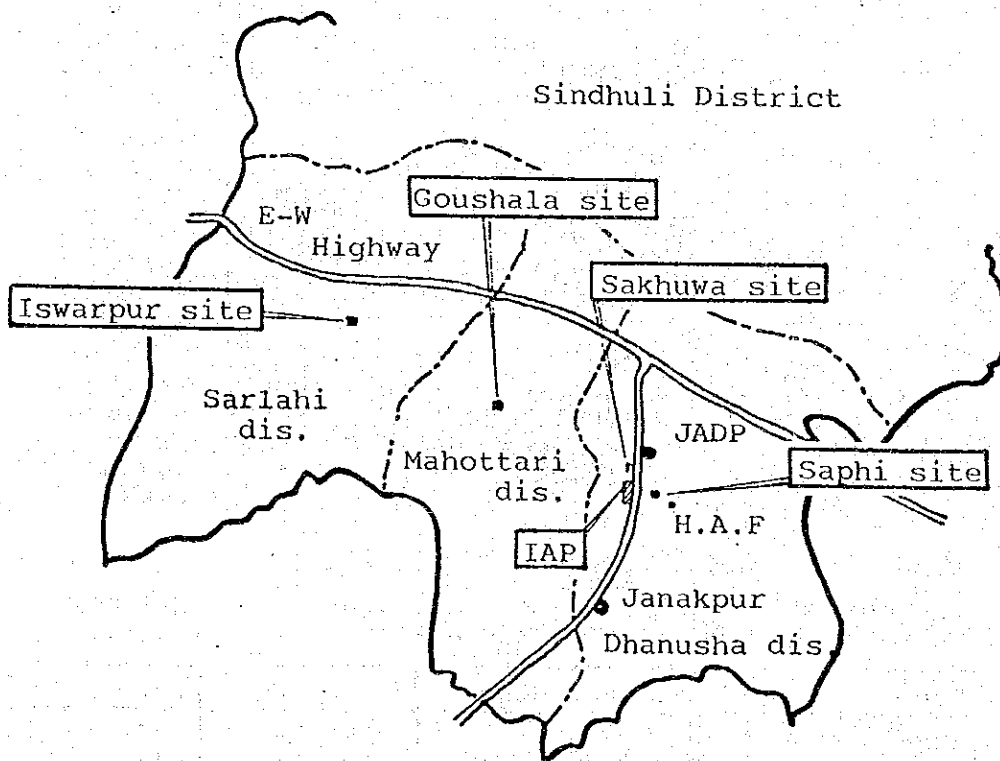


PROPOSED CROPPING PATTERN
AND
EXPECTED PRODUCTION INCREASE
ON
IRRIGATED MODEL FARM SCHEME

Janakpur Zone Agriculture Development Project

August 1981



Terai 3 districts of Janakpur Zone

IRRIGATED MODEL FARM SCHEME

Introduction :

In accordance with introduction of Shallow Tubewell Development Programme, Irrigated Model Farm Scheme (IFMS) has been established in order to demonstrate or to guide farmers who are going to utilize pump set for agriculture production since irrigation water was defined as "The most important factor of agriculture production".

IMFS site was selected in Terai three districts of Dhanusha, Mahottari and Sarlahi in Janakpur Zone. They are, Sakhuwa, Saphi (Dhanusha), Goushala (Mahottari) and Iswarpur (Sarlahi) as it is described in cover paper.

Among four sites, Sakhuwa site is so called "Intensive type" (land consolidation involved) and others are "General type". In addition to IMFS for shallow tubewell zone, one IMFS in IAP (Intensive irrigation and agriculture programme) has also been established for deep tubewell zone.

Conditions/Assumptions :

(1). Running cost of pump set

For the purpose of formulation of agronomical programme, the conditions and the assumptions stated in table-1 were applied. However, water discharge of tube-well vary from site to site. Therefore, pump running cost/operation cost was calculated according to the actual pumping test results as it is shown below.

site	water discharge	water cost	remarks
Iswarpur	6 litre/sec.	RS.0.60/m ³	General
Goushala	11 "	RS.0.32/m ³	General
Saphi	10 "	RS.0.36/m ³	General
Sakhuwa	20 "	RS.0.14/m ³	Intensive

Note: Fuel consumption of 1.5 litre/hour plus 10% of fuel cost for lubricant were assumed with the unit price of fuel/diesel of RS.5.65/litre.

(running cost : RS.9.3/hr.)

Water losses of 10% in Sakhuwa (intensive) and 28% for other sites (general) was considered.

(2). Fertilizer, seed, labour cost and etc.

The cost of fertilizer, seed and labour are mentioned in table-1. Quantity of these input are as follows.

Crops	Fertilizer dose	Seed	Labour etc.
Normal paddy	70kg N/ha.	35kg/ha.	158days/ha.
Wheat	80kg N+40kg P/ha.	100kg/ha.	113 "
Maize	80kg N+30kg P/ha.	20kg/ha.	120 "
Mung bean	20kg N+10kg P/ha.	20kg/ha.	83 "
Vegetables	70-30-30kg NPK/ha	0.6kg/ha.	350 "
Tobacco	(RS.903/ha.)	(RS.45/ha.)	667 "

(3). Initial investment

Cost of initial investment (pumpset, tube-well, facility and cost of capital) is not counted in the calculation.

COST OF PRODUCTION AND EXPECTED PRODUCTION INCREASE FOR
SHALLOW TUBE-WELL DEVELOPMENT PROGRAMME IN TERAI PLAIN
OF JANAKPUR ZONE

Table-1

(Per ha. base)

Crops Items	Paddy		Wheat	Maize			Mung bean	Tobacco
	Normal	Early		Winter	Spring	Summer		
Duration(days)	120	100	120	150	120/90	120/90	75	120
Days/Times of irrigation	105	85	4times	5times	4times	4times	2times	5times
Required water (mm/day or time)	6.28 mm/day	6.28 mm/day	60mm/ time	60mm/ time	60mm/ time	60mm/ time	60mm/ time	60mm/ time
Water for field preparation	100mm	100mm	-	-	-	-	-	-
Total water re- quired(m ³ /ha.)	7,600	6,340	2,400	3,000	2,400	2,400	1,200	3,000
*Expected effective rainfall(m ³ /ha.)	5,600 6/15- 11/30	2,670 4/15- 7/15	-	-	640 2/1- 5/30	4,390 4/15- 8/15	1,050 4/15- 6/30	-
Water to be irr- igated (m ³ /ha.)	2,000	3,670	2,400	3,000	1,760	-	150	3,000
** Pump operation (hrs./ha.)	77	141	92	115	68	-	6	115
Pump operation/ running cost (fuel + lubricant) A. (RS/ha.)	716	1,311	855	1,070	632	-	56	1,070
Fertilizer cost (RS/ha.)	472	472	782	722	722	722	193	903
Seed (RS/ha.)	70	70	318	40	40	40	40	45
B. fertilizer+seed	542	542	1,100	762	762	762	233	948
Labour/operation cost(RS./ha.)								
Present	850	850	630	650	650	650	450	3,500
C. Programme	950	950	680	720	720	720	500	4,000
Total cost(RS.) A + B + C	2,208	2,803	2,635	2,552	2,114	1,482	849	6,018
Expected yield (t/ha.)	3.5	3.0	2.5	3.0	2.8	2.8	0.5	1.0
Expected unit price of product(RS/kg)	1.5	1.5	1.8	1.3	1.3	1.3	5.0	13.2
Gross output D. (RS/ha.)	5,250	4,500	4,500	3,900	3,640	3,640	2,500	13,200
Net benefit(RS/ha.) D - (A + B + C)	3,042	1,697	1,865	1,348	1,526	2,158	1,651	7,182

Note : *Effective rainfall recorded in 1981 at Hardinath Agriculture Farm, counted on daily rainfall base with 80% of more than 5mm and less than 80mm.

**Pump operation hours and running cost are calculated based on the assumption of 10 l/sec(discharge), 28% losses and fuel consumption of 1.5 litre/hour.

Unit price of inputs are assumed as follows:

Fuel/diesel : RS.5.65/l., Lubricant: 10% of fuel cost,

Fertilizer Urea: RS.3.10/kg,

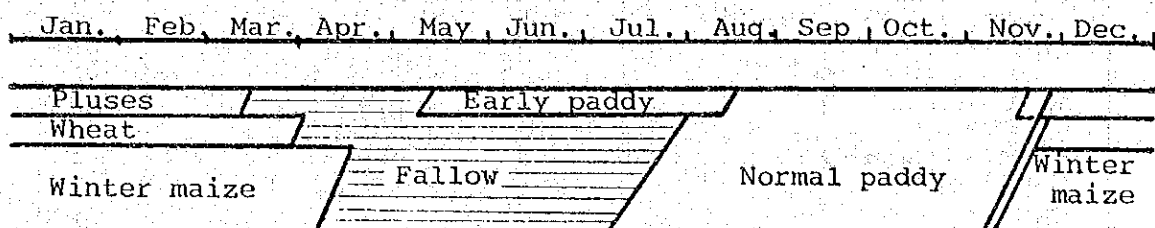
Triple Super Phosphate(TSP): RS.2.73/kg.

Labour: RS.6.0/day (7 hours/day)

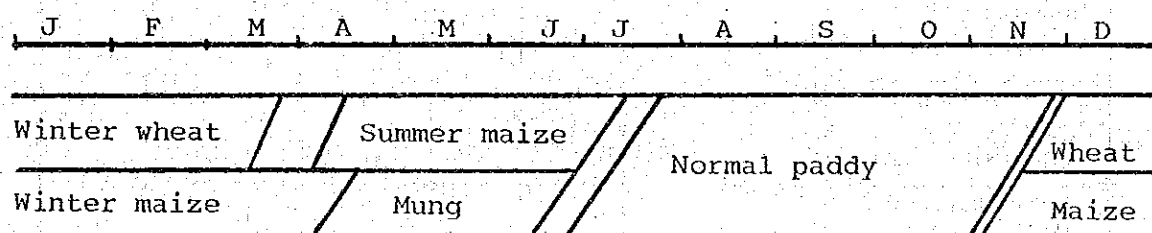
Iswarpur panchayat
 Sarlahi district
 Projected area : 5.6 ha.
 Landholder : Jainur Mukeri

1. Cropping pattern :

A. Previous pattern



B. IMFS (Programme)



2. Planted area and production :

Crops	Previous			IMFS			Incremental gross benefit X10 ³ RS.
	Planted area (ha)	Yield (t/ha)	Gross benefit X10 ³ RS	Planted area (ha)	Yield (t/ha)	Gross benefit X10 ³ RS	
Normal paddy	5.60	2.30	19.32	5.60	3.50	29.40	10.08
Early paddy	0.50	2.40	1.80	-	-	-	-1.80
Winter wheat	1.00	0.80	1.44	3.00	2.50	13.50	12.06
Winter maize	4.00	1.00	5.20	2.60	3.00	10.14	4.94
Summer maize	-	-	-	3.00	2.80	10.92	10.92
Mung bean	-	-	-	2.60	0.50	6.50	6.50
Winter pluse	0.60	0.20	0.60	-	-	-	-0.60
Total	11.70		28.36	16.80		70.46	42.10
Cropping intensity	209%			300%			

Iswarpur panchayat
Projected area : 5.6 ha.

