leq ha < 1$	34	34
1 2	$1 \leq ha < 2$	33	23
2 3	$2 \leq ha < 3$	20	23
3 4	$3 \leq ha < 4$	9	12
4 5	$4 \leq ha < 5$	5	5
5 10	$5 \leq ha < 10$	4	4

S.T.W.P.

Division	Scale of farmer	Number of farmer
		1983
0 1	$0 \leq ha < 1$	1
1 2	$1 \leq ha < 2$	4
2 3	$2 \leq ha < 3$	6
3 4	$3 \leq ha < 4$	8
4 5	$4 \leq ha < 5$	13
5 10	$5 \leq ha < 10$	38
10 15	$10 \leq ha < 15$	20
15 20	$15 \leq ha < 20$	4
20	$20 \leq ha$	7

A.A.

Division	Year of training	Number of farmer
76 77	1976 - july - 1977 - june	34
77 78	1977 - " - 1978 - "	23
78 79	1978 - " - 1979 - "	11
79 80	1979 - " - 1980 - "	4
80 81	1980 - " - 1981 - "	14
81 82	1981 - " - 1982 - "	2
82 83	1982 - " - 1983 - "	8

Non-project area

Division	Scale of farmer	Number of farmer
		1983
0 1	$0 \leq ha < 1$	23
1 2	$1 \leq ha < 2$	27
2 3	$2 \leq ha < 3$	26
3 4	$3 \leq ha < 4$	8
4 5	$4 \leq ha < 5$	7
5 10	$5 \leq ha < 10$	17
10 15	$10 \leq ha < 15$	2

1. General Survey

1-1 General condition of farmers (A.T. = Attached Table)

1-1-1 Family constitution and situation [A.T.-1-1]

a) Number of family

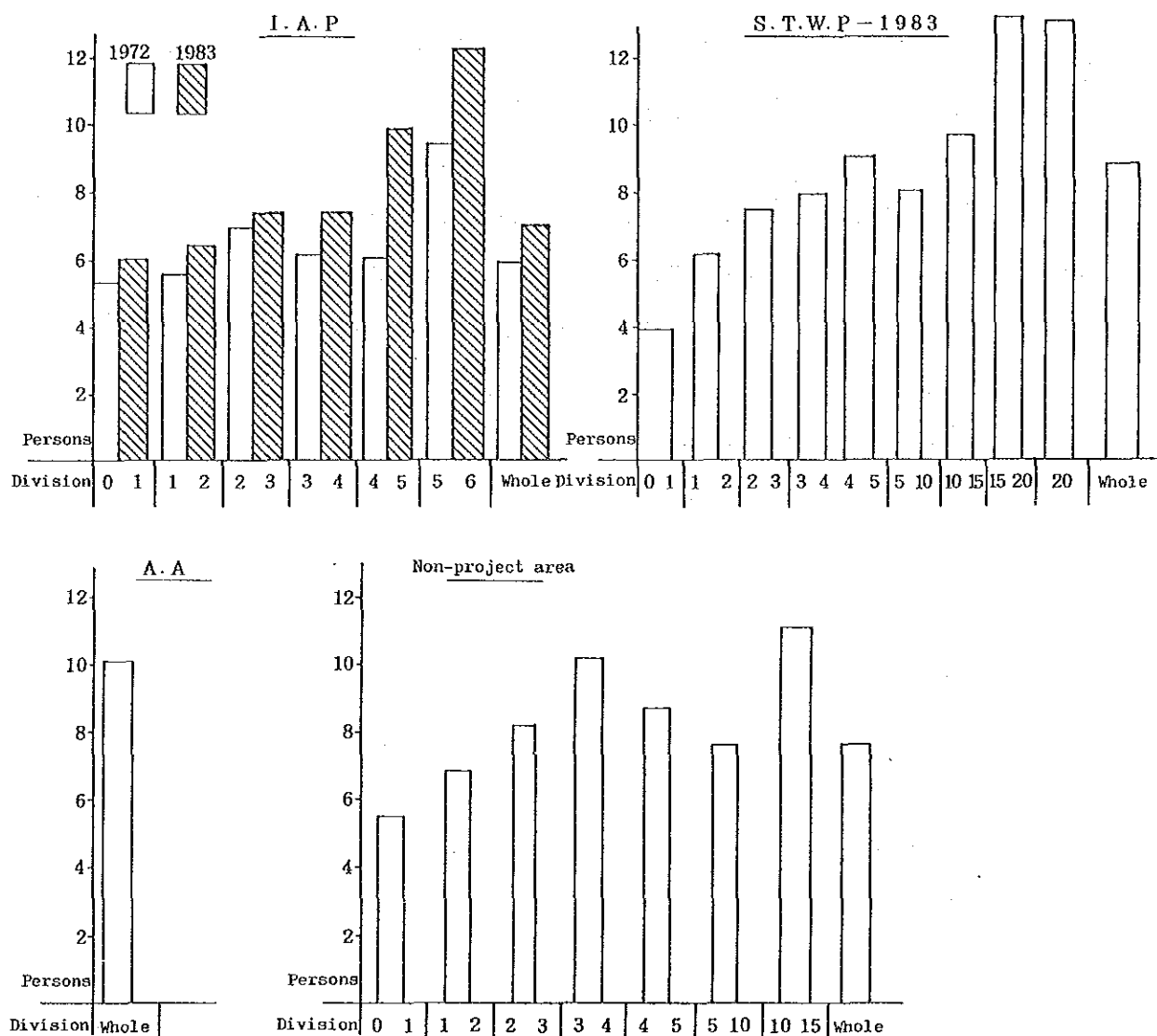
With I.A.P. the number of family per farmer in 1972 was 6.0 (persons), then increased to 7.1 in 1983, i.e. 1.1 persons increase during 11 years period, 18% increase. By Survey of S.T.W.P.-1983, it was 9.0 persons per farmer due to major scale of farmer as started later, i.e. average large number of family. With A.A, being 10.1 persons, most. With non-project, 7.5 persons, not so much different from I.A.P.

The number of family is increasing in proportion to owned land area.

* Comparing with 24% population increase of Nepal during 1971 - 1981, 18% increase of I.A.P. Area is not so high.

Source: Central Bureau of Statistics

Fig. 1 Number of family per farm by scale



b) Ratio of schoolability (Ratio of school attendance)

Those who are attending school and attended school were surveyed altogether as "those who are attending school" or as "educated persons" (hereinafter simply express in percentage-%)

I.A.P: 5% (of all, hereinafter same) in 1972. Which householder (head of family) and wife-0%, male children -11%, female children-3%. By Survey 1983, it was 14% of all, about 2.8 times rise.

Especially, male children rose to 40% and female children rose to 15%.

S.T.W.P.: By survey 1983, 46% of all was higher than that of other areas. 46% educated householders is considered to be a main factor capable of early introduction of new activities called S.T.W.P. With children, male-85% and female 66%. The cause of such high school attendance rate, as described later, seems to be due to their economic well-doing by major scale farmers.

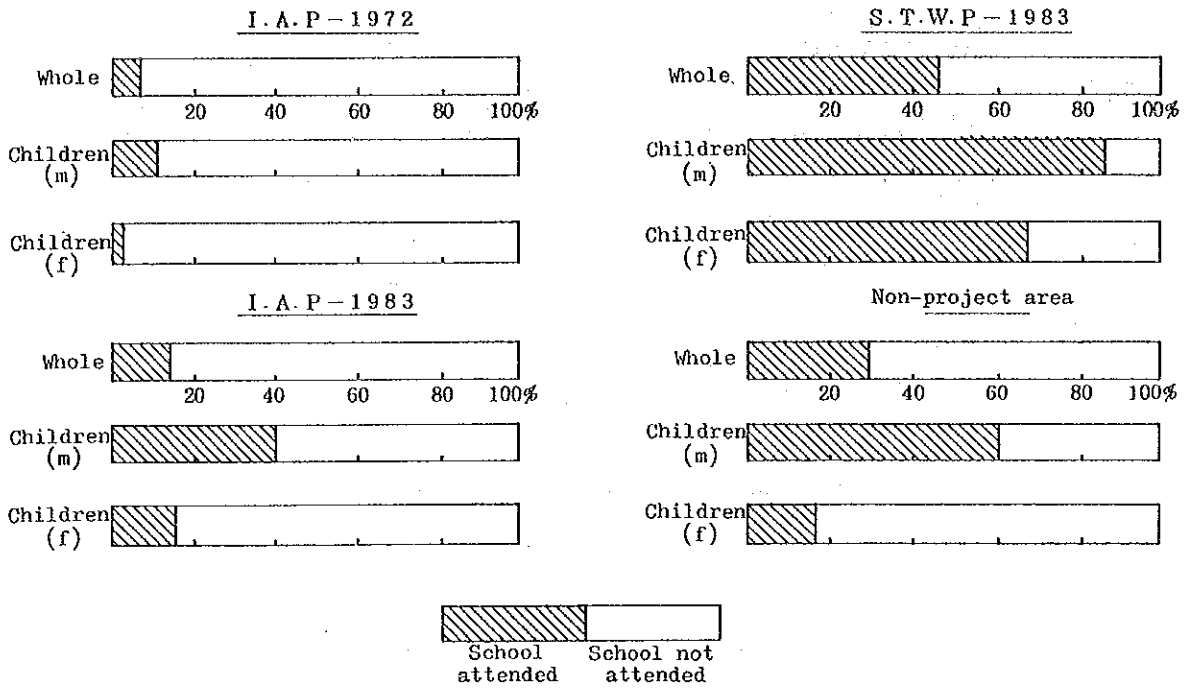
Non-project Area: 28% of all and higher than that of I.A.P. of same scale of farmers. This area, near Janakpur, seems to be largely influenced by town. Of these three areas, schoolability is high in order of S.T.W.P, non-project area and I.A.P., and this ranking is closely relating to owned land area and farmers' income.

No comparison is made as the entire rate of schoolability of Nepal of 1983, however, judging from 9.8% in 1978, the education level of area under this project is considered high.

With A.A. no Survey of schoolability is conducted. However, all the A.A. members with more than 8 years education were surveyed and from this point, their level of education is considered high same as that of S.T.W.P. areas' farmers.

No relationship was found between the scale of farmers and schoolability.

Fig. 2 Schoolability

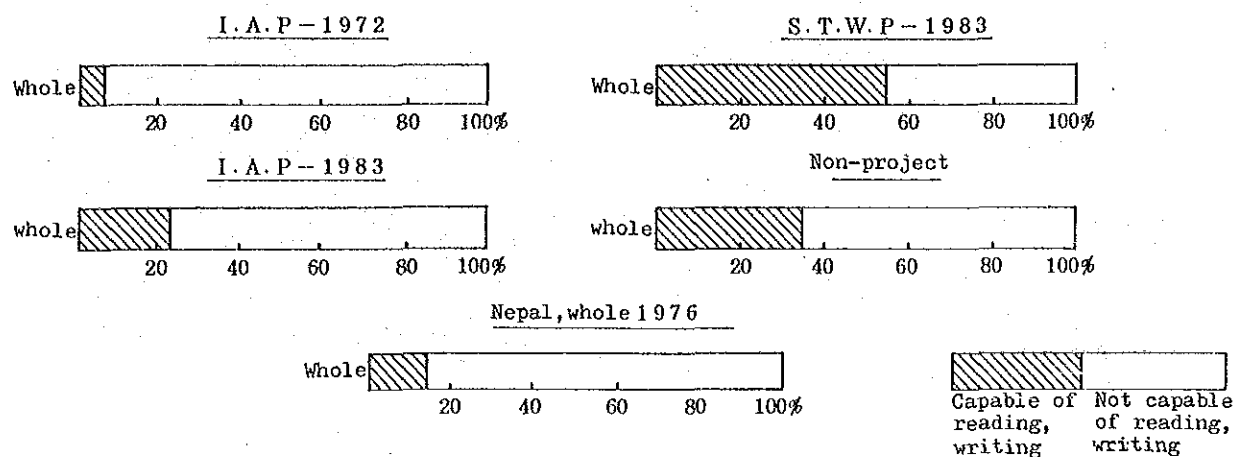


c) Ratio (%) of literacy

Survey results on those who are capable of "Reading and Writing" showed some difference from those who attended school. They seem to have learned letter by some method or others as letter became necessary as social modernization proceeded. This tendency is remarkable with householders and their wives. While this ratio (%) of literacy of householders of I.A.P. in 1972 was 0%, it rose to as high as 33% in 1983.

From the fact there is no big difference between the two with children, most of them seem to have learned at school.

Fig. 3 Ratio (%) of literacy



Source: Nepal, whole 1976 Central Bureau of Statistics

d) Occupation

By this Survey, occupation was classified as itemized hereunder.

Farming workers: Men and women above 15 years of age, excluding non-farming worker and students

Non-Farming Worker : Men and women excluding farming workers and students

Student : Those attending school

Preschoolable : Boys and girls under 15 years of age, those not attending school

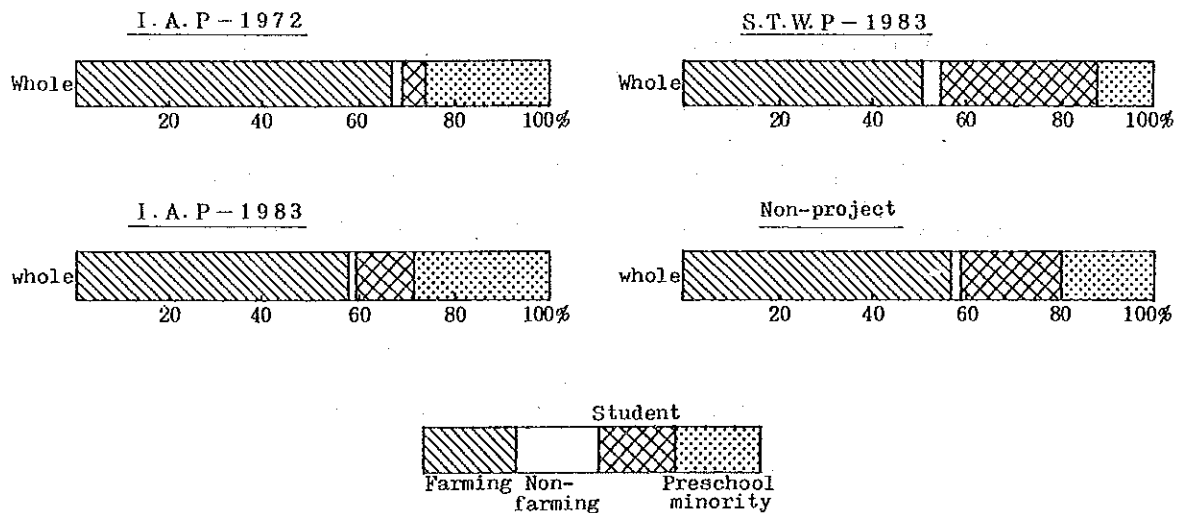
I.A.P.: The ratio (%) of farming workers on IAP's total population in 1972 was 66% and in 1983 was 58% and that of non-farming worker was only 1 - 2% in both years.

8% decrease of 1983 from 1972 may be due to increase of students and farmer workers of minority decreased. Hence, adults farming workers remained unchanged in

that ratio.

S.T.W.P., Non-project Areas: The ratio (%) of farming workers in both Areas were 52% and 56% respectively, slightly lower than that of I.A.P. Also those of non-farming worker were respectively 3% each, being higher than that of I.A.P. but their number is very small. It is reported that the ratio of farming workers, in the whole Nepal, on the total workers is 89.9%. With the surveyed area this, it was 95%, thus considered to be of high dependence on farming.

Fig. 4 Ratio (%) by Occupation



1-1-2 Farm implements, livestock, durable goods etc.

owned [A.T. 1-2]

a) Farm implements

I.A.P.: During a period of 1972 - 1983, the number of local farm implements showed no big change but number of irrigating pump is slightly increasing with large scale farmers.

S.T.W.P.: Same as I.A.P., no remarkable change was seen, during 1981 - 1983, with local farm implements but, number of irrigating pump showed natural increase for the purpose (intended activities) of S.T.W.P.

A.A.: More owners of improved plow were found than other areas surveyed as a good extension effect.

Non-project Areas: Owner of irrigating pump was found many next to S.T.W.P. areas unexpectedly.

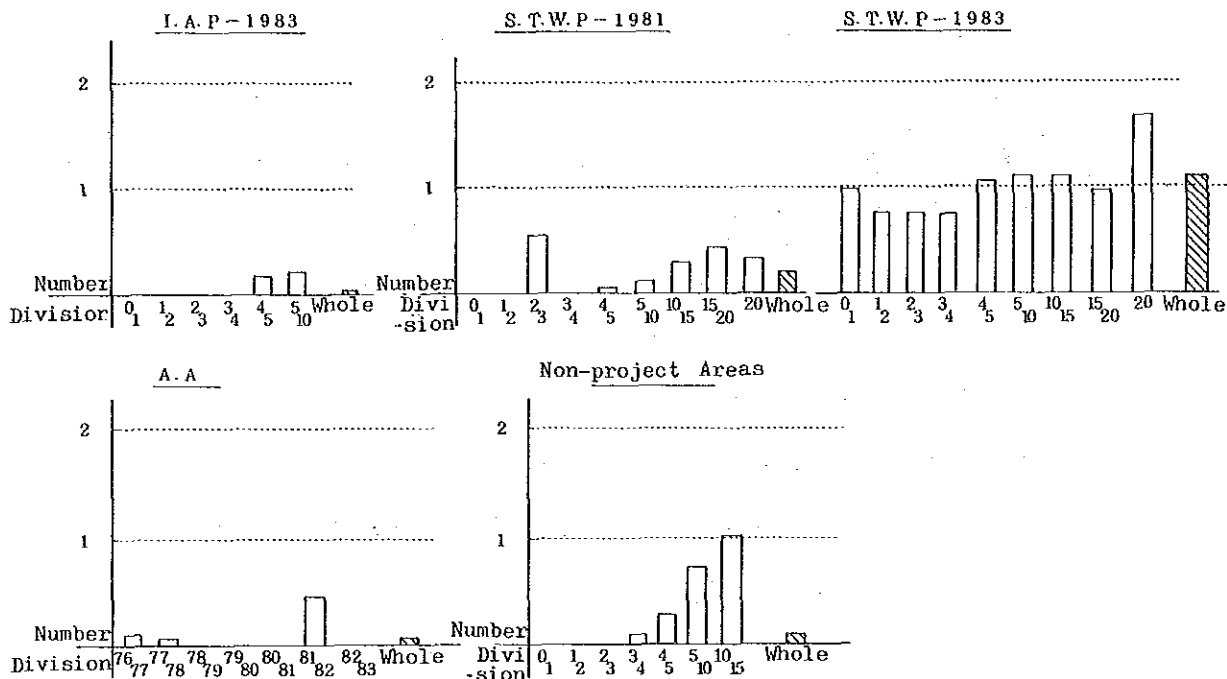
This may come from that farmers in these areas were making effort for irrigation from some water source, also became the areas controlled under S.T.W.P. by J.A.D.P. from this year onward.

With every area surveyed, owners of farm implements are increasing in proportion to the scale of farmers. However, though necessary those not owning big farm implements such as oxcart and plow with small scale farmers below 2ha (farm-land). Irrigation pump, excluding S.T.W.P. is owned by big scale farmers of more than 4ha and tractor by those of more than 10ha. As seen above, irrigating pump and improved plow are gradually increasing, but their numbers are not sufficient. From this Survey Results, expensive pumps are being diffused to some extent, in the areas except S.T.W.P., farmers seem to have their strong hope and wish for irrigated farming.

The reason why number of pump owner was small in I.A.P. may be due to their unnecessary to have to own each by their deep tube well irrigation system

whereby they can obtain water without it.

Fig. 5 Number of Irrigating Pump Owned per Farmer



b) Livestock

With each surveyed area, raising number of livestock was greater in order of cattle, goats, buffalos and fowls. Cattle are for ploughing and objects of worship as their dung is important as fuel, not so much used as compost. Goats are bred as meat and buffalos for milking purpose.

Scarce fowls raising is by the eating habit of native inhabitant of Terai.

The raising number of fowls is slightly increasing for the purpose of being sold to Janakpur.

Number of (fowls) raising in I.A.P. and non-project area is not so much different, and fewer number of them (fowls) than S.T.W.P. and A.A. explains

the scale of farmers of these areas.

With A.A. no clear condition or difference in this respect was seen by the year of (their) training.

The comparison of survey results by APROSCO in 1976 and the present Survey Results is shown in Table 10. By this results, in other areas except S.T.W.P. the number of (livestock) raising was less than that of APROSC survey results.

This cause could not be made clear, but may be ascribable to the following reasons.

The scale of farmers under APROSC survey was larger than that of farms of I.A.P. and of non-project under the present Survey and smaller than that of S.T.W.P., and A.A. Then, as described above, from the close relationship between the number of livestock owned by farmers and the scale of farmers, the number (of livestock owned by farmers) became smaller in I.A.P. surveyed areas where minor scale farmers are many or dominant and became larger in S.T.W.P. area where major scale farmers are densely inhabited (indigenous).

In short, in each area altogether, no remarkable change is seen in the past and present number of livestock, but it depends on the scale of farmers.

Fig. 6 Number of Cattle (Except Buffalos) per Farmer by Scale

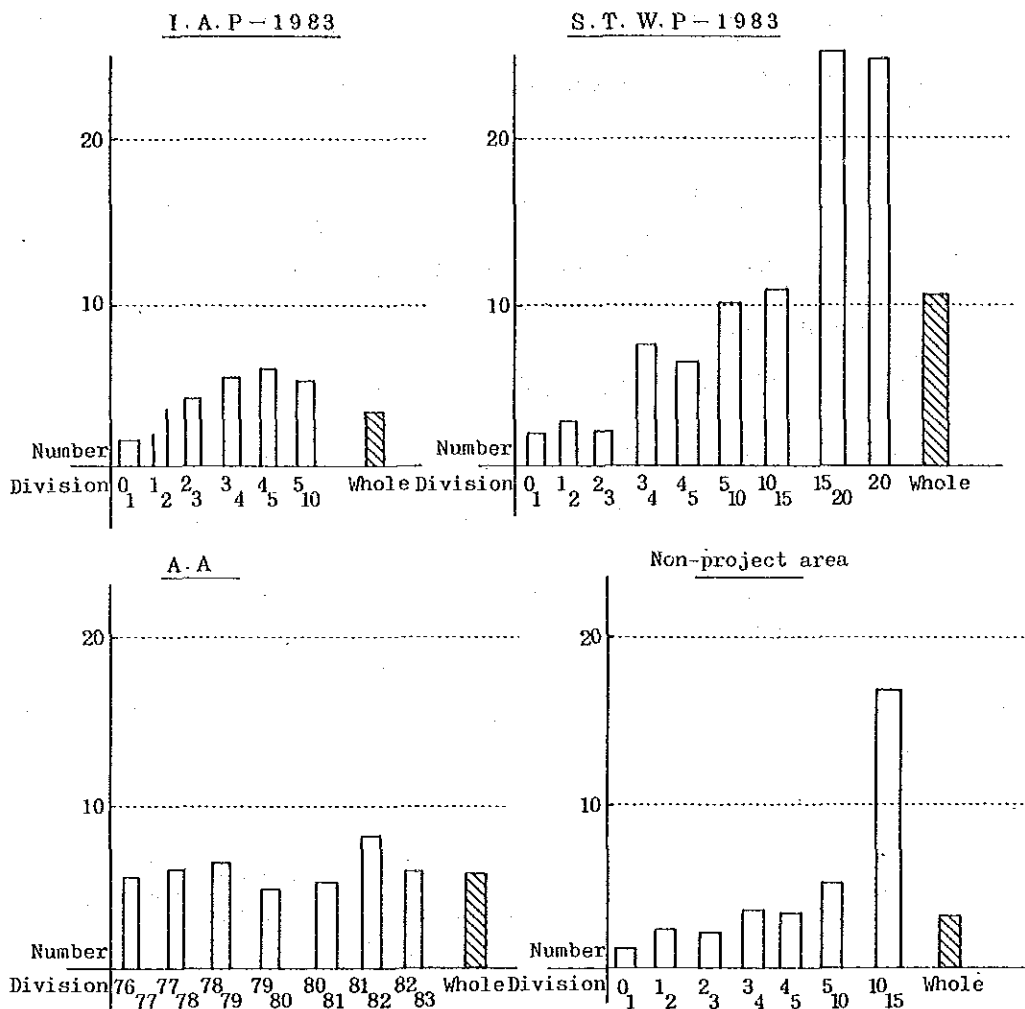


Table 10 Average Number of Livestock Owned

Present Survey

	Cattle	Buffalos	Goats
I. A. P - 1983	3.34	0.76	1.12
S. T. W. P - 1983	10.37	2.39	3.33
A. A	5.61	1.54	1.83
Non-project	2.79	0.76	1.15

APROSC Survey, 1976

Terai	4.92	2.37	2.41
Hill	4.05	2.70	3.90

c) Durable goods

As one of methods to evaluate their (farmers') standard of living, number of bicycle, watch etc., were surveyed.

With I.A.P. the number of these articles per farmer and of owner during 11 years period from 1973 is increasing respectively. Also in 1983, the number with S.T.W.P. and A.A was found many and with I.A.P. fewest. By all Survey Results, the larger the scale of farmer, the more the number.

Table 11 Owned Number per Farmer (Bicycle, Watch, radio)
(Average number per farmer)

	IAP-1972	IAP-1983	STWP-1983	A . A	Non-project areas
Bicycle	0.1	0.28	0.47	0.61	0.51
Watch	0.1	0.37	1.68	1.02	0.91
Radio	0.0	0.15	0.68	0.52	0.39

From the above Survey Results, the number of farm implements, livestock, Durable goods was found the most with S.T.W.P. and then followed non-project areas and I.A.P. in this order.

From the classification of farmer's scale, the larger the scale, the more the number.

With I.A.P. also, when comparing those in 1972 and in 1983, some increase was found with those other than the Local farm implements.

1-1-3 Kinds of house-building [A.T. 1-3]

One of visual changes found in accordance with farmers rise of living standard is the aspect (structure/appearance) of their house-buildings.

The change or improvement taken in this area is seen with their roofing materials, i.e. from "miscanthus-thatched roof" to "tiled roof".

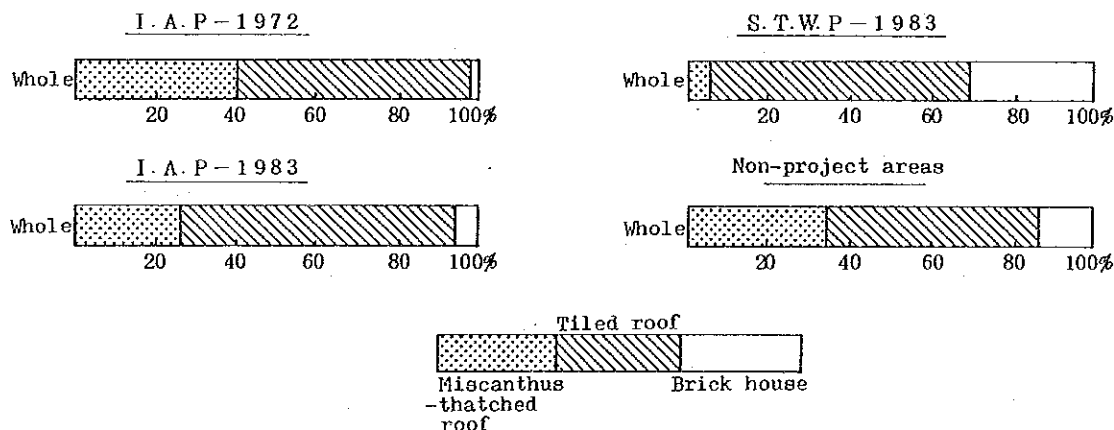
Thus, Survey was given to miscanthus-thatched roofing, tile roofing and brick construction house-buildings.

By the Survey conducted in 1972 with/for I.A.P., 40% miscanthus-thatched roof ratio decrease to 26% in 1983 and, to that extent, tiled roof and brick house-buildings increased instead.

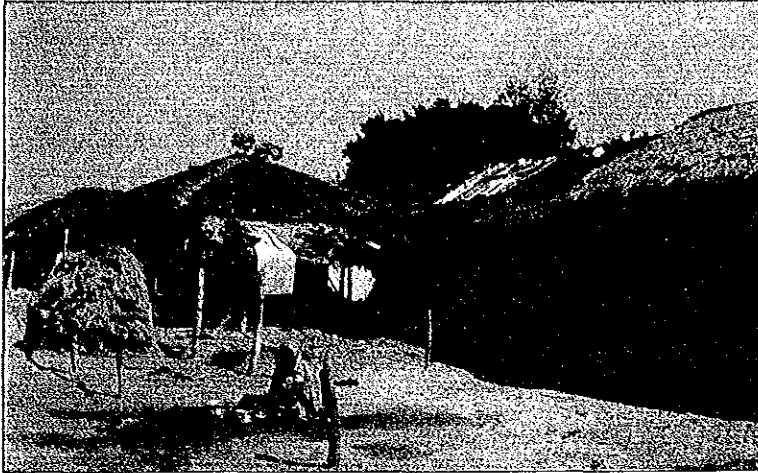
The ratio of tile roof plus brick house altogether was 95% with S.T.W.P., and then followed 74% I.A.P. and non-project areas 65%.

