

APPENDIX C
AGRICULTURE

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- C.2. CROP
- C.3. LIVESTOCK
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- C.5. SURVEY OF RICE CULTIVATING
FARMERS AND SOME IMPROVEMENTS

APPENDIX C. I.

LAND

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Table C.1.1 Progress in Land Cultivation (1)

	Year	Iran (1) (¹ 000 ha)	Mazandaran(2) (¹ 000 ha)	(2)/(1) x 100 (%)
Total Cultivated Area	1971	16,154(100)	742 (100)	4.6
	1975	15,710(97)	791 (107)	5.0
	1982	14,846(92)	887 (120)	6.0
Irrigated Area	1971	4,678(100)*	214 (100)*	4.6
	1975	5,982(128)	356 (157)	5.6
	1982	5,685(122)	300 (140)	5.3
Non-Irrigated Area	1971	10,904(100)*	476 (100)*	4.4
	1975	9,728(89)	455 (96)	4.7
	1982	9,160(84)	587 (123)	6.4
° Annual Crops & Grass	1971	8,697(100)	630 (100)	7.2
	1975	9,254(106)	708 (112)	7.7
	1982	9,227(106)	792 (126)	8.6
° Perennial Crops	1971	573(100)	51 (100)	8.9
	1975	653(114)	45 (88)	6.9
	1982	727(127)	39 (76)	5.4
° Fallow	1971	6,885(100)	61 (100)	0.9
	1975	5,802(84)	38 (62)	0.7
	1982	4,895(71)	58 (95)	1.2

* Excluding perennial crops

Source: Agricultural Statistics, Iran Statistic Center MPB

Table C.1.1 Progress in Land Cultivation (2)

	Year	Iran (1) ('000 ha)	Mazandaran(2) ('000 ha)	(2)/(1) x 100 (%)
<u>Irrigated Area</u>				
° Annual Crops & Grass	1971	2,850 (100)	202 (100)	7.8
	1975	3,477 (122)	308 (152)	8.9
	1982	3,465 (122)	268 (133)	7.7
° Perennial Crops	1971	N.A.* (-)	N.A.* (-)	-
	1975	530 (-)	22 (-)	4.2
	1982	638 (-)	29 (-)	4.5
° Fallow	1971	1,828 (100)	12 (100)	0.7
	1975	1,975 (108)	6 (50)	0.3
	1982	1,583 (82)	3 (25)	0.2
<u>Non-Irrigated Area</u>				
° Annual Crops & Grass	1971	5,847 (100)	427 (100)	7.3
	1975	5,777 (99)	399 (93)	6.9
	1982	5,759 (98)	525 (123)	9.1
° Perennial Crops	1971	N.A.* (-)	N.A.* (-)	-
	1975	123 (-)	23 (-)	18.7
	1982	89 (-)	10 (-)	11.2
° Fallow	1971	5,057 (100)	49 (100)	1.0
	1975	3,827 (76)	32 (65)	0.8
	1982	3,313 (66)	52 (106)	1.6

* Breakdown is not available

Source: Agricultural Statistics, Iran Statistic Center MPB

Table C.1.1.2 Present Land Use

Present Land Use	Amol		Babol		Total	
	Ha	%	Ha	%	Ha	%
Paddy Rice (R)	50,030	70.4	22,580	66.0	72,610	69.0
Upland Crops (U)	1,060	1.5	2,690	7.9	3,750	3.6
Orchards (O)	1,720	2.4	300	0.9	2,020	1.9
<u>Sub-total</u>	<u>52,810</u>	<u>74.3</u>	<u>25,570</u>	<u>74.8</u>	<u>78,380</u>	<u>74.5</u>
Forest (F)	3,690	5.2	-	-	3,690	3.5
Sand Beach (B)	1,000	1.4	940	2.8	1,940	1.9
Water Reservoir (P)	1,590	2.2	2,240	6.6	3,830	3.6
Villages (V)	5,320	7.5	2,510	7.3	7,830	7.4
Rivers	860	1.2	-	-	860	0.8
Roads/Canals ^{1/}	5,780	8.2	2,920	8.5	8,700	8.3
<u>Sub-total</u>	<u>18,240</u>	<u>25.7</u>	<u>8,610</u>	<u>25.2</u>	<u>26,850</u>	<u>25.5</u>
<u>Total</u>	<u>71,050</u>	<u>100.0</u>	<u>34,180</u>	<u>100.0</u>	<u>105,220</u>	<u>100.0</u>
	(67.5%)		(32.5%)		(100.0%)	

Note: 1/..... Roads/Canals was estimated at 10% of fields of paddy rice and upland crops.