3. Production cost :

Crops	Area (ha)	Previous cost (X 10 ³ RS)			Area (ha)	IMFS (X 10 ³ RS.)					Incremental Production cost (X 10 ³ RS.)
		Ferti-lizer	seed	Labour		Total	Ferti-lizer	Seed	Labour	Pump running	
Normal paddy	5.60	-	0.39	4.76	5.15	2.64	0.39	5.32	6.72	15.07	9.92
Early paddy	0.50	0.05	0.03	0.42	0.50	-	-	-	-	-	-0.50
Wheat	1.00	0.56	0.31	0.63	1.50	2.34	0.95	2.04	4.32	9.65	8.15
Maize (W)	4.00	2.88	0.16	2.60	5.64	1.87	0.10	1.87	4.68	8.52	2.88
Maize (S)	-	-	-	-	-	2.16	0.12	2.16	0.27	4.71	4.71
Mung	-	-	-	-	-	0.50	0.26	1.30	0.23	2.29	2.29
Pulses	0.60	-	0.06	0.12	0.18	-	-	-	-	-	-0.18
Total	11.70	3.49	0.95	8.53	12.97	9.51	1.82	12.69	16.22	40.24	27.27

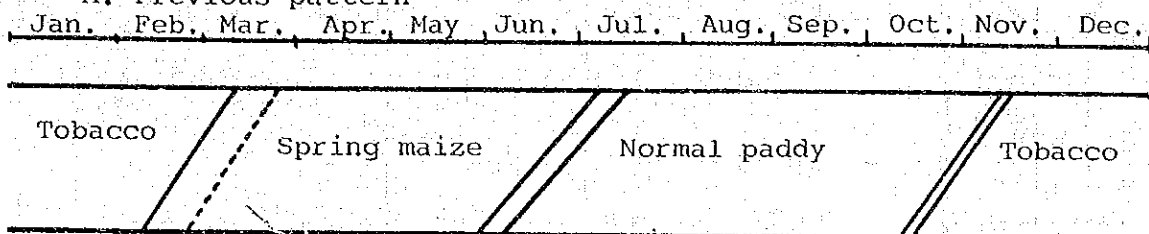
4. Production cost and benefit : (RS.)

Crops	Incremental gross benefit	Incremental production cost	Incremental net benefit
Normal paddy	10,080	9,920	160
Early paddy	-1,800	-500	-1,300
Winter wheat	12,060	8,150	3,910
Winter maize	4,940	2,880	2,060
Summer maize	10,920	4,710	6,210
Mung bean	6,500	2,290	4,210
Winter pulses	-600	-180	-420
Total	42,100	27,270	14,830

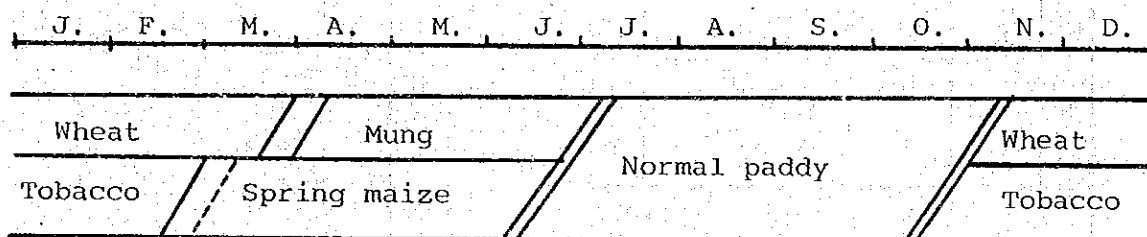
Goushala panchayat
 Mahottari district
 Projected area : 4.1 ha.
 Landholder : Mukund Prasad

1. Cropping pattern :

A. Previous pattern



B. IMFS (programme)



2. Planted area and production :

Crops	Previous			IMFS			Incremental gross benefit X10 ³ RS.
	Planted area (ha.)	Yield (t/ha.)	Gross benefit X 10 ³ RS	Planted area (ha.)	Yield (t/ha.)	Gross benefit X10 ³ RS	
Normal paddy	4.10	2.20	13.53	4.10	3.50	21.52	7.99
Winter wheat	-	-	-	2.00	2.50	9.00	9.00
Spring maize	4.10	1.20	8.85	2.10	2.80	7.64	-1.21
Tobacco	4.10	0.50	27.06	2.10	1.00	27.72	0.66
Mung bean	-	-	-	2.00	0.50	5.00	5.00
Total	12.30		49.44	12.3		70.88	21.44
Cropping intensity	300%			300%			

Goushala panchayat
Projected area : 4.1 ha.

3. Production cost :

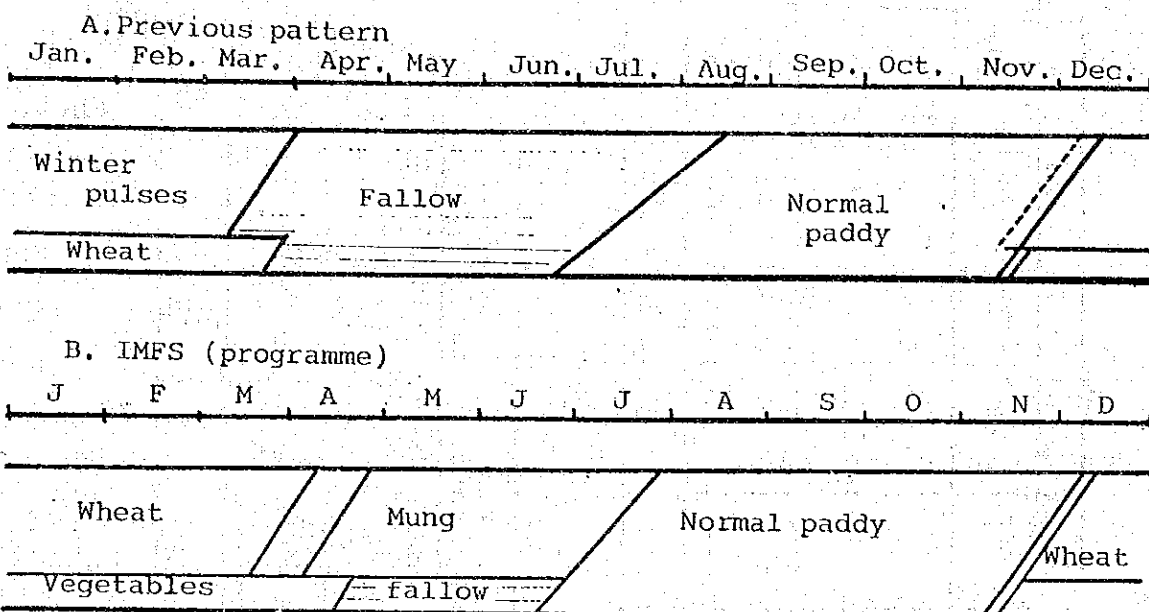
Crops	Area (ha)	Previous cost (X10 ³ RS)				Area (ha)	IMFS (X 10 ³ RS)				Incremental production cost (X 10 ³ RS)	
		Ferti-lizer	Seed	Labour	Total		Ferti-lizer	Seed	Labour	Pump running		Total
Normal paddy	4.1	-	0.28	3.48	3.76	4.1	1.93	0.28	3.89	2.62	8.72	4.96
Wheat	-	-	-	-	-	2.0	1.56	0.63	1.36	1.53	5.08	5.08
Maize	4.1	-	0.16	2.66	2.82	2.1	1.51	0.08	1.51	1.18	4.28	1.46
Tobacco	4.1	1.10	0.18	14.35	15.63	2.1	1.95	0.09	8.40	2.01	12.45	-3.18
Mung	-	-	-	-	-	2.0	0.38	0.20	1.00	0.09	1.68	1.68
Total	12.3	1.10	0.62	20.49	22.21	12.3	7.33	1.28	16.16	7.43	32.21	10.00

4. Production cost and benefit : (RS.)

Crops	Incremental gross benefit	Incremental production cost	Incremental net benefit
Normal paddy	7,990	4,960	3,030
Winter wheat	9,000	5,080	3,920
Maize	-1,210	1,460	-2,670
Tobacco	660	-3,180	3,840
Mung bean	5,000	1,680	3,320
Total	21,440	10,000	11,440

Saphi Panchayat
 Dhanusha district
 Projected area : 4.6 ha.
 Number of farmers : 19

1. Cropping tattern :



2. Planted area and production :

Crops	Previous			IMFS			Incremental gross benefit X1000RS
	Planted area (ha.)	Yield (t/ha.)	Gross benefit X1000RS	Planted area (ha.)	Yield (t/ha.)	Gross benefit X1000RS	
Normal paddy	4.6	1.5	10.35	4.6	3.5	24.15	13.80
Winter wheat	0.5	0.6	0.54	4.0	2.5	18.00	17.46
Mung bean	-	-	-	4.0	0.5	10.00	10.00
Winter pluse	4.1	0.1	2.05	-	-	-	-2.05
Vegetables	-	-	-	0.6	±5.0	6.00	6.00
Total	9.2		12.94	13.2		58.15	45.21
Cropping intensity	200%			287%			

Saphi panchayat
Projected area; 4.6 ha.