The roof aspect, in every area, closely relates to the scale of farmers, brick house-buildings found many are of the larger scale farmers who own more than 4-5ha farm-land, and miscanthus-thatched roofs found many are of the small scale farmers of 0-2ha.

Fig. 7 Kind of House-Buildings (%)



PHOTOGRAPH



Miscanthus-thatched
roof(right)



Tiled roof



Brick house

1-2 Area of farm-land

1-2-1 Number of farmers by farming area (by scale of farmer)

(A.T. 1-4)

The farming area was classified into the following

5 groups by Farming scale.

Farming area

$0 \leq \text{ha} < 1$ Poor farmers

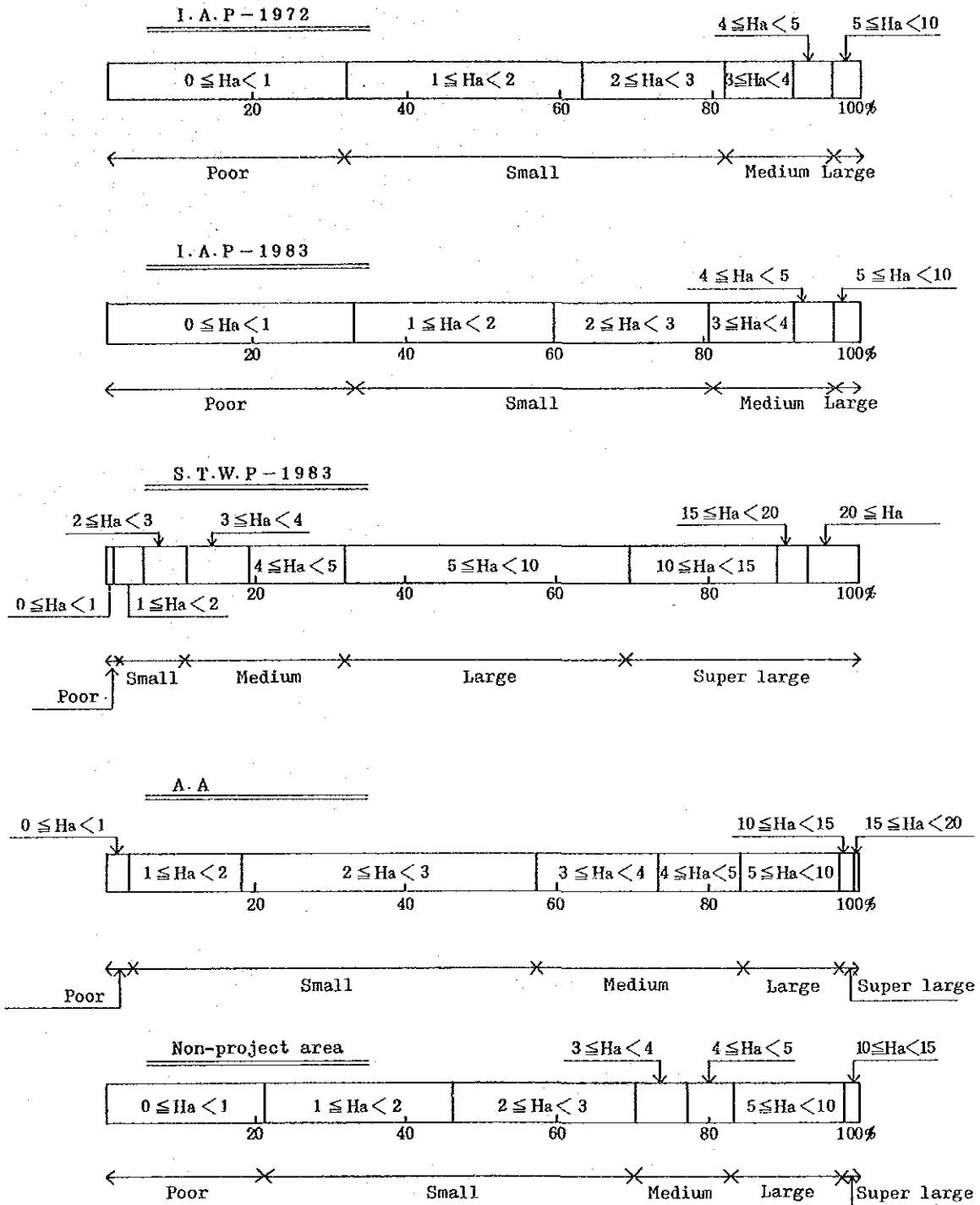
$1 \leq \text{ha} < 3$ Small scale farmers (Small)

$3 \leq \text{ha} < 5$ Medium scale farmers (Medium)

$5 \leq \text{ha} < 10$ Large scale farmers (Large)

$10 \leq \text{ha}$ Super large scale farmers (Super large)

Fig-8 Ratio (%) by scale of farmer



With I.A.P. poor farmers occupied 33%, more than those of other areas, and the next was 20% of Non-project areas, while with S.T.W.P. and A.A. the ratios were 1%, 3% respectively. The ratio of the above poor farms plus small scale farmers was 79% with I.A.P. and 70% with Non-project areas, i.e. small scale farmers occupied most with both areas, while with S.T.W.P. and A.A. the ratios were as low as 11% and 57% respectively. The ratios of medium scale farmers were 14% with I.A.P., 21% S.T.W.P., 27% A.A. and 13% with Non-project areas respectively.

The ratios of large scale and super large scale farmers were 4% with I.A.P., 68% S.T.W.P., 16% A.A. and 17% with Non-project areas respectively.

Of these super large scale farmers occupied 31% with S.T.W.P. The ratios classified by the scale of farmers of Terai obtained from APROSC, 1976 Survey Results are reported as follows.

poor farmers	36%
Small scale farmers	29%
Medium scale farmers	15%
Large scale farmers	20%

When comparing the above data with Present Survey Results, in the areas under I.A.P. farmers resemble those found in Terai and with I.A.P. poor farmers occupied most, while Large scale farmers were dominant with S.T.W.P. and Medium scale farmers were found many with A.A.

With I.A.P. during a period of 1972 ~ 1983, farmers of 1 ~ 2 ha (farm-land) decreased by 10% and farmers of 2 ~ 3 ha increased. This situation is considered coming from the fact that there was not big difference in the area owned per farmer, as stated

later, 1972 and in 1983 and that there was farm-land trade (buy and scale) among farmers to some extent. Also, there found no big change in the situation between poor farmers (group) and Medium and Large scale farmers.

As described above, big difference was found with the scale of farmers depending on the area surveyed. This is closely related to or giving influence on the number of family, ratio of schoolability and the number of owned farm implements, durable goods etc., and consequently gave causes/to make differences in all respects, i.e. crops production capacity and income etc., etc.

Apart from the present extension Effect Evaluation, the scale of farmers under S.T.W.P was surveyed in 1983/84, which shows much increase of Medium, Small scale farmers and decrease of Large and Super Large scale farmers. This tendency seems to continue.

Variation by year of scale of farmers under S.T.W.P.

	Poor farmers	Small scale farmers	Medium scale farmers	Large scale farmers	Super large scale farmers
Farmers carried out in 1981/82	1 %	10 %	21 %	37 %	31 %
Farmers carried out in 1983/84	4 %	21 %	30 %	6 %	39 %

1-2-1 Number of farmers by farming area (by scale of farmer)
(owner and tenant) [A.T. 1-5]

The farm operation type of Terai can be roughly divided into "owned farm-land", "tenanted farm-land" and contracted farm-land", of which outlined hereunder.

Owned farm-land: Own farm-land farming by farmers
themselves

Tenanted farm-land: "Tenency" is concluded with land-owners. Tenant farmers pay the land-tax in kind, i.e. principal crops (mainly rice) to their land owners annually. The land-tax in kind is divided into three stages depending on the degree of fertility of land, i.e., 630 kg, 514 kg and 400 kg per ha respectively. When the land-owners wish to sell their own farm-land, they must transfer 1/4 of the land to their tenant farmers. This system is, however, not so often taken as it turns to be more disadvantageous to the owners than "contract" system.

Contracted farm-land: Contract cultivation system by crop is taken. Distribution of crops is made on 1:1 base, but the expense for the farming materials must be borne by the contracted farmers themselves.

By the present Survey Results, all the farmers, more or less, owned farm-land.

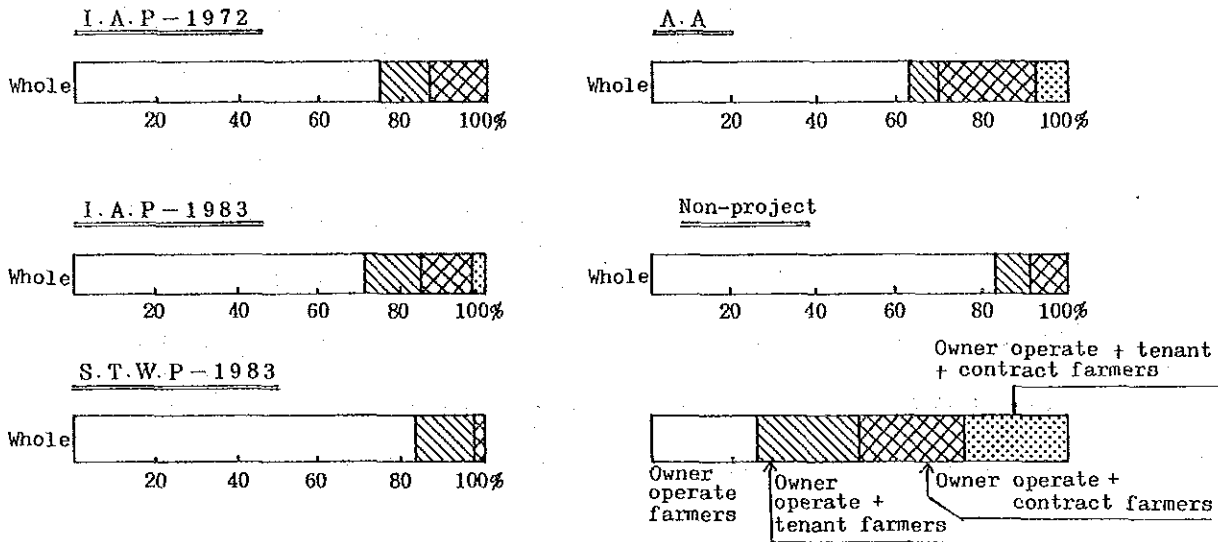
Farming type was of 4 different groups:

1. Land owned farmers
2. Land owned plus tenanted farmer
3. Land owned plus contracted farmers

4. Land owned, tenanted, contracted (3-kind mixed) farmers

The ratios(%) of such farmers are shown in Fig.-10.

Fig.-9 Number of farmers by farming type



The ratios of owner operate farmers were 71% with I.A.P., 84% S.T.W.P., 63% A.A. and 83% with Non-project area, respectively. By APROSC Survey Results, and when comparing 65% owner farmers of Terai, the present Survey Results made clear that there found many owner farmers except A.A. There found no farmers who did not own farm-land but tenant and contract or both, also there found farmers who owned their own farm-land more or less and farming under tenant or contract systems.

The findings that there were many owner operate farmers alone with S.T.W.P may be due to so many large scale farmers and with Non-project area also, there were many owner operate farmers. This is because the area is located near (the city

of) Janakpur and such farmers were of their own opinion that they might be more advantageous to get income than farming operation under tenant and contract systems.

With I.A.P. there found no big difference in the findings of 1972 and 1983. Also, in any area, there found no clear distinction between Small scale and Large scale farmers. Even those Large scale farmers were on owner concurrently tenant system, owner concurrently contract system or on both and this tendency is considered to be greatly due to their traditional habit not from their necessity.

Though having been out of the present Survey, the land-lenders (so-called landlord) were found many living in Kathmandu and Janakpur as absentee landlords.

Within farm villages, they are supposed few except Super Large scale farmers who are lending farm-land.

1-2-3 Land area per farmer (arable/cultivation land)

[A.T. 1-6]

The average land area per farmer was 8.2 ha with S.T.W.P., must, 3.4 ha A.A., Non-project area 2.8 ha and 1.9 ha with I.A.P., and that of S.T.W.P. was about 4 times as large as that of I.A.P.

According to the Agricultural Statistics of Nepal, 1972, it is reported that the average land area owned per farmer in Janakpur Zone and Terai is 1.53 ha. The present Surveyed areas and activities of J.A.D.P. have been for Large scale farmers.

The ratios of farmers' owned land area on the total cultivation area of each farmer were 88.2% with I.A.P., 96.4% S.T.W.P., were tenant or contract land areas.

The ratio of irrigatable land to non-irrigatable land area were 1.7:1 with I.A.P., 1.3:1 with S.T.W.P., 1.1:1 A.A., and 0.5:1 with Non-project area, hence, the ratios of irrigatable land area of I.A.P. and S.T.W.P. were larger.

This means that the irrigatable land areas of I.A.P. and S.T.W.P. were developed by J.A.D.P. activities and before this development conducted these areas were non-irrigatable. There found no big difference during 11 years of 1972 ~ 1983 by the Survey conducted, for owners land area, under I.A.P. Also, that of I.A.P. area per farmer was lower than the average land area of Janakpur Zone as given in Table-12.

Table-12 Land area per head

I.A.P.	0.26 ha
S.T.W.P.	0.92
A.A.	0.34
Non-project area	0.37

Janakpur	0.29 ha
Nepal	0.19

Source ; Janakpur ---- Agricultural Statistics of Nepal 1972
 Population Census 1971
 Nepal ----- The fifth Plan (1975-80)

Fig.-10 Land area per farmer (arable land)

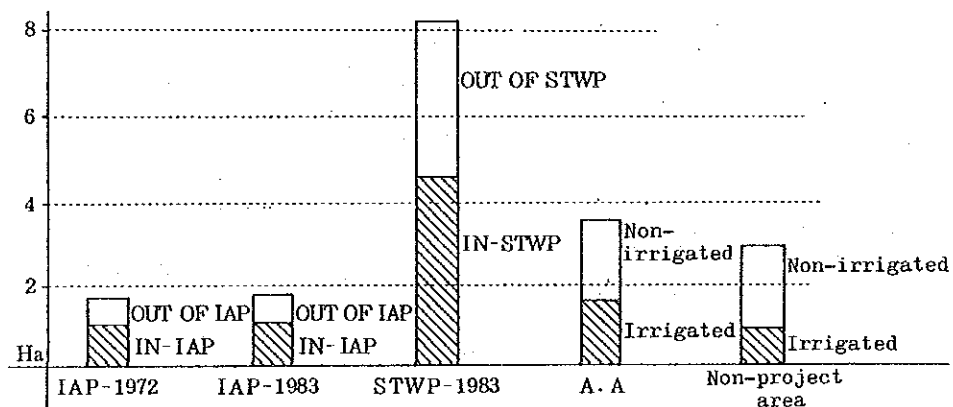
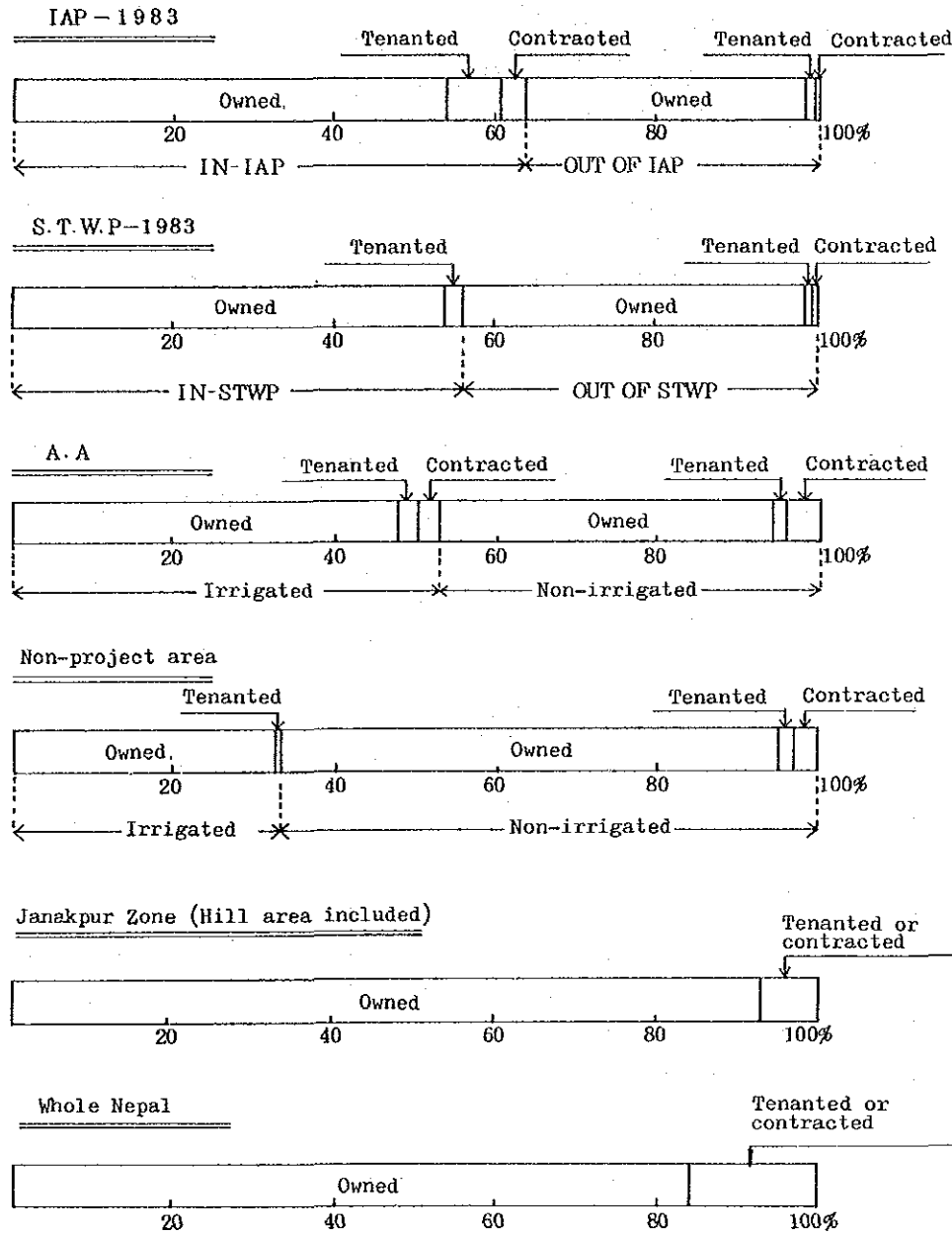


Fig-11 Ratio (%) of area by farming type (owner, tenant, contract)



Source : Central Bureau of Statistics.

1-3 Agricultural production

1-3-1 Planted area per farmer by crops [A.T. 1-7]

a. Paddy

I.A.P.: Planted area of paddy of IN-I.A.P., 1972 was 1.15 ha., 54% of the total paddy planted area of 2.14 ha. 1983 was 1.43 ha, 66% of the total paddy planted area of 2.17 ha. Thus, while only 0.03 ha increase of the total on area, but 0.20 ha increase with IN-I.A.P. Also, the ratio of IN-I.A.P. dependence increase from 54% to 66%.

With improved variety, the total planted area during "Early" and "Normal" seasons was 0.051 ha in 1972, which increased to 0.677 ha in 1983. This means that 2.4% of the total paddy planted area in 1972 was occupied by this improved variety and it was raised to 31.1% in 1983.

Also, with Early and Rainy seasons paddy, the farmer occupied 2.4% of the total paddy planted area in 1983 and the rest ratio was by the latter, hence, the progress of irrigation system made Early paddy occupy 17.1%.

S.T.W.P.: In 1981, the total paddy planted area was 7.46 ha, which was raised to 7.9 ha, about 6% increase in 1983. Also, with IN-S.T.W.P. in 1983, the planted area occupied 62% of the total.

"Land area per farmer": With IN-S.T.W.P., the land area occupied 55.8%. Hence, the above ratio of 62% means high dependence on S.T.W.P.

The ratio of land occupied by improved variety in 1981 was 14% (1.04 ha) and 14.2% (1.18 ha) in 1983 i.e. no big difference was found between the two.

It is supposed that the above fact comes from the planted

area of improved variety has no change, not from insufficient extension activities to this area only two years after S.T.W.P. activities conducted.

A.A.: The total paddy planted area before training was 2.54 ha, which was raised up to 23% increase of 3.12 ha after training.

With improved variety, it was only 12.8% before training and increased three times as high as 38.1% after training.

However, no clear change by Training year was seen.

Non-project area: The total paddy planted area was 3.1 ha of which 41% was on irrigated farm-land and 59% non-irrigated farm-land. The ratio of improved variety was only 4% of the total paddy planted area. As stated above, the planted area showed its difference in order of S.T.W.P., A.A., Non-project area, I.A.P. and dependence on irrigatable land was highest with I.A.P. and next S.T.W.P.

In Non-project area, the planted area on non-irrigation land was larger.

The ratio occupied by improved variety were 38.7% with A.A., 31.1% I.A.P. and 4% Non-project area. While extension activities have been conducted to A.A. and I.A.P. for more than seven years, S.T.W.P. is still on its starting stage and more powerful activities will have to be carried out.

Also, considering from the ratio of planted area of improved variety with Non-project area which remained same as that of I.A.P., in 1972, importance must be given to the extension activities in this area, too.

Fig.-12 Paddy planted area per farmer

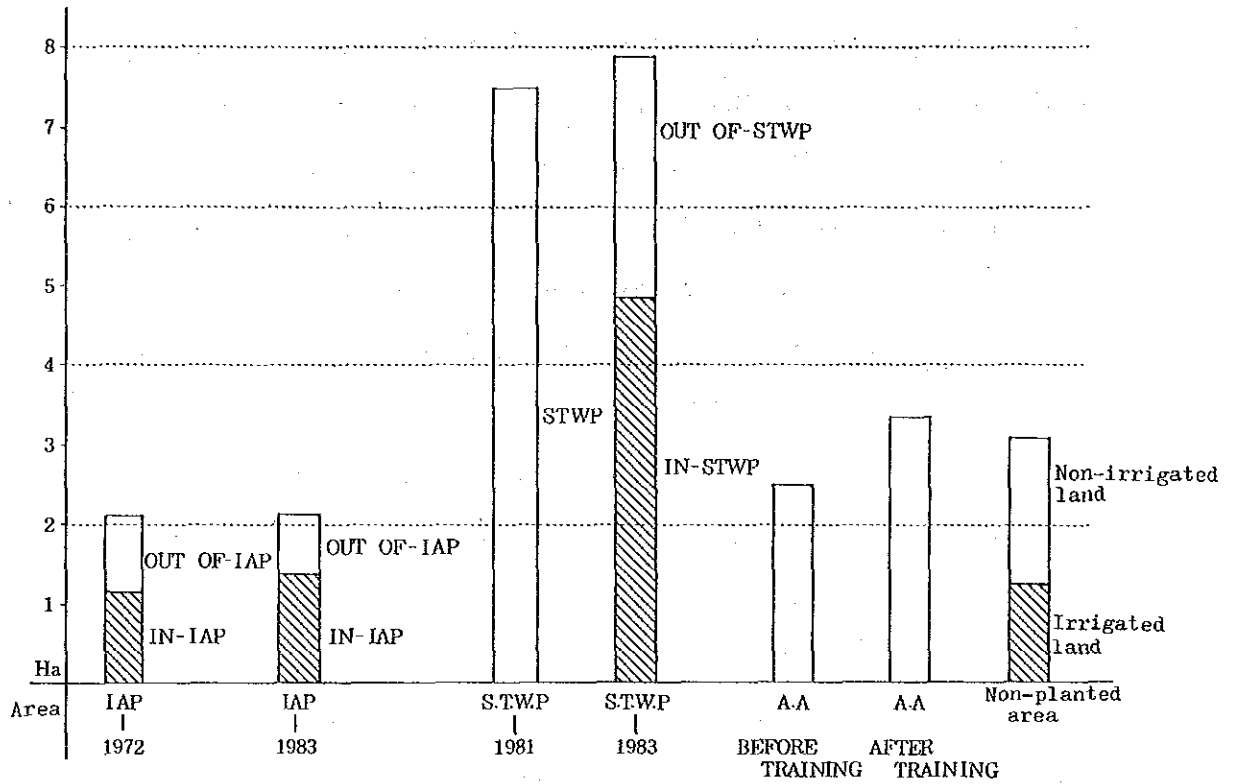
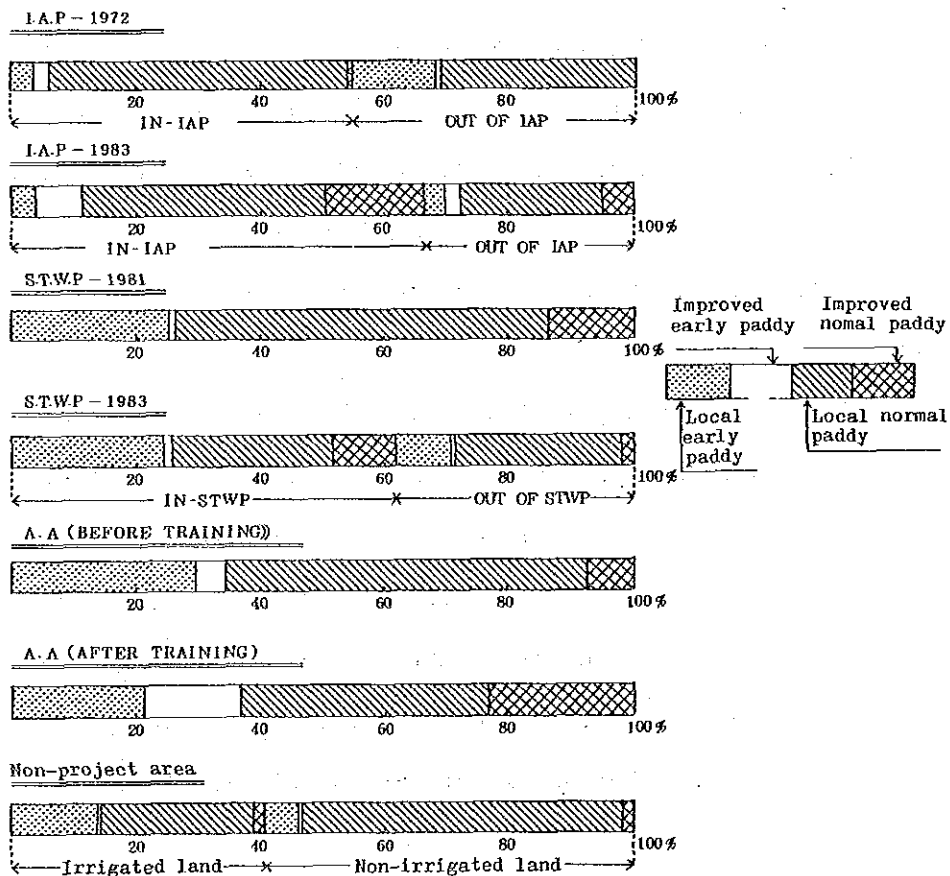


Fig.-13 Ratio of planted area by varieties



b) Wheat

I.A.P.: The total wheat planted area in 1972 was 0.275 ha, of which 26% was by IN-I.A.P. and 75% by OUT OF I.A.P.

However, it was 0.49 ha in 1983, of which 69% was occupied by IN-I.A.P. and 31% by OUT OF I.A.P., i.e. adverse dependence of 1972. Also, against as high as 4.8 times increase of planted area of IN-I.A.P., that (planting area) of OUT OF I.A.P. decreased by 0.74 time.

S.T.W.P.: The total planted area of 1.06 ha in 1981 increased to 1.85 ha, 1.7 times, in 1983. Of this 1.85 ha, 81% was occupied by IN-S.T.W.P and 19% only by OUT OF S.T.W.P.