Table C.1.3 Present Land Use by Sub-Area

Sub-Area	Haraz Left Bank			Haraz Right Bank			Kari Rud			Total		
	High Land	Middle Land	Low Land	High Land	Middle Land	Low Land	High Land	Middle Land	Low Land	High Land	Middle Land	Low Land
Administration Boundary	Amol	Amol	Amol, Babol	Amol	Amol	Amol, Babol	Amol, Babol	Amol, Babol	Amol, Babol	Amol, Babol	Amol, Babol	Amol, Babol
Altitude (EL, m PGD)	20~190	-10~20	-23~10	20~190	-10~20	-23~10	20~190	-10~20	-23~10	20~190	-10~20	-23~10
Land Slope (%)	1.1	0.4	0.2~0.3	1.1	0.4	0.1	1.1	0.2~0.3	0.1	1.1	0.2~0.3	0.1
Gross Area (ha) $\frac{1}{1} / (\%) \frac{2}{2}$	11,950 (11.4)	15,540 (12.8)	14,600 (14.0)	6,580 (6.3)	6,550 (6.3)	6,090 (5.8)	10,510 (9.9)	19,960 (19.1)	15,000 (14.4)	28,820 (27.6)	39,850 (38.2)	35,690 (34.2)
Cultivated Area (ha) (%)	8,710 (73.0)	9,910 (74.5)	10,250 (70.1)	4,950 (75.2)	5,660 (86.4)	4,390 (72.1)	8,580 (83.2)	15,300 (76.7)	10,640 (70.9)	22,240 (77.2)	50,870 (77.4)	25,260 (70.8)
Paddy Field	8,070 (67.6)	9,470 (71.0)	9,650 (66.1)	4,720 (71.7)	5,430 (82.9)	3,990 (65.5)	8,590 (81.4)	13,890 (69.6)	9,000 (60.0)	21,180 (73.5)	28,790 (72.2)	22,640 (62.4)
Upland Field	330 (2.8)	260 (2.0)	140 (1.0)	70 (1.1)	80 (1.2)	140 (2.3)	70 (0.7)	1,250 (6.3)	1,410 (9.4)	470 (1.6)	1,590 (4.0)	1,690 (4.7)
Orchard	310 (2.6)	180 (1.3)	440 (3.0)	160 (2.4)	150 (2.3)	260 (4.3)	120 (1.1)	160 (0.8)	230 (1.5)	590 (2.1)	490 (1.2)	930 (2.6)
Non Cultivable	1,980 (16.6)	1,850 (13.9)	2,730 (18.7)	1,620 (24.6)	800 (12.2)	1,290 (21.2)	1,650 (16.0)	3,510 (17.6)	3,040 (20.3)	5,250 (18.2)	6,160 (15.5)	7,060 (19.8)
Non Cultivated	1,240 (10.4)	1,580 (11.8)	1,640 (11.2)	10 (0.2)	90 (1.4)	410 (6.7)	80 (0.8)	1,150 (5.7)	1,320 (8.8)	1,530 (4.6)	2,820 (7.1)	3,570 (9.4)
Irrigation Pond	-	210 (1.6)	640 (4.4)	10 (0.2)	90 (1.4)	410 (6.7)	-	1,150 (5.7)	1,320 (8.8)	10 (0)	1,450 (3.6)	2,370 (6.6)
Forest	1,240 (10.4)	1,570 (10.2)	1,000 (6.8)	-	-	-	80 (0.8)	-	-	1,320 (4.6)	1,370 (3.5)	1,000 (2.8)
Irrigation Condition	good	fair	poor	good	good	fair	good	fair-poor	poor	good	fair-poor	poor
Drainage Condition	good	fair	poor	good	fair	poor	good	fair-poor	poor	good	fair-poor	poor

Notes: 1/ Excluded the area of the rivers (860 ha)

2/ Percent to the total gross area of 104,360 ha

3/ Percent to the total gross area of each Sub-Area

Table C.I.4 Land Use (Village Survey - 1985) (1)

Sub-Area	No. of Villages	Paddy	Upland	Orchard	Fallow & etc.	Total
<u>Haraz Left Bank</u>						
High Land	64	6,274.9(75.6)	663.8(8.0)	489.0(5.9)	877.0(10.6)	8,304.7(100)
Middle Land	53	7,324.4(90.4)	341.4(4.2)	381.0(4.7)	57.0(0.7)	8,103.8(100)
Low Land	40	7,889.4(93.2)	309.5(3.7)	249.3(2.9)	15.0(0.2)	8,463.2(100)
<u>Haraz Right Bank</u>						
High Land	30	4,527.7(95.2)	126.0(2.7)	95.9(2.0)	4.0(0.1)	4,753.6(100)
Middle Land	37	3,817.3(96.6)	34.0(0.9)	85.8(2.2)	16.0(0.4)	3,953.1(100)
Low Land	17	4,882.0(94.8)	170.0(3.3)	97.0(1.9)	2.0(0)	5,151.0(100)
<u>Kari Rud</u>						
High Land	42	6,289.2(88.4)	444.4(6.2)	129.8(1.8)	252.0(3.5)	7,115.4(100)
Middle Land	89	13,375.7(95.4)	218.0(1.6)	405.1(2.9)	23.1(0.2)	14,021.9(100)
Low Land	34	5,974.0(84.4)	612.5(8.7)	145.5(2.1)	347.0(4.9)	7,079.0(100)
<u>Sub-total</u>		<u>60,354.6(90.2)</u>	<u>2,919.6(4.4)</u>	<u>2,078.4(3.1)</u>	<u>1,593.1(2.4)</u>	<u>66,945.6(100)</u>
Not Available	79	8,467.8(87.5)	525.2(5.4)	348.5(3.6)	358.0(3.7)	9,699.5(100)
<u>Total</u>	<u>485</u>	<u>68,822.4(89.8)</u>	<u>3,444.8(4.5)</u>	<u>2,426.9(3.2)</u>	<u>1,951.1(2.5)</u>	<u>76,645.1(100)</u>

Note: () ... Percent to the total acreage by Sub-area

Source: Village Survey - 1985

Table C.1.4 Land Use (Village Survey - 1985) (2)

Sub-Area	No. of Villages	Paddy	Upland	Orchard	Fallow & etc.	Total
<u>Haraz Left Bank</u>						
High Land	64	6,274.9(10.4)	663.8(22.7)	489.0(23.5)	877.0(55.0)	8,304.7(12.4)
Middle Land	55	7,324.4(12.1)	341.4(11.7)	581.0(18.3)	57.0(3.6)	8,103.8(12.1)
Low Land	40	7,889.4(13.1)	509.5(10.6)	249.5(12.0)	15.0(0.9)	8,463.2(12.6)
<u>Haraz Right Bank</u>						
High Land	30	4,527.7(7.5)	126.0(4.3)	95.9(4.6)	4.0(0.3)	4,753.6(7.1)
Middle Land	37	3,817.3(6.3)	34.0(1.2)	85.8(4.1)	16.0(1.0)	3,953.1(5.9)
Low Land	17	4,882.0(8.1)	170.0(5.8)	97.0(4.7)	2.0(0.1)	5,151.0(7.7)
<u>Kari Rud</u>						
High Land	42	6,289.2(10.4)	444.4(15.2)	129.8(6.2)	252.0(15.8)	7,115.4(10.6)
Middle Land	89	13,375.7(22.2)	218.0(7.5)	405.1(19.5)	23.1(1.5)	14,021.9(20.9)
Low Land	34	5,974.0(9.9)	612.5(21.0)	145.5(7.0)	347.0(21.8)	7,079.0(10.6)
<u>Sub-total</u>		<u>60,354.6(100)</u>	<u>2,919.6(100)</u>	<u>2,078.4(100)</u>	<u>1,593.1(100)</u>	<u>66,945.6(100)</u>
Not Available	79	8,467.8	525.2	348.5	358.0	9,699.5
<u>Total</u>	<u>485</u>	<u>68,822.4</u>	<u>3,444.8</u>	<u>2,426.9</u>	<u>1,951.1</u>	<u>76,645.1</u>