3. Production cost :

Crops	Area (ha)	Previous cost (X 1000RS)			Area (ha)	IMFS (X 1000RS.)					Incremental production cost (X 1000RS.)
		Fertilizer	seed	labour		Total	Fertilizer	Seed	Labour	Pump running	
Normal paddy	4.6	0.14	0.32	3.91	4.37	2.17	0.32	4.37	3.29	10.15	5.78
Wheat	0.5	0.15	0.15	0.31	0.61	3.12	1.27	2.72	3.42	10.53	9.92
Mung	-	-	-	-	-	0.77	0.40	2.00	0.22	3.39	3.39
Winter pulses	4.1	-	0.41	0.82	1.23	-	-	-	-	-	-1.23
Vegetables	-	-	-	-	-	0.44	0.02	1.26	0.86	2.58	2.58
Total	9.2	0.29	0.88	5.04	6.21	6.5	2.01	10.35	7.79	26.65	20.44

4. Production cost and Benefit : (RS,)

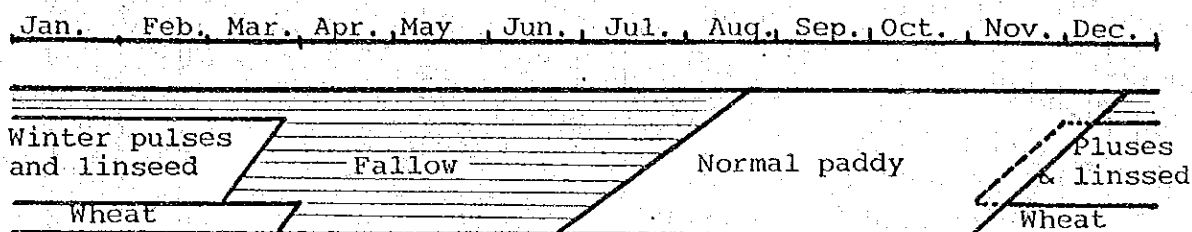
Crops	Incremental gross benefit	Incremental production cost	Incremental net benefit
Normal paddy	13,800	5,780	8,020
Winter wheat	17,460	9,920	7,540
Mung bean	10,000	3,390	6,610
Winter pulses	-2,050	-1,230	-820
Vegetables	6,000	2,580	3,420
Total	45,210	20,440	24,770

Note : Initial investment (Cost of pumpset, tube-well, other facilities and cost of capital) is excluded.

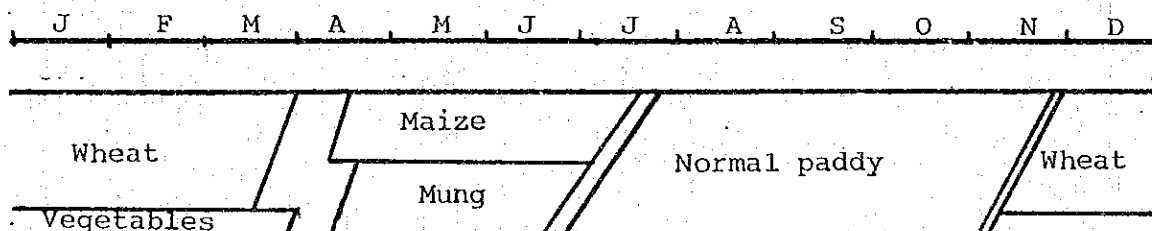
Sakhuwa panchayat
 Dhanusha district
 Projected area : 7.0 ha.
 Number of farmers : 17

1. Cropping pattern :

A. Previous pattern



B. IMFS (Programme)



2. Planted area and production :

Crops	Previous			IMFS			Incremental gross benefit X10 ³ RS
	Planted area (ha)	Yield (t/ha)	Gross benefit X10 ³ RS	Planted area (ha)	Yield (t/ha.)	Gross benefit X10 ³ RS	
Normal paddy	7.00	1.60	16.80	7.00	3.50	36.75	19.95
Winter wheat	0.50	1.00	0.90	6.70	2.50	30.15	29.25
Maize	-	-	-	4.00	2.80	14.56	14.56
Mung	-	-	-	3.00	0.50	7.50	7.50
Winter pulse & linseed	4.50	0.15	3.37	-	-	-	-3.37
Vegetables	-	-	-	0.30	±5.00	3.00	3.00
Total	12.00		21.07	21.00		91.96	70.89
Cropping intensity	171%			300%			

Sakhuwa panchayat
Projected area : 7.0 ha.

3. Production cost :

Crops	Area (ha)	Previous cost (X 10 ³ RS)			Area (ha)	IMFS (X 10 ³ RS.)					Incremental production cost (X 10 ³ RS.)	
		Ferti-lizer	seed	labour		Total	Ferti-lizer	seed	labour	Pump running		Total
Normal paddy	7.00	-	0.49	5.95	6.44	7.00	3.30	0.49	6.65	1.96	12.40	5.96
Wheat	0.50	0.07	1.60	0.31	1.98	6.70	5.24	2.13	4.55	2.25	14.17	12.19
Maize	-	-	-	-	-	4.00	2.89	0.16	2.88	0.84	6.77	6.77
Mung	-	-	-	-	-	3.00	0.58	0.30	1.50	0.63	3.01	3.01
Pulses & linseed	4.50	-	0.45	0.90	1.35	-	-	-	-	-	-	-1.35
Vegetables	-	-	-	-	-	0.30	0.22	0.01	0.63	0.17	1.03	1.03
Total	12.00	0.07	2.54	7.16	9.77	21.00	12.23	3.09	16.21	5.85	37.38	27.61

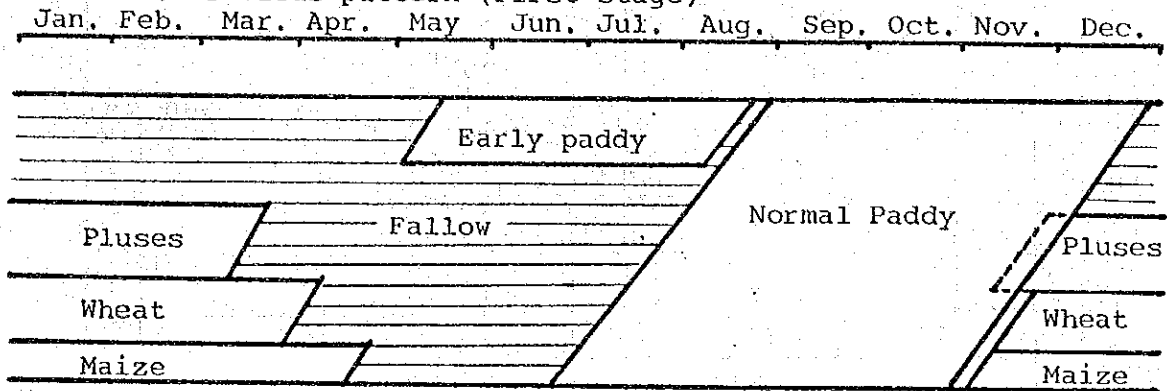
4. Production cost and benefit : (RS.)

Crops	Incremental gross benefit	Incremental production cost	Incremental net benefit
Normal paddy	19,950	5,960	13,990
Winter wheat	29,250	12,190	17,060
Maize	14,560	6,770	7,790
Mung bean	7,500	3,010	4,490
Pluses & linseed	-3,370	-1,350	-2,020
Vegetables	3,000	1,030	1,970
Total	70,890	27,610	43,280

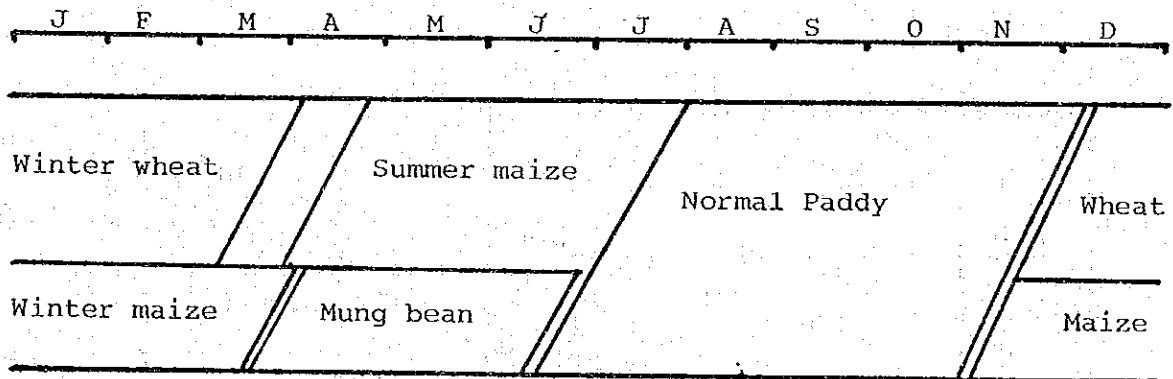
IAP area
 Dhanusha district
 Projected area : 45.6 ha.
 Cultivated area: 45.0 ha.

1. Cropping pattern :

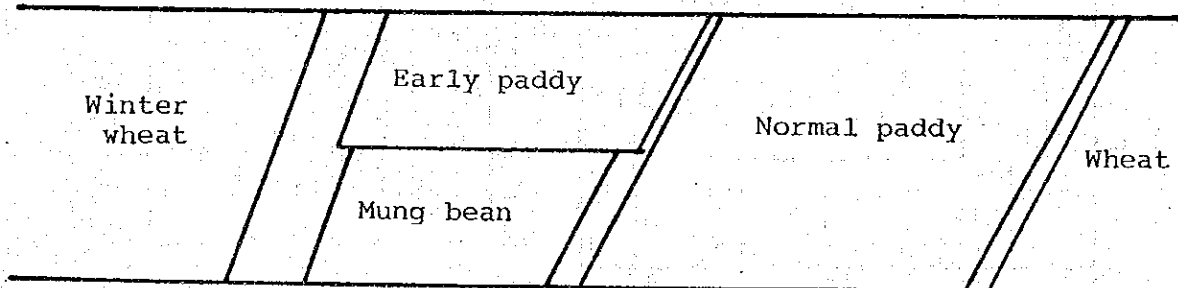
A. Previous pattern (First stage)



B. Proposed pattern (alternative-1)



B-2. Proposed pattern (alternative-2)