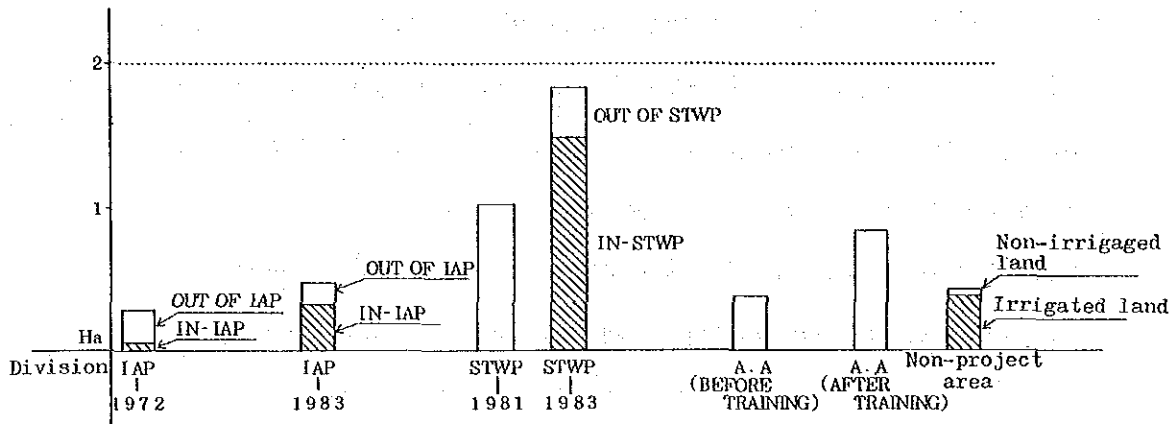
A.A.: 0.4 ha before training increase by 2.2 times to 0.85 ha after training.

Non-project area: Of the total 0.475 ha planted area, 83% of which was by irrigated farm-land.

As described, the total wheat planted area all increased with I.A.P., S.T.W.P., A.A. Especially, with IN-I.A.P. as high as 4.8 times increase during these 11 years, likewise 2.5 times with A.A. and 1.7 times increase with S.T.W.P. only in two years shorter period.

In every area, wheat planting depends highly on irrigated farm-land by as high ratio as more than 80%. On the other hand, IN-I.A.P. is 73.8%, lower than that of other areas. With OUT OF I.A.P. also had Hardinath irrigation canal to have made the firm-land irrigatable where about 26% was for plating purpose. Also, in every area, improved variety occupied more than 95% and local variety was very few.

Fig.-14 Wheat planted area per farmer



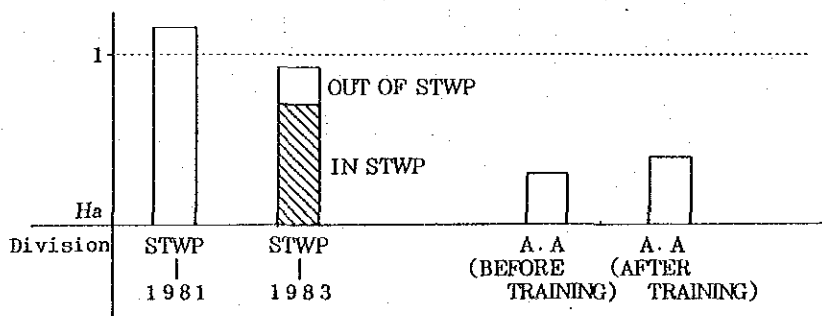
c) Maize

Maize is not planted in I.A.P. area and Non-project area. With S.T.W.P. the total planting area decreased, by about 23%, i.e. from 1.18 ha to 0.913 ha. While, on the other hand, (the planting of) wheat and early paddy seem(s) to have increased.

By Survey 1983, maize was planted in IN-S.T.W.P area occupying 81% of the total planting area and its (maize planting) dependence is as high as that of wheat.

With A.A., 0.318 ha of the planted area before training increase 0.432 ha after training.

Fig.-15 Planting area of maize per farmer



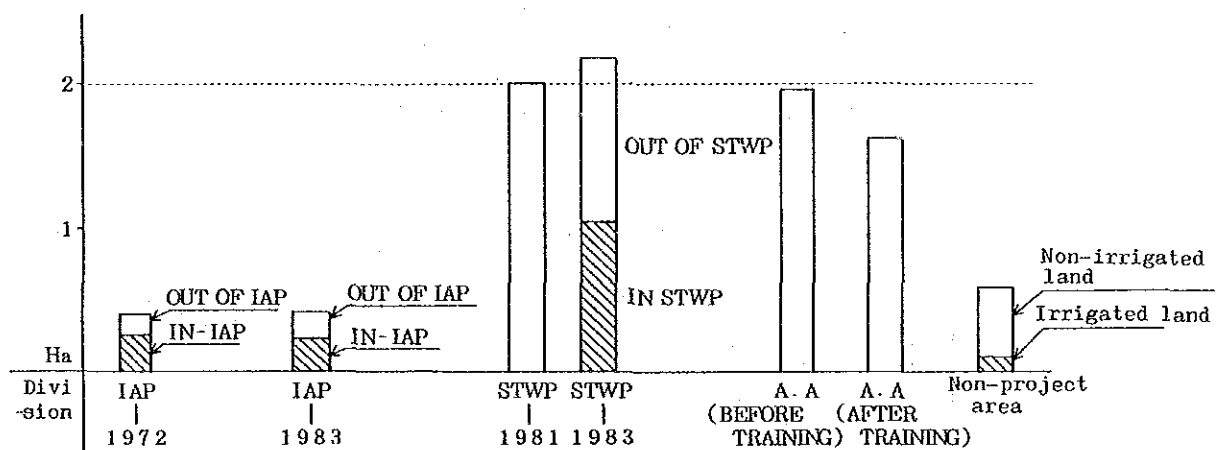
d) Vegetable, fruit tree, tobacco and other crops

As crops other than principal ones, with I.A.P. areas, beans and oil crops, with S.T.W.O., tobacco, sugar cane etc., with A.A., various crops and with Non-project area, much vegetable, are being planted.

With I.A.P. and S.T.W.P., there found no big difference of planting area before and after their activities and, also, not centering on IN-I.A.P. nor on IN-S.T.W.P.

With A.A., the planting area was found decreasing after training and so much is considered that of Early paddy and wheat was increasing. The reason why the planting area of A.A. and S.T.W.P. is larger than that of other areas may be due to many larger scale farmers are inhabiting there or due to larger planting area required for tobacco and sugar cane etc.

Fig.-16 Planting area per farmer of vegetable, fruit tree, tobacco and other crops.



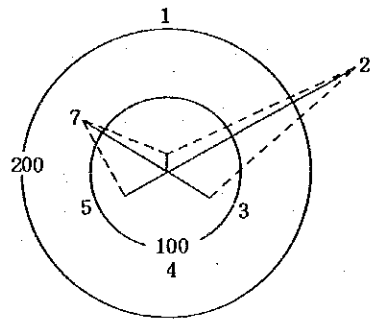
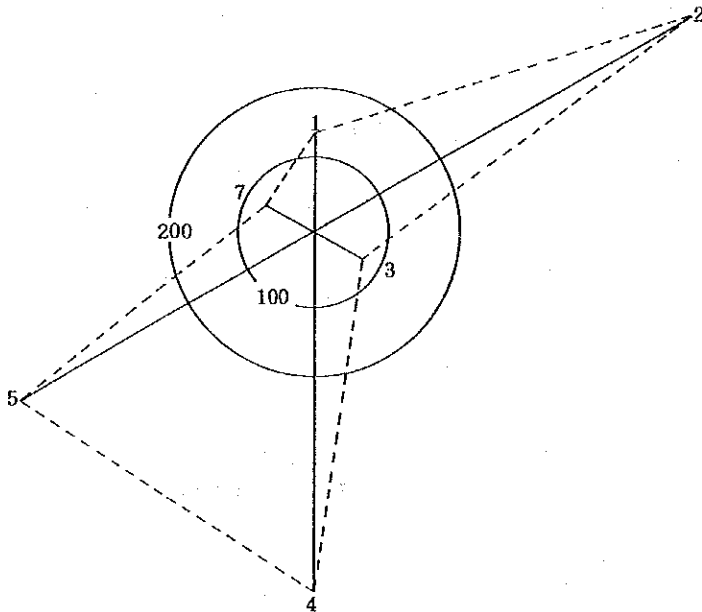
Changes of each planting area mentioned above are given in Fig.-17. In every area, the planting areas of improved variety paddy and wheat are shown considerably increased, which local paddy decreased. Also found no change or slight decrease with maize and other crops.

Fig- 17 Change of planting area per farmer

I. A. P (Planting area, 1972 = 100)

IN IAP

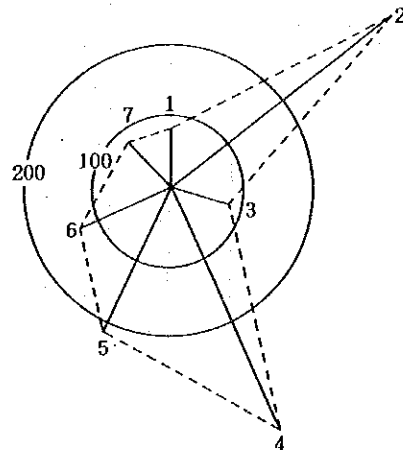
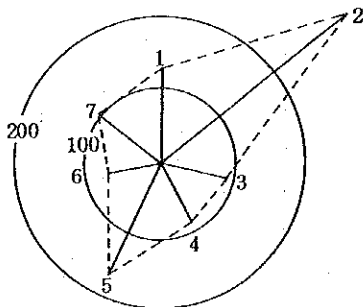
OUT OF IAP



(Improved "Normal" variety not comparable as 1972 = 0)

S. T. W. P (1981 = 100)

A. A (Before training = 100)



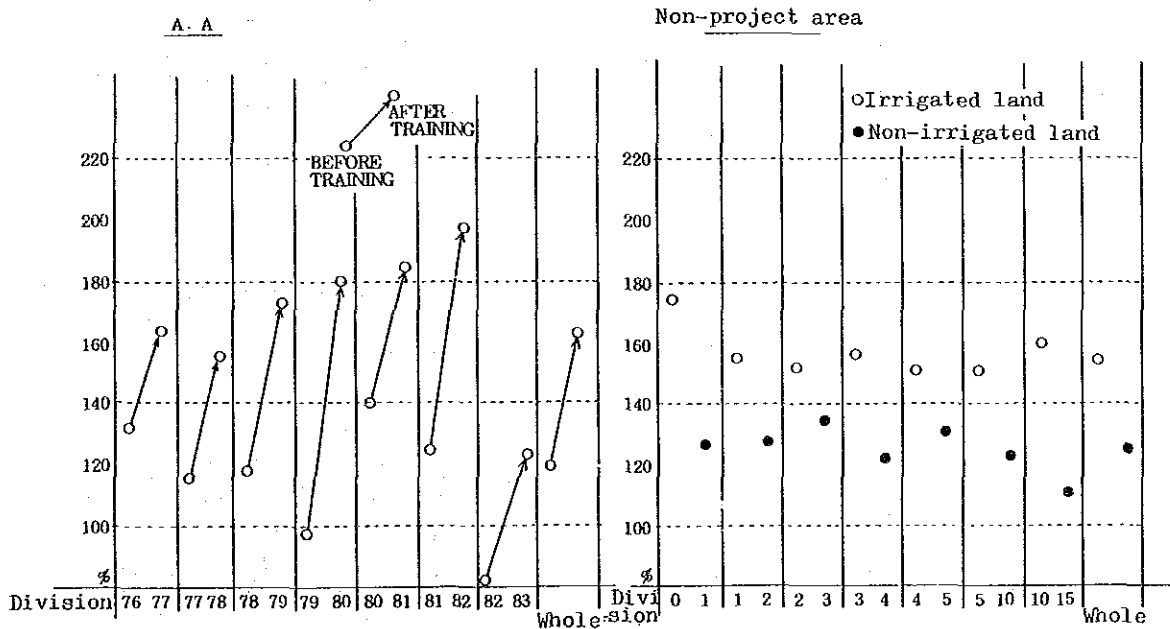
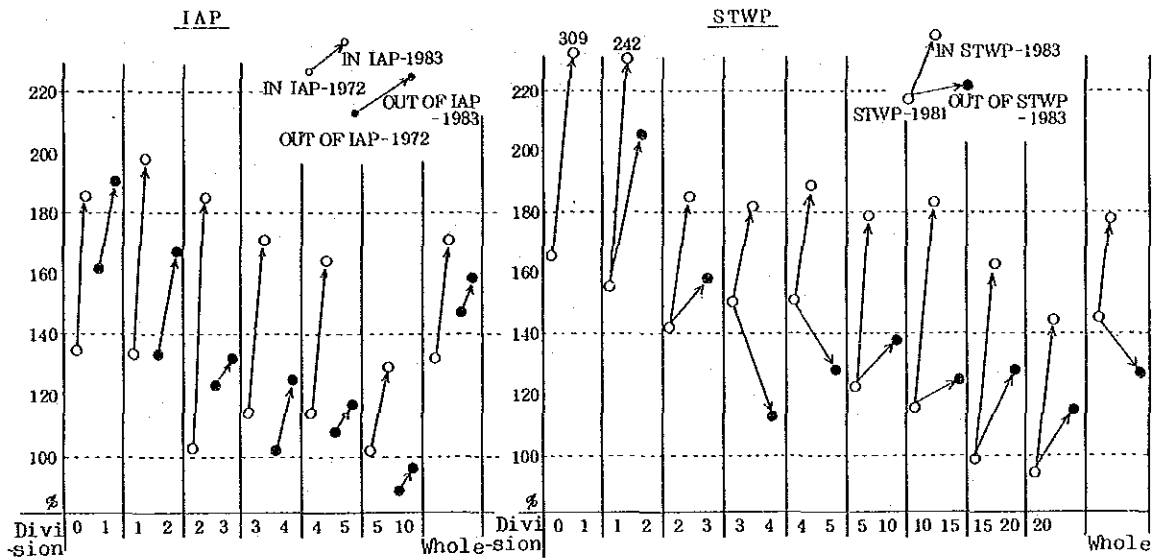
- | | |
|-----------------------------|----------|
| 1 Local "Early" variety | 5 Wheat |
| 2 Improved "Early" variety | 6 Maize |
| 3 Local "Normal" variety | 7 Others |
| 4 Improved "Normal" variety | |

1-3-2 Change of cropping intensity A.T. 1-8

As an index of high utility of land, the cropping intensity and planting frequency are taken as important factors.

Refer to Fig. 18.

Fig.-18 Cropping intensity



As the cropping intensity, with I.A.P. in 1972, IN-I.A.P. was 135%, OUT OF I.A.P. 154%, and that of the area of the latter was much higher, of which Hardinath irrigation canal existed before the year (1972) is supposed, to some extent, to have been helpful for irrigating the farm-land there.

The findings of Survey 1983 marked the ratio of IN-I.A.P. 168%, OUT OF I.A.P. 161% to have made I.A.P.'s higher and showed no big difference with that of OUT OF I.A.P.

As shown in Fig.-18, the ratio grew the higher, the smaller the scale of farmers and the effort rendered by those poor or smaller scale farmers. Similar tendency is also found with S.T.W.P. areas, but not found with non-project area.

The total cropping intensity of S.T.W.P. in 1981 was 143% and, in 1983, it was 178% with IN-S.T.W.P. and 124% with OUT OF S.T.W.P. Especially, decrease in the ratio of OUT OF S.T.W.P. is noticeable. This may be attributable to the fact that the type of farming in the irrigatable land is changing to the intensive method.

With A.A., that of 123% before training was raised to 164% after training, but, as these ratios include both, irrigated and non-irrigated areas altogether, those of irrigated area alone seem to be much higher. (Not analyzed by the present Survey)

With non-project area, too, it was 154% of irrigated land and 126% of non-irrigated land.

From the above condition, in every area, the cropping intensity grew higher with irrigatable land than before, however, that of non-irrigating land and of non-irrigating land remained unchanged or decreased.

The cropping intensity of whole Nepal is shown in Table-13.

Table-13 Cropping Intensity in Nepal

1975/76	103.6
1976/77	104.3
1977/78	106.6

Source : Department of Food and Agricultural
Marketing Services.

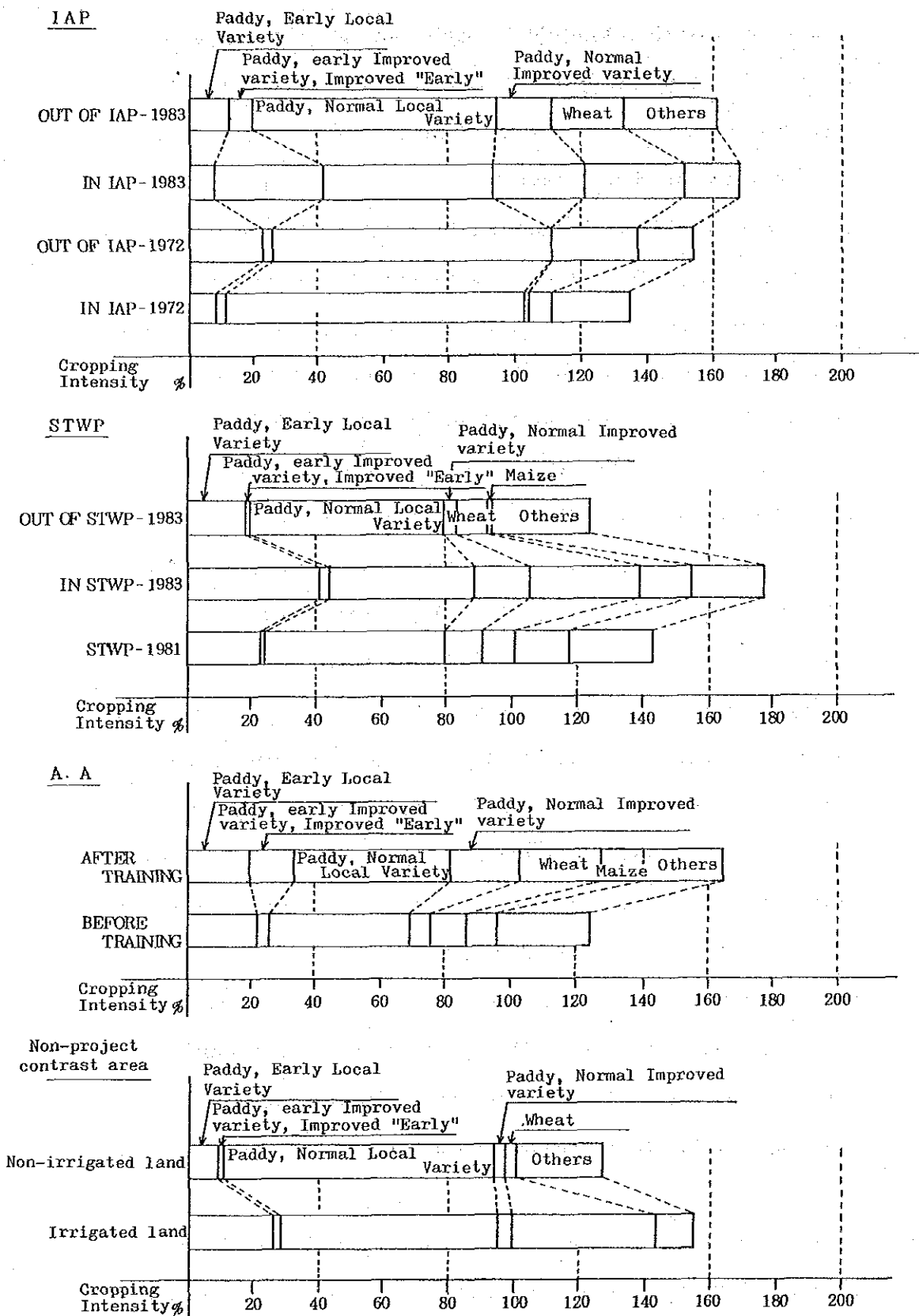
Comparing with Table-13, the cropping intensity of the area surveyed this time was high in every area.

The cropping intensity by crop is shown in Fig.-19.

That of paddy of IN-I.A.P., 1983 was higher than 120% and, in other areas about 100% of irrigatable land and about 80% of non- irrigating land.

That (the cropping intensity of paddy) of improved variety was higher than of local variety, in the areas of IN-I.A.P., 1983, however, in other areas, that of local variety was higher than that of improved variety. The cropping intensity of wheat was raised higher in every area than before.

Fig.-19 Cropping intensity by crop



1-3-3 Yield per ha A.T.-1-9

a) Paddy

(Refer to Fig.-20 for production of unhulled rice per ha)

I.A.P.: The average yield in 1972 was 1.5t/ha which was supposed to be lower than that of about 2t/ha of the average yield of whole Nepal.

In the area of IN I.A.P. and OUT OF I.A.P., the yield attained during 1972 1983 showed gradual increase reaching more than the average yield of whole Nepal in 1980.

Especially, increased greatly with IN I.A.P., about 1.6 times that of 1972. That of improved variety was 10 ~ 20% higher than that of Local variety.

S.T.W.P.: By Survey 1981, it was not divided into IN-S.T.W.P. and OUT OF S.T.W.P., hence examine the whole results obtained.

With IN S.T.W.P., it showed 25 ~ 50% increase, except "Early, Improved variety," in 1983 from that of 1981. especially showed its big increase with "Local variety", of which the cause may be attributable to fertilization management, preventive method of disease and insects were not trained for "Improve variety cultivation".

With OUT OF S.T.W.P., the yield is lowering showing its big difference from that of IN S.T.W.P.

A.A.: The yield was found as high as 1.8t/ha even before training, and they (A.A.) all seem to be most efficient farming producers. And after acquiring the technique by training, 1.5 times increase, especially with "Improved variety".

Non-project area: Lower than the average yield of whole Nepal, being 1/2 of A.A.'s similar to that of I.A.P. in 1972.

From the above, that of A.A. stood highest and then followed I.A.P. This is explainable that the former's high yield is ascribable to its long term training given by J.A.D.P. and good effect attained by activities, and AA's eagerness and the latter is ascribable to I.A.P's deep well irrigation and extension effect.

What is worthy mentioning is the high yield even with OUT OF I.A.P. shows that the extension effect in IN I.A.P. was spread, including OUT OF I.A.P.

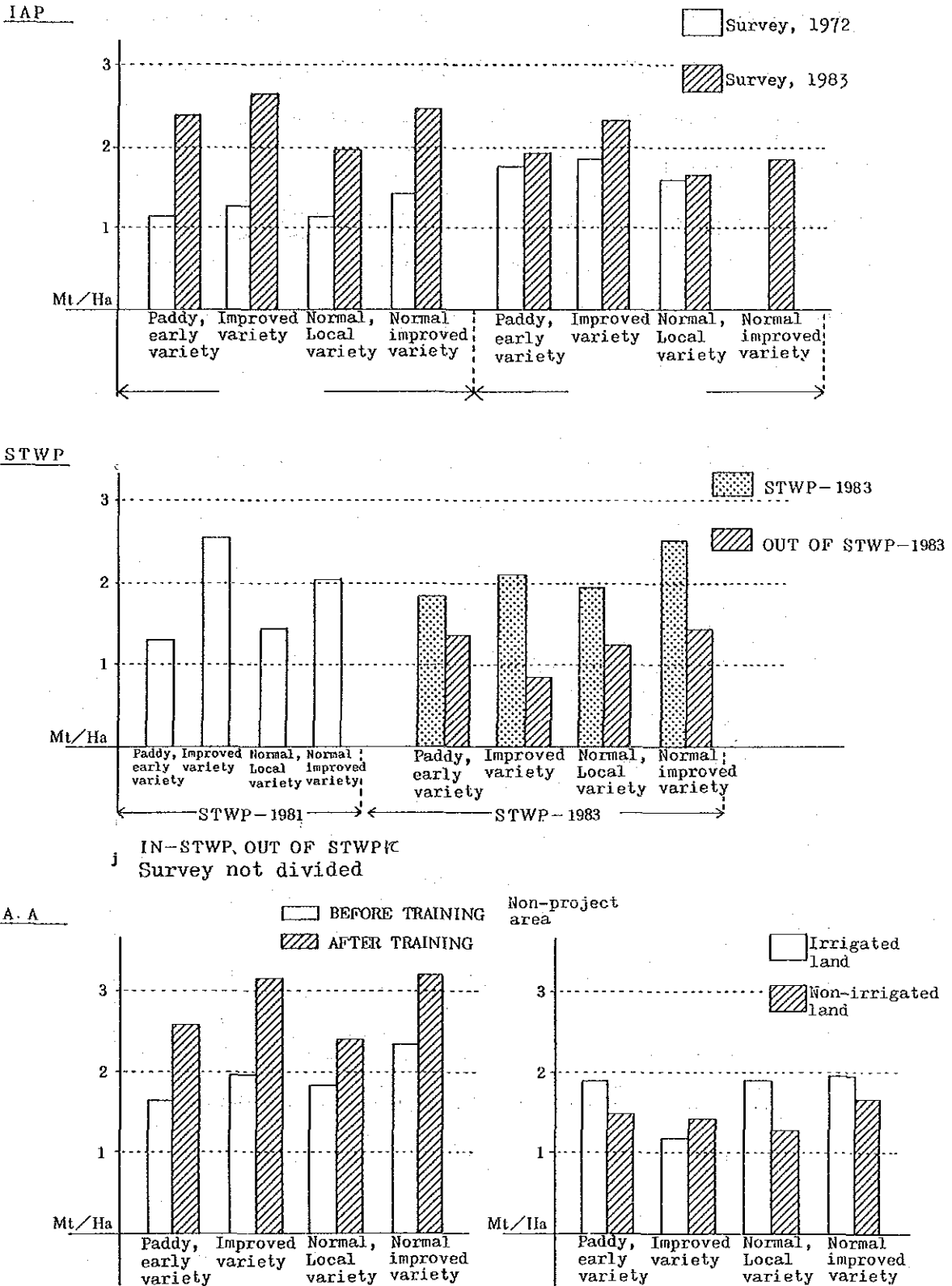
That S.T.W.P. showed lower yield than I.A.P. and A.A. seems to be coming from their short experience of irrigated farming and extension activities did not bring satisfactory effect. Especially, the yield drop of "Early Improved Variety" must be reffect. Also, lower yield of non- project area must be reconsidered to have more concentrating extension services and activities there.

Table-14 Average yield per ha of whole Nepal

Crop	Year				
	1975 - 76	76 - 77	77 - 78	78 - 79	79 - 80
Paddy	2.07	1.89	1.81	1.85	1.64
Wheat	1.65	1.79	1.66	1.64	1.28
Maize	1.18	1.04	1.12	1.21	1.20
Millet	1.14	1.13	1.07	1.08	0.97

Source : Food & Agricultural Marketing Service Dept.

Fig-20 Yield of paddy per ha



b) Wheat

With I.A.P., 1972, yield of wheat was about 0.75t/ha by IN I.A.P. and OUT OF I.A.P. respectively, no big difference. By Survey 1983, both IN I.A.P. 1.6y/ha and OUT OF I.A.P. 1.1t/ha, showed 2.2 times and 1.6 times growth respectively.

With S.T.W.P., yield about 1.4t/ha in 1981, IN S.T.W.P. in 1983 grew to 1.8t/ha, however, OUT OF S.T.W.P. showed no difference as before. While, with IN S.T.W.P. showed the higher the productivity, the smaller the scale of farmers, no such a tendency was found with OUT OF S.T.W.P.

With A.A., it was 1.3t/ha before training and 2.5t/ha after training, 1.9 times growth, higher than that of other areas.

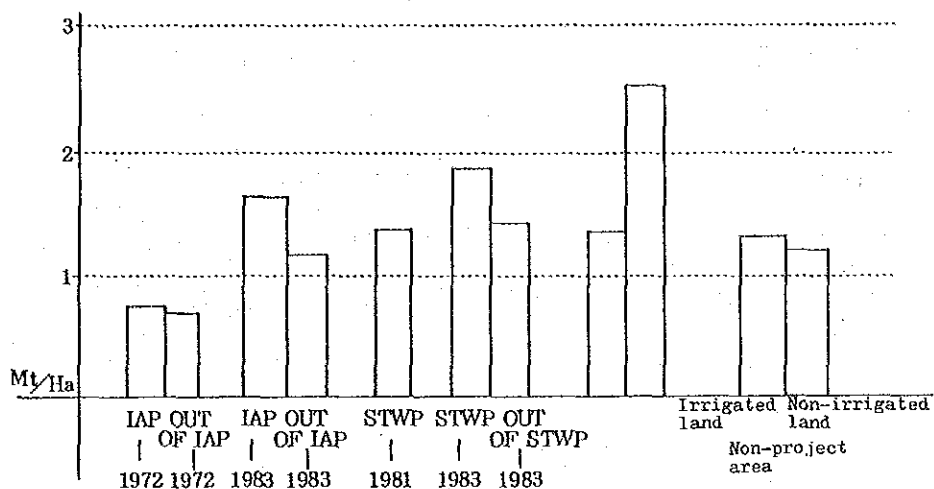
With non-project area, it was 1.3t/ha of irrigated land and 1.2t/ha of non-irrigated land, which showed no big difference between the two.

By this survey, in non-irrigated land, there's no big difference among I.A.P., S.T.W.P. and non-project area, and also the yield had no difference compared with the average in Nepal.