Note: () ... Percent to the acreage of Sub-total

Source: Village Survey - 1985

Table C.1.5 Land Use Plan

Sub-Area	Present (ha)		With Project (ha)		(2)-(1) (ha)
	Gross Area	Fallow & etc. 1/	Net Area(1)	Right of Ways Drainage (%) 2/ On-Farm (%) 3/	
<u>Haraz Left Bank</u>					
High Land	8,070	1,360	6,710	-	7,720
Middle Land	9,470	390	9,080	130(1.4)	8,930
Low Land	9,650	340	9,310	210(2.2)	9,020
<u>Haraz Right Bank</u>					
High Land	4,720	160	4,560	-	4,520
Middle Land	5,430	200	5,230	80(1.4)	5,120
Low Land	5,990	140	5,850	90(2.2)	5,730
<u>Kari Rud</u>					
High Land	8,390	600	7,790	-	8,030
Middle Land	13,890	500	13,390	250(1.8)	13,040
Low Land	9,000	800	8,200	260(2.9)	8,350
<u>Total</u>					
High Land	21,180	2,120	19,060	-	20,270
Middle Land	28,790	1,090	27,700	460	27,090
Low Land	22,640	1,280	21,360	560	21,100
Total	72,610	4,490	68,120	1,020	68,460

Notes: Land use plan is limited only to paddy field.
 /..... From Village Survey - 1985
 /..... Percentage of Right of Ways, from Survey in Sample Area.

APPENDIX C. 2.

CROP

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Table C.2.1 Progress of Crop Production, Mazandaran Province

	Year	Iran			Mazandaran		
		Area ('000 ha)	Yield (kg/ha)	Production ('000 ton)	Area ('000 ha)	Yield (kg/ha)	Production ('000 ton)
Paddy	1971	344(100)	2,546(100)	877(100)	101(100)	2,814(100)	285(100)
	1975	400(116)	2,558(100)	1,023(117)	139(138)	2,867(102)	398(140)
	1980	457(133)	N.A.(-)	1,114(127)	166(164)	N.A.(-)	527(185)
	1982	397(115)	2,766(109)	1,098(125)	169(167)	2,906(103)	491(172)
Wheat	1971	5,565(100)	649(100)	3,612(100)	207(100)	1,142(100)	236(100)
	1975	5,566(100)	784(121)	4,366(121)	212(102)	1,449(127)	307(130)
	1980	5,891(106)	N.A.(-)	N.A.(-)	432(209)	N.A.(-)	726(308)
	1982	5,059(91)	844(130)	4,270(118)	285(138)	1,350(118)	384(163)
Barley	1971	1,446(100)	589(100)	851(100)	92(100)	649(100)	60(100)
	1975	1,439(100)	707(120)	1,019(120)	105(114)	819(126)	86(143)
	1980	1,369(95)	N.A.(-)	1,201(141)	123(134)	N.A.(-)	106(177)
	1982	1,831(127)	826(140)	1,512(177)	140(152)	668(105)	93(155)
Pulse	1971	210(100)	486(100)	102(100)	7(100)	1,053(100)	7(100)
	1975	327(156)	N.A.(-)	147(144)	2(29)	N.A.(-)	4(57)
	1980	207(99)	N.A.(-)	227(223)	5(71)	N.A.(-)	9(129)
	1982	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)
Sugar beet	1971	150(100)	25,222(100)	3,772(100)	1(100)	29,727(100)	26(100)
	1975	177(118)	25,272(100)	4,494(119)	-(-)	-(-)	-(-)
	1980	153(102)	N.A.(-)	3,694(98)	-(-)	-(-)	-(-)
	1982	147(98)	24,143(96)	3,552(94)	-(-)	-(-)	-(-)
Cotton	1971	307(100)	1,516(100)	466(100)	210(100)	1,628(100)	342(100)
	1975	282(92)	1,544(102)	436(94)	190(90)	1,528(94)	291(83)
	1980	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)
	1982	180(59)	1,520(100)	274(59)	98(47)	1,770(109)	173(51)

Source: Agricultural Statistics, Iran Statistic Center MPB

Table C.2.2 Crop Production Data, Mazandaran Province

Crops	Cropping Area ('000 ha)				Production ('000 ton)			
	1971	1975	1980	1982	1971	1975	1980	1982
Paddy	101.3(29.4)	138.9(34.7)	165.7(36.3)	169.1(42.6)	285.1(32.5)	398.3(38.9)	526.9(47.3)	491.5(44.8)
Wheat	206.7(3.7)	211.9(3.8)	432.0(7.3)	284.7(5.6)	236.2(6.5)	307.1(7.0)	726.0(15.1)	384.3(9.0)
Barley	92.2(6.4)	104.5(7.3)	123.0(9.0)	140.0(7.6)	59.9(7.0)	85.7(8.4)	106.0(8.8)	93.5(6.2)
Other cereals	3.9(10.2)	N.A.(-)	N.A.(-)	N.A.(-)	1.0(2.5)	N.A.(-)	N.A.(-)	N.A.(-)
Pulses	7.2(3.4)	2.0(0.6)	5.2(2.5)	N.A.(-)	7.5(7.3)	3.9(2.6)	9.0(4.0)	N.A.(-)
Sugar beet	0.9(0.6)	N.A.(-)	N.A.(-)	N.A.(-)	25.9(0.7)	N.A.(-)	N.A.(-)	N.A.(-)
Tobacco	4.3(23.0)	1.2(9.3)	2.5(14.9)	N.A.(-)	3.4(21.8)	0.9(8.9)	2.8(15.4)	N.A.(-)
Cotton	210.0(68.3)	190.1(67.4)	N.A.(-)	97.5(54.2)	341.8(73.3)	290.6(66.7)	N.A.(-)	172.7(63.1)
Kenaf	2.1(96.4)	N.A.(-)	N.A.(-)	N.A.(-)	1.5(93.6)	N.A.(-)	N.A.(-)	N.A.(-)
Oil crops	28.7(37.7)	N.A.(-)	38.6(76.1)	N.A.(-)	17.3(31.9)	N.A.(-)	52.2(80.0)	N.A.(-)
Potato	1.4(6.0)	1.5(3.7)	9.2(11.0)	10.6(12.4)	6.5(4.1)	8.8(3.2)	119.3(10.2)	99.3(11.8)
Onion	0.4(4.0)	1.0(6.8)	2.0(4.9)	0.8(3.0)	3.2(2.9)	6.2(2.8)	23.8(3.7)	7.8(1.4)
Tomato	0.3(2.1)	2.9(10.6)	N.A.(-)	N.A.(-)	2.2(1.7)	18.5(5.0)	N.A.(-)	N.A.(-)
Other vegetables	2.6(13.5)	N.A.(-)	N.A.(-)	N.A.(-)	15.3(7.7)	N.A.(-)	N.A.(-)	N.A.(-)
Cucurbits	7.7(7.1)	N.A.(-)	N.A.(-)	N.A.(-)	50.3(5.0)	N.A.(-)	N.A.(-)	N.A.(-)
Alfalfa	1.3(0.5)	0.7(0.2)		N.A.(-)	5.5(0.7)	2.1(0.2)	N.A.(-)	N.A.(-)
Clover	0.2(0.5)	2.6(6.1)	5.8(1.6)	N.A.(-)	0.9(0.4)	7.6(4.0)		N.A.(-)
Other grass	2.2(1.6)	N.A.(-)		N.A.(-)	8.3(3.7)	N.A.(-)	44.4(1.8)	N.A.(-)
Other annual crops	1.6(7.4)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)
Orange	15.6(80.1)	19.1(37.0)	N.A.(-)	N.A.(-)	63.9(76.1)	N.A.(-)	N.A.(-)	N.A.(-)
Other citrus	3.2(30.6)		N.A.(-)	N.A.(-)	4.0(14.3)	N.A.(-)	N.A.(-)	N.A.(-)
Apple	8.7(22.8)		N.A.(-)	N.A.(-)	19.2(21.1)	N.A.(-)	N.A.(-)	N.A.(-)
Other Pomaceous fruits	0.8(7.8)	9.5(10.5)	N.A.(-)	N.A.(-)	1.1(4.0)	N.A.(-)	N.A.(-)	N.A.(-)
Stone fruits	2.2(4.3)	1.5(3.1)	N.A.(-)	N.A.(-)	2.1(1.4)	N.A.(-)	N.A.(-)	N.A.(-)
Grape	0.3(0.2)	0.2(0.1)	N.A.(-)	N.A.(-)	0.9(0.1)	1.3(0.2)	N.A.(-)	N.A.(-)
Fig								
Pomegranate	5.2(15.2)	N.A.(-)	N.A.(-)	N.A.(-)	9.5(7.2)	N.A.(-)	N.A.(-)	N.A.(-)
Walnuts	0.6(7.0)	N.A.(-)	N.A.(-)	N.A.(-)	1.4(8.0)	N.A.(-)	N.A.(-)	N.A.(-)
Other fruits	1.2(16.3)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)	N.A.(-)
Tea	2.7(13.5)	N.A.(-)	N.A.(-)	N.A.(-)	3.8(10.1)	N.A.(-)	N.A.(-)	N.A.(-)