2. Planted area and production :

	Crops	Planted area (ha)	Yield (t/ha)	Gross production (t)	Gross outputs (X10 ³ RS)	Incremental gross output VS First stage(X10 ³ RS)
First stage	Normal paddy	45.0	2.08	93.6	140.40	
	Early paddy	10.5	1.99	20.9	31.35	
	Winter wheat	12.0	1.33	16.0	28.80	
	Maize	4.2	2.00	8.4	10.92	
	Pluses	9.0	0.20	1.8	9.00	
	Total	80.7			220.47	
	Cropping intensity	179%				
Alternative-1	Normal paddy	45.0	3.50	157.5	236.25	
	Winter wheat	30.0	2.50	75.0	135.00	
	Winter maize	15.0	3.00	45.0	58.50	
	Summer maize	30.0	2.80	84.0	109.20	
	Mung bean	15.0	0.50	7.5	37.50	
	Total	135.0			576.45	355.98
	Cropping intensity	300%				
Alternative-2	Normal paddy	45.0	3.50	157.5	236.25	
	Early paddy	22.5	3.00	67.5	101.25	
	Winter wheat	45.0	2.50	112.5	202.50	
	Mung bean	22.5	0.50	11.2	56.00	
	Total	135.0			596.00	375.53
	Cropping intensity	300%				

Incremental gross output/gross benefit VS first stage :

Alternative-1 : RS.576,450 - 220,470 = RS.355,980
 RS.355,980/45 ha. = 7,910/ha/year

Alternative-2 : RS.596,000 - 220,470 = RS.375,530
 RS.375,530/45 ha. = 8,345/ha/year

3. Production cost :

	Crops	Area planted (ha)	Production cost (X 10 ³ RS.)				Total
			Fertilizer	Seed	Labour etc.	Pump running	
First stage	Normal paddy	45.0	3.75	3.15	38.25	-	45.15
	Early paddy	10.5	0.90	0.73	8.92	-	10.55
	Winter wheat	12.0	2.26	3.81	7.56	-	13.63
	Maize	4.2	0.80	0.17	2.73	-	3.70
	Pluses	9.0	-	0.90	1.80	-	2.70
	Total	80.7	7.71	8.76	59.26	-	75.73
Alternative-1	Normal paddy	45.0	21.24	3.15	42.75	15.30	82.44
	Winter wheat	30.0	23.46	9.54	20.40	14.40	67.80
	Winter maize	15.0	10.83	0.60	10.80	9.00	31.23
	Summer maize	30.0	21.66	1.20	21.60	0.90	45.36
	Mung bean	15.0	2.89	1.50	7.50	0.45	12.34
	Total	135.0	80.08	15.99	103.05	40.05	239.17
Alternative-2	Normal paddy	45.0	21.24	3.15	42.75	15.30	82.44
	Early paddy	22.5	10.62	1.57	21.37	16.51	50.07
	Winter wheat	45.0	35.19	14.31	30.60	21.60	101.70
	Mung bean	22.5	4.34	2.25	11.25	0.67	18.51
	Total	135.0	71.39	21.28	105.97	54.08	252.72

Incremental production cost over first stage :

Alternative-1 : RS.239,170 - RS.75,730 = RS.163,440
 RS.163,440/45 ha. = RS.3,632/ha/year

Alternative-2 : RS.252,720 - RS.75,730 = RS.176,990
 RS.176,990/45 ha. = RS.3,933/ha/year

Note : Fuel consumption of 2.5 litre/hr. plus 10% of fuel cost for lubricant were assumed.

Water discharge of 35 litre/sec. at monsoon (normal paddy) and 30 litre/sec. at other season with water loss of 28% were assumed.

Running cost of irrigation water was calculated considering only when water is pumped up.

4. Production cost and benefit : (RS.)

IAP area

A. Alternative -1

Crops	Incremental gross benefit	Incremental production cost	Incremental net benefit
Normal paddy	95,850	37,290	58,560
Winter wheat	106,200	54,170	52,030
Winter maize	47,580	27,530	20,050
Summer maize	109,200	45,360	63,840
Mung bean	37,500	12,340	25,160
Early paddy	-31,350	-10,550	-20,800
Winter pulses	-9,000	-2,700	-6,300
Total	355,980	163,440	192,540

B. Alternative -2

Crops	Incremental gross benefit	Incremental production cost	Incremental net benefit
Normal paddy	95,850	37,290	58,560
Early paddy	69,900	39,520	30,380
Winter wheat	173,700	88,070	85,630
Mung bean	56,000	18,510	37,490
Maize	-10,920	-3,700	-7,220
Winter pulses	-9,000	-2,700	-6,300
Total	375,530	176,990	198,540

5. Incremental net benefit :

A. Alternative -1

RS.192,540/45 ha. = RS.4,278/ha/year

B. Alternative -2

RS.198,540/45 ha. = RS.4,412/ha/year

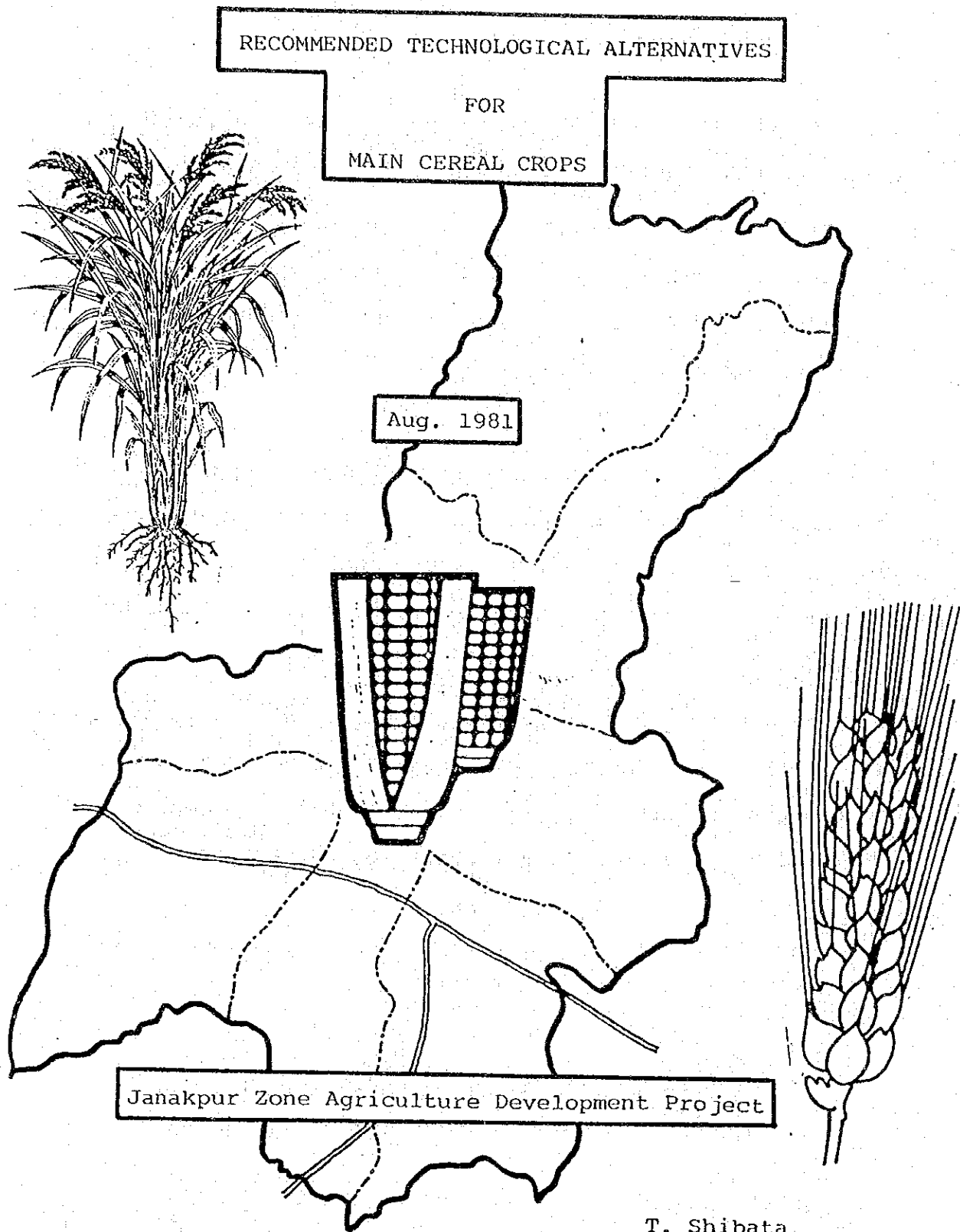
MANAGEMENT SCHEDULE OF RICE DEMONSTRATION PLOT
FOR IRRIGATED MODEL FARM SCHEME

Normal paddy 1981

Sites Management	Hasinapur	Saphi	Gaushala	Iwarpur	Remarks
Seedbed preparation	June 14-16	June 13-15	June 29-30	July 3-5	1/20 area of main field
Fertilizer application for seedbed	June 16	June 15	July 1	July 5	6gram each of N & P/m ²
Seed sowing	June 16	June 15	July 1	July 5	60g seeds/m ² (30kg/ha.)
Main field preparation	July 8-11	July 8	July 22-24	July 27-30	
Basal fertilizer application	July 10	July 8	July 23	July 29	30kg N/ha. (65kg urea/ha.)
Transplanting	July 10-11	July 9	July 25	July 30	20cm X 20cm approximate
1st top dressing	July 27	July 26	Aug. 10	Aug. 15	20kg N/ha. (43kg urea/ha.)
1st weeding	July 27	July 26	Aug. 10	Aug. 15	Just after 1st topdress
2nd weeding	Aug. 16	Aug. 15	Aug. 30	Sep. 5	‡ 35 days after transplant.
2nd top dressing	Sep. 16(S)*	Sep. 15(S)	Sep. 30(S)	Oct. 5(S)	20kg N./ha. (43kg urea/ha.)
Plant protection when needed	Oct. 1 (M)**	Sep. 30(M)	Oct. 15(M)	Oct. 20(M)	
Expected harvest (field's day at the time of harvest)	Nov. 6(S) Nov. 25(M)	Nov. 5(S) Nov. 25(M)	Nov. 20(S) Dec. 10(M)	Nov. 25(S) Dec. 15(M)	‡140 days after sowing ‡160 days after sowing

Note : *(S)----Sabitri variety
**(M)----Masuli variety

Field day : At harvest time, field day will be held at the site of demonstration in order to have clear discussion with farmers regarding inputs cost and production.



T. Shibata

Production Agronomist

PREFACE

Food grain crops, especially rice, wheat and maize are important diets for the peoples of Nepal.