By the present Survey, in irrigated areas, the yield of IN S.T.W.P was 0.2t/ha more than that of IN I.A.P. areas. This may come from their effective use of irrigating water, i.e., with IN I.A.P., not sufficient water quantity and not satisfactory irrigation effect. However, IN S.T.W.P. enabled to supply necessary quantity of water with required irrigation efficiency which possible made some difference in the yield.

From this year onward., installation irrigation pumps to nine deep wells of IN-I.A.P. areas will raise up the water supply quantity to increase the yield of I.A.P.

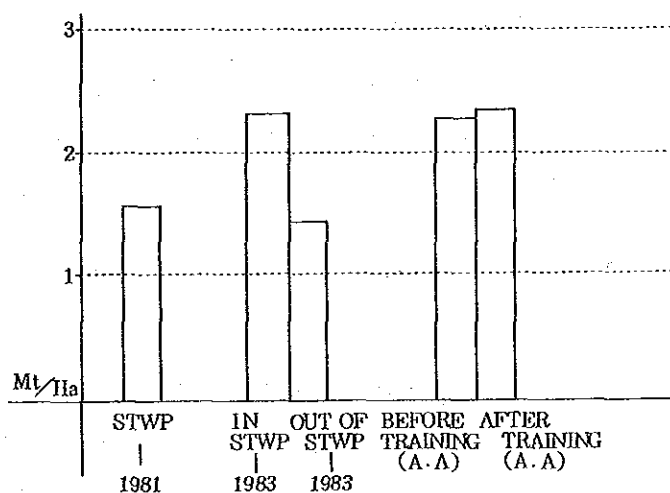
Fig.-21 Wheat yield per ha



c) Maize

The yield of maize per ha is shown in Fig.-22.

Fig.-22 Yield of maize per ha



Yield was 1.4t/ha of S.T.W.P. in 1981, that of IN S.T.W.P., grew 1.6 times in 1983 and no increase was found with that of OUT OF S.T.W.P.

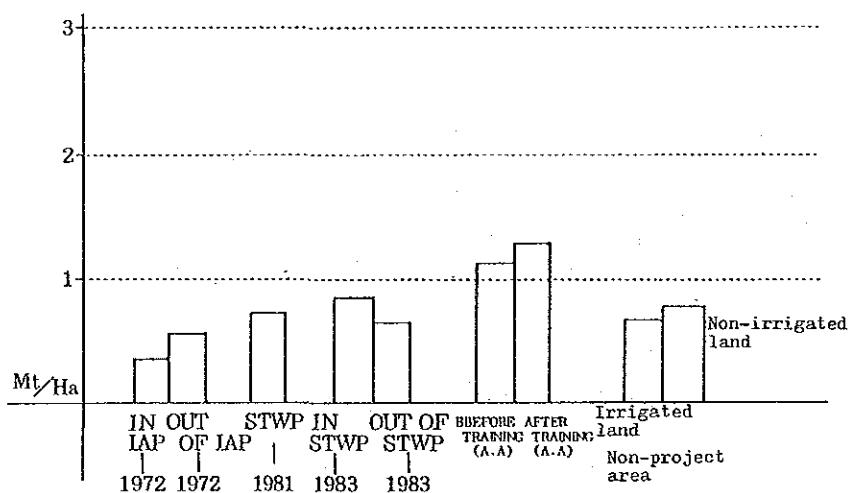
A.A. showed no big difference before and after training, 2.3t/ha respectively

Comparing with an average yield of 1.6t/ha of whole Nepal, IN S.T.W.P. and A.A. gained higher yield than the average, but less with OUT OF S.T.W.P.

d) Millet (Japanese millet)

The yield per ha is given in Fig.-23.

Fig.-23 Yield of millet per ha



No difference of yield was found with irrigatable and non-irrigatable areas (land). Rather much yield with non-irrigatable areas as millet is one of crops of dry land where no irrigated water is required.

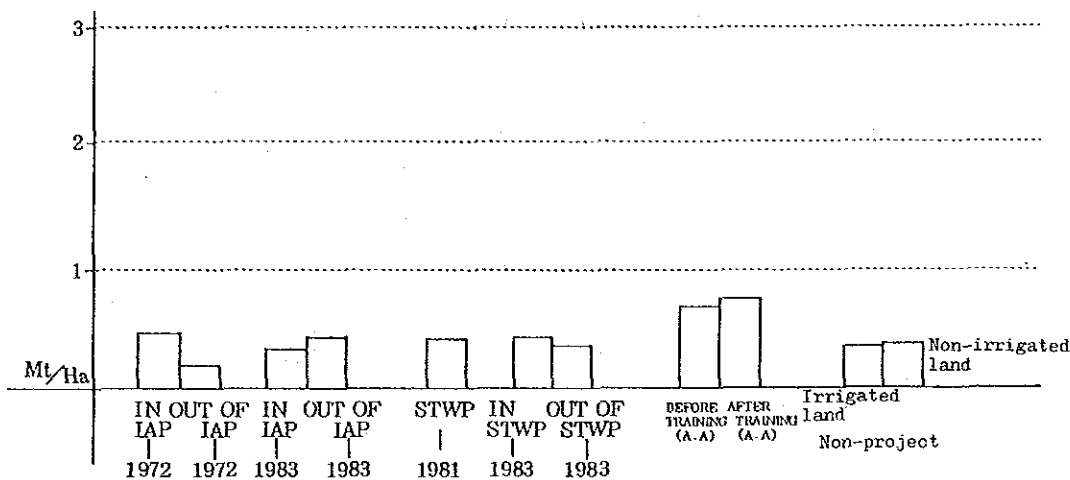
While about 1t/ha, average of whole Nepal, the yield was below this level except A.A.

The yield of millet which is suitable for planting in hill areas seems to be higher there than that of Terai district. Especially, its cultivation in irrigatable areas (land) is disadvantageous by the above reason and guidance is being given by J.A.D.P. to change it to wheat and maize.

e) Pulses and oil-crops

The yield per ha is given in Fig.-24

Fig.-24 Yield of beans, oil-crops per Ha



Pulses are much cultivated main for "Bean soup".

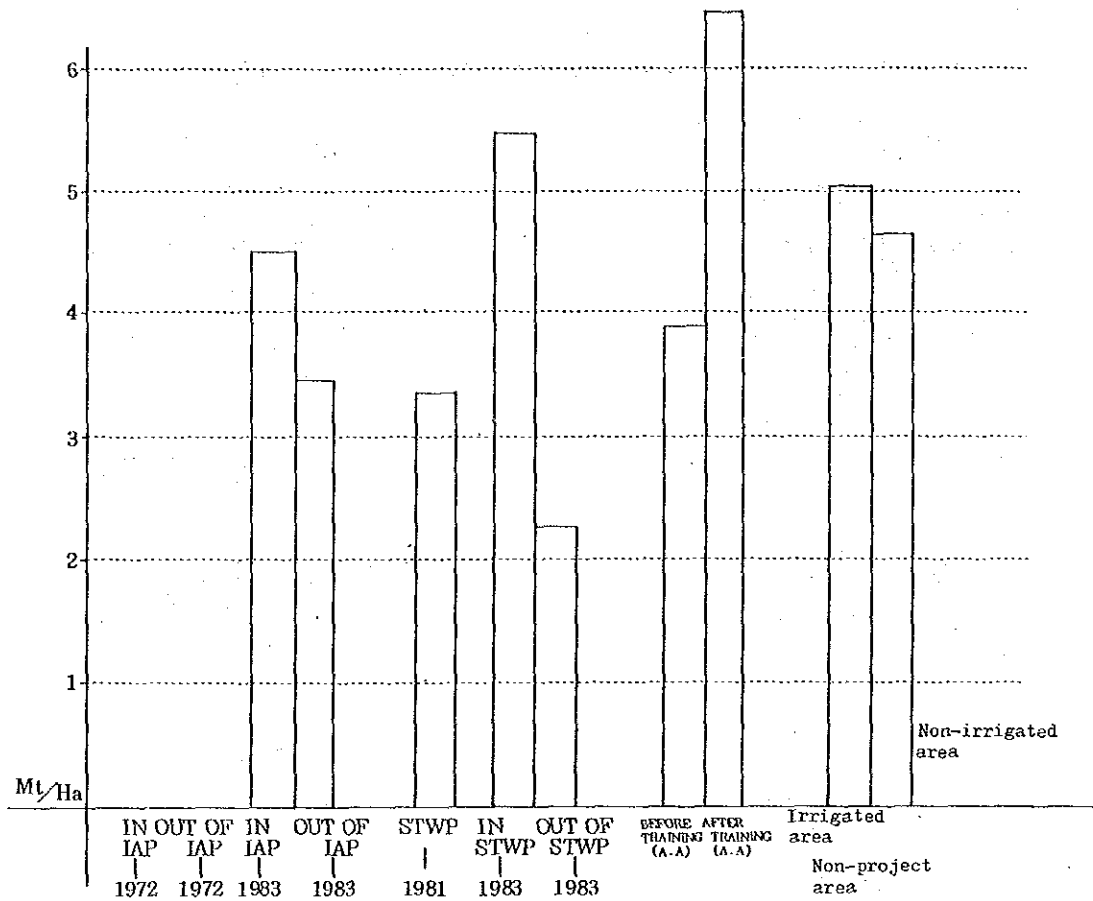
As oil-crops, mustard and others are cultivated.

As their cultivation method, several pulses are mixed to be sowed in droad cast, before the harvest of paddy, and sprouted after the reaping of paddy and harvested at the first of March. With out fertilization method, sowing and harvesting only. As their cultivating time falls on that of wheat, hence in oeder to increase the planting area of wheat, production of these crops (pulses) must be decrease instead, thus being a factor to hinder the expansion of wheat planting area. There found no big difference in the yield of these crops among I.A.P., S.T.W.P., Non-project area and irrigatable or non-irrigatable areas

f) Horticultural crops

The yield per ha is shown in Fig.-25

Fig.-25 Yield of horticultural crops per ha



Of the horticultural crops such as fruit trees and vegetables, potato is principal and cultivated much, but a little of others. In every area, yield of such crops was higher in irrigatable areas than non-irrigatable areas, however, its difference was not found so much with Non-project areas. The areas near Janakpur are almost of suitable vegetable cultivation and horticulture is seen active. Hence, farmers in these areas seem to be making efforts of irrigated or non-irrigated for horticultural production irrespective. In I.A.P. and S.T.W.P. areas, being a granary, horticultural production is not so active.

Fig.-26 Change of yield per ha

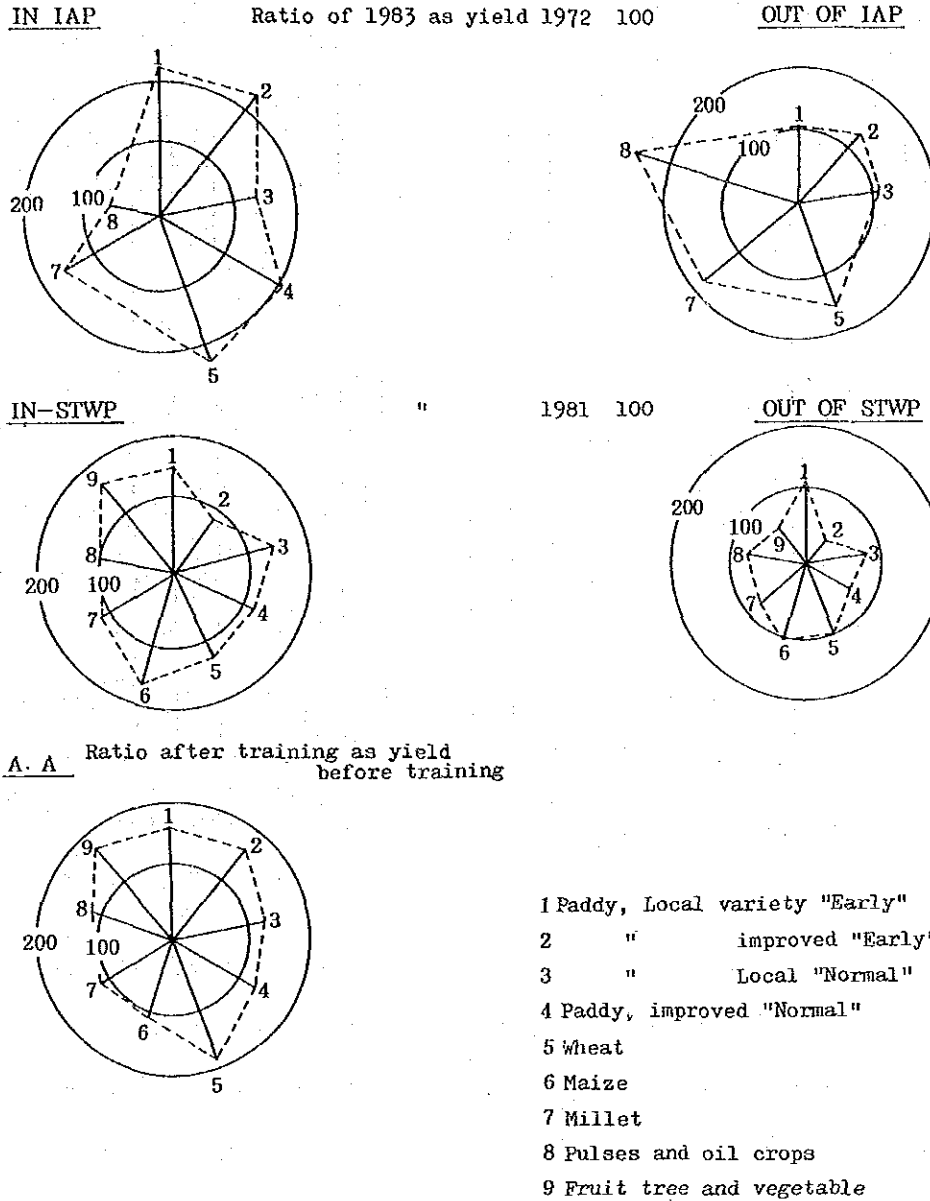


Fig.-60 shows Change of yield per ha

There found yield increase with paddy in all areas except OUT OF S.T.W.P., especially high ratio with IN I.A.P.

With A.A. as yield before training was also high, the rate of yield increase was not so remarkable.

OUT OF S.T.W.P., that of every area decreased and an intensive

farming is seen with IN S.T.W.P. and that of wheat increased, especially high with IN I.A.P. and A.A.

IN S.T.W.P. yield of maize was high, but in other area showed no big difference. That of millet was high with I.A.P., but seen no big difference in other areas. Pulses and oil crops increased only with OUT OF I.A.P. and other areas no change or decreased. Fruit trees and vegetable increased, except OUT OF S.T.W.P., very highly.

As stated above, production of paddy, wheat, maize, etc.

under extension activities increased by farmers' efforts.

However, paddy of improved variety alone, with S.T.W.P., decreased or not increased by a clear reason that the knowledge and information on the technique of such improved variety seem to have been insufficient, hence more strengthening extension activities will be required.

1-3-4 Production per farmer A.T. 1-10

a) Paddy

I.A.P: Production per farmer was 3.1t in 1972 and increased to 4.5t in 1983, i.e. about 1.4 times as much. By scale of farmers that (production) of poor and Large scale farmers remained low as 11% in 1983, and Medium scale farmers showed 150 ~ 160%.

Also, production of IN-I.A.P. in 1972 was 53%, which rose to 69% in 1983, hence showed high dependence on IN-I.A.P. Between 0 ~ 1 ha farmers and 5 ~ 10 ha farmers in 1972 and 1983, there found a big difference as much as 6.5 times which remained unchanged as such, i.e. no great increase in 1983.

Ratio occupied by "Improved variety" was 2.4% in 1972 and 37% in 1983.

S.T.W.P. while its production of 1972 was 11.1t, that of 1983 grew to 13.9t, i.e. 125% increase. Especially, with 0 ~ 2 ha poor farmers, it was a big growth by 300% ~ 700%, while with those (farmers) of 3 ~ 4 ha and of greater than 20 ha, it showed a slight decrease, which was due to decrease of planting area and yield drop per ha in OUT OF S.T.W.P.

There found, in 1981, as much difference as 10 times between poor farmers (0-1 ha) and Large scale farmer (5 ~ 10 ha) and Super Large scale farmers as much difference as 57 times. Likewise, in 1983, found not much difference as 3.8 times and 7.4 times respectively.

Also, 71% production was occupied by IN-S.T.W.P.

Ratio occupied by "Improved variety" was 16% both in 1981

and in 1983.

A.A.: 4.6t before training rose to 8.5t after training, 1.8 times growth, but no data was obtained by year of training. "Improved" occupied 15% before training and 45% after training.

Non-project area: Production per farmer was 3.4t of which 30% was occupied by irrigated areas and 70% by non-irrigated areas (Rain-fed). That of "Improve variety" was only 5.8%.

There found as much difference as 10 times between poor farmers (0 ~ 1 ha) and Large scale farmers (5 ~ 10 ha).

As clearly seen from the above, the present production of I.A.P. is so big as 1.3 times that of Non-project area whose planting area per farmer is larger than that of I.A.P.

As the total production growth with A.A. is 1.8 times, L.A.P. 1.4 times and S.T.W.P. 1.25 times respectively.

Ratio occupied by "Improved variety" is high with I.A.P. and A.A. being a main factor of production increase.

That of Non-project area shows no remarkable difference from I.A.P. of 1972, of which it is supposed to have given no improvement during these 12 years.

With S.T.W.P., difference in production between poor farmers and large scale farmers is shorteing and effort by the farmer is seen evidently.

Fig.-27 Production of paddy per farmer

Paddy

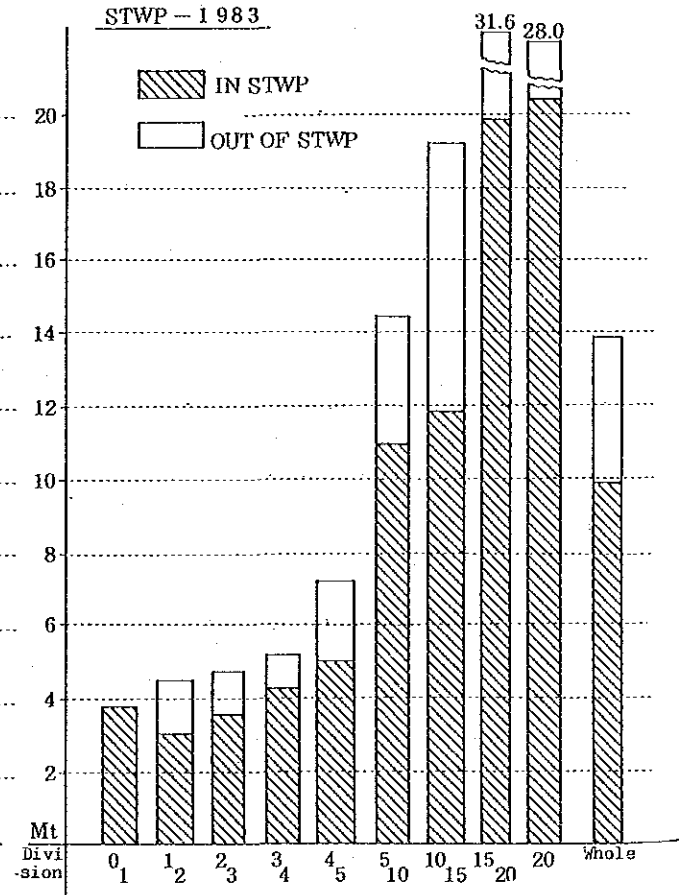
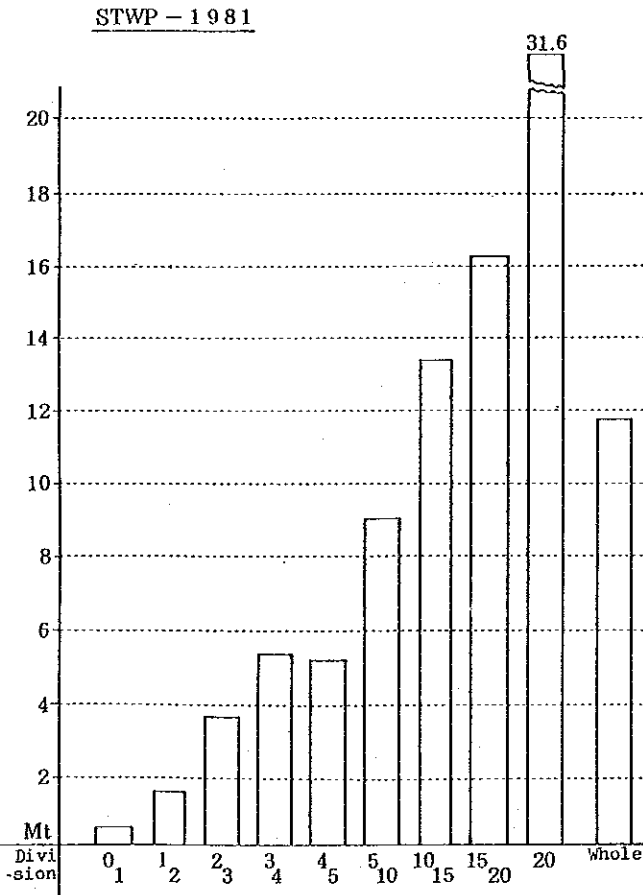
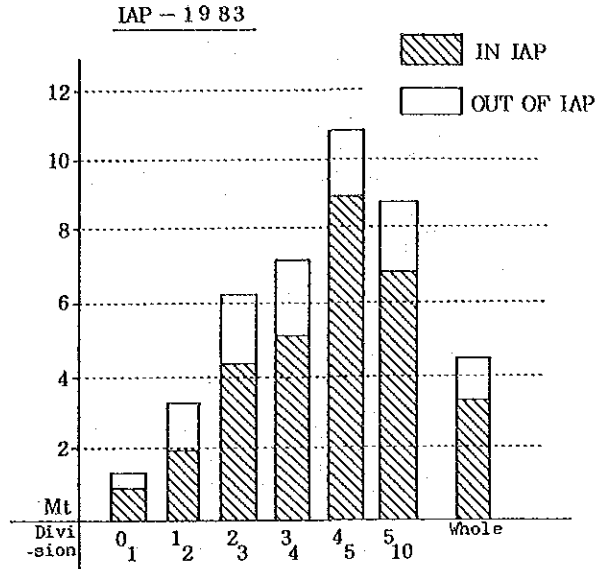
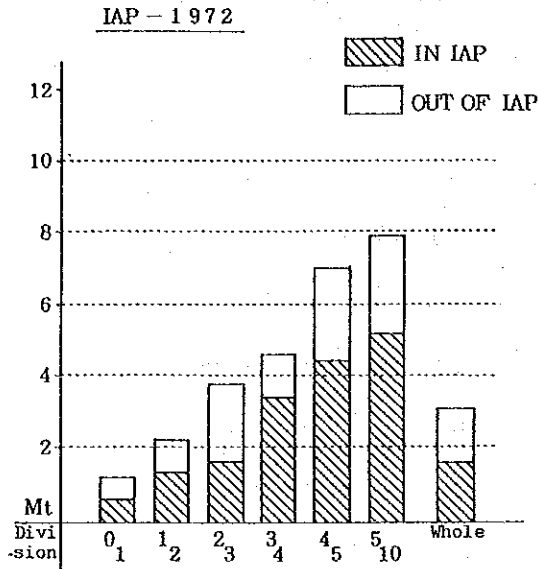


Fig.-27 Production of paddy per farmer

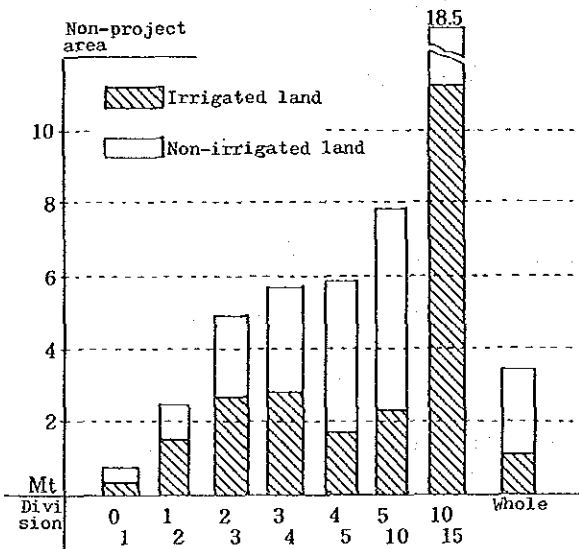
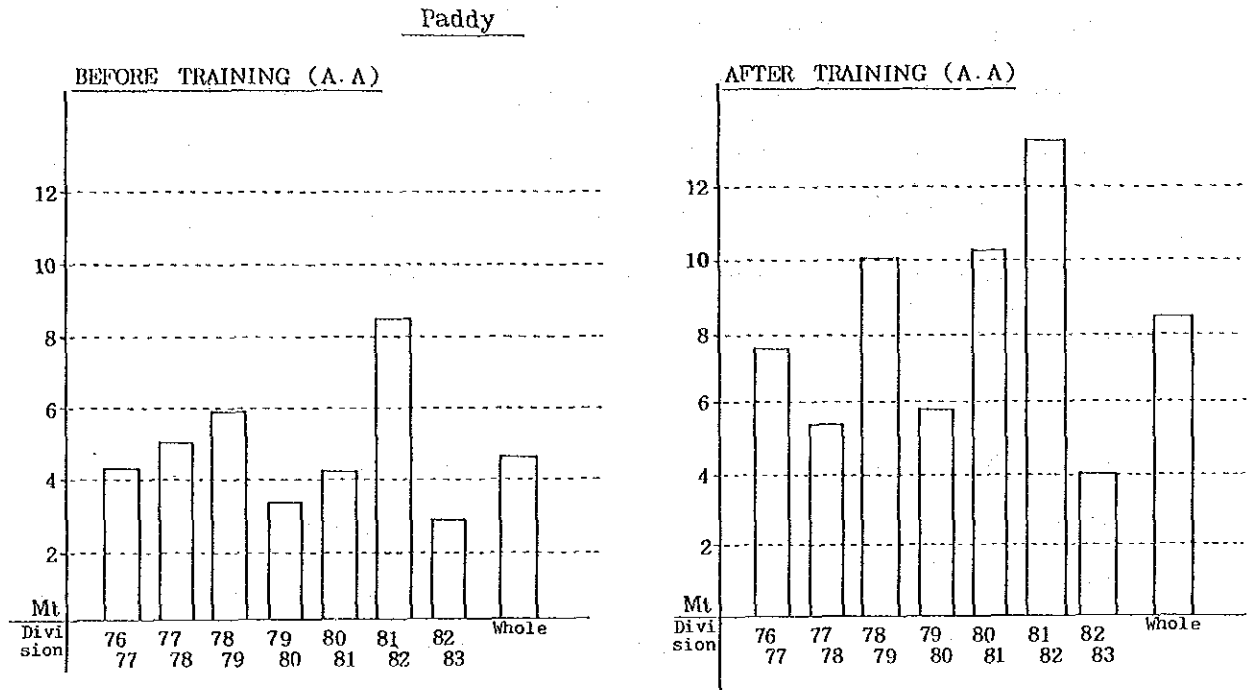
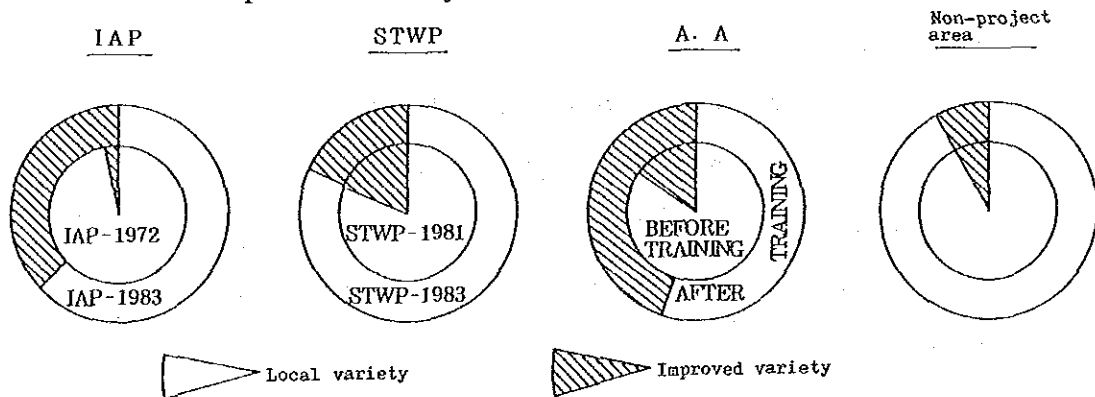


Fig.-28 Production ratio per farmer of paddy, Local variety, improved variety



b) Wheat

With I.A.P. wheat production per farmer in 1972 was 0.2 t of which 73% was by OUT OF I.A.P. In 1983, however, it rose to 0.7 t, about 3.5 times increase of which 77% was by IN I.A.P., thus production dependence area went by contraries. In 1972, production difference between poor farmers and large scale farmers was as big as 3 times which developed to further 6 times as big in 1983. With increase ratio in 1972 and 1983 was 235% with poor farmers and 470% as big with large scale farmers, the greater the growth, the larger the farmers scale. This is considered to be coming from that the 9 deep wells, irrespective of their water supply limit in quantity, is of free irrigating system of which large scale farmers can preferentially irrigate therefrom and poor farmers can not irrigate sufficiently, hence brought their production gap. As such water control will be exactly carried out and then this problem will be solved in future.