() Percentage to total area of each crop in Iran.

Source: Agricultural Statistics, Iran Statistic Center MPB

Table C.2.3. Crop Production Data,
Amol and Babol Sahrestan (1)

Year	Amol			Babol		
	Area (ha)	Yield (t/ha)	Production (t)	Area (ha)	Yield (t/ha)	Production (t)
Paddy						
1981	47,000	5.4	253,000	54,000	4.2	226,800
1982	48,000	5.4	259,200	55,000	4.4	244,255
1983	50,000	5.4	270,000	58,500	4.8	282,028
1984	52,000	6.2	320,000	60,000	5.9	356,760
1985	55,000	6.2	338,690	56,881	6.4	363,005
Average	50,400	5.7	288,180	56,880	5.2	294,570
Wheat						
1980	3,000	2.0	6,000	6,305	3.0	18,915
1981	3,500	2.0	7,000	7,361	2.5	18,402
1982	3,500	2.0	7,000	4,070	3.6	14,448
1983	3,000	2.0	6,000	5,200	4.0	20,800
1984	2,700	2.5	6,750	4,400	2.9	12,760
Average	3,140	2.1	6,550	5,467	3.1	17,065
Barley						
1980	350	1.5	525	625	1.0	625
1981	400	1.8	720	500	1.3	625
1982	400	1.8	720	600	1.2	720
1983	450	1.8	810	600	1.3	750
1984	500	2.0	1,000	550	2.0	1,100
Average	420	1.8	755	575	1.3	764
Maize & Sorghum						
1980		- No data -		45	4.0	180
1981		- do -		50	4.0	200
1982		- do -		60	4.0	240
1983		- do -		70	4.0	280
1984		- do -		80	4.0	320
Average				61	4.0	244
Soybean						
1980	720	2.0	1,440	3,000	0.9	2,700
1981	750	2.0	1,500	500	1.1	550
1982	920	2.0	1,840	1,300	0.9	1,170
1983	700	2.0	1,400	1,900	1.6	3,040
1984	640	2.0	1,260	1,200	1.5	1,800
Average	744	2.0	1,488	1,580	1.2	1,852

Table C.2.3 Crop Production Data,
Amol and Babol Shahrestan (2)

Year	Amol			Babol		
	Area (ha)	Yield (t/ha)	Production (t)	Area (ha)	Yield (t/ha)	Production (t)
Broad Bean						
1980	350	2.0	700	1,000	3.0	3,000
1981	350	2.0	700	960	3.0	2,880
1982	400	2.0	800	900	3.0	2,700
1983	400	2.0	800	400	3.0	1,200
1984	400	2.0	800	250	3.0	750
Average	380	2.0	760	702	3.0	2,106
Potato						
1980	200	10.0	2,000	30	8.0	240
1981	200	10.0	2,000	30	8.0	240
1982	200	10.0	2,000	30	8.0	240
1983	250	10.0	2,500	45	6.0	270
1984	250	10.0	2,500	45	6.0	270
Average	220	10.0	2,200	36	7.0	252
Tomato						
1980	350	10.0	3,500	800	15.0	12,000
1981	400	10.0	4,000	1,000	15.0	15,000
1982	400	10.0	4,000	1,050	15.0	15,750
1983	400	10.0	4,000	1,100	15.0	16,500
1984	450	10.0	4,500	900	15.0	13,500
Average	400	10.0	4,000	970	15.0	14,550
Onion						
1980	20	12.0	240	230	12.0	2,760
1981	20	12.0	240	230	12.0	2,760
1982	20	12.0	240	250	12.0	3,000
1983	20	12.0	240	120	12.0	1,440
1984	30	10.7	320	100	12.0	1,200
Average	22	11.6	256	186	12.0	2,232
Garlic						
1980	50	5.0	250	45	8.0	360
1981	50	5.0	250	40	8.0	320
1982	100	5.0	500	45	8.0	360
1983	100	5.0	500	45	8.0	360
1984	100	5.0	500	40	8.0	320
Average	80	5.0	400	43	8.0	344