Recommended Technological Alternatives stated here were formulated based on the informations, experiences and the results of practical trials conducted at government farms and farmer's fields.

The basic concept of recommendation is not to maximize the production level but to maximize the benefit of farmers in consideration of agro-climatic and socio-economic conditions. Cost of production, price of product, cost of capital, risk probability and marketability were taken as important economic factors for agriculture production.

It is hoped that appropriate improvement and adjustment of the recommendation will be made in accordance with the changes of economical factors since the recommended alternatives mentioned here are not the perfect one.

T. Shibata

Production Agronomist, JADP
Assigned : Aug. 1978 - Aug. 1981

RECOMMENDED TECHNOLOGICAL ALTERNATIVES ON
PADDY CULTIVATION

1. Varieties

For terai plain

Early paddy : Chandina, CH-45, Parwanipur-1, Durga, Laximi,

Normal paddy: Masuli, Sabitri, Janaki, Laximi, CH-45, IR-8,
Parwanipur-1, Chandina, IR-20, IR-24, IR-22,

For river basin and inner terai

Early paddy : CH-45, Parwanipur-1, Durga, Laximi,

Normal paddy: Masuli, Sabitri, Janaki, Laximi, CH-45,
Parwanipur-1, IR-24,

For hilly areas : Taichung-176, Chainan-2, Tainan-1, Tainan-3,
Taichung N-1, Chainung-242, Khumaltar-1,
*Pokareli Masino(local),

2. Seed bed

Seed selection : Specific gravity selection is recommended, or
at least pure water selection.

In case of specific gravity selection, 2kg of
salt or 3kg of ammonium sulphate mixed with
H₂O to get gravity solution of 1.10.

Seed soaking : + 48 hours (2 days) in lowland condition.

Seed incubation: 20-40 hours in lowland condition.

Seeding density: At a rate of 50-70grams of dry seed/m².
(25-35kg of dry seed required for 1 ha.)

Seed bed area : 1/20 of main field (500m² for 1 ha.)

Age of seedling: 20-30 days in lowland condition.

Fertilizer application for seedbed :

(1). 6grams each of NPK/m²

(2). 6grams each of N & P/m²

13 grams of urea + 13 grams of TSP.

3. Main field management

Transplanting density : (1). 20 X 20cm. (25.0 hills/m²)

(2). 20 X 15cm. (33.3 hills/m²)

(3). 20 X 25cm. (20.0 hills/m²)

Fertilizer application :

District	Recommended alternatives (NPK kg/ha.)		
Dhanusha	70-0-0	75-20-0	75-20-20
Mohottari	70-0-0	100-20-0	100-20-20
Sarlahi	70-0-0	100-20-0	100-20-20
Sindhuli	70-0-0	75-20-0	75-20-20
Ramechhap	70-0-0	75-20-0	75-20-20

Other cultural practices :

Refer to "LIFE HISTORY OF RICE PLANT AND RECOMMENDED
PRACTICES FOR IMPROVED VARIETIES UNDER IRRIGATED
CONDITION".

RECOMMENDED TECHNOLOGICAL ALTERNATIVES FOR MAIZE

1. Varieties :

White -- Sarlahi white,
 Yellow-- Rampur yellow, Rampur composite, Khumaltar yellow,
 Hetauda composite, Arun(short maturity),

2. Seeding rate/Seed quantity :

20-25kg/ha.

3. Planting density :

75cm X 25cm. (53,333 plants/ha.)

4. Planting time :

Summer maize : April to early May
 (sowing at pre-monsoon season)
 Winter maize : October to early November
 Spring maize : Middle to end of February

5. Fertilizer application : (irrigated condition)

Districts	Alternatives (NPK kg/ha.)		
Dhanusha	80-30-0	80-0-0	90-30-25
Mohottari	80-30-0	80-0-0	120-30-25
Sarlahi	80-30-0	80-0-0	120-30-25
Sindhuli	80-30-0	80-0-0	90-30-20
Ramechhap	80-30-0	80-0-0	90-30-20

In case of 80-30-0 or 80-0-0, All of phosphorus and 30 kg of Nitrogen are applied at a time of planting as a basal dose. Rest of 1/2 of nitrogen will be applied at knee high stage and 1/2 of nitrogen will be applied at tasseling stage as a side dressing.

For rain-fed condition, single application of 40kg nitrogen/ha. would be recommended.

6. Irrigation :

For winter maize cultivation, 5 times irrigation with + 25 days interval would be required during growing period.

Standard level of irrigation water supply will be :
 60mm X 5 times = 300mm. (3,000 m³/ha.)

7. Others :

Refer to "GROWTH OF MAIZE AND CULTURAL PRACTICES".

RECOMMENDED TECHNOLOGICAL ALTERNATIVES ON
WINTER WHEAT CULTIVATION

1. Varieties :

RR-21, UP-262,

2. Seed :

Seed quantity : 100-120kg/ha.

Quality seed : Specific gravity (1.20) seed selection is recommended if possible.

Planting time : Middle of November to first week of December.

3. Planting method :

Line sowing with 20cm row to row is basically recommended, however broadcast or behind plow system are also accepted according to farmers choice.

4. Fertilizer application : (Irrigated condition)

District	Recommended alternatives (NPK kg/ha.)		
Dhanusha	80-40-0	75-25-0	75-25-20
Mohotarri	80-40-0	100-25-0	100-25-20
Sarlahi	80-40-0	100-25-0	100-25-20
Sindhuli	80-40-0	75-25-0	75-25-20
Ramechhap	80-40-0	75-25-0	75-25-20

50% of Nitrogen and all amount of Phosphorus or Potassium are applied as a basal dose, and rest of 50% of Nitrogen will be top dressed during growing period depending upon the plant and soil conditions.

5. Irrigation :

When irrigation water is available, 4 times irrigation may be required during growing period.

Standard level of irrigation water supply will be :

60mm with 25 days interval 4 times irrigation.

60mm X 4times = 240mm. (2,400m³/ha.)

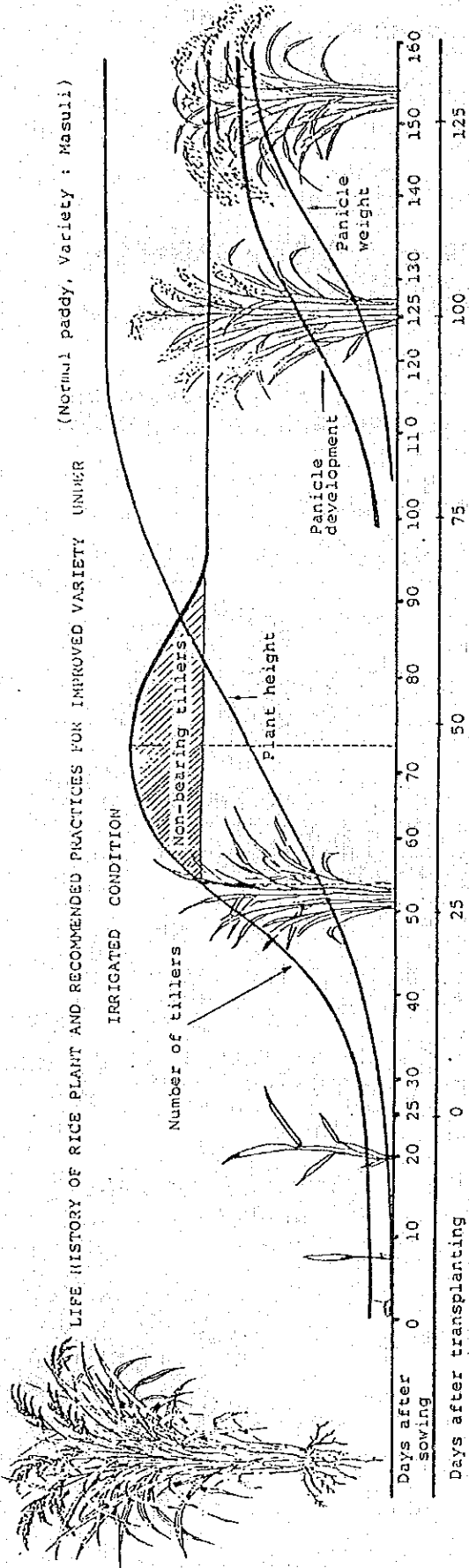
6. Others :

Refer to "GROWTH OF WINTER WHEAT AND RECOMMENDED CULTURAL PRACTICES FOR IMPROVED VARIETY".

(Nohini paddy, Variety : Masuli)