With S.T.W.P. areas, 1.4 t production per farmer in 1981 rose to 3.3 t in 1983, i.e. 2.4 times increase. Also, 85% of the total production was by IN S.T.W.P. While there found 4 times as much production difference between poor farmers and large scale farmers, it was shortened to 1.5 times on 1983.

This is possible because of production increase gained by poor farmers per ha, and of irrigation area is limit by one well of which even large scale farmers had a limit of planting area of wheat which requires irrigated water as necessary therefor.

With ratio of yield, poor farmers raised as high as 600% ~ 283%, Large scale farmers 200%, thus, the higher the ratio, the smaller the scale of farmers.

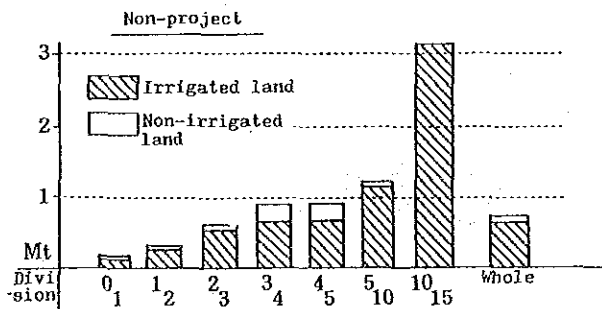
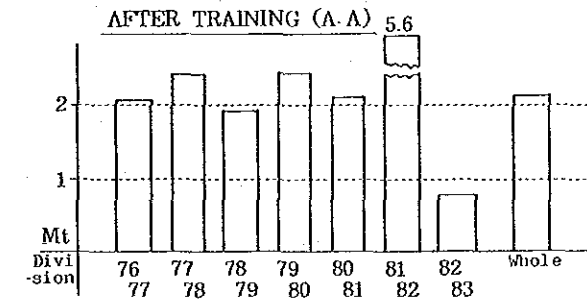
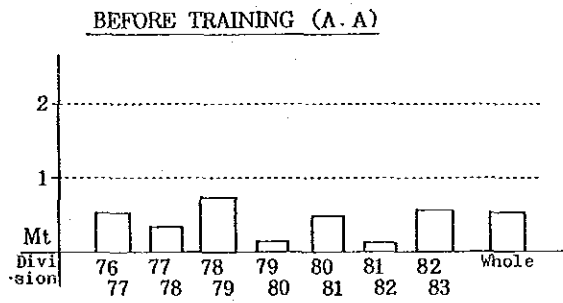
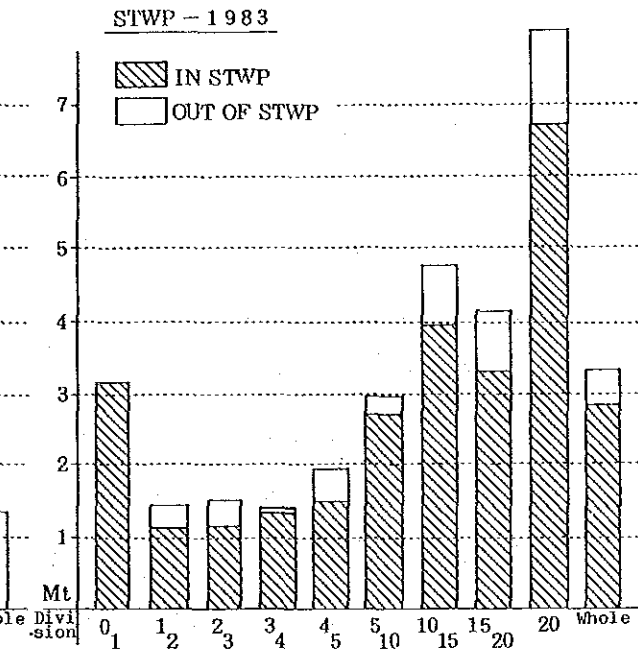
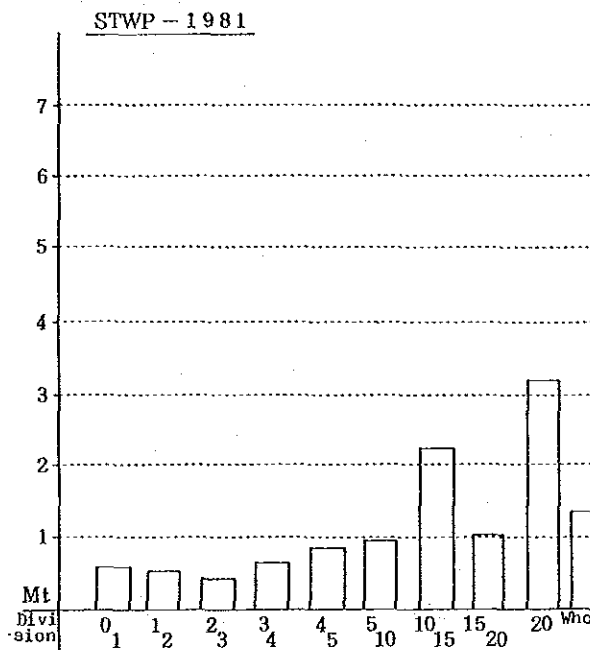
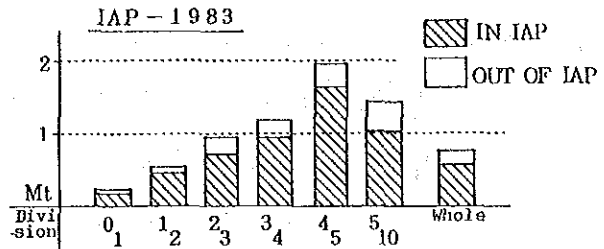
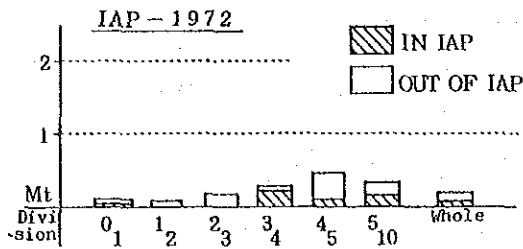
Production of A.A. was 0.5 t before training and 2 t after training, i.e. increase by about 4 times. However, no relation was found in production growth by year of training.

That of Non-project area was 0.7 t, and production per farmer by the scale of farmers in the Non-project area was lower than that of I.A.P., and S.T.W.P. comparing with the same scale of farmers.

As stated about, more than 80% of wheat production was by irrigatable land and found that the irrigation is indispensable for wheat cultivation. Also, the growth of production with I.A.P., S.T.W.P. and A.A. was 3 4 times as much higher as that of paddy due to the increase per ha as well as that of planting area per farmer.

However, as wheat planting which requires irrigation system as indispensable, it is difficult to extend the planting area as farmers hope with I.A.P. and S.T.W.P. areas where irrigation facilities are well provided. Hence, future production increase may not be expected unless production per ha is planned.

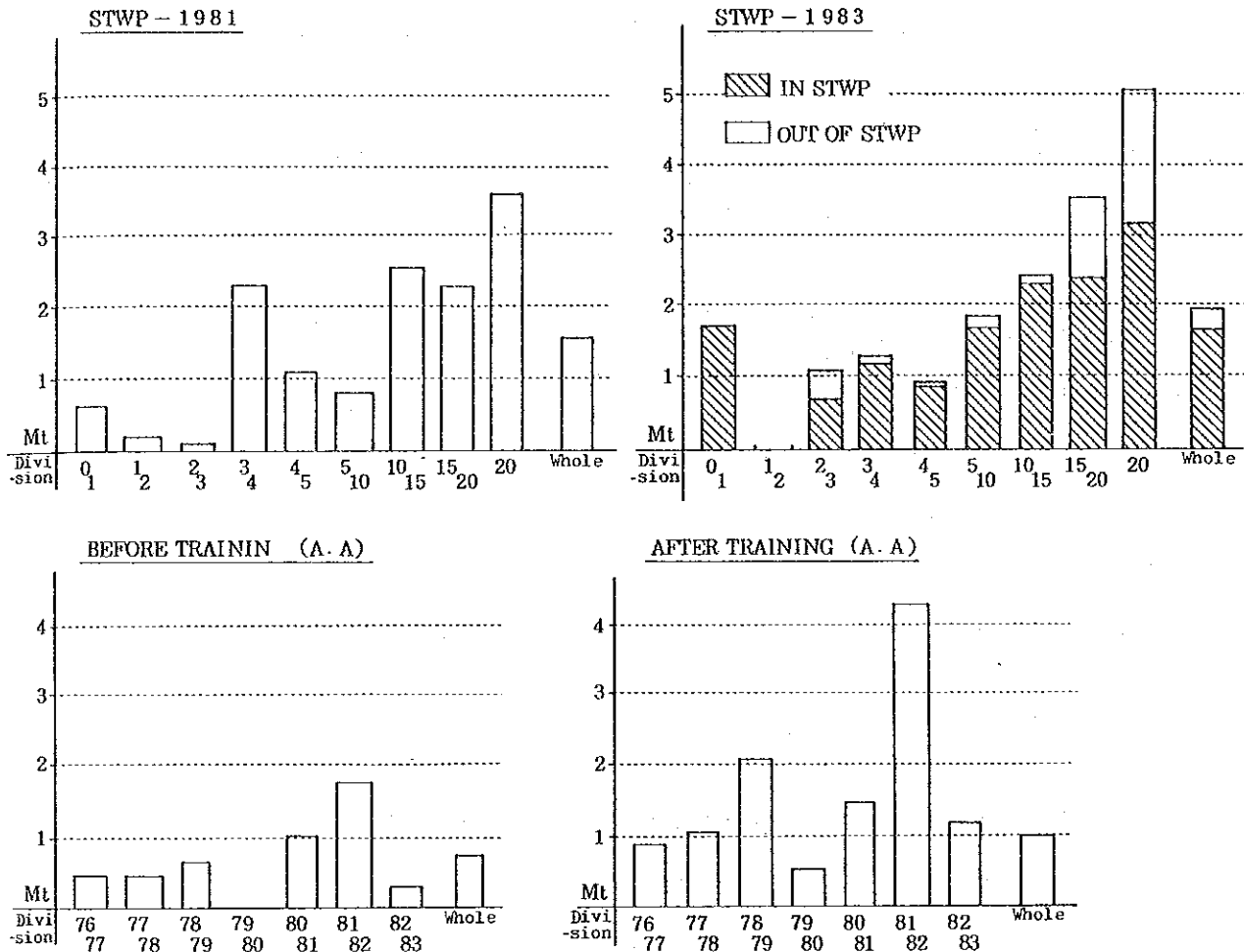
Fig.-29 Production of wheat per farmer



c) Maize

Production of maize per farmer is shown in Fig.-30.

Fig.-30 Maize production per farmer



It was 1.2 times with S.T.W.P., and 1.4 times with A.A., but the growth rate is seen lower than that of paddy and wheat. But, with S.T.W.P., 87% was by IN S.T.W.P.

d) Fruit trees, vegetable, minor cereals and other crops.

An interarea comparison is not obtainable as characteristics of each crop item differ by area.

With I.A.P. production of minor cereals was much and between that of 1972 and 1983, no big difference was seen with IN I.A.P., but as much as about 5 times increase was found with OUT OF I.A.P.

With S.T.W.P., the production of 1981 and 1983 showed no big difference with about 1.9 t respectively.

However, ratio of dependence on IN S.T.W.P. was 64.5%, lower than the main cereal crops (paddy, wheat, maize).

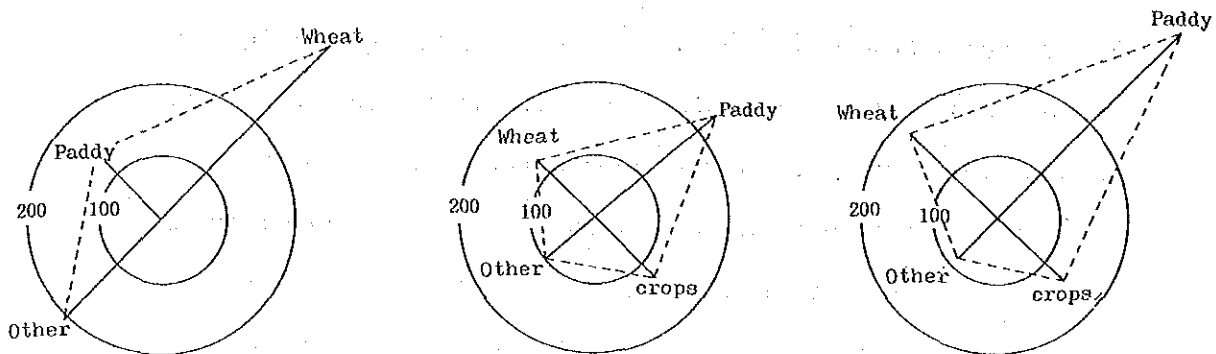
With A.A. such production decreased to 90%, which reason may be due to farmers' interest transfer to those main cereal crops.

With Non-project area, it showed about double increase of I.A.P. whose scale of farmer is similar, and this cause may be due to its location near Janakpur City being a horticultural production area and active in vegetable production.

In I.A.P., S.T.W.P. and A.A. production increase of fruit trees and other was low as extension activities were mainly given to paddy and wheat. Also, no change or decreasing production of these crops and increase of paddy and wheat may be attributable to some hopeful appearance variation of every area by crop is given in Fig-31.

In every area, wheat showed its big production rise and paddy and maize ranked next and others showed increase with I.A.P. alone and two other areas showed no change.

Fig.-31 Production variation per farmer



IAP (Ratio of 1983 as 1972 100)

SIWP (Ratio of 1983 as 1981 100)

A.A Ratio after training as before training 100

1-3-5 Number of producer by crop A.T.-1-11

I.A.P.: That of IN I.A.P., except paddy, local variety, "Rainy" and oil/pulses, showed increased production during 10 years from 1972. Especially, that of paddy improved variety and improved variety wheat was remarkable. That of OUT OF I.A.P. was more than IN I.A.P., however, with main cereal crops, that of IN I.A.P. showed increase by the reason production of millet which requires no irrigation system is moving to other non irrigating areas.

S.T.W.P.: When comparing 1981 and 1983, that of IN-S.T.W.P., increased with paddy, except "local variety", "Rainly", and wheat. Especially, big increase of paddy improved variety is due to sufficient irrigation system established and also to avtive extension effect by J.A.D.P., hence increase of farmers. While, on the other hand, with OUT OF S.T.W.P., the number decreased greatly of all crops except oil/pulses. Thus, seen is their cultivation land mainly having been centralized toward IN S.T.W.P., hence those of OUT OF S.T.W.P. almost gave up such planting volition.

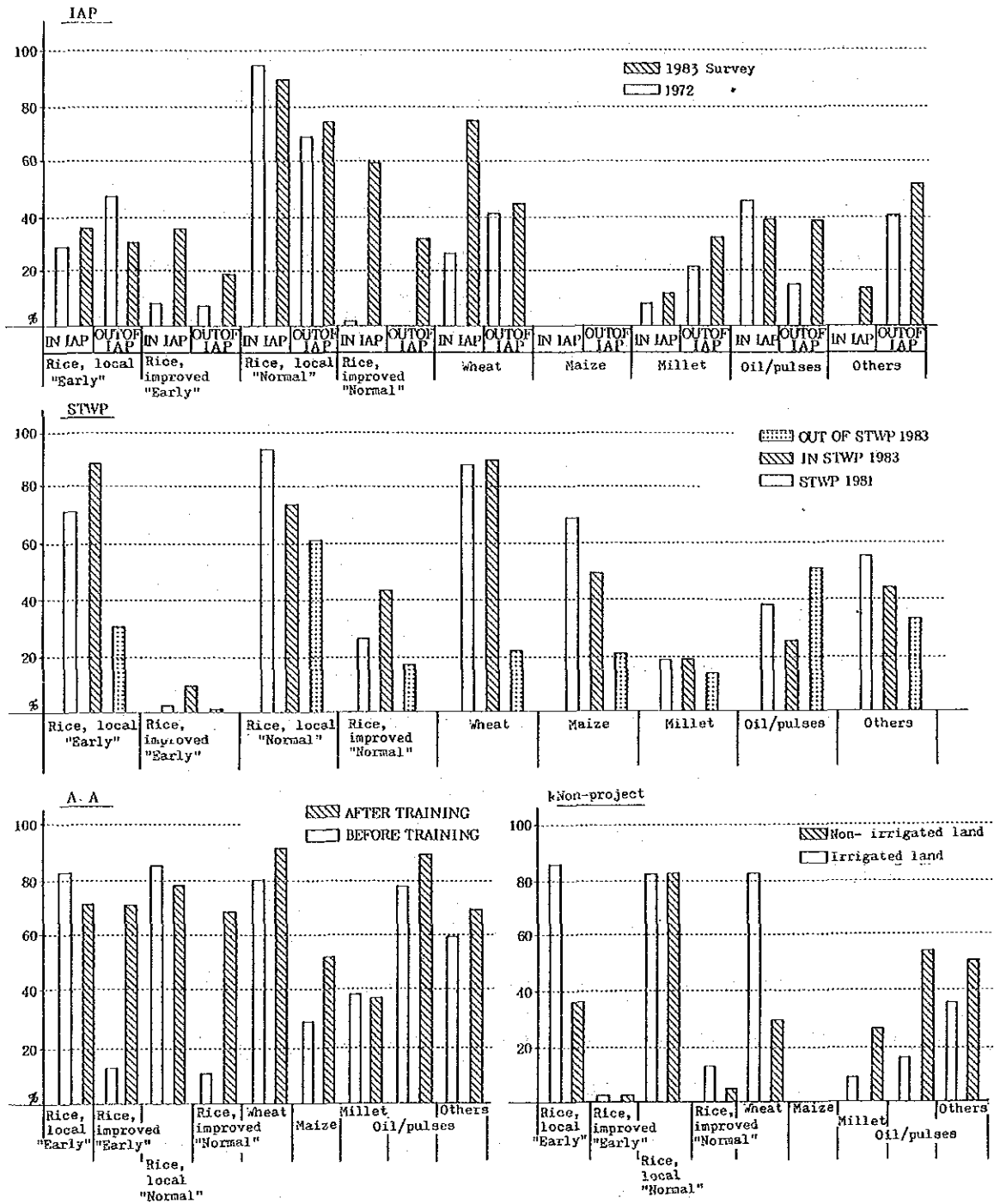
A.A.: That of all crops except paddy local variety and millet increased. Especially remarkable was with paddy improved variety, and from decrease of local variety after training, it seems that farmers who plant improved variety only are found.

Non-project area: That of main cereal crops such as paddy and wheat in irrigated land is found many, and that of millet, oil/pulses and others is found many in non-irrigated land. But, very few with paddy improved variety, one farmer (1%) of improved variety "Early".

The above can conclude that, in every area of I.A.P., S.T.W.P.,

and with A.A., the number is increasing and that many farmers are planting improved paddy, paddy wheat in irrigatable farm land, and oil/pulses and others in non-irrigatable land.

Fig.-32 Ratio of number of producer by crop



a) Compost

In Terai, dung are precious fuel, there found not so many farmers who can make use of much as compost only limited to Large scale farmers who can raise many number of livestock. By the present Survey, there found unexpectedly much more formers who can utilize this dung as compost. However, as such, in most cases, the quantity was only a little, but not as compost itself, their ash after used as fuel.

Although tried to confirm the quantity utilized, no concrete response was obtained. As a rough survey result, ratio of utilizers was, in I.A.P., 50% 57% for paddy field, 21% 26% for wheat, and found no big difference between IN-I.A.P. and OUT OF I.A.P. As S.T.W.P., with IN S.T.W.P. 73%, 58%, 40% respectively for paddy, wheat, maize, with OUT OF S.T.W.P., 26%, 27%, 2%, lower than IN S.T.W.P., this, however, is taken natural as with the same difference of number of producers.

With A.A. before training, it was 63% for paddy, 54% wheat, 25% maize respectively, and, after training, 74%, 67%, 33%, respectively about 10% increase. In non-project area, in irrigated land, 67% for paddy, 37% wheat, and in non-irrigated land, 47% and 14% respectively.

Farmers understand well that compost is most effective manure, however, for those who take dung as valuable fuel by short of firewood, production raise of compost can not be expected and difficult.

On J.A.D.P. training on how to make compost, while farmers of hill district show their interest, but those of Terai not so much.

b) Compound fertilizer (20:20:0)

The ratio of farmers who use compound fertilizer (nitrogen, phosphoric acid) by 1983 Survey, was 67% ~ 77% for paddy and wheat with IN I.A.P., and 40% ~ 50% respectively with OUT OF I.A.P.

Likewise by S.T.W.P.-1981, 4% for paddy, 21% wheat, 7% maize, however, it was, with IN S.T.W.P., 60%, 90%, 46% and with OUT OF S.T.W.P., 19%, 18% and 4% respectively.

With A.A., before training, 16%, 19%, 17%, which rose to 84%, 93%, 58% after training.

In Non-project area, in irrigated land, it was 44% for paddy and 70% wheat while it was 28%, 22% in non-irrigated land.

Namely, compound fertilizer users are, in any area, found many in irrigated land and few in non-irrigated land.

Similar findings were seen also with the number of farmers, and whose variation was seen or related to the number of compound fertilizer users.

In every area, the number for wheat is higher than for paddy, but with I.A.P. and A.A., no big difference was seen between the two crops, but big difference was found with S.T.W.P. and non-project area. This reason runs hereunder. Generally, compound fertilizer is used as a basal, especially for improved variety crop.

Wheat is, in any area, of improved variety a ratio of more than 95% and farmers know well of such a basal's effect. Hence, many users of compound fertilizer (basal dressing) for wheat. On the other hand, paddy mostly of local variety does not need such a basal fertilizer.

Hence, unless number of planters of improve variety increases, users of basal dressing (compound fertilizer) for paddy will not increase.

From the above reason, with I.A.P. and A.A. whose "Extension activities" is rather long history, farmers of wheat, paddy improved variety are found many and such basal dressing's effect is well understood. On the other hand, with S.T.W.P. and non-project area, farmers of paddy improved variety are found few, and so less the users of compound fertilizer as basal dressing.

c) Urea (Nitrogen 46%)

Urea is used as top dressing.

IN I.A.P., 84% for paddy and 77% for wheat and more users than compound fertilizer. Same tendency also found with OUT OF I.A.P. The ratio of users was higher with paddy than wheat, urea is taken as more important as top dressing. S.T.W.P., in 1981, ratio of urea users was, respectively 19% for paddy, 40% wheat and 14% for maize. In 1983, IN S.T.W.P., 73%, 88%, 49% and with OUT OF S.T.W.P., 33%, 15%, 30%. When comparing with users of compound fertilizer, those of urea were more for paddy and compound fertilizer were more for wheat.

A.A., before training, paddy 20%, wheat 23%, maize 11% and after training, 89%, 89% and 44% respectively.

Especially, there found no difference between paddy and wheat, from a similar tendency seen with compound fertilizer, users seem to have a balance for using "Basal dressing" and "top dressing" respectively for paddy and wheat.

d) Agricultural chemicals

The ratio of users to paddy in 1983 was A.A. 89%, IN S.T.W.P. 54%, IN I.A.P. 46%, and Non-project area 11%. For wheat, A.A. 58%, IN S.T.W.P. 7%, I.A.P. 15% and non-project area 4%, respectively more for paddy than for wheat. This may come from the planting of paddy improved variety gave so many kind of disease and insects and with wheat, such damages other than rats which might give a serious influence on its poor yield. Reason why of fewer users in Non-project area is greatly due to insufficient guidance and shortage of sprayers. Comparing with the above state or condition, I.A.P. and S.T.W.P. extension sub-centers provide, prevention machinery against damages by disease and insects for free use by farmers, hence, so many users of agricultural chemicals are found in these areas. This J.A.D.P. Center also to lend 20 units of such tools, but seen insufficient still.

e) Tractor

Users are found not many in every area, found must in IN S.T.W.P. area, especially of wheat cultivation. Most users are of Large scale farmers of more than 5 ha.

f) Irrigation pump

Many users, naturally in S.T.W.P. areas. In I.A.P., 10 15% of farmers as OUT OF I.A.P., for pumping up from Hardinath-irrigation canal. A.A., 30 40% after training. Higher yield of A.A. per ha than that of other area seems to be coming from their new technique for securing necessary water other

by irrigation.

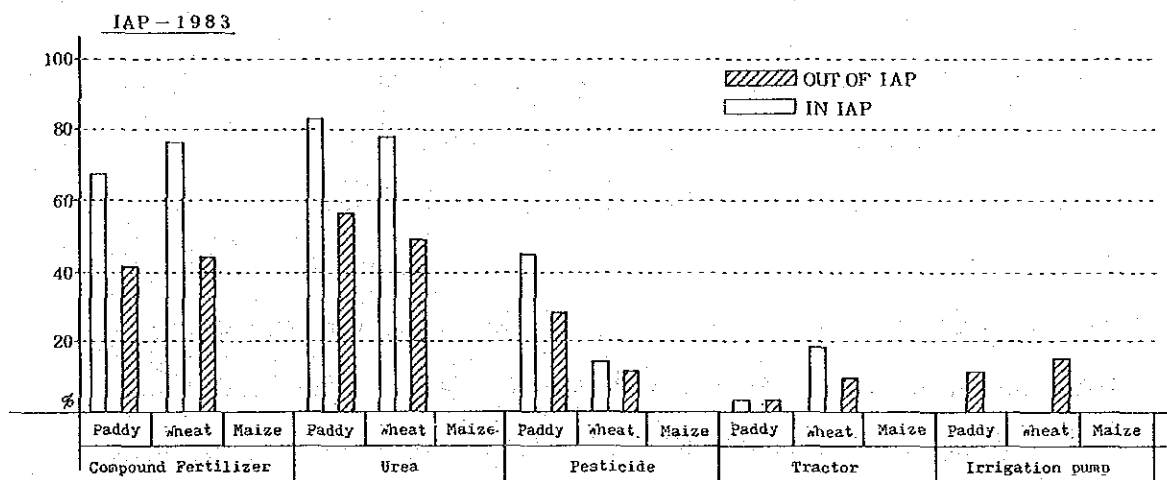
Namely, with I.A.P. and S.T.W.P. whose irrigation system well arranged, their technical is also raised enough to solve water problems.