Table C.2.3 Crop Production Data,
Amol and Babol Shahrestan (3)

Year	Amol			Babol		
	Area (ha)	Yield (t/ha)	Production (t)	Area (ha)	Yield (t/ha)	Production (t)
Cucumber						
1980	300	12.0	3,600	2,000	10.0	20,000
1981	350	12.0	4,200	2,000	10.0	20,000
1982	400	12.0	4,800	1,800	10.0	18,000
1983	400	12.0	4,800	1,500	10.0	15,000
1984	450	12.0	5,400	1,800	10.0	18,000
Average	380	12.0	4,560	1,820	10.0	18,200
Spinach						
1980	350	6.0	2,100	40	4.0	160
1981	350	6.0	2,100	30	4.0	120
1982	400	6.0	2,400	25	4.0	100
1983	400	6.0	2,400	28	4.0	112
1984	400	6.0	2,400	30	4.0	120
Average	380	6.0	2,280	32	8.0	122
Lettuce						
1980	350	12.0	4,200	250	20.0	5,000
1981	400	12.0	4,800	250	20.0	5,000
1982	400	12.0	4,800	250	20.0	5,000
1983	400	12.0	4,800	250	20.0	5,000
1984	400	12.0	4,800	250	20.0	5,000
Average	390	12.0	4,680	250	20.0	5,000
Clover						
1980	350	15.0	5,250	60	12.0	720
1981	400	15.0	6,000	63	12.0	756
1982	400	15.0	6,000	1,000	12.0	12,000
1983	1,000	15.0	15,000	3,327	55.0	182,985
1984	2,000	20.0	40,000	6,111	55.0	336,105
Average	830	17.4	14,450	2,112	50.4	106,513
Alfalfa						
1980	300	15.0	4,500	600	14.0	8,400
1981	350	15.0	5,250	200	14.0	2,800
1982	400	15.0	6,000	150	14.0	2,100
1983	400	15.0	6,000	100	14.0	1,400
1984	450	15.4	6,950	80	14.0	1,120
Average	380	15.1	5,740	226	14.0	3,164

Table C.2.3 Crop Production Data,
Amol and Babol Shahrestan (4)

Year	Amol			Babol		
	Area (ha)	Yield (t/ha)	Production (t)	Area (ha)	Yield (t/ha)	Production (t)
Green Barley						
1980	200	15.0	3,000	160	30.0	4,800
1981	250	15.0	3,750	200	30.0	6,000
1982	300	15.0	4,500	250	30.0	7,500
1983	300	15.0	4,500	250	30.0	7,500
1984	300	15.0	4,500	280	30.0	8,400
Average	270	15.0	4,050	228	30.0	6,840
Cotton						
1980	-	-	-	450	8.0	3,600
1981	-	-	-	400	10.0	4,000
1982	-	-	-	400	12.0	4,800
1983	-	-	-	350	13.0	4,550
1984	-	-	-	320	14.3	4,560
Average	-	-	-	384	11.2	4,302
Orange & Tangerine						
1980	1,400	10.0	14,000	2,678	12.8	34,300
1981	1,400	10.0	14,000	2,600	19.8	51,500
1982	1,400	10.0	14,000	4,000	22.0	88,000
1983	1,500	10.0	15,000	4,550	15.5	70,700
1984	1,600	10.0	16,000	5,300	14.7	78,000
Average	1,460	10.0	14,600	3,826	16.9	64,500

Source: Activities of Agricultural Development - Mazandaran Province, Amol Agriculture Office, Babol Rural Service Center

Table C.2.4 Crop Production Data, the Project Area

Crops	Cropping Area (ha)		Yield (ton/ha)
	1985	1984	
Paddy	67,919.0	68,122.0	6 - 7
Wheat & Barley	654.5	671.5	2 - 5
Pulses	414.0	315.5	2 - 3
Cotton	12.5	11.5	1 - 2
Onion	78.0	77.7	7 - 8
Garlic	122.8	123.6	3 - 4
Cucumber	577.8	569.4	11 - 13
Tomato	80.5	78.2	8 - 10
Eggplant	18.2	20.0	6 - 7
Melon	230.5	256.5	12 - 14
Pumpkin	110.0	110.0	6 - 8
Lettuce	65.9	78.8	12 - 14
Spinach	32.4	40.4	10 - 12
Radish	62.6	79.1	10 - 12
Other leaf vegetables	880.1	911.4	13 - 15
Fresh broad bean	819.9	958.6	3 - 4
Pumpkin (seed)	62.5	56.5	0.3 - 0.5
Parsley	1.0	-	6 - 8
Clover	864.9	1,379.6	20 - 30
Foxtail millet	59.0	70.0	2 - 5

Source: Village Survey - 1985

Table C.2.5 Cropping Area, Paddy in the Project Area (1)

Variety	Amol		Babol		Total ^{*/}	
	1983	1984	1983	1984	1983	1984
Tarom	22,513.2 (50.3)	14,032.1 (31.3)	5,484.5 (28.3)	3,277.5 (16.9)	29,302.1 (43.1)	18,295.6 (26.9)
Amol-3	10,593.8 (23.7)	22,327.6 (49.8)	7,726.5 (39.9)	12,308.5 (63.3)	19,725.3 (29.1)	36,808.0 (54.0)
Amol-2	2,781.1 (6.2)	1,529.6 (3.4)	1,503.0 (7.7)	410.5 (2.1)	4,582.6 (6.7)	2,072.6 (3.0)
Others	8,834.8 (19.8)	6,927.1 (15.5)	4,667.5 (24.1)	3,444.0 (17.7)	14,308.8 (21.1)	10,946.0 (16.1)
Total	<u>44,722.9</u> (100)	<u>44,816.4</u> (100)	<u>19,381.5</u> (100)	<u>19,440.5</u> (100)	<u>67,918.8</u> (100)	<u>68,122.2</u> (100)

Note: ^{*/} inclusive of Areas of "not-available"
(see Appendix F Village Survey - 1985)

Table C.2.5 Cropping Area, Paddy in the Project Area (2)

(Unit: ha)