LIFE HISTORY OF RICE PLANT AND RECOMMENDED PRACTICES FOR IMPROVED VARIETY UNMR

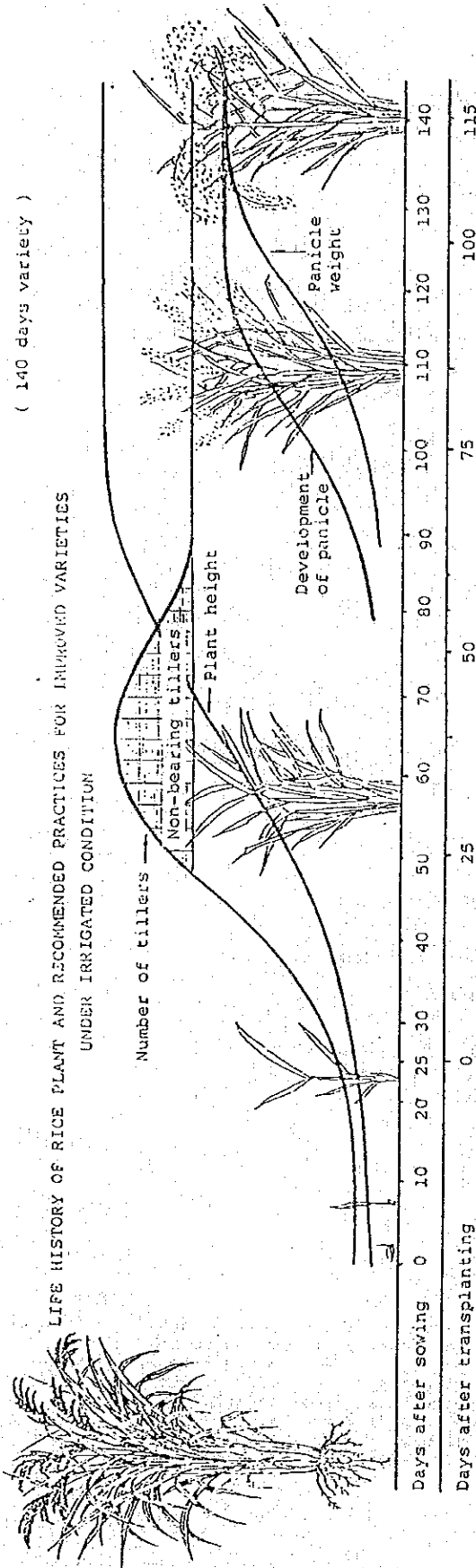
IRRIGATED CONDITION



Days after sowing	Days after transplanting	Month	Growing stages	Phenological stages	Management practices
0	0	June	Nursery stage	Germination	Seeding density: 50-70g/m ² (25-35kg for 1 ha.) Seedbed area: 1/20 of main. Fertilizer for seedbed: 6g each of NPK or NP/m ² Sowing Incubation : 20-40 hours Seed soaking : ± 2 days Seed selection Specific gravity selection (2kg salt mix with 10 l H ₂ O) at least pure water selection
25	25	July	Rooting	Transplanting	Basal fertilizer application (30kg N/ha. ; 65kg urea/ha.) Final puddling Transplanting Shallow transplanting 25 hills/m ² (20 X 20cm)
40	40	July	Tillingering stage	Rooting	Planting density: 25 hills/m ² (20 X 20cm)
50	50	July	Effective	The most active tillering stage	1st weeding 1st top dressing of nitrogen (20kg N/ha. ; 43kg urea/ha.)
60	60	August	Non-effective	End stage of valid tillering	
75	75	September	Panicle formation stage	Maximum number of tillering stage	2nd weeding
90	90	September	Panicle primordia formation stage	Young panicle formation	2nd top dressing of nitrogen (20kg N/ha. ; 43kg urea/ha.)
100	100	October	Reduction division stage	Reduction division stage	
110	110	October	Booting stage	Booting stage	
120	120	October	Heading stage	Heading stage	Rice bug control when needed (Metacid, Dipterex, Thiodan, Nuvacron, Dimecron, etc.)
130	130	October	Milky stage	Milky stage	
140	140	October	Dough stage	Dough stage	
150	150	November	Yellow ripe stage	Yellow ripe stage	Irrigation water supply cut off
160	160	November	Harvest Full ripe stage	Harvest Full ripe stage	Threshing Harvesting

(140 days variety)

LIFE HISTORY OF RICE PLANT AND RECOMMENDED PRACTICES FOR IMPROVED VARIETIES UNDER IRRIGATED CONDITION



Month	June	July	August	September	October	November
Growing stages	Germination	Nursery stage	Rooting	Transplanting	Rooting	Rooting
Tillering stages			The most active tillering stage	End stage of valid tillering	Maximum number of tillering	
Panicle formation stages				Young panicle formation	Panicle Primordia formation	
Ripening stages				Booting	Reduction division	
Harvesting stages				Heading stage	Heading stage	
Maturity stages				Milky stage	Dough stage	
Harvesting stages				Yellow ripe stage	Full ripe stage	

Harvesting

Irrigation water supply cut off

Rice bug control when needed (Dimcron, Thiodan, Nuvacron, Dipterex, Metacid, etc.)

2nd top dressing of nitrogen (20-25kg N/ha. ; 43-55kg urea/ha.)

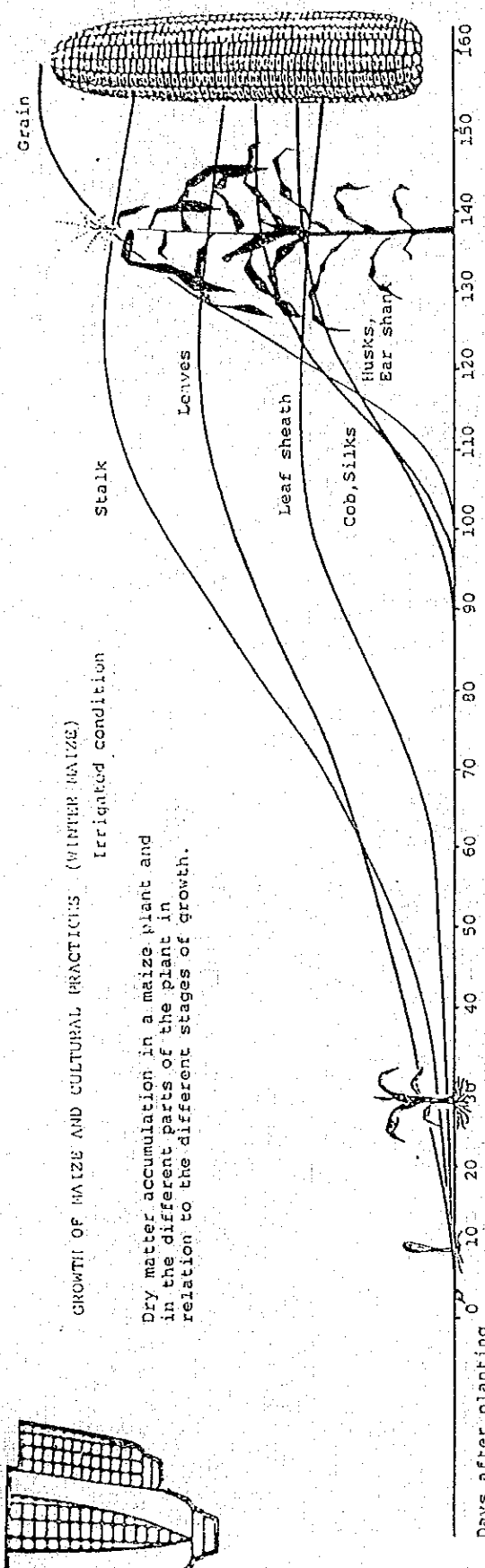
2nd weeding

1st weeding

1st top dressing of nitrogen (20-25kg N/ha. ; 43-55kg urea/ha.)

Planting density 25 hills/m² (20 X 20cm)
 Shallow transplanting 2-4 seedlings/hill
 Final puddling
 Basal fertilizer application (30kg N/ha. ; 65kg urea/ha.)

Seeding density : 50-70g/m² (25-35kg for 1 ha.)
 Seedbed area : 1/20 of main field.
 Fertilizer application for seedbed (6g each of NPK or NP/m², 40g of complete (15-15-15) or 13g each of urea and TSP/m²)
 Incubation : 20-40 hours
 seed soaking : + 2days
 Seed selection :
 Specific gravity selection (2kg salt mix with 10 l. H₂O)
 At least pure water selection



GROWTH OF MAIZE AND CULTURAL PRACTICES (WINTER MAIZE)
Irrigated condition

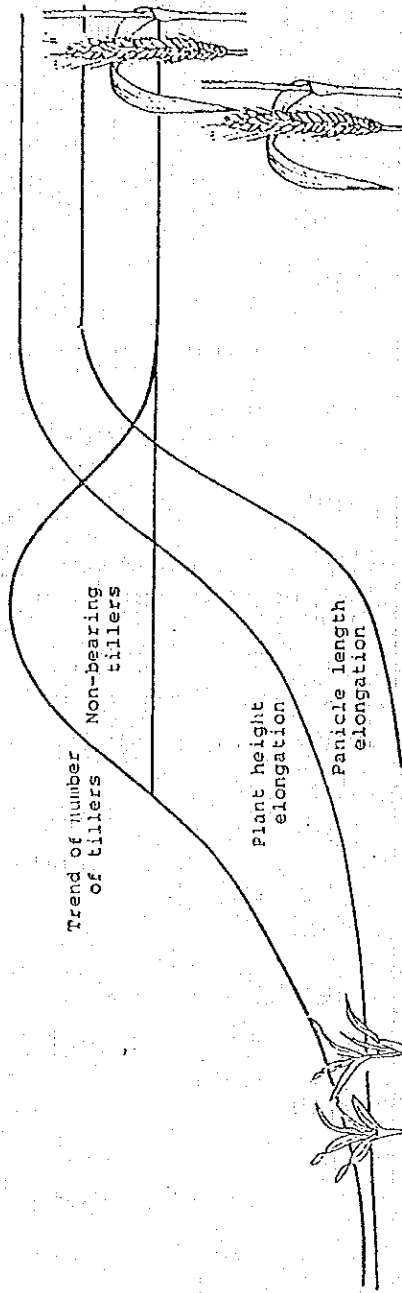
Dry matter accumulation in a maize plant and in the different parts of the plant in relation to the different stages of growth.

Days after planting	Month	Key Events and Cultural Practices
0	November	Germination
0	November	Seed sowing Seed rate : 20-25kg of dry seed/ha. Planting density : 75cm row to row 25cm plant to plant (53,333 plants/ha.) Basal fertilizer application 30kg N/ha. + 30kg P/ha. (65kg urea + 66kg TSP/ha.) Seed treatment with insecticide when needed
10	November	1st irrigation (60mm)
20	November	Tassel initiation (still below the soil surface)
30	November	Lower internode elongation
40	December	Beginning of tassel development
50	December	Intercultivation and weeding 1st side dressing of Nitrogen (25kg N/ha. : 54kg urea/ha.) 2nd irrigation (60mm)
60	December	Uppermost ear initiation and formation
70	January	Ear and silk development 3rd irrigation
80	January	Enlargement and elongation of top ear Uppernode elongation
90	January	2nd side dressing of Nitrogen (25kg N/ha. : 54kg urea/ha.) 4th irrigation (60mm) Tasseling
100	February	End stage of internode elongation Silking, Pollen shedding
110	February	Beginning of starch acculation Blister stage
120	February	Starch accumulation in the endosperm 5th irrigation (60mm)
130	March	Dough stage
140	March	Morphological maturity of embryo
150	March	Physiological maturity
160	March	Harvest