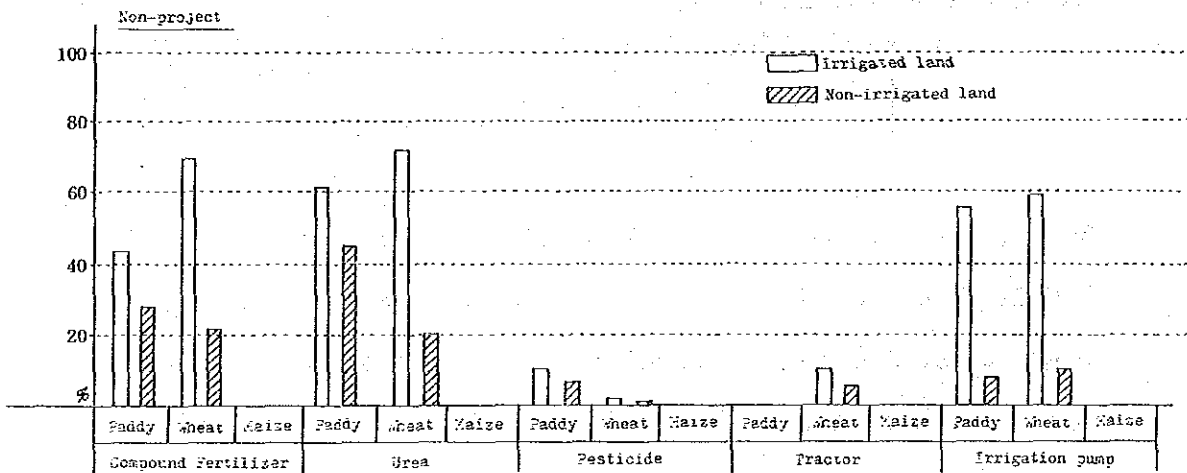
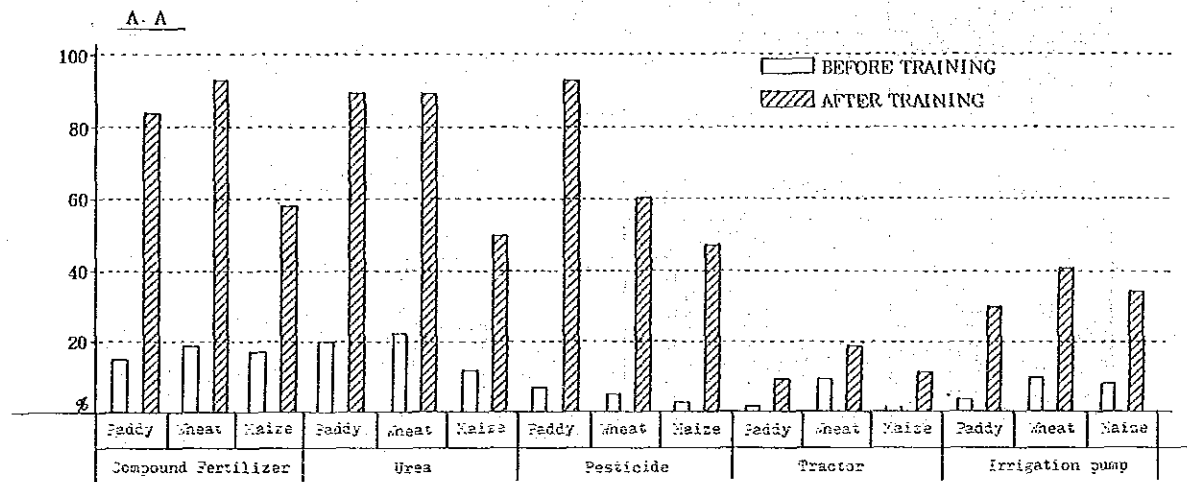
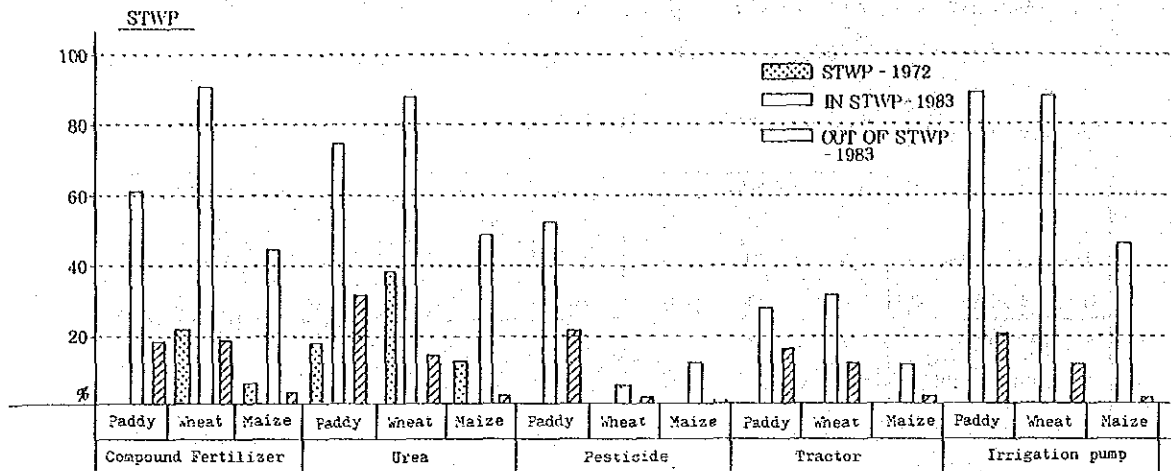
However, A.A., became to attain their present level of field first by acquiring knowledge and information and then making use of farming in-put.

If this A.A. can solve their water problem, they are sure to be able to attain higher production rate than present level.

In non-project area, some farmers are irrigation farming by using of pump, but their low rate of production may be attributable to their fewer number who can make use of other farming in-puts than those of project areas.

Fig.-33 Ratio of users of farming in-puts





1-3-7 Amount of fertilizer applied per ha

Present Survey results

	Paddy			Wheat			Maize		
	N	P	K	N	P	K	N	P	K
IN IAP - 1983	38	14	0	43	18	0	-	-	-
OUT OF IAP-1983	33	11	0	40	16	0	-	-	-
STWP-1981	20	4	0	28	12	0	14	8	0
IN STWP-1983	43	17	0	50	21	0	41	16	0
OUT OF STWP-1983	31	10	0	33	15	0	9	5	0
A.A BEFORE TRAINING	21	8	0	25	11	0	28	13	0
A.A AFTER TRAINING	45	17	0	59	23	0	52	22	0
Non-project area irrigated	36	13	0	48	20	0	-	-	-
Non-project area, non-irrigated	32	11	0	29	10	0	-	-	-

1976 Survey results, by APROSG

	Paddy			Wheat		
	N	P	K	N	P	K
Poor farmers	4	3	0	17	11	6
Small scale farmers	8	8	0	28	6	0
Medium scale farmers	8	3	0	20	9	4
Large scale farmers	22	4	0	29	12	0

Recommended fertilizer application

	Paddy			Wheat			Maize		
	N	P	K	N	P	K	N	P	K
	70	0	0	80	40	0	80	30	0

In I.A.P. there found no big difference in amount of fertilizer applied between IN I.A.P. and OUT OF I.A.P. and about 50% of J.A.D.P. recommended fertilizer application with paddy and wheat.

In S.T.W.P., amount of N. apply of S.T.W.P.-1981 was 29% for paddy. 30% wheat, 17% maize of the recommended fertilizer application while, IN S.T.W.P.-1983 was 61%, 62%, 51% respectively, near recommended application level.

A.A., 30% for, paddy 30%, wheat 31%, maize 35% of N

respectively on J.A.D.P. recommendation level before training and raised to 64%, 74%, 65% after training. Non-project area also showed, 51% for paddy, wheat 60% respectively of N, in irrigated land, which was not so low comparing with that of project areas.

When comparing with amount of N fertilizer applied in Terai surveyed by APROSC, 1976 on J.A.D.P. recommended application, with Large scale farmers, it was 31% for paddy, 36% wheat showing their (farmers') tendency of the smaller the scale of farmers, the less the amount of fertilizer applied. From this (above) results and from the present Survey Results, the amount of fertilizer applied in every area increased as much as about 2 times in irrigated land as 1.2 times in non-irrigated land. Also by the Present Survey, there found no relationship between the scale of farmers and Fertilizer, even with small scale farmers, found no decrease.

As clearly shown in the above description, it is indeed the quantity is increasing, but still no reaching its recommended fertilizer application level. This may affect the income of farmers to great extent, but A.I.C. can not supply them with sufficient amount of fertilizer they require. When examined from J.A.D.P. recommended fertilizer application and from farmers' fertilization situation, K is not at all used, by possible reason that in Nepal they can purchase "Complex (20:20:0)" and urea (46%) alone, not others.

1-4. Economy of farmers

1-4-1 Income per farmer (Income by scale of agricultural products) A.T.-1-14

In I.A.P., average farming income (scale income of agricultural products) is Rs 1,987, and 70% of which is occupied by rice and 14% by wheat, hence its high dependence on rice is seen.

By scale of farmers, even Small scale farmers earned their income by scale of crops other than rice and wheat, however, those of Large scale of more than 4 ha had their own income only by (scale of) rice and wheat. Income gap between poor farmers and Large scale farmers was so big as much as 13.6 times. S.T.W.P.'s annual income was Rs 19,757, very higher than that of other areas, which was reasoned that the income was almost all by Large scale farmers, however, even small farmers' income was found greater than that of other areas.

The total income, rice occupied 32%, wheat 19% and others 49%. While, in other areas, dependence on rice and wheat was high, in S.T.W.P. areas, income by tobacco and sugar cane was higher, which was seen with Large scale farmers alone, and with Small scale farmers of 0 ~ 2 ha, it was 70% ~ 80% by rice and wheat similar to other areas. Also, found 10 ~ 15 times income difference between Large and Small scale farmers, however, from their more than 20 times difference of farming land area, effort by Smaller scale farmer is clearly known.

A.A., it was Rs 4,221, of which by rice 49%, wheat 28%, and by other crops 23%. From year of training, income

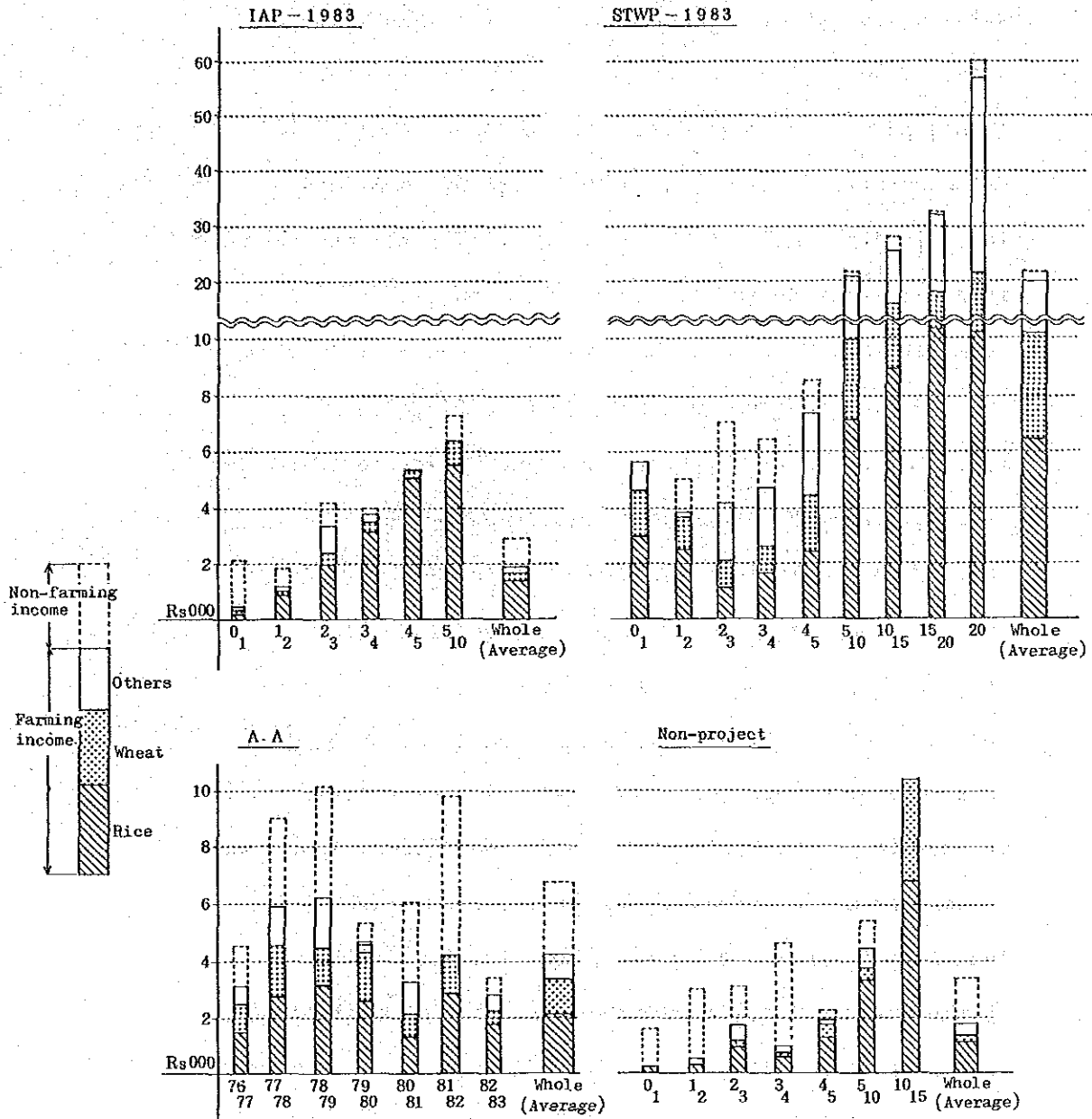
by those trained during 1977 ~ 1979 was high. In Non-project area, it was Rs 1,674, least of all areas, of which 63% by rice, 16% wheat was greater than that of other areas.

As stated above, it is natural that there should be a close corelationship between the Scale of farmers and their income. Especially, very low income by poor farmers is due to thei necessity to have self supply of food no room for scale much and the larger the scale of farmers, the less the influence. Income per ha was, I.A.P. Rs 1,073, S.T.W.P. 2,400, A.A. 1,240 and Non-project area Rs 598. S.T.W.P.'s was highest clearly as by Large scale farmers and their less dependence on their own food to have to be spared, and so much increased for sale.

In addition, they have much cash crops such as tobacco and sugar cane cultivation, hence high income per ha. As income by non-project area, its low income level per ha and per farmer, despite larger area than I.A.P. shows that higher extension effect of technology and irrigation facility of I.A.P. is found remarkable.

By the present Survey, interview investigation on farming income was most difficult as they did not make clear of their real farming situation for their fear of tax to be imposed thereon, so the Survey Results this time much have so wide difference from what those farmers are. Income termed here is only by sales profit not including income in kind (rent, school expense), and if including this, their income may be increased more, but no actual status obtainable.

Fig.-35 Farming income (sale of agricultural products) and non-farming income per farmer



1-4-2 Non-farming income A.T. 1-15

Non-farming income was survey by dividing into "Employment", "Coolie", "Commerce", "Support from out" and "Others".

In I.A.P., the smaller the scale of farmers, the more the non-farming income, and higher dependence thereon accordingly.

Its average is Rs 930, 31% of their total income.

S.T.W.P. showed no such tendency between scale of farmers and their non-farming income. It was Rs 1594, less than that of A.A. and non-project area, and only 7.5% of the total.

To A.A. farmers, annually Rs 600 is given for their income amounts to Rs 2454, which is higher than that of other areas and 37% as much of the total income. In Non-project area,

it was Rs 1684, 50% of the total, which was higher than that of other areas. This is because of their less income from

farming, and they are making effort to compensate it with non-farming income instead, also from Janakpur City as

employers. As their income source, in every area, many are workers under "Employment" then comes "Commerce".

1-4-3 Fund on loan A.T.-1-16

In every area, farmers loan many from City Banks, A.D.B/N. and private money broker. In S.T.W.P., 92% of them are loaning from A.D.B/N. which occupies mostly as expenses of pumps and well digging for their introduction of S.T.W.P. activities.

A.A., also there found many farmers who loaned from A.D.B/N., and this is considered that they showed their high volition for agricultural operation. In I.A.P. and Non-project area, most of Small scale farmers were found loaning from private traders unwillingly on high interest because of their lack of their own land as security.

In S.T.W.P., those who were loaning from the financing organs other than A.D.B/N. were found not so many as many Large scale farmers in this area seem to have had no need of loaning.

By APROSC Survey 1976, lenders were as shown in Table 15.

When comparing this tendency with the present Survey results, the following variation was found.

Increase of loaning farmers.

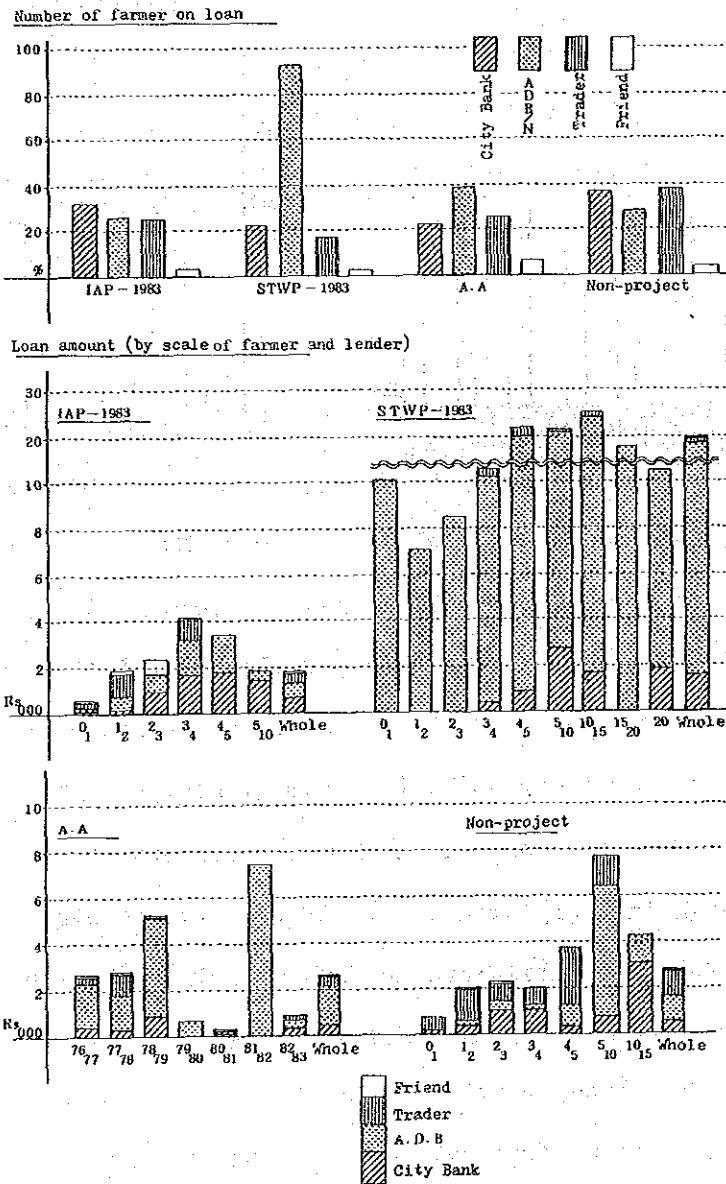
Many from private traders before turned to those from the public organs such as City Banks and A.D.B/N.

Table-15 Ratio of farmers on loan (by lender)

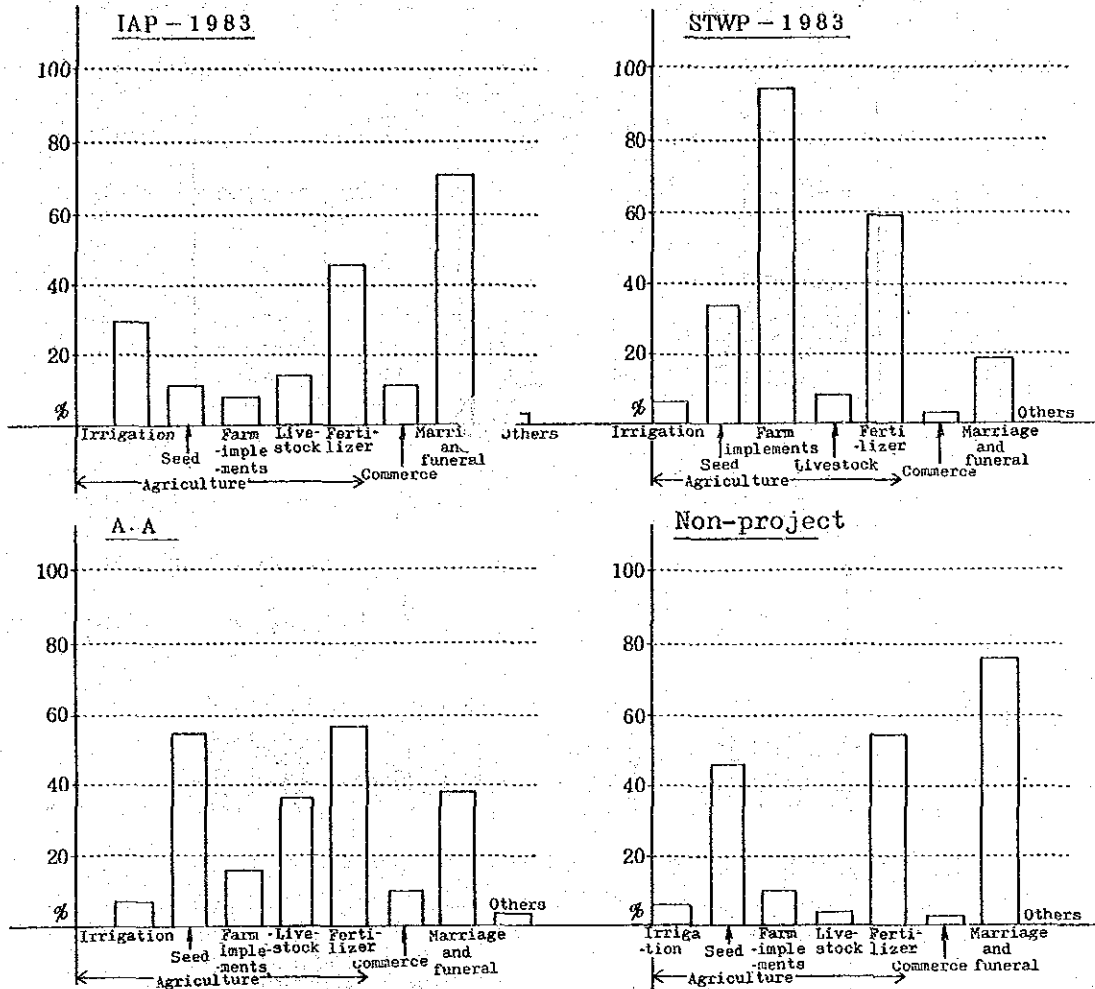
(APROSC, 1976 Survey)

	City bank	Agricultural Development Bank, Nepal (A.D.B/N.)	Money broker	None
Poor farmers	0 %	7 %	56 %	37 %
Small scale farmers	0	28	35	37
Medium scale farmers	0	56	32	12
Large scale farmers	13	36	15	36

Fig.-36 Fund on loan



Reason/for (ratio)



As monetary amount of loan, there found that its average was Rs 19,478 of S.T.W.P., Rs 2,630 of A.A., Rs 2,806 of non-project area and Rs 1,793 of I.A.P. Of this monetary loan amount, with S.T.W.P., average of Rs 14,000 was for pumps and well-digging, occupying most part of their fund on loan. As such money lenders, A.D.B/N.'s stood high in every area except I.A.P. The monetary amount loaned from the public organs such as City Banks and A.D.B/N. occupied 93% with S.T.W.P., 81% A.A., 73% I.A.P. and 61% with Non-project.

The ratio of loan from public organs by S.T.W.P.

and A.A. farmers who owned their own farm land as their security, was higher. That of I.A.P. which was guided constantly by J.A.D.P. was higher than that of Non-project area.

As was reported by APROSC 1976 Survey that it was Rs 526 per farmer, it is presumed that the present loan is considerably increasing to have given a big burden to those farmers.

Their fund loan was respective for the followings.

As agricultural purpose, in every area, mostly for their purchase of seed and fertilizer, except for their purchase of pumps and well-digging expenses with S.T.W.P.

By the present Survey, except farming implements of S.T.W.P., farmers' purposes of loan is much for the purchase of consumable materials, but little of durable materials (farming implements, livestock, irrigation equipment).

In other words, farmers are seen loaning for purchasing of present required material due to their shortage of fund (money in hand) rather than for their future farming equipment (implements, tools) as investment.

Other than their loan for farming purpose, marriage and funeal expenses are found much and high.

Especially, Small scale farmers of I.A.P. and non-project areas are found many for this purpose and this burden seems to be their heavy pressure on their livelihood.

On our question "Repayment, possible or not?" more than 95% of those belong to I.A.P., S.T.W.P., and A.A. replied "Yes", while those of Non-project areas replied 79% "Yes" and 21% "No". Such being the case, on "blight" future of

the former three, "dark" answer by the latter was very
impressive after the present Survey.

1-5 Consciousness of farmers

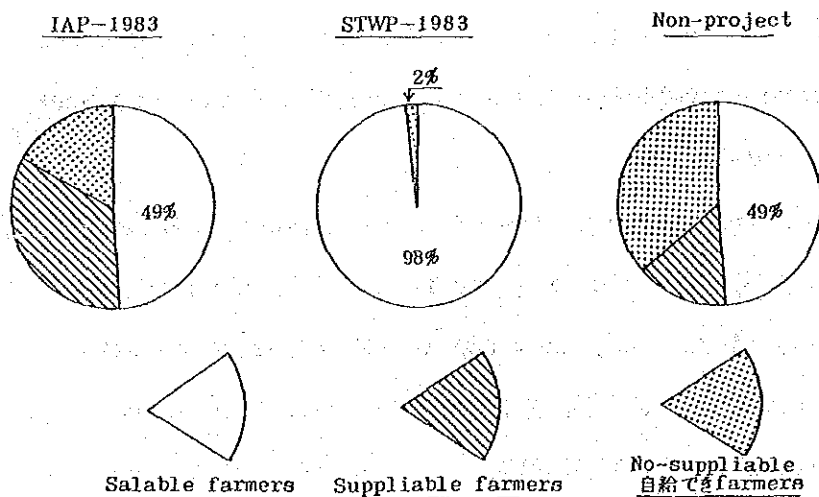
From the starting time of J.A.D.P., up to present, our Survey has been conducted on the change of farmers consciousness on their own food (self) supply condition, farming operation-especially agricultural production and technology, and against causes and reasons of variation. The findings run as follows.

1-5-1 Self-supply of food A.T.-1-17

With Non-project area, 36% of farmers are short of their own food, and purchasing about 4.7 months quantity. Likewise, in I.A.P., 17%, 4.4 months and S.T.W.P. 2% 4.5 months quantity.

In I.A.P. area, farmers under 3ha scale, and with Non-project area those below 4ha are complaining of food shortage, and there found 1ha difference at the upper limit between the two. Also, it is worthy noting that the number of farmers and month of food shortage of Non-project area are more serious than those of I.A.P.

Fig.-37 Self-supply of food



1-5-2 Change of production (From Survey on farmers' consciousness) A.T.-1-18, 1-19

On our question "How did your production quantity change, i.e. increased or decreased, comparing before each project and several years before with your present level (production quantity) their answers are graphed in Fig.-38.

In I.A.P., those who replied "Increased" with IN I.A.P. was paddy-98%, wheat-100%, and others 61%, and with OUT OF I.A.P., 62%, 83% and 34%. With these both, the number of farmers who answered "Increased" was higher than that of "Unchange", "Decreased". Especially, those who were given strong and effective guidance from J.A.D.P. replied "Increased" of paddy and wheat. All the farmers of IN I.A.P. replied "Increased".

On similar question to S.T.W.P., with IN S.T.W.P., they replied "Increased" as with paddy 91%, wheat 87%, and others 72%, slightly lower than IN I.A.P., but high enough. With OUT OF S.T.W.P., they replied "Increased" as with paddy 26%, wheat 16%, others 14%, while "Decrease" as with 30%, 44% and 60%.

The above cause will be analyzed later, but can conclude that farmers volition was strong for the former and weak for the latter.

A.A. they replied "Increased" as with paddy 93%, wheat 97%, others 93%, no scattering was found with these crops.

In Non-project area, they replied "Increased" as with respectively 37%, 66%, 3%, and "Decreased" as with respectively 29%, 17%, 94%.

No difference or remarkable tendency were found between the scale of farmers and "Variation in Production".

Their cause or reason of "Increase" and "Decrease" is examined as follows.

The main cause of "Decrease" is attributable to "Drop of fertility". This term "Fertility", other than its original meaning, contains or includes desolation by poor irrigation facility, and flood of river and also by farmers' weak or poor interest in their own farm land care and control, thus left untouched into waste or desolation.

Then, next, farmers pointed out the deterioration of seed, comparing with "improved variety", they found "local variety" gave poor yield, hence they said "Deterioration of seed".

Of "Increased production" many farmers (70% 90%), in every area, pointed out it was due to irrigated water and chemical fertilizer, improved variety they made use of.

Also, those who reasoned of acquiring new technology showed as high as 97 99% in I.A.P. and A.A. of rather long history of extension activities from J.A.D.P., and 78% of shorter history of S.T.W.P. On the other hand, 56%

farmers of Non-project area reasoned as such. Those who reasoned of agricultural chemicals was, in every area,

as low as 50%. They understand well of importance of

agricultural chemicals, poor number of sprayers and

difficulty in purchasing pesticide was a big cause not

capable of raising their yield.

Our examination is given hereunder on how and where they got these technical information.

In I.A.P., many of them got it from J.T., J.T.A. and Demonstration Farms. J.A.D.P. provides 1 J.T. with I.A.P. for giving farmers its daily guidance as well as 30 Demonstration plots at farmers'.

Also, many got such information from J.A.D.P. and Governmental Farms and their dependence on J.A.D.P. related organs was much higher than those in other areas. However, there found not many farmers were getting such information from printed materials and from training. It is considered natural that this J.A.D.P. took its extension method mainly with J.T.'s activities mentioned above.

In S.T.W.P., also main was given to J.T. and J.T.A. activities and many farmers were found getting such information from J.A.D.P., but few from Governmental Farms as S.T.W.P. areas seem to have had only a few Governmental Farms.

A.A. such information source is much diversified comparing with other areas, as printed materials, and training were found as their (farmers) main information source. For A.A., receiving one month training from J.A.D.P., such a long training became their main source of securing technique.