Sub-Areas	Tarom		Amol-3		Amol-2		Total	
	1983	1984	1983	1984	1983	1984	1983	1984
<u>Haraz Left Bank</u>								
High Land	2,607(42)	1,240(20)	1,705(28)	3,532(57)	421(7)	229(4)	6,198(100)	6,194(100)
Middle Land	5,449(72)	2,674(35)	1,288(17)	4,225(56)	242(3)	164(2)	7,575(100)	7,586(100)
Low Land	5,873(79)	4,762(64)	342(5)	1,690(23)	405(5)	157(2)	7,407(100)	7,453(100)
<u>Haraz Right Bank</u>								
High Land	870(20)	483(11)	2,230(52)	5,069(72)	640(15)	356(8)	4,250(100)	4,269(100)
Middle Land	1,634(40)	750(18)	1,284(32)	2,708(67)	162(4)	63(2)	4,070(100)	4,069(100)
Low Land	2,910(59)	2,560(52)	315(6)	810(17)	129(5)	102(2)	4,917(100)	4,891(100)
<u>Kari Rud</u>								
High Land	859(14)	429(7)	3,055(50)	4,273(69)	486(8)	270(4)	6,129(100)	6,175(100)
Middle Land	3,047(24)	1,401(11)	6,610(52)	9,992(78)	916(7)	258(2)	12,759(100)	12,868(100)
Low Land	2,645(45)	2,301(39)	309(5)	1,234(21)	378(6)	169(3)	5,927(100)	5,945(100)
<u>Sub-total</u>	<u>25,893(44)</u>	<u>16,599(28)</u>	<u>17,136(29)</u>	<u>31,535(53)</u>	<u>3,779(6)</u>	<u>1,767(3)</u>	<u>59,232(100)</u>	<u>59,449(100)</u>
Not Available	3,409(39)	1,697(20)	2,589(30)	5,275(61)	804(9)	306(4)	8,687(100)	8,673(100)
<u>Total</u>	<u>29,302(43)</u>	<u>18,296(27)</u>	<u>19,725(29)</u>	<u>36,808(54)</u>	<u>4,583(7)</u>	<u>2,073(3)</u>	<u>67,919(100)</u>	<u>68,122(100)</u>

Note: () ... Percent to the total cropping area by Sub-Areas

Source: Village Survey - 1985

Table C.2.6 Cropping Area, Secondary Crops

(Unit: ha)

Sub-Areas	Secondary Crops (1983)			Secondary Crops (1984)				
	Clover	Others	Total	Paddy	Clover	Others	Total	Paddy
<u>Haraz Left Bank</u>								
High Land	281.5(4.5)	308.5(5.0)	590.0(9.5)	6,198	421.5(6.8)	350.0(5.7)	771.5(12.5)	6,194
Middle Land	6.0(0.1)	6.0(0.1)	12.0(0.2)	7,575	7.0(0.1)	6.0(0.1)	13.0(0.2)	7,586
Low Land	3.0(0)	4.0(0.1)	7.0(0.1)	7,407	10.0(0.1)	1.0(0)	11.0(0.1)	7,453
<u>Haraz Right Bank</u>								
High Land	66.5(1.6)	36.0(0.8)	102.5(2.4)	4,250	119.2(2.8)	47.0(1.1)	166.2(3.9)	4,269
Middle Land	1.4(0)	-(-)	1.4(0)	4,070	5.4(0.1)	-(-)	5.4(0.1)	4,069
Low Land	-(-)	-(-)	-(-)	4,917	-(-)	-(-)	-(-)	4,891
<u>Kari Rud</u>								
High Land	116.5(1.9)	71.8(1.2)	188.3(3.1)	6,129	231.5(3.7)	145.8(2.4)	377.3(6.1)	6,175
Middle Land	226.0(1.8)	302.5(2.3)	528.5(4.1)	12,759	357.0(2.8)	322.0(2.5)	679.0(5.3)	12,868
Low Land	-(-)	-(-)	-(-)	5,927	-(-)	-(-)	-(-)	5,945
<u>Sub-total</u>	<u>700.9(1.2)</u>	<u>728.8(1.2)</u>	<u>1,429.7(2.4)</u>	<u>59,232</u>	<u>1,151.6(1.9)</u>	<u>871.8(1.5)</u>	<u>2,023.4(3.4)</u>	<u>59,449</u>
Not Available	147.5(1.7)	68.3(0.8)	215.8(2.5)	8,687	203.0(2.3)	87.5(1.0)	290.5(0.3)	8,673
<u>Total</u>	<u>848.4(1.2)</u>	<u>797.1(1.2)</u>	<u>1,645.5(2.4)</u>	<u>67,919</u>	<u>1,354.6(2.0)</u>	<u>959.3(1.4)</u>	<u>2,313.9(3.4)</u>	<u>68,122</u>

Note: ()... Percent to the cropping area of paddy by sub-areas

Source: Village Survey - 1985

Table C.2.7 Yield Components of Amol-3 in the Project Area

Villages	(1) Number of panicles per hill	(2) Number of hills per m ²	(3)= (1)x(2) Number of panicles per m ²	Number of Percentage			Yield		Physical Condition	Fertilizer Amount				
				(4) Number of spikelets per hill	(5) Number of spikelets per panicle	(6) Percentage of ripened grains	(7) Weight of 1,000 spikelets grains per hill	(8) Weight of 1,000 spikelets grains per panicle		(9) Weight of 1,000 spikelets grains per panicle	(10)= (9)x(2) Weight of spikelets per m ²	(11) Weight of spikelets per 10a	Urea (N)	DAP (P ₂ O ₅) (kg/ha)
Marion Kola	20.4	9.2	188.0	4,277.5	208.7	60.0%	61.5g	23.9g	3.0g	565.3g	565.3kg	Good	695	525
Tejenjar	19.8	11.8	232.7	4,254.0	212.7	61.1	60.4	23.2	3.0	702.6	702.6	"	160	660
Hend Kola	18.5	9.1	168.6	3,449.5	191.6	84.6	68.6	23.5	3.8	631.0	631.0	"	380	580
Mahamad-Abad	15.3	16.7	255.8	2,412.5	155.6	79.5	42.1	21.9	2.7	694.5	694.5	"	-	-
Kabood Kola	14.4	13.6	196.1	2,436.0	174.0	71.8	43.0	24.6	3.1	602.0	602.0	Bad	375	500
Asad moon	13.5	14.6	194.0	2,140.0	158.5	61.6	34.1	25.8	2.5	489.9	489.9	"	170	170
Carieard	15.8	10.9	171.7	2,989.0	186.8	76.9	57.6	25.1	3.6	618.0	618.0	"	125	125
Shir Mahalleh	17.7	13.2	233.6	2,961.5	174.2	68.8	50.0	24.5	2.9	686.9	686.9	"	Poor	100

Note: 1/ Selected by salt water of specific gravity 1.06

2/ Inclusive of 14% moisture

(1) Average number of panicles of 150 hills by villages

(4)-(9) Average number of the representative 2 hills out of 150 hills by villages.