GROWTH STAGES AND CULTURAL PRACTICES

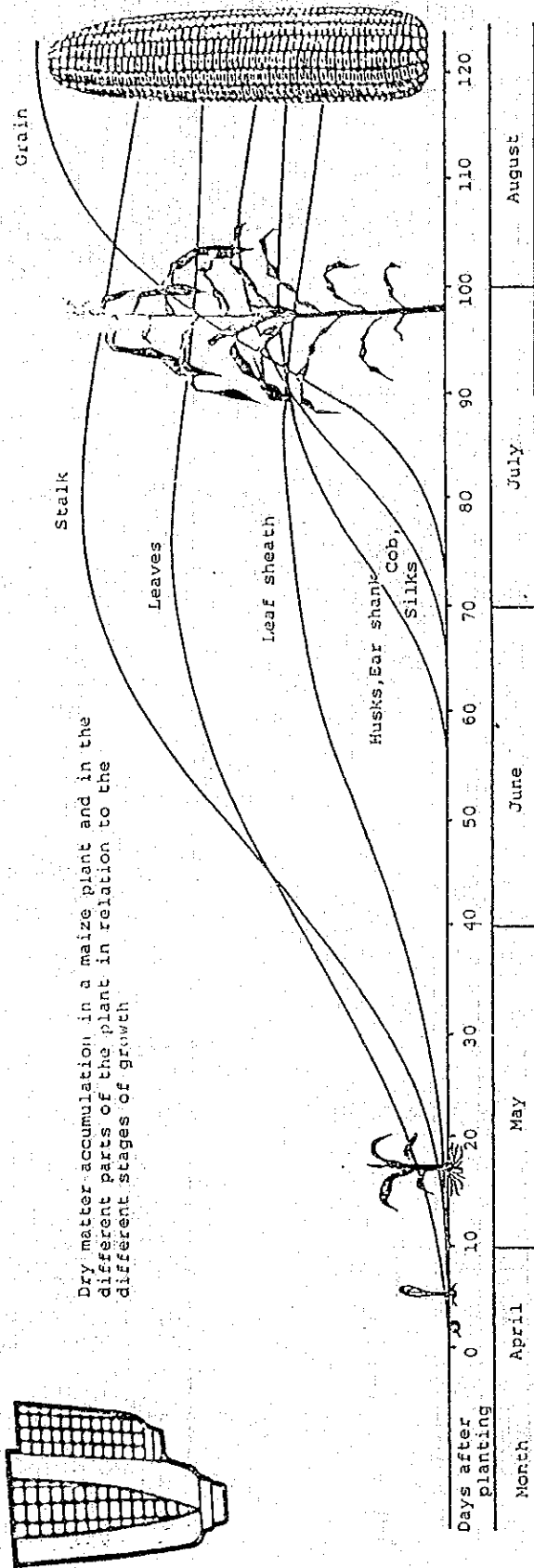
Varieties: RR-21, UP-26,
Tera1, Innerterai, lower hill
under irrigated condition.

GROWTH OF WINTER WHEAT AND RECOMMENDED CULTURAL PRACTICES FOR IMPROVED VARIETY



Days after sowing	Month	Growing stages	Cultural practices
0	December	Sowing	Sowing Seed rate: 100-120kg/ha. Line sowing (20cm row to row) Broadcast Behind plow Basal fertilizer application 40kg N+40kg P/ha. (87kg urea + 89kg TSP/ha.) Specific gravity(1.20)seed selection if possible
10	December	Germination	
20	December	Beginning of tillering stage	1st top dressing of Nitrogen (20kg N/ha. : 43kg Urea/ha.)
30	January		
40	January	End stage of valid tillering	
50	January	Panicle premerdia formation	2nd irrigation water supply (60mm)
55	January	Maximum number of tillering stage	
60	January	Beginning of internode elongation	2nd top dressing of Nitrogen (20 kg N/ha. : 43kg urea/ha.)
70	February	Young panicle formation stage	
80	February	Reduction division stage	3rd irrigation(60mm)
85	February	Heading stage	
90	February	Flowering stage	4th irrigation(60mm)
100	March	Milky stage	
105	March	Dough stage	
110	March	Yellow ripe stage	
115	March	Full ripe stage	
120	March	Dead ripe stage	Harvest

GROWTH OF MAIZE AND CULTURAL PRACTICES (SUMMER MAIZE)



Month	Days after planting	Cultural Practices
April	0	Germination
April	0	Seed sowing Seed rate : 20-25kg dry seed/ha. Planting density : 75 X 25cm. (53,333 plants/ha.)
April	0	Basal fertilizer application 30kg N/ha. + 30kg P/ha. (65kg urea + 66kg TSP/ha.)
April	0	Seed treatment with insecticide when needed
May	10	Weeding
May	20	Tassel initiation
May	30	1st side dressing of Nitrogen (25kg N/ha. : 54kg urea/ha.)
May	40	Lower internode elongation
May	40	Intercultivation and weeding
May	50	Uppermost ear initiation and formation
May	50	Tassel development
June	60	enlargement and elongation of top ear
June	60	Upper internode elongation
June	70	2nd side dressing of Nitrogen (25kg N/ha. : 54kg urea/ha.)
June	70	Tasseling
June	70	End stage of internode elongation
June	70	Silking, Pollen shedding
July	80	Beginning of starch accumulation
July	90	Blister stage
July	90	Active starch accumulation in the endosperm
July	100	Dough stage
August	110	Morphological maturity of embryo
August	120	Physiological maturity
August	120	Harvest

GROWTH STAGES AND CULTURAL PRACTICES

BENCH MARK SURVEY ON SHALLOW TUBE WELL PROGRAMME

- | | |
|-------------------|---|
| 1. Method | At random interview |
| 2. Nos. of sample | 107 |
| 3. Survey time | Mar. to June 1982 |
| 4. Surveyer | A.
P.K. Mahato
Junior technician
Economik division
JADP |

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1. FAMILY'S POPULATION
2. LANDHOLDING BASED ON THE TYPE OF LAND
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 - (3) Planned irrigated area
 - (4) Sub-total land area
 - (5) Tenancy
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 - (7) Own landholding
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5. FARMING SITUATION
 - (1) Main crops
 - (2) Cash crops, cereal crops and vegetables'
 - (3) Fertilizer application

1. FAMILY'S POPULATION

Size of groupe	Nos. of household	Percentage %
Less than 3	3	2.8
3 - 6	20	19.2
6 - 9	34	32.7
9 - 12	27	26.0
12 - 15	11	10.6
15 - 18	3	2.8
18 - 21	2	1.8
21 - 24	2	1.8
24 - 27	1	1.0
27 - 30	0	0
30 - 33	1	1.0
Total	104	100

2. LANDHOLDING BASED ON THE TYPE OF LAND

(1) Irrigated area*

Size of parcel in hectare	Nos. of land owner	Per cent distrib- ution	Area of parcel in hectare	Per cent distrib- ution
Less than 1	53	49.6	5.51	1.9
1 - 2	12	11.2	16.41	5.6
2 - 3	12	11.2	28.75	9.8
3 - 6	12	11.2	51.05	17.5
6 - 9	9	8.5	60.50	20.7
9 - 12	5	4.7	51.69	17.7
12 - 15	1	0.9	13.51	4.6
15 - 20	1	0.9	17.57	6.0
20 - 25	1	0.9	22.30	7.6
25 - 30	1	0.9	25.00	8.6
Total	107	100.0	292.29	100.0

* Irrigated area does not mean the land which has the irrigation facility throughout the year, but means the land irrigated seasonally.

(2) Non irrigated area

Size of parcel in ha	Numbers of land owner	Per cent distribution	Area of parcel in ha	Per cent distribution
Less than 1	66	61.7	6.47	3.2
1 - 2	14	13.1	16.71	8.4
2 - 3	4	3.7	9.13	4.6
3 - 6	11	10.4	43.62	21.9
6 - 9	6	5.6	45.25	22.7
9 - 12	4	3.7	45.63	22.9
12 - 15	1	0.9	14.87	7.5
15 - 20	1	0.9	17.54	8.8
Total	107	100.0	199.22	100.0

(3) PLANNED IRRIGATED AREA*

Size of parcel in ha	Numbers of land owner	Per cent distribution	Area of parcel in ha	Per cent distribution
Less than 1	3	2.8	1.82	0.4
1 - 2	11	10.3	15.70	3.2
2 - 3	21	19.6	51.08	10.5
3 - 6	45	42.1	190.93	39.3
6 - 9	18	16.7	130.81	26.9
9 - 12	8	7.6	83.12	17.2
12 - 15	1	0.9	12.18	2.5
Total	107	100.0	485.74	100.0

* Planned irrigated area means the land where the farmer intends to irrigate by his shallow tube well.

(4) SUB-TOTAL LAND AREA*

* It means total area of (1), (2) & (3).

Size of parcel in ha	Area of parcel in ha	Per cent distribution
Less than 1	13.80	1.4
1 - 2	48.82	5.0
2 - 3	88.96	9.1
3 - 6	285.60	29.2
6 - 9	236.56	24.2
9 - 12	180.44	18.4
12 - 15	37.18	4.2
15 - 20	35.11	3.6
20 - 25	22.30	2.3
25 - 30	25.00	2.6
Total	977.15	100.0

(5) TENANCY

Size of parcel in ha	Numbers of tenant	Per cent distribution	Area of parcel in ha	Per cent distribution
Less than 1	95*	88.8	3.77	9.3
1 - 2	8	7.5	10.56	26.0
2 - 3	1	0.9	2.71	6.7
3 - 6	2	1.9	10.14	24.8
6 - 9	0	0	0	0
9 - 12	0	0	0	0
12 - 15	1	0.9	13.51	33.2
Total	107	100.0	40.69	100.0

* Out of them, only eighteen farmers have tenancy.

(6) OFFERED LAND

Size of parcel in ha	Numbers of offerer	Per cent distribution	Area of parcel in ha	Per cent distribution
Less than 1	91*	85.0	3.95	6.7
1 - 2	5	4.7	6.07	10.2
2 - 3	6	5.6	13.53	22.8
3 - 6	2	1.9	8.11	13.7
6 - 9	2	1.9	14.20	23.8
9 - 12	0	0	0	0
12 - 15	1	0.9	13.51	22.8
Total	107	100.0	59.37	100.0

* Out of them, only twenty four farmers offer their land.