As printed information materials, there are "Farmers News", "One Point Extension" published by J.A.D.P., posters and Agricultural calendars etc. The "Farmers News" has been published up to present No. 80 with a circulation of 2000 copies per publication, and mainly distributed to each extension Station, its branches and

to A.A. A.A. members are easy to get these printed materials as their important information source while farmers of I.A.P. and S.T.W.P. areas have little chance to get these printed material.

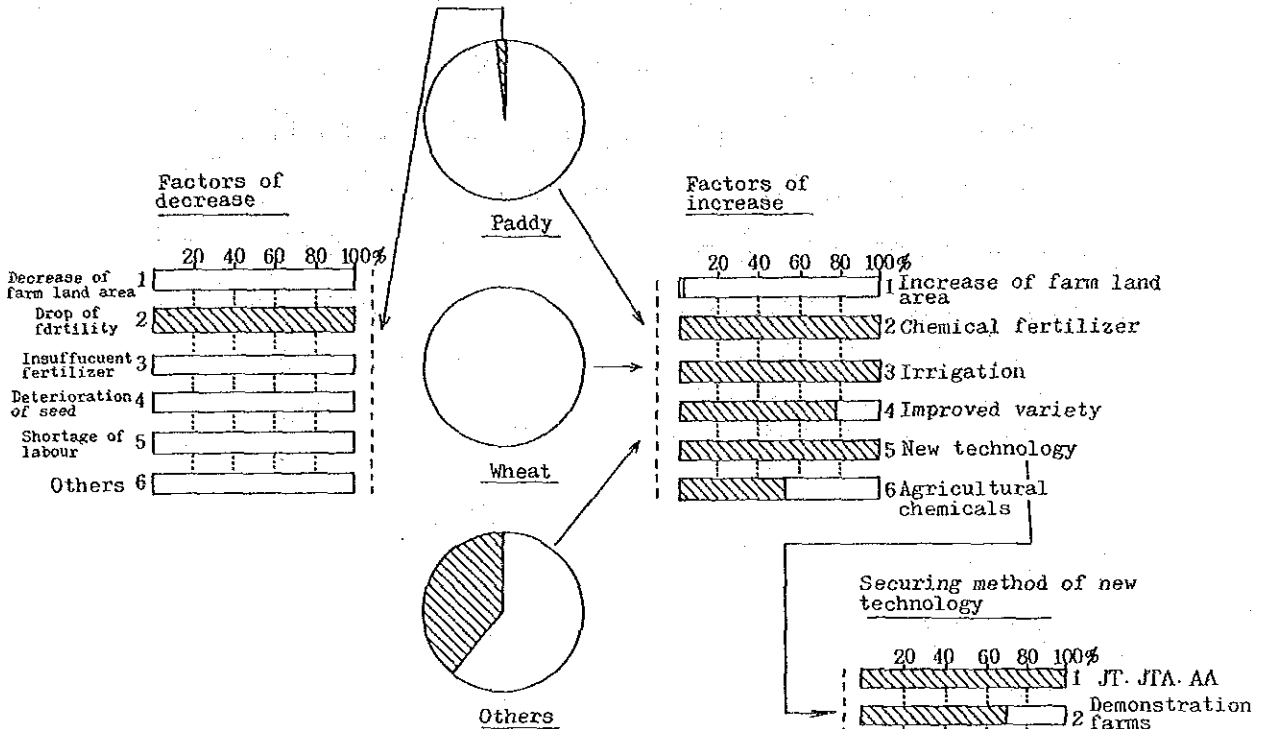
In Non-project areas, there found many farmers who got such information by their friends, and from J.T., J.T.A. and Demonstration Farmers. In these areas where no governmental aid is given, information exchange among their frinds is very important.

Fig.-38 Change of production (From Survey on farmers consciousness)

Change of production before and after

© I.A.P.

IN IAP



OUT OF IAP

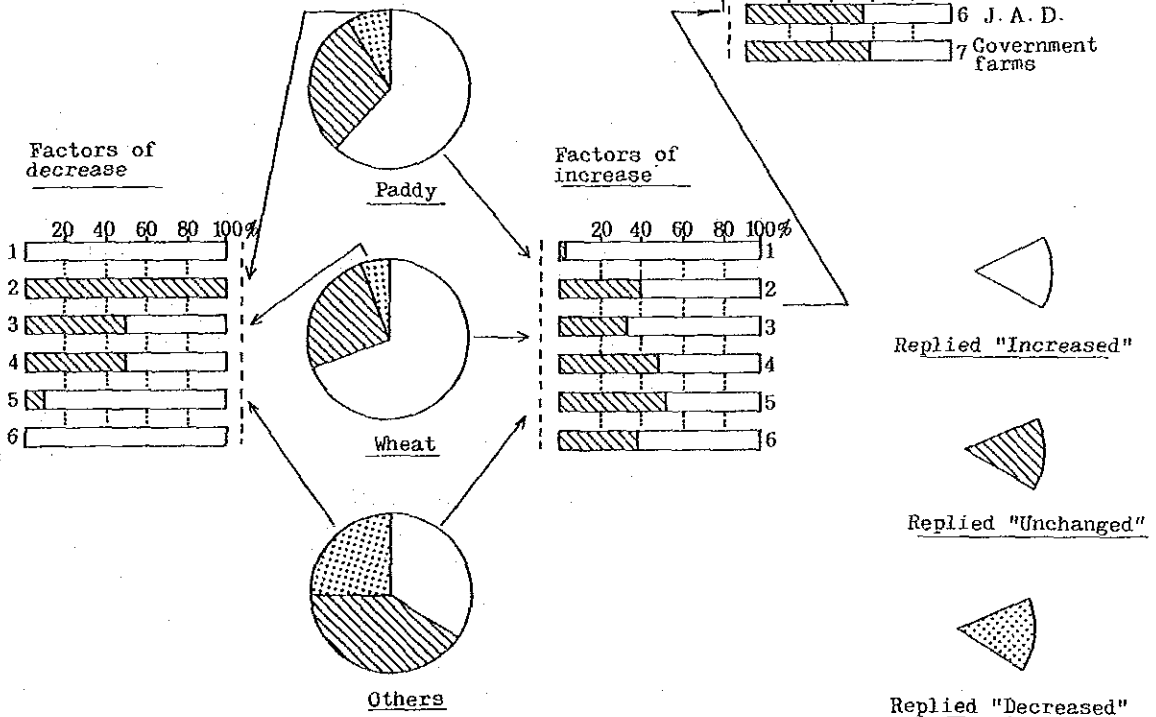
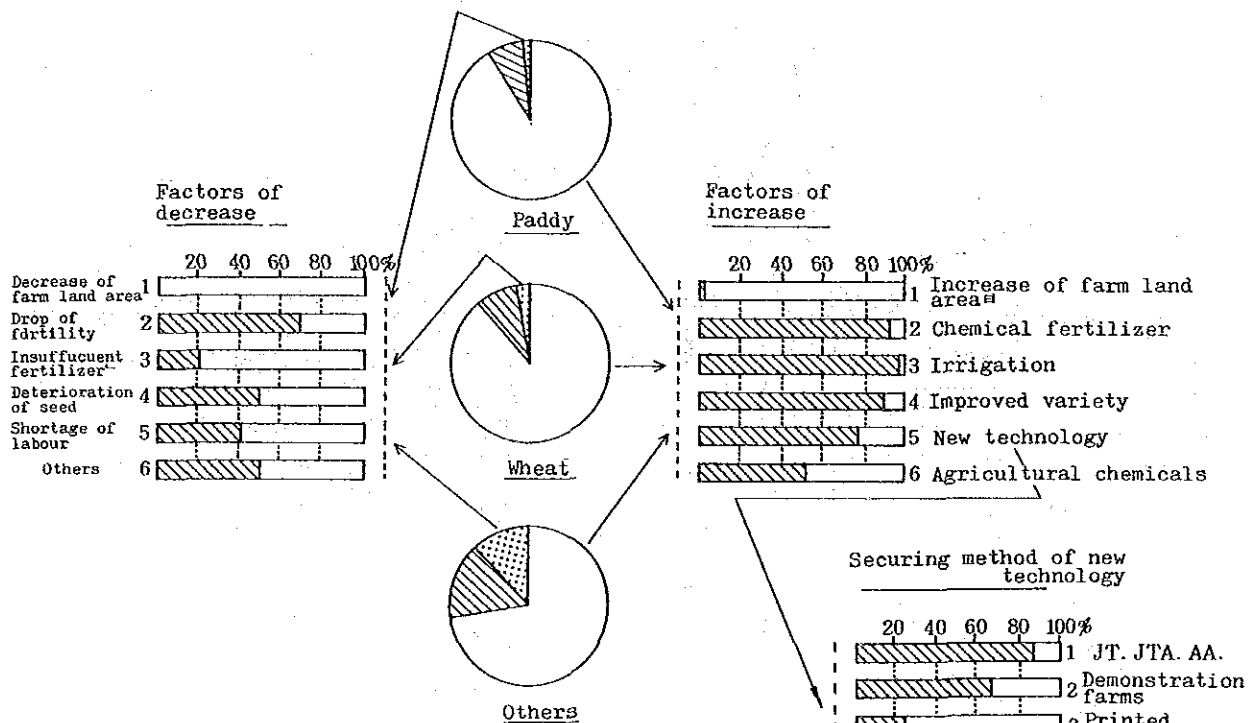


Fig.-38 Change of production (From Survey on farmers consciousness)

© Change of production before and after S.T.W.P.

IN STWP



OUT OF STWP

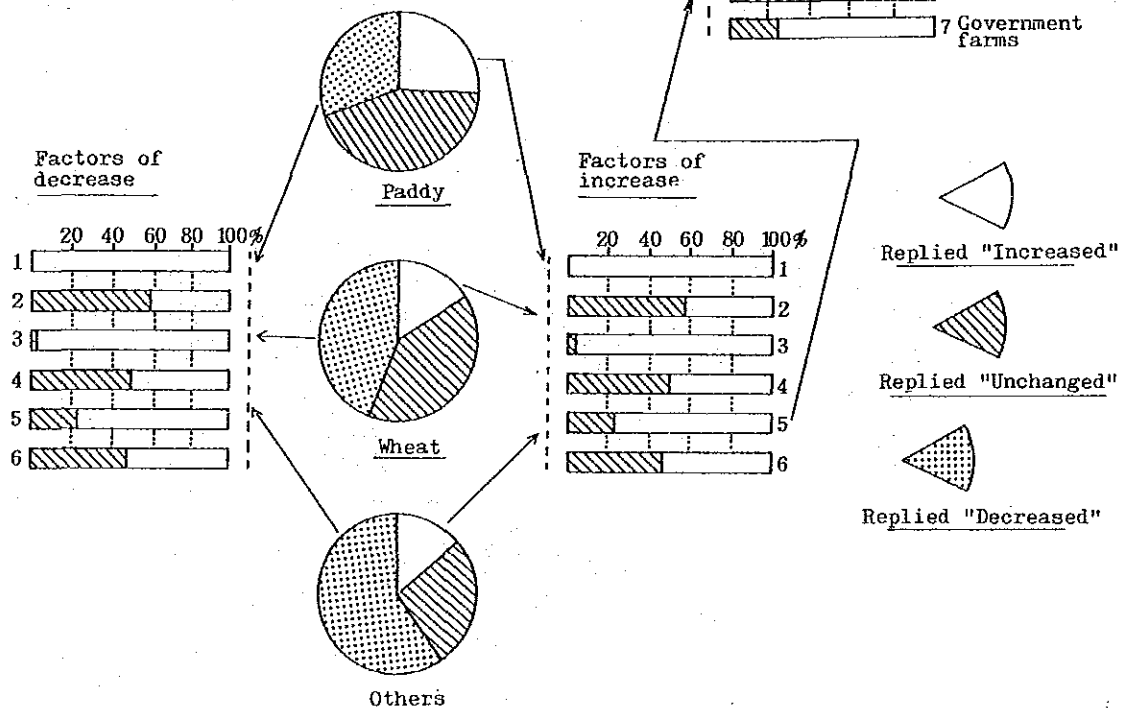
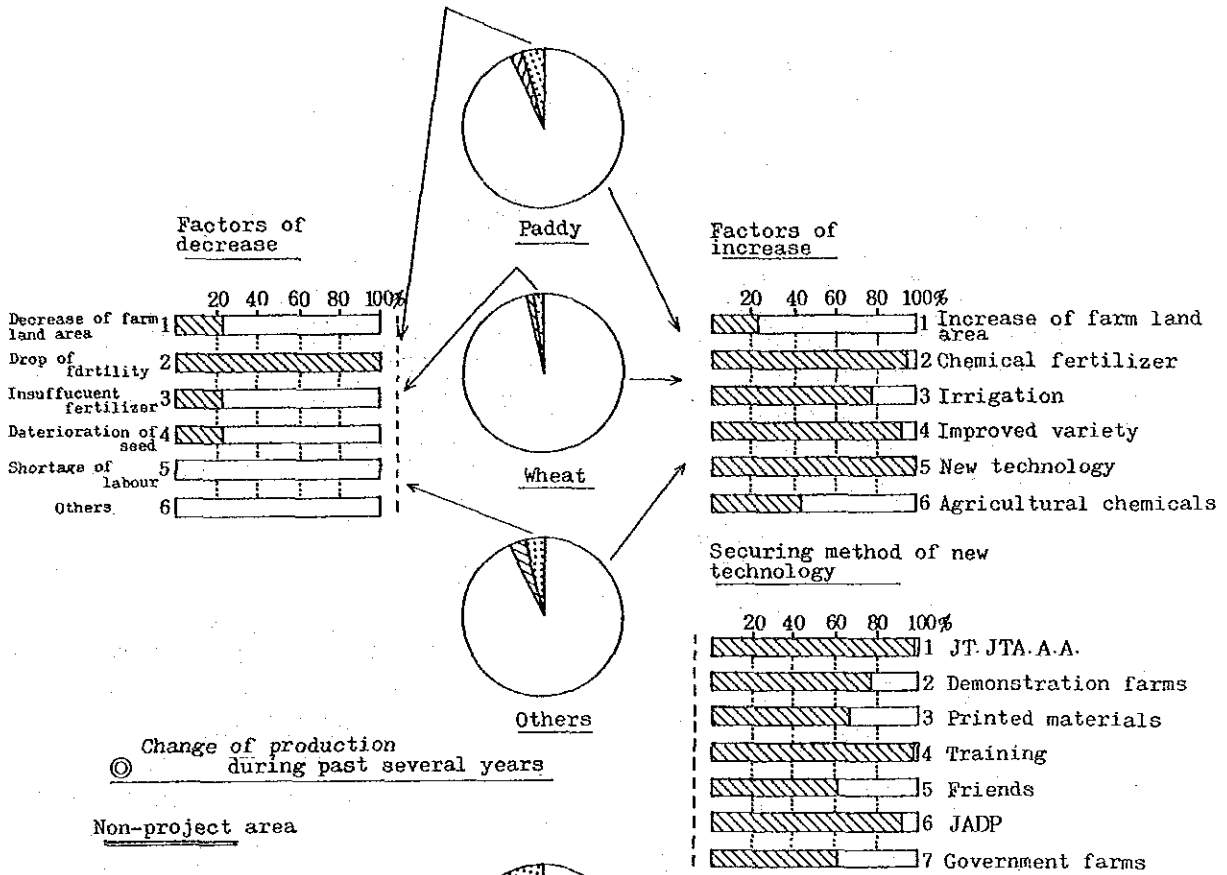


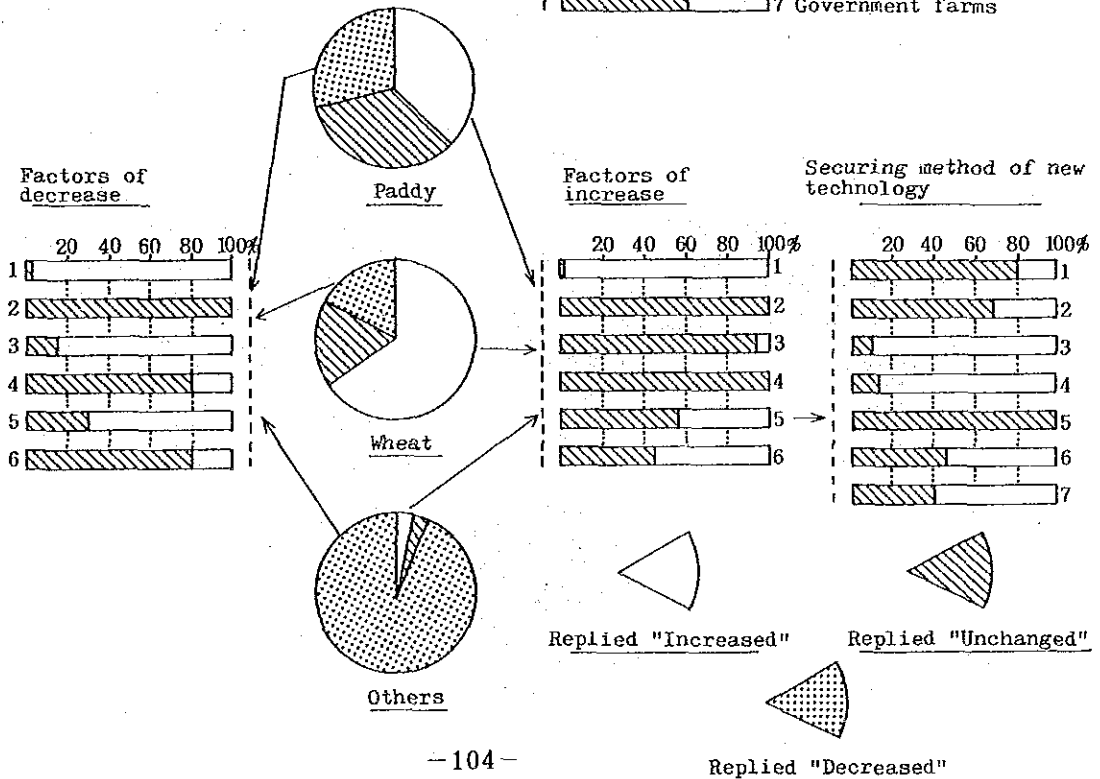
Fig.-38 Change of production (From Survey on farmers consciousness)

© Change of production before and after A.A. training

A. A



Non-project area



1-5-3 Contact with extension worker (J.T., J.T.A.) [A.T.-1-20]

High dependence of farmers on J.T., J.T.A., in every areas, as their introductory source of new technology is as was stated above. Rough findings of farmers frequency of contacting with J.T. and J.T.A. and of consulted matters are given in Fig.-39.

Their contacting frequency during a month per farmer was 0.7 times with I.A.P., S.T.W.P. and 0.9 times with A.A., the latter being a little higher, while 0.4 times of Non-project area (once per 2 ~ 3 month) was much lower than those of other areas, about a half.

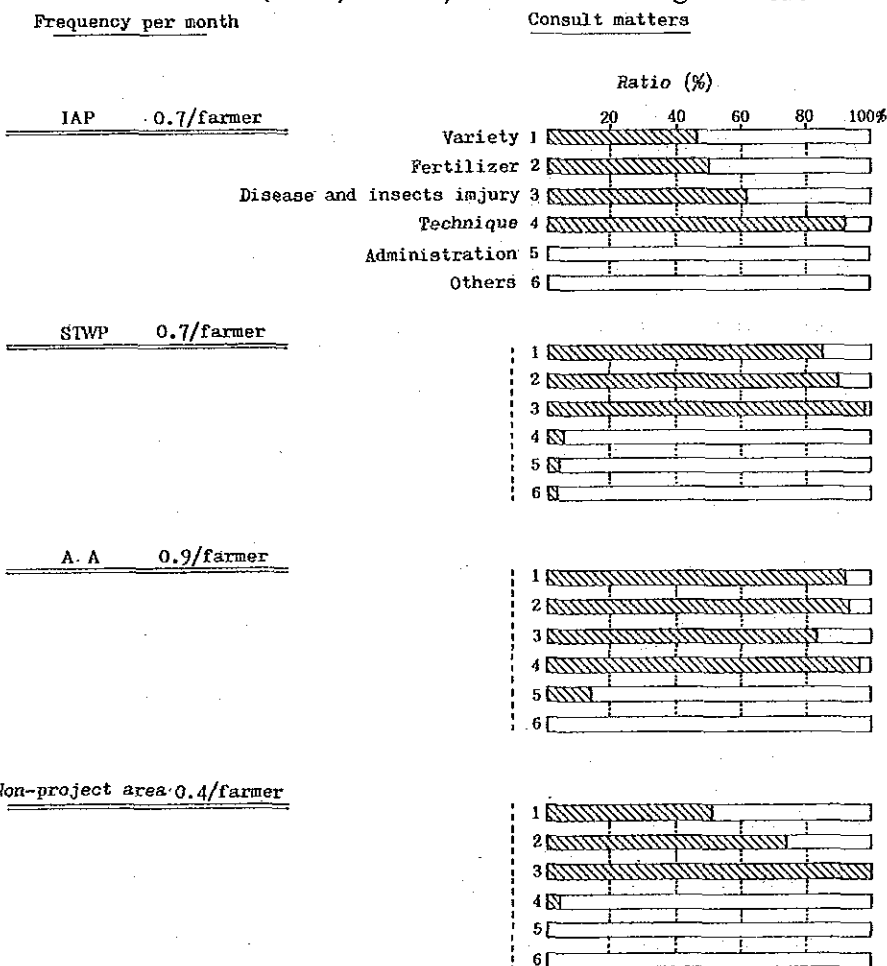
As their consulted matters, in every area, occupied much were on variety, fertilizer, disease and insects, and, on new technology with I.A.P. and A.A., not so much with S.T.W.P. and Non-project areas where extension activities from J.A.D.P. were not found sufficient. As their production increase factors, much were on variety, fertilizer and technique and there found an interrelationship to their consulted matter with J.T., J.T.A. Also, many farmers found on disease and insects, but not many who said their production increase was by their use of agricultural chemicals. Of this problem, they approached J.T. and J.T.A. for the prevention of disease and insects damages which clearly appear, but found that many of them were giving up because of no sprayers and of difficulty in purchasing agricultural chemicals.

I.A.P. and A.A. very much was on technique but not so much In S.T.W.P., Non-project areas, this difference may be explained as follows. Here describing "Technology" is

their method of farming. First, farmers ask J.T., J.T.A. on variety, fertilizer and injury by disease and insects as these three are under active propagation by their Government and farmers themselves show interest yield. If their yield is raised more or less by the above, nexty come are their question on their own effective method of use and more efficient farming method. These questions being divided into two stages are often experienced while conducting extension activities.

Many farmers questioning I.A.P., and A.A. seem to have reached the 2nd stage while those of S.T.W.P., and Non-project areas are still on the 1st stage.

Fig.-39 Farmers contacting frequency with extension worker (J.T., J.T.A) and consulting matters



1-5-4 Training, farmers meeting, demonstration farms, and

Utility of farmers newspaper (for farmers) A.T.-1-21
 J.A.D.P. and A.D.O. provided training, farmers meeting, demonstration farms and farmers newspaper as part of extension activities. Farmers' participation frequency therein in each area is shown in Fig.-40.

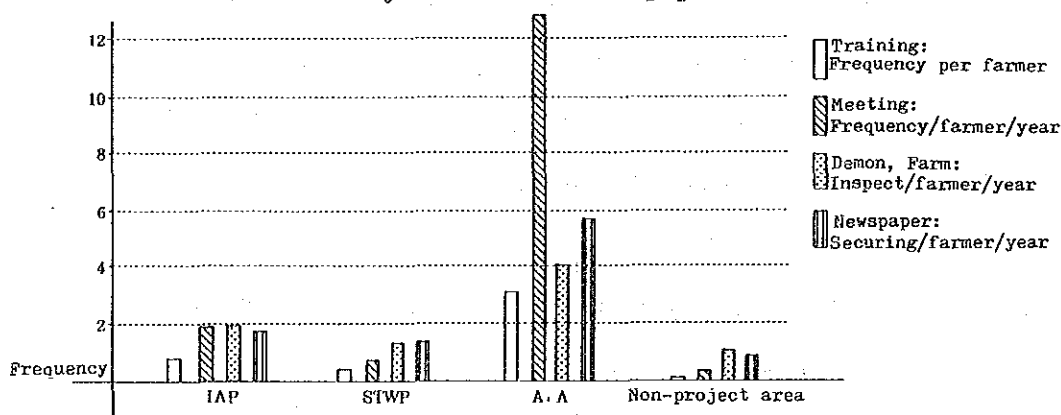
A.A. showed higher frequencies than those of other areas. A.A.'s duty is to give farmers their effective guide and training to let them have the basic agricultural knowledge, attend such farmers meetings and practise their own working on the Demonstration farms, plus preferential distribution of farmers newspaper etc bore fruit of J.A.D.P. and A.D.O's efforts.

I.A.P., base of extension activities of J.A.D.P., gives practical guidance to farmers on their own farm land whereby farmers participation frequency was not high.

S.T.W.P. of shorter experience of extension activities showed lower frequency than I.A.P. However, as S.T.W.P. area is so large that J.A.D.P. can not cover all and must take similar method of guidance to that of A.A.

In Non-project area, farmers frequency of contacting extension activities and their chance showed low level.

Fig.-40 Training, farmers meeting, demonstration farms and utility of farmers newspaper



2. Special survey by activities

The activities of J.A.D.P. are diversified to considerable extent, of which the present Survey has been conducted on three minor activities and on their Non-project areas. While these three activities are for similar purposes to be attained, their nature or characteristics are respectively different. Hence, the present Survey has been made along with these features.

2-1 Farmers' view on I.A.P. A.T.2-1

Our questions were given on the following four points.

- a. Were I.A.P. activities useful or serviceable?
- b. Was irrigation problem solved or not?
- c. How do you comment on No. 5 system?
- d. Was your livelihood improved?

On Question a, 57% of farmers answered "Very useful", 43% "Useful" and none replied "Not effective or useful".

From the above, farmers on the whole were found generally in their satisfaction except otherwise with their water problem to some extent.

On Question b, 56% replied "Completely solved", 40% "Half solved" and 4% "Not solved".

The latter two total 44% is a bottleneck of I.A.P., due to poor artisan quantity. However, this problem is being solved by No. 5 system with pumping up. Many of poor and Small scale farmers who replied "Not solved" may have their "force-relation" with other farmers of different scales. So-call No. 5 system referred to c is a cost of water collecting system of which a six-inch pump is

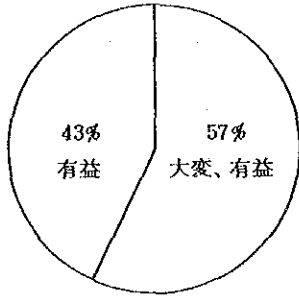
provided with a deep well and thus pump up water is sold by farmers' payment of Rs16/hour. Namely, whenever they require, they can buy such water by the pump operation. By this system, any scale farmers became capable of buying their required quantity of water impartially for their own more efficient use of water and the quantity of water also became to increase from 10 /sec to 30 40 /sec.

All of farmers are in favour of this system by reason of "Impartial water supply"-95% and "Increase of discharge" 41% and their dissatisfaction on "Partial water supply" disappeared, but some are still not, saying "Not free water requiring" (10%) and "Not satisfied with water sale system" (12%).

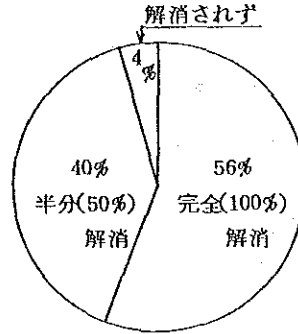
On Question d, 97% replied "Improved" 3% "Worsened" of which reason by poor and Small scale farmers must be reanalyzed.

Fig.-41 Farmers' opinion on against I.A.P.

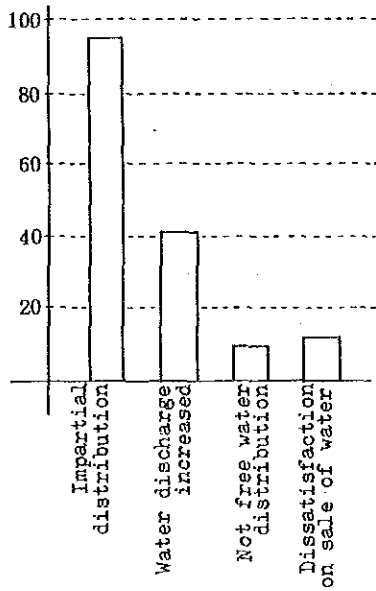
◎ IAP事業は、有益でしたか。



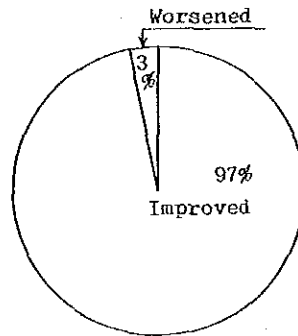
◎ かんがい問題は、解消されましたか。



How do you comment on No. 5 system?
◎



Was your livelihood improved?
◎



2-2 Farmers opinion on against S.T.W.P. A.T.2-2

2-2-1 Condition of well and pump

Number of well per farmer is 1.4, Farmers who dug more than one well are of Large scale of more than 3ha by their reason of their dispersed farmland and efficient use of them by moving. Average number of pump per farmer owned is 1.2 of which 0.4 is Indian made and 0.8 is Japanese made. Owners of pumps more than 2 are Large scale farmers of more then 4ha, and 2.7 are Super large scale farmers of above 20ha. Pumping water discharge is difficult to be measured, but farmers say from experience it is about 16 /sec, much higher than expected.