Source: Yield Survey by JICA Team in 1985

Table C.2.8. Data of Yield, Paddy

Variety	Amol Shahrestan				Babol Sharestan			
	1984		1985		1984		1985	
	Cultivation Portion (%)	Yield (ton/ha)	Cultivation Portion (%)	Yield (ton/ha)	Cultivation Portion (%)	Yield (ton/ha)	Cultivation Portion (%)	Yield (ton/ha)
1. Amol-3	52	6.12	33	8.1			52.5	7.8
2. Tarom	22	4.32	41	4.8			19.5	4.5
3. Gerdeh & Champa	8.4	4.77	8	7.3			2	6.5
4. Rashti	6	4.35	8	4.5		- No data -	10	4.4
5. Shastak Malek Abkenari & Binam	5.8	4.51	7	5.4			5	4.3
6. Mesbah	3.8	4.48	3	6.5			8.5	6.5
7. Amol-2	2	6.51	-	-			2.5	6.5
<u>Total</u>	<u>100</u>		<u>100</u>				<u>100</u>	

Source: AO of Amol, ARTSC of Babol

Table C.2.9 Farming Practice of Paddy in the Project Area

	Input Material (kg/ha)				Working Period ^{1/}								
	Seed	Urea	DAP	Chemicals Konstar Diasion kg/ha	N	P	H	T	F	W	I	H	
Amol-5 (20)2/	54	259	243	3.3	63	Mar. -Apr.	Mar. -May	Apr. -May	Apr. -May	Apr. -Jun.	Apr. -Jun.	May -Jul.	Sep. -Oct.
Tarom (18)	51	144	141	3.8	43	-do-	-do-	-do-	-do-	Apr. -May	-do-	-do-	Aug. -Sep.

Notes: Each input amount is average of the amount applied by sample farmers.

- 1/ ; N.....Nursery Preparation, P.....Plowing
 L.....Harrowing & Levelling, T.....Transplanting
 F.....Fertilizing, W.....Weeding
 I.....Insecticide Application, H.....Harvesting

2/ ; Number of Sample Farmers

Sources: Farm Economic Survey, Village Survey - 1985

Table C.2.10 Frequency of Agricultural Working
in the Project Area

Work Frequency	Number of farmers				Remarks
	Plowing in winter	Fertilizing	Weeding	Insecticide Application	
<u>Amol-3</u>					
1		11 (55)	4 (20)	1 (5)	
2	[7 (35)]	6 (30)	9 (45)	2 (10)	
3 ~		3 (15)	7 (35)	17 (85)	
Total	[20(100)]	20 (100)	20 (100)	20 (100)	
<u>Tarom</u>					
1		13 (72)	6 (33)	-	
2	[7 (39)]	5 (28)	9 (50)	5 (28)	
3 ~		-	3 (17)	13 (72)	
Total	[18(100)]	18 (100)	18 (100)	18 (100)	

Note: ()....Percent to the total number of the sample farmers

Source: Farm Economic Survey

Table C.2.11. Crop Production with and without Project (1)

Crops	Without Project			With Project			Incremental Production (2) - (1) (ton)
	Cropping Area (ha)	Yield (ton/ha)	Production (1) (ton)	Cropping Area (ha)	Yield (ton/ha)	Production (2) (ton)	
<u>Haraz Left Bank</u>							
<u>High Land</u>							
Paddy	6,589		44,276	7,620		57,607	13,331
Local Variety	2,636	4.2	11,071	1,524	4.2	6,401	Δ4,670
Improved Variety	3,953	8.4	33,205	6,096	8.4	51,206	18,001
Winter Vegetables	373		2,618	762		12,640	10,022
Lettuce	10	30	300	158	30	4,740	4,440
Spinach	10	20	200	91	20	1,820	1,620
Radish	-	-	-	158	25	3,950	3,950
Broad Bean	353	6	2,118	355	6	2,130	12
<u>Middle Land</u>							
Paddy	8,926		53,557	8,814		66,633	13,076
Local Variety	3,570	3.9	13,923	1,763	4.2	7,405	Δ6,518
Improved Variety	5,356	7.4	39,634	7,051	8.4	59,228	19,594
<u>Low Land</u>							
Paddy	9,170		55,020	8,903		67,305	12,285
Local Variety	3,668	3.9	14,305	1,781	4.2	7,480	Δ6,825
Improved Variety	5,502	7.4	40,715	7,122	8.4	59,825	19,110
<u>Total</u>							
Paddy	24,685		152,853	25,337		191,545	38,692
Local Variety	9,874	4.0	39,299	5,068	4.2	21,286	Δ18,013
Improved Variety	14,811	7.7	113,554	20,269	8.4	170,259	56,705
Winter Vegetables	373		2,618	762		12,640	10,022
Lettuce	10	30	300	158	30	4,740	4,440
Spinach	10	20	200	91	20	1,820	1,620
Radish	-	-	-	158	25	3,950	3,950
Broad Bean	353	6	2,118	355	6	2,130	12

Table C.2.11. Crop Production with and without Project (2)

Crops	Without Project			With Project			Incremental Production (2) - (1) (ton)
	Cropping Area (ha)	Yield (ton/ha)	Production (1) (ton)	Cropping Area (ha)	Yield (ton/ha)	Production (2) (ton)	
<u>High Land</u>							
Paddy	4,478	4.2	30,093	4,461	4.2	33,726	3,633
Local Variety	1,791	8.4	7,522	892	8.4	2,746	Δ 3,776
Improved Variety	2,687	-	22,571	3,569	30	29,980	7,409
Winter Vegetables	49	-	294	446	20	10,604	10,310
Lettuce	-	-	-	158	25	4,740	4,740
Spinach	-	-	-	81	6	1,620	1,620
Radish	-	-	-	158	-	3,950	3,950
Broad Bean	49	6	294	49	-	294	0
<u>Middle Land</u>							
Paddy	5,141	3.9	30,847	5,053	4.2	38,199	7,352
Local Variety	2,056	7.4	8,018	1,011	8.4	4,246	Δ 3,772
Improved Variety	3,085	-	22,829	4,042	-	33,953	11,124
<u>Low Land</u>							
Paddy	3,792	3.9	22,751	3,682	4.2	27,837	5,086
Local Variety	1,517	7.4	5,916	736	8.4	3,091	Δ 2,825
Improved Variety	2,275	-	16,835	2,946	-	27,746	7,911
<u>Total</u>							
Paddy	13,411	4.0	83,691	13,196	4.2	99,762	16,071
Local Variety	5,364	7.7	21,456	2,639	8.4	11,083	Δ 10,373
Improved Variety	8,047	-	62,235	10,557	-	88,679	26,444
Winter Vegetables	49	-	294	446	30	10,604	10,310
Lettuce	-	-	-	158	20	4,740	4,740
Spinach	-	-	-	81	25	1,620	1,620
Radish	-	-	-	158	6	3,950	3,950
Broad Bean	49	6	294	49	-	294	0