(7) OWN LANDHOLDING*

Size of parcel in ha	Numbers of owner	Per cent distribution	Area of parcel in ha	Per cent distribution
Less than 1	1	0.9	0.84	0.1
1 - 2	5	4.7	6.97	0.7
2 - 3	5	4.7	12.85	1.3
3 - 6	29	27.1	132.91	13.9
6 - 9	28	26.2	217.37	22.7
9 - 12	16	15.0	170.62	17.8
12 - 15	11	10.2	155.63	16.2
15 - 20	5	4.7	91.11	9.5
20 - 25	0	0	0	0
25 - 30	4	3.7	106.06	11.1
30 - 35	2	1.9	64.21	6.7
Total	107	100.0	958.57	100.0

* This is calculated as follows;
(1) + (2) + (3) + (5) - (6)

3. AGRICULTURAL IMPLEMENTS

(in head)

Numbers of implements	Tractor	Pump set	Bullock cart	Thresher	Sprayer	Plough L. M.	Plank	Hoe	Small hoe	
0	93	85	3	103	71	3	93	3	0	43
1	11	16	70	1	27	18	6	72	2	3
2	0	3	31	0	5	42	6	26	33	5
3	0	0	0	0	1	21	1	3	10	4
4	0	0	0	0	0	10	1	0	34	12
5	0	0	0	0	0	6	0	0	13	17
6 - 9	0	0	0	0	0	7	0	0	10	18
10 - 15	0	0	0	0	0	0	0	0	1	1
N.A.	3	3	3	3	3	0	0	4	4	4
Total	107	107	107	107	107	107	107	107	107	107

*L. and M. mean a local and modern plough respectively.

4. LIVESTOCK

(in head)

Numbers of livestock	Bullock	Cow	Buffalo	Goat
0	1	29	25	29
1 - 3	21	42	66	27
4 - 6	59	18	11	34
7 - 9	11	4	1	7
10 - 12	7	3	1	6
13 - 15	1	5	0	1
16 - 18	2	0	0	0
19 - 21	1	1	0	0
21 - 24	0	1	0	0
N.A.	4	4	3	3

1. Early: Bawal ~ Bheallo - crop
 2. Late: Jent ~ ~~Kattle~~ Monsir

5. FARMING SITUATION
 (1) MAIN CROPS

	Improved - paddy		Local - paddy		Wheat		Maize	
	Early	Late	Early	Late	Improved	Local	Improved	Local
Numbers of cultivated farm	3	60	87	97	90	48	11	
Numbers of non-culti. farmer	100	43	16	6	14	55	92	
N.A.	4	4	4	4	3	4	4	
Yield t/ha								
Min.	1.47	0.39	0.43	0.29	0.30	0.00	0.32	
Max.	4.28	4.23	2.94	2.97	5.30	3.53	2.37	
Ave.*	3.29	2.17	1.79	1.62	1.33	1.24	1.18	
Planted area ha								
Min.	0.41	0.20	0.07	0.34	0.10	0.17	0.17	
Max.	3.04	8.11	13.51	23.65	9.00	10.14	10.14	
Ave.*	1.43	1.72	2.32	4.81	1.16	2.20	1.76	
total	4.29	103.48	201.52	466.60	104.77	105.43	19.33	

* Average means figures calculated only by cultivated farmers.

(2) CASH CROPS, CEREAL CROPS AND VEGETABLES

	Tobacco	Jute	Potato	Millet	Lentil	Pulses	Other vegetable
Numbers of cultivated farmer	55	12	18	22	15	32	28
Numbers of non-culti. farmer	47	90	85	83	88	72	75
N.A.	5	5	4	2	4	3	4
Yield t/ha							
Min.	0.17	0.06	0.59	0.30	0.12	0.00	0.00
Max.	1.46	1.77	22.35	1.76	0.80	2.96	35.88
Ave.*	0.59	0.51	8.69	0.89	0.43	0.63	4.68
Planted area ha							
Min.	0.10	0.41	0.07	0.07	0.34	0.17	0.07
Max.	9.46	1.35	0.84	2.03	2.03	18.00	6.77
Ave.*	1.84	0.74	0.30	0.47	0.96	1.65	0.96
Total	101.26	8.83	5.39	10.41	14.38	52.67	26.77

* Average means figures calculated only by cultivated farmers.

(3). FERTILIZER APPLICATION

	Paddy	Wheat	Maize	Tobacco	Jute	Potato	Other vegetable
Numbers of applied farmer	20	43	14	34	2	1	4
Numbers of non-applied farmer	84	61	90	69	102	103	100
N.A.	3	3	3	4	3	3	3
Average*	37:7:2	50:19:3	42:19:4	28:0:5	14:8:0	69:0:0	58:28:0

*Average means figures calculated only by applied farmers.

1. NUMBERS* OF BORING WELL AND MONTH(1981 Nov. to 1982 June)

Month	1981		Jan.	Feb.	Mar.	1982		June	Total
	Nov.	Dec.				Apr.	May		
Nos. of well	0	9	26	25	40	47	59	12	218
Nos. of team	2	2	5	5	6	6	6	6	

*Numbers of well is total of success and unsuccess well.

2. NUMBERS OF SUCCESS AND UNSUCCESS WELL

	Numbers
Success	198
Unsuccess	20
Total	218

3. NATURAL WATER LEVEL

Max. N.W.L.	Min. N.W.L.	Ave. N.W.L.
10.00 ^m	0.30 ^m	2.74 ^m

4. DRILLING DEPTH, PIPE, SCREEN and WATER DISCHARGE

	Drilling depth	Pipe	Screen	Water discharge*
Max.	68.33 m	57.83 m	17.00 m	29.0 l/s
Min.	13.68	5.04	5.50	5.0
Ave.	20.93	12.24	9.75	16.9

*Water discharge does not mean figures got by regular pump test. It means figures got by running about four hours before delivery to farmers.

5. NUMBERS OF VILLAGE, PANCHAYAT, TUBE WELL & PUMP SET ON DISTRICT WISE

District	Village panchayat	Numbers of well		Pump set
		Success	Unsuccess	
Dhanusha	7	82	6	28
Mahottari	4	48	2	31
Sarlahi	7	68	12	39
Total	18	198	20	98

6. DRILLING COST* AND MATERIAL CONSUMPTION

	Bentnite kg	Berrite kg	CMC kg	Gravel cu. m	Welding rod kg
Total q'ty	J 49150 I 10425	586	674	346	365
Q'ty/m	13.63	0.13	0.15	0.07	0.08
Cost Rs./m	42	0.69	5.32	9.45	1.00

	Diesel lit.	Mobil lit.	Grease kg	Gearoil lit.	Breakoil lit.
Total q'ty	53290	2165	178	105	32
Q'ty/m	11.70	0.47	0.04	0.023	0.007
Cost Rs./m	64.58	12.00	1.25	0.67	0.18

*Material rate is used in June 1982.

J and I mean Japanese and Indian bentnite respectively.

Drilling cost 137.14 Rs./m



J.A.D.P.
I.A.P. PLOT MAP
SARAH RAJAWA
MUNUSHA, JANGAPUR NEPAL

大阪電気通信大学・石原 忠重 I S H I H A R A T a d a s h i g e
 運輸調査局 金沢 弘雄 K A N A Z A W A H i r o o
 大阪電気通信大学 猪原 正守 I H A R A M a s a m o r i

1. 地方の産業。 今春の金沢におけるOR学会の特別テーマは「地方の時代」であり、特別講演は地方の産業に関するものであった。 私なりの理解であるが、小笠原先生の御話は「地方の時代」とは名のみで、現実には東京に資本、企業の中核、情報等「1極集中」が行われている。 地方にとつて厳しい環境にあつて「地方の時代」を生かすにはSoftwareを生かすことである、という主旨の透明な指摘であつた。 中核と周辺とを支配するある種のdynamicsがあり、世界のなかの金、物、情報、人の流れ方もこの話に似たと感じられる。 中核は先進工業国であり地方は途上国である。 N I C S 諸国は成功した新産業都市と云つたところであらうが、貧困途上国は貧しい僻地に該当しよう。 中核集中のdynamicsの中で、資源を持たない、工業化もできない上国、Softwareを生かす第3次産業に頼らざるを得ない。 ネパールはまさにその様な国の1つである。

2. 石川県とネパールの観光産業 春の学会の第1日目の講演は金沢市、石川県の観光産業の関係するものであつた。 その中午後の県商工労働部次長の山岸正美氏の話を振り返つてみて本論のネパールの観光産業と対比をしてみたい。 石川県の四地域、加賀、金沢、能登、白山の観光産業が石川県を支えている。

観光客の総数及び消費総数は(61年)統計で、

	加賀	金沢	白山	能登	合計
人口	688万	476万	95万	108万	1825万
消費計	1076億	271億	63億	919億	2329億

である。 また、消費計の業種別分類は、宿泊飲食、娯楽費、1485億、土産品、324億 交通費、520億 合計2329億である。 後述するようにヒマラヤの名峰を数多く持つネパールは、(1986年度)総Tourism収入は4000万\$であり石川県の白山1山だけで約5000万\$(63億円)の収入に匹敵している。 どうしてこのような大差が生じているのか? この差は如何にしたら生まれるのか? これらが本論の考察テーマである。

3. ネパールの経済資源と経済発展の困難さ ネパールの1人当り国民所得は140\$、世界で7番目に貧しい。 国連の「最貧国」に属してその経済発展は著しい困難を抱えている。(以下、O. H. Pで)
4. ネパールの資源消費生産(外貨収支)バランス。(O. H. P. で)
5. 水資源 (O. H. P. で)
6. 世界の観光産業の現状とネパール (O. H. P. で)

7. 日本の観光からみた地域産業 (O. H. P. で)
8. ネパール地域経済開発と行政制度 (O. H. P. で)
9. 総合地域開発Projectと地域住民の関与 (O. H. P. で)
10. ネパール観光開発の問題点 (O. H. P. で)
11. 総合地域開発の一環としての観光開発 (O. H. P. で)
12. 結論 以上にみてきたように、観光資源は現在活用できる唯一の資源であり、観光開発を地域住民の雇用、所得増、Infraの改良に結び付けることが可能である。地元の人々の積極的な参加と諸外国の積極的な援助が観光を支える全ての産業、また波及する全ての産業、事業の中の多くの方面で可能である。
- 最も大切な点は、諸外国の援助による開発投資が不遇層を含む広い範囲の地元民に積極的なプラスをもたらすように行われることである。援助側だけでなく、問題点は非常に沢山あるにせよ、受け入れ側も協同組合その他を活用して、積極的に自分達からやる気を出して、事業を計画、開発に参加するべきであり、このことが、貧困と森林、土地資源の喪失の続いているネパールの生き延びて行く道であろう。

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