2-2-2 Effect of S.T.W.P.

On our question "Was S.T.W.P. generally advantageous to your farming?" those under 3ha replied "Not effective", while those of above 4ha replied "Effective" or "Very effective", more than 90%.

2-2-3 Pump trouble and repairing method

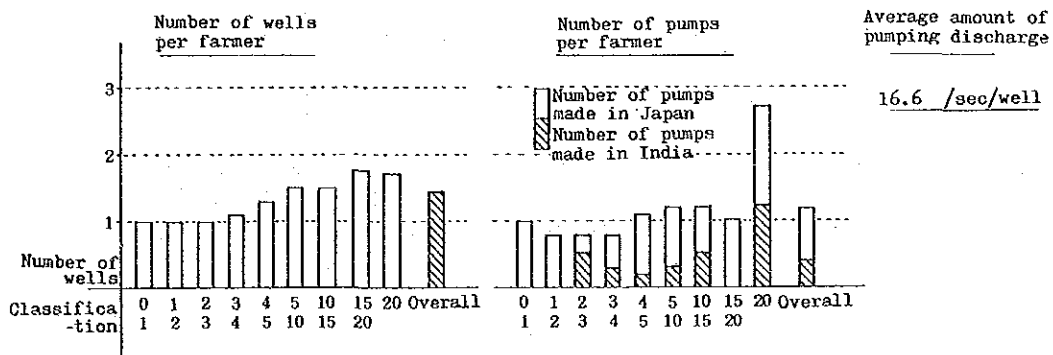
Rate of trouble frequency per pump is 1.7. More trouble frequency with those above 10ha is related to pump operation hour.

Such trouble pumps are being repaired by J.A.D.P. Service Team, 42%, private Service Team trained by J.A.D.P., 31%, i.e. 73% high rate repairing shows farmers' full utilization of J.A.D.P.'s After Care system.

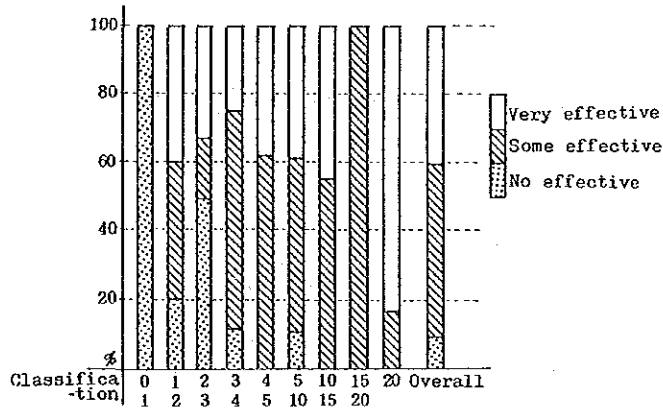
2-2-4 Sale of water

25% of farmers sell water. Time of selling water per farmer throughout a year reaches 28 hours and the price is Rs16 per hour. This price is the same with the price of IAP, and since the amount of pumping discharge of IAP is 30 - 40 /sec, the price of amount of water comes to be expensive.

Fig-42 Farmers' opinions on S.T.W.P.

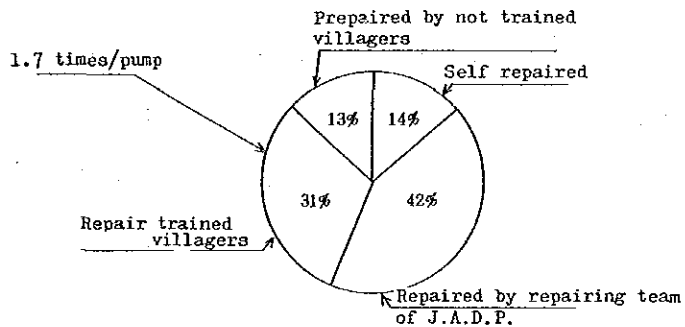


Effect of S.T.W.P. (Farmers' opinion)



Number of troubles per pump

Repairing method



2-2-5 Irrigating condition to each crop

a) Irrigating area of each crop per farmer

Total area of irrigation per farmer for one year is 7.26 ha on average, of which paddy 65%, wheat 20%, maize and tabacco account for the rest of 15%.

b) Irrigating hour per farmer

Irrigating hour throughout a year (pump operating hour) is 307 hours, of which paddy and wheat account for 84%.

c) Irrigating number by each crop

"Early" paddy: 2.5 times.

"Normal" paddy: 1.8 times

Maize : 1.4 times

This number is based on wheat, 4 times, maize, 5 times by J.A.D.P.'s guidance, but farmers' number is less than that.

d) Irrigating hour of each crop per ha

Maize accounts for the most hour, 80.7 hours, next follows wheat, 52.6 hours. Both of them are crops for dry season that need a lot of amount of irrigating water.

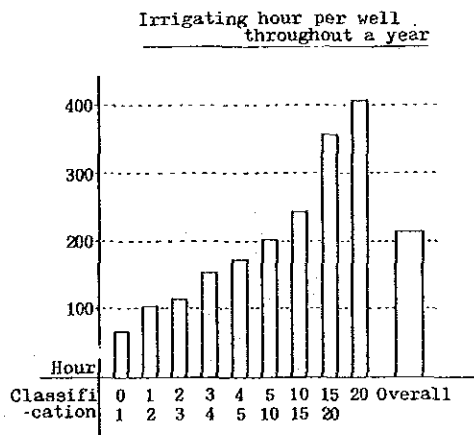
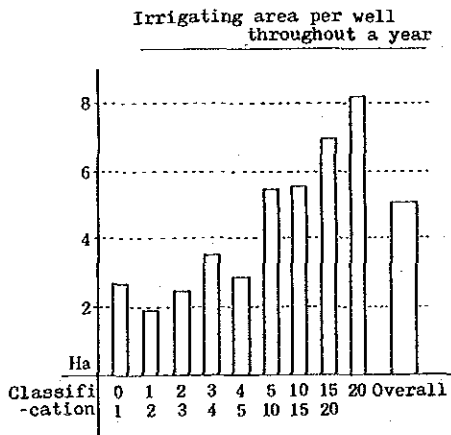
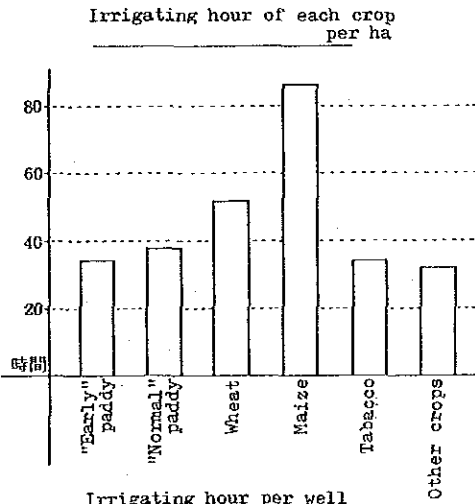
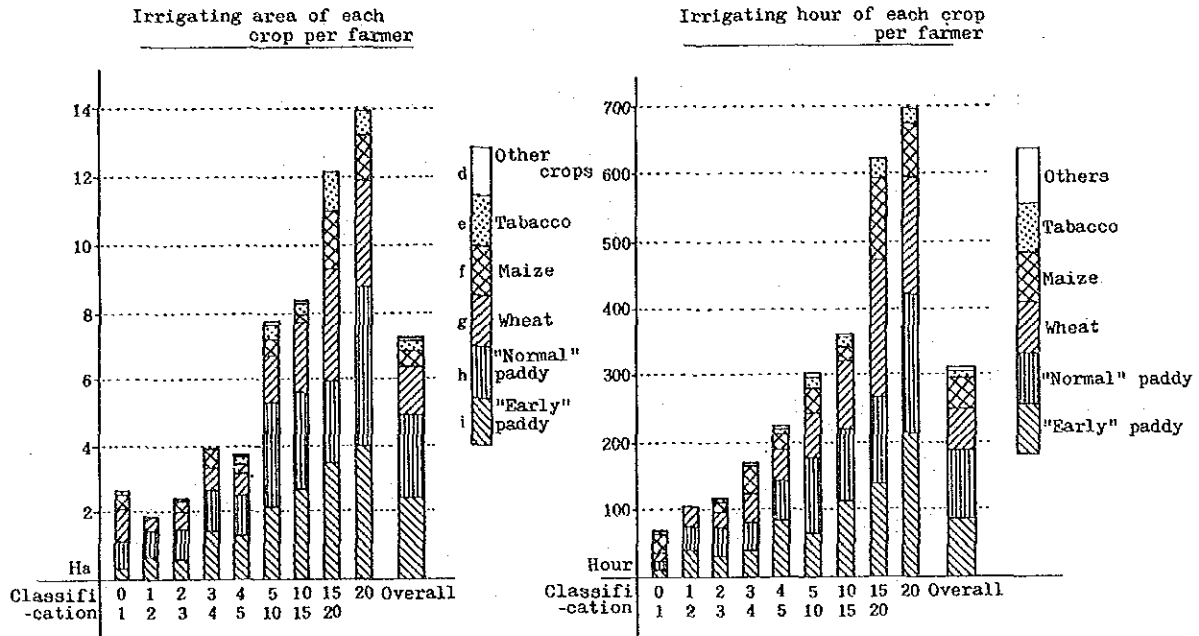
Maize especially needs the most amount of irrigating water because of its planting in April and May of the highest temperature and dry season. Paddy, in less than the previous ones.

e) Irrigating hour per well throughout a year

Irrigating hour on the average is 216.8 hours, but it depends greatly on the size of farmers. Discrepancy of six times was found that 69 hours in farmers with

less than 1 ha, 409 hours in super large scale farmers with more than 20 ha.

Fig-43 Irrigating condition by S.T.W.P



f) Irrigating area per well

Average area irrigated with one well is 5.11 ha, but discrepancy of 3 times was found between small scale farmers and super-large scale farmers.

2-2-6 Profit account by S.T.W.P.

We would like to discuss about the result of "Economic analysis of shallow well irrigation in Tarai plain, Janakpur, Nepal." and survey of this time.

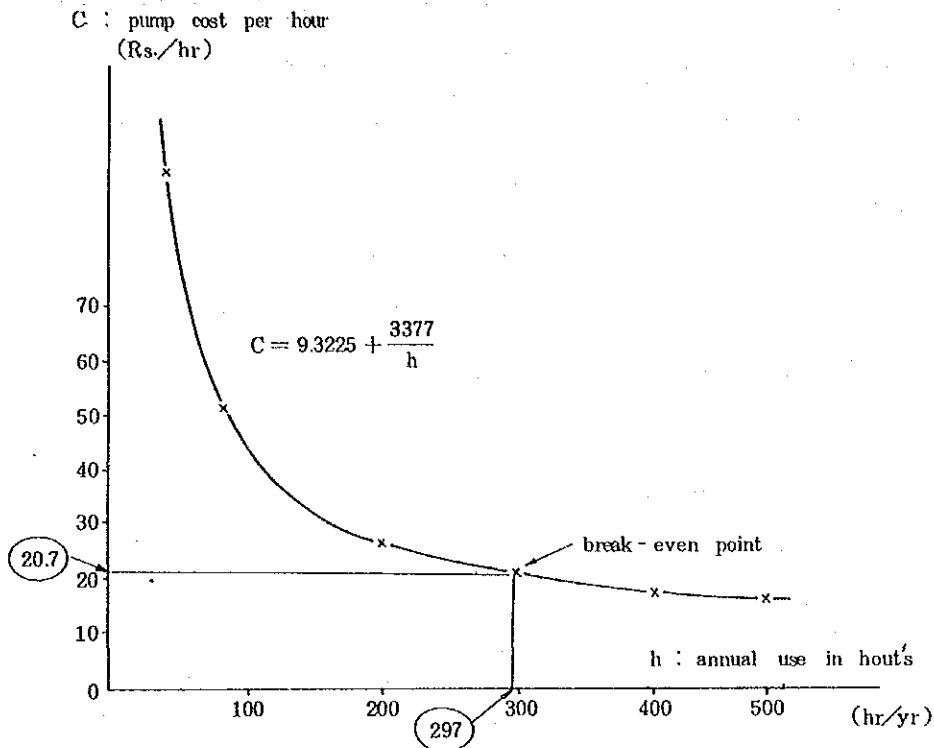
According to the above mentioned report,

Relation between pump operating hours and pump costs is shown in Fig.-44.

Pump operating cost per hour is Rs 20.7, and operating hour throughout a year becomes 297 hours by substituting this for Fig.-44. After all, operating about more than 300 hours a year makes pump owners profitable, on the other hand, with less than this hours, it's more advantageous to use renting or sale of water under condition of Rs 20.7 as pump renting cost.

Fixed charges of a pump and a well (pump cost, drilling cost of well and spare parts) cost Rs 3,377 a year.

Fig.-44 Pump operating hour and pump cost



This break-even point shows 300 hours' annual use and that operating cost per hour is Rs 20.7. When applying the relation to this survey, we find farmers with more than 15 ha effectively use over 300 hours. The selling price of water, according to this survey, is Rs 16.3 per hour, showing that it is more advantageous to use sales of water that is lower than the above Rs 20.7.

Annual cost per well was found by the following formula.

$$\begin{array}{rcl} \text{Rs } 3,377 & + & (\text{Rs } 9.3225 \times 216.8) = \text{Rs } 5,398 \\ \text{Fixed cost} & & \text{Annual total} \\ \text{Operating} & & \text{Average cost} \\ \text{cost per} & & \text{operating} \\ \text{hour} & & \text{hour} \end{array}$$

Since average agricultural income per farmer is Rs 19,757, costs of well and pump account for about 27% of income,

which would be severe burden for farmers.

Table-16 shows the relation between increased yield converted into maney after S.T.W.P. and other various S.T.W.P. costs.

Table-16 Net increased yield by S.T.W.P.

Scale of farmers	Increased benefit per farmer A (Rs)	Number of well per farmer B	Increased benefit per well $\frac{A}{B}=E$ (Rs)	Annual pump operating hours C	Operating cost per hour D (Rs)	Annual operating cost C×D=F (Rs)	Increased net benefit by S.T.W.P. E-F=G (Rs)
0 1	19,422	1.0	19,422	69	58.3	4,023	15,399
1 2	10,664	1.0	10,664	106	41.2	4,367	6,297
2 3	8,708	1.0	8,708	117	38.2	4,469	4,239
3 4	-713	1.1	-648	154	31.3	4,820	-5,468
4 5	8,563	1.3	6,587	172	29.0	4,988	1,599
5 10	22,290	1.5	14,860	202	26.0	5,252	9,608
10 15	22,770	1.5	15,180	243	23.2	5,637	9,543
15 20	52,402	1.75	29,944	359	18.7	6,713	23,231
20	8,628	1.75	4,930	409	17.6	7,198	-2,268
Whole	9,821	1.4	7,015	216.8	24.9	5,398	1,617

A : Increased yield of paddy, wheat and maize between 1981 and 1983, which was converted into money.

Paddy: Rs 2.6/kg, wheat: Rs 3/kg, maize: Rs 2.5/kg

D : We substituted them for the formula, $C = 9.3225 + \frac{3377}{h}$ as shown Fig.-44.

After carrying out S.T.W.P., big discrepancy of increased benefit was found depending on scale of farmers. In poor farmers and large scale farmers, especially S.T.W.P. made a contribution to increased benefit, but in medium scale of farmers and super-large scale of farmers it showed less benefit.

This calculation, however, was made including both "IN S.T.W.P" and "OUT OF S.T.W.P" on land. If this were calculated only by "IN S.T.W.P", effect of well could

show remarkably.

As for medium and large scale of farmers showed the result of minus, they almost gave up "OUT OF S.T.W.P.", showing decrease in both amount of yield per ha and planting area. Even if increase was found, it resulted in less or no-change on the whole.

Costs after carrying out S.T.W.P. increased more than before, so that income of farmers resulted in minus.

2-3 Farmer's opinion on AA Training (Attached Table 2-4)

Farmers' answers about their hope hereafter on training and how training worked well to manage farming are as follows.

As for training they want to take, the highest ratio of all, more than 70% of them want trainings such as crops (cultivation) and disease, and insects injury. Followed horticulture, soil for 45%. Then agricultural machines and irrigation for 30%. Also, as for "factor of increased yield" of previous items, more than 90% of AA points out improved variety, fertilizer and new technology. Positive relation was found between this result and items desired for training. Although many wanted to study about disease and insects injury, only 43% answered that use of agricultural chemicals led to an increase of yield.

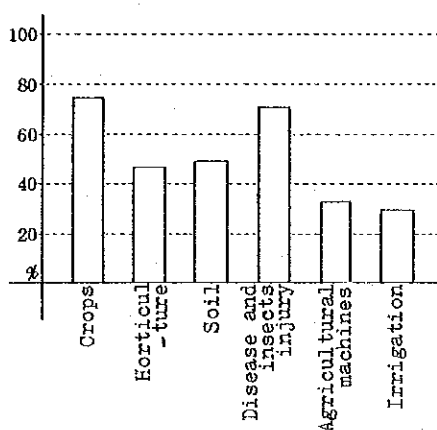
Farmers are much interested in disease and insects injury as a big problem, but they can't exterminate because of shortage of sprayer and agricultural chemicals under the present conditions. As for agricultural machines and irrigation, fewer farmers wanted to take training, this would be due to the under developed stage of agriculture. However, was the training useful to manage on a question of agriculture?", all farmers answered "Yes". We gave them a test at the same time with this survey, of which content was the same carried out at training new AA. Fig.-45 shows the result.

Those farmers who took training years ago took high score, though there was no big difference in each year. Average score of AA immediately after training got 67 points, on

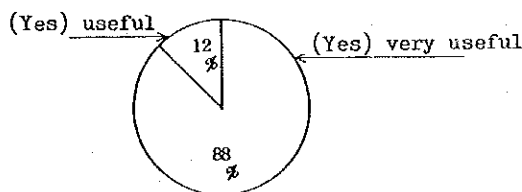
the other hand, old AA got 43.8 points, a little less than former ones. It would be natural that they forget knowledge as time goes by. But, even old AA could maintain 45 - 48 points, J.A.D.P.'s follow-up training, JT and JTA's guidance contributed it a lot.

Fig.-45 Farmer's opinion on AA training

What subject would you like to take hereafter?
 (Ratio on the number of all farmers)



Do you think the training was useful to farming?
 (Ratio on the number of all farmers)



Test result of AA

Before training 22.1 points
 Immediately after training 67.0 points
 → From the result of 1983 and 1984

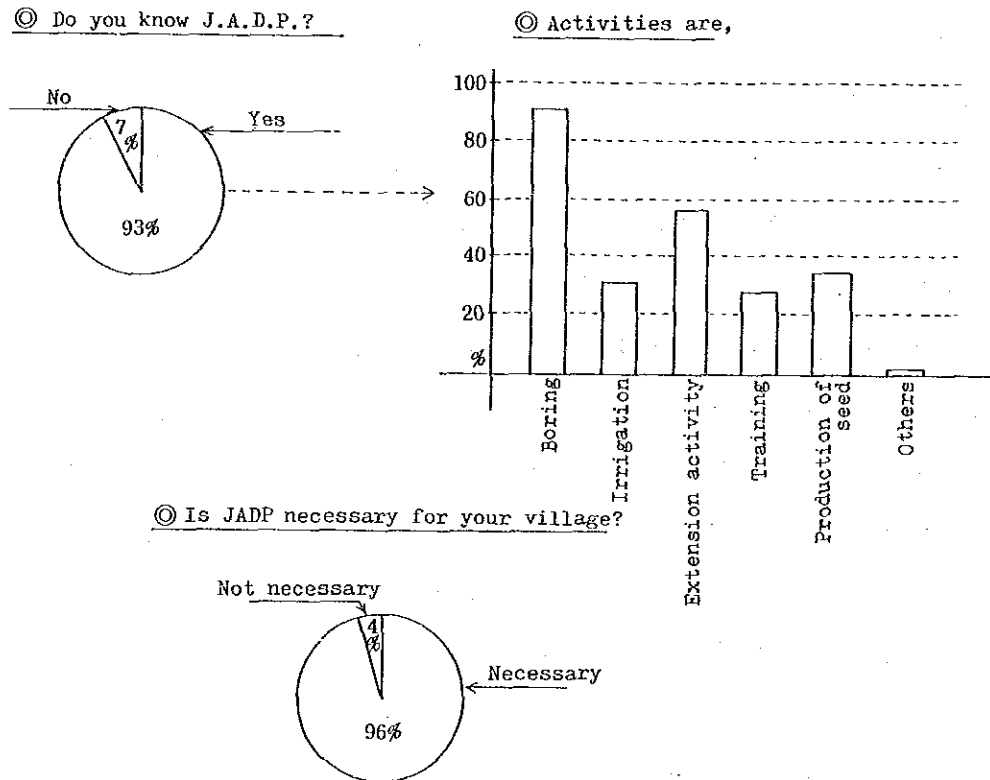
Training in each year (Carried out at the survey)

Training year	Points
76-77	48.9
77-78	39.9
78-79	44.7
79-80	47.8
80-81	40.8
81-82	42.3
82-83	42.4
Overall	43.8

2-4 Farmer's understanding on JADP of the Non-project area surveyed

Even non-project area of surveyed J.A.D.P.'s activity, 93% of the people know J.A.D.P. somehow. Among activities, boring (drilling well) was most widely known, and extension activities follows that. On a question of "Are J.A.D.P's activities necessary for your village?", 96% answered "necessary". Some poor scale of farmers answered "Not necessary".

Fig.-46 Understanding on JADP of the Non-project area surveyed



3. Economic effect of IMFs (Irrigated Model Farm Scheme) Project
and spread effect as Model farm

In summarizing I.M.F.

As we have measured extension effect of whole this JADP so far, in this chapter we will more detail view of economic effect of I.M.F.s carried out since the second - 4th half term in 1981 in order to promote shallow tube well programme.

The ratio of cultivated area of joined farmers within IMF is as follows. 35% in Hasinapar 17% in Saphi area, 29% in Goushala area, 39% in Iswarpur area and 26% in IAP No. 5 area.

Rainwater is mainly used for some farmers' cultivated land as various area joined. The role of IMF accounting for in these farmers' annual gross income is, as a matter of course, proportional to its ratio. IMF activities were aimed to demonstrate and extend not for whole area of Terai three Districts, but for shallow tube well practicable area of about 1/4 area in Terai plain three Districts. The scale and the number of establishment of IMF are not enough for this extensive area.

Only about 2.5 years have passed for cultivation period since IMF was established, in which cultivation period of 2.5 years, they had a big drought in 1982. Under these circumstances, it is quite difficult to carry out extension effect evaluation based on a generally discussed farmer's economy. Therefore, we are not going to discuss about extension effect from the view of farmers' economy. But we will only give the present analysis of cultivation

mainly on farming income and expenditure per unit area.

3-1 Outline and utility of IMFs programme

3-1-1 Outline of programme

The primary object of R/D project renewed in 1979 was placed on extension activity of developed various agricultural technology during the previous R/D period.

As the most appropriate approach to achieve this purpose, irrigated agricultural model-farm scheme was taken up.

Farms constructed as shallow tube well project were carried out not only for key positions of extension activities but also for preceding trial activities of S.T.W.P. (Shallow Tube Well Project).

On this programme, we carried out adjustment of agricultural foundation activity, taking up four areas, from cultivated lands where rainwater dependent type agriculture to shallow tube well irrigated agriculture model farms and one area (46 ha) of deep tube well irrigated agriculture model farm. As the degree of improvement, considering present and future situation of Nepal's land consolidation, we set up "Intensive Type" of land consolidation requires and "General Type" of no land consolidation required.

We carried out the project selecting one area of shallow tube well irrigated model farm as the former and three areas of shallow tube well irrigated model farm and one area of deep tube well irrigated model farm as the latter.

Table-1 Model Farm

Name of model farm	District	Area (ha)	Well	Type of Development
1. Iswarpur	Sarlahi	5.6	Shallow tube well	General Type
2. Goshala	Mahottari	4.1	Shallow tube well	General Type
3. Saphy	Dhanusa	4.6	Shallow tube well	General Type
4. Sakhuwa	Dhanusa	5.0	Shallow tube well	Intensive Type
5. I A P (No.5 Water control Block)	Dhanusa	45.6	Deep tube well	General Type
Total		64.9		

3-1-2 Course of programme

IAP programme (Intensive Irrigated Agriculture Programme), one of main projects since establishment of JADP, had various problems of commercial agriculture and water control with a decrease of artesian well. There was a strong demand for farmers getting lot more amount of irrigated water.

JADP understood that first purpose of introduction of irrigated agriculture was, to some degree, achieved. Then, Model Infla project was introduced into some part of No.5 (45.6 ha) in IAP area (420 ha) to meet the demand of consciously minded farmers of making effective use of water source.

Table-2 Change of artesian discharge

Year, Month	No1	No2	No3	No4	No5	No6	No7	No8	No9	Total (l/s)	Volume proposed of water discharge (l/s) at Block
1975-- 4				14.4			4.7	9.4		28.5	80.0
7				16.8			3.9	9.8		30.5	"
8				14.5			4.9	10.0		29.4	"
11				15.9			8.1	10.4		34.4	"
1976-- 3				16.8		25.0	8.0	11.2		53.8	100.0
6	28.0	15.0		16.8	18.0	24.0	8.0	11.2		120.0	138.0
10	22.5	19.7		10.6	15.3	19.4	8.2	8.1		103.8	"
1977-- 1	23.6	18.2		10.9	12.6	14.7	11.5	8.8		100.3	"
3	18.3	15.7	18.0	10.4	11.2	14.1	12.7	8.9		109.3	153.0
5	16.3	14.9	14.9	9.4	8.7	17.4	10.9	8.0	29.0	129.5	"
9	12.2	11.5	11.8	7.6	8.4	17.7	8.7	6.4	28.6	112.9	"
1978-- 6	9.6	12.0	11.5	7.8	12.2	22.0	9.5	11.1	28.3	124.0	"
1979-- 5	7.1	8.6	7.7	5.7	10.4	8.2	5.0	8.1	13.1	73.9	"
7	9.4	15.1	9.8	8.7	12.4	14.9	7.5	10.4	20.8	109.0	"
1980-- 7	7.4	9.6	7.6	6.2	11.6	13.5	5.7	9.2	18.5	89.3	"
12	17.0	12.4	10.7	11.8	13.0	18.7	8.9	9.9	23.4	125.8	"
1981-- 6	4.8	8.3	7.2	6.3	10.7	12.4	7.2	8.7	17.2	82.8	"
12	15.8	13.2	11.0	10.5	12.8	13.3	9.1	9.2	19.1	113.4	"
1982-- 6	2.5	8.0	6.5	4.5	(12.8)	13.0	2.7	8.3	13.3	71.6	"

NOTE: Deep well No.5 (1982-6) is estimated-value

On choosing areas for this IMF programme (5 areas), except IAP No.5, where was decided at the beginning, following points were kept in mind.

- a. Shallow ground water should be abundant.
- b. Demonstration effect should be expected at the place.
- c. Should be intended for more than two farmers to show the shallow tube well irrigation scheme. (bringing up small scale farmers)
- d. Should be intended for STWP practicable whole area of Terai Plain Three Districts. (Spread effect of demonstration farm)
- e. Should be intended for relatively high farming practical farmers.

Application of IMF programme ended before rainy season in

1981, then cultivation demonstration activity started from normal paddy planting at this time. Also, introduction of shallow tube well into general farmers started in dry season, November of the same year from full-scale boring/operation.

3-1-3 Utilizing purpose of IMF programme

- a. Key position of promotion and extension activities for Shallow Tube Well programme (hereafter simply termed as STWP)

The project will be a model for the those farmers introducing STW as a preceding of STWP and also be effect to promote this programme.

- b. Development of improved technology and actual proof of this technology.

Irrigated agriculture especially such as pumping-up irrigation farming of STW costs a lot of investment. This model farm should be a place of actual proof and practical trial comparing study of improvement, of irrigated agriculture, collection of data required to assembly and economical agricultural, improved technology.

- c. Bringing up small scale of farmers, and Organizing irrigation committee

Joined farmers, 17 in Hasinapur, 19 in Saphi, 122 in IAP No.5, are all organized by small scale of farmers except some farmers. Schemed STWP might be called a small irrigation each farmer holds.

However, JADP were really afraid that it was difficult for