Table C.2.11. Crop Production with and without Project (3)

Crops	Without Project			With Project			Incremental Production (2) - (1) (ton)
	Cropping Area (ha)	Yield (ton/ha)	Production (1) (ton)	Cropping Area (ha)	Yield (ton/ha)	Production (2) (ton)	
<u>High Land</u>							
Paddy	7,650		51,408	7,926		59,921	8,513
Local Variety	3,060	4.2	12,852	1,585	4.2	6,657	Δ6,195
Improved Variety	4,590	8.4	38,556	6,341	8.4	53,264	14,708
Winter Vegetables	188		1,888	793		17,643	15,755
Lettuce	10	30	300	257	30	7,710	7,410
Spinach	10	20	200	131	20	2,620	2,420
Radish	20	25	500	257	25	6,425	5,925
Broad Bean	148	6	888	148	6	888	0
<u>Middle Land</u>							
Paddy	13,162		78,972	12,870		97,297	18,325
Local Variety	5,265	3.9	20,534	2,574	4.2	10,811	Δ9,723
Improved Variety	7,897	7.4	58,438	10,296	8.4	86,486	28,048
Winter Vegetables	305		1,830	306		1,836	6
Broad Bean	305	6	1,830	306	6	1,836	6
<u>Low Land</u>							
Paddy	8,077		48,461	8,241		62,303	13,842
Local Variety	3,231	3.9	12,601	1,648	4.2	6,922	Δ5,679
Improved Variety	4,846	7.4	35,860	6,593	8.4	55,381	19,521
<u>Total</u>							
Paddy	28,889		178,841	29,037		219,521	40,680
Local Variety	11,556	4.0	45,987	5,807	4.2	24,390	Δ21,597
Improved Variety	17,333	7.7	132,854	23,230	8.4	195,131	62,277
Winter Vegetables	493	6	3,718	1,099		19,479	15,761
Lettuce	10	30	300	257	30	7,710	7,410
Spinach	10	20	200	131	20	2,620	2,420
Radish	20	25	500	257	25	6,425	5,925
Broad Bean	453	6	2,718	454	6	2,724	6

Table C.2.12. Characteristics of Rice Varieties

Characteristics	Amol-3	Tarom
growing period	late (140 days)	early (120 days)
plant type	erect	medium
column height	118 - 120 cm	160 - 170 cm
tillering capacity	large	medium
lodging resistance	strong	weak
photoperiodic sensitivity	neutral	neutral
number of grains per panicle	155	96
length of panicle	23.5 cm	22.6 cm
weight of panicle	3.1g	1.23g
weight of 1,000 grains (unhulled)	25.8g	22.4g
shape of kernel	5.03	
disease resistance	blast R sheath blight M.S	blast S
insect resistance	stem borer M.S leaf hopper M.S	stem borer M.S leaf hopper M.S

Source: Amol Rice Research Station

Table C.2.13. Percentage of Productive Tiller of Typical Varieties of Rice

Year	Amol-2			Amol-3			Tarom		% of productive tiller
	(A)	(B)	(C)	(A)	(B)	(C)	Average of max. tillers per hill	Average of panicles per hill	
1983	21.0	16.9	80.0	19.2	15.3	80.0	18.4	15.6	85.0
	21.1	17.0	81.0	22.2	17.2	77.0			
	22.6	19.7	87.0	23.6	16.9	72.0			
	23.0	18.6	81.0	24.3	15.6	64.0			
	23.1	20.1	87.0	21.0	18.4	88.0			
Ave.	22.2	18.5	83.4	Ave. 22.1	16.7	76.2			
1984	26.2	22.0	84.0	27.2	19.0	70.0	19.0	16.5	87.0
	19.0	16.0	84.0	26.0	19.0	73.0			
	24.5	17.1	70.0	21.0	18.0	86.0			
				22.4	17.0	76.0			
	Ave.	23.2	18.4	79.3	Ave. 24.2	18.3	76.3		
1985	20.8	17.6	84.0	20.3	15.8	77.8	18.5	16.0	86.0
	24.3	19.7	81.0	20.3	19.2	94.5			
				20.2	16.1	79.3			
				27.7	20.8	75.2			
	Ave.	22.6	18.4	82.6	Ave. 22.1	18.0	81.7	18.7	
Ave.			81.8			78.1			

Source: Amol Rice Research Station

Note : (A) ... Number of tillers per hill at maximum tillering stage
 (B) ... Number of panicles per hill at ripening stage
 (C) ... Percentage of productive tiller

Table C.2.14. Researches at the Rasht and Amol Rice Research Stations

Research Fields	Intention of Research	Subject	Researchers	
			Rasht	Amol
Breeding	breeding of new, high yield, good quality and disease resistance variety.	(1) collection of parents for crossing. (2) crossing and F ₁ , F ₂ pedigree system. (3) yield trials (small and large scales).	2 (breeder)	2 (breeder)
Agronomy	best technics for producing high yield of rice in paddy.	(1) date of sowing and rate of sowing. (2) transplanting rate. (3) water consumption and water stress. (4) fertilizer application for cultivating new varieties.	2 (agronomist)	2 (agronomist)
Pest and Disease	(1) best way for disease and insect control. (2) biological control for stem borow.	(1) time of insecticides application. (2) selection of disease resistance variety to blast. (3) selection of insect resistance variety to stem borow. (4) date of sowing in relation to the application of insecticides. (5) biological control to stem borow.		1 (entomologist)
Mechanization	mechanization of transplanting and harvesting of rice	(1) trials of rice transplanter for paddy (2 rows, 4 rows, 6 rows) (2) test of harvestors in several types (3) study of adaptable method to mechanization in rice cultivation.		1 (mechanist)

° Following researches are proceeding jointly with other organizations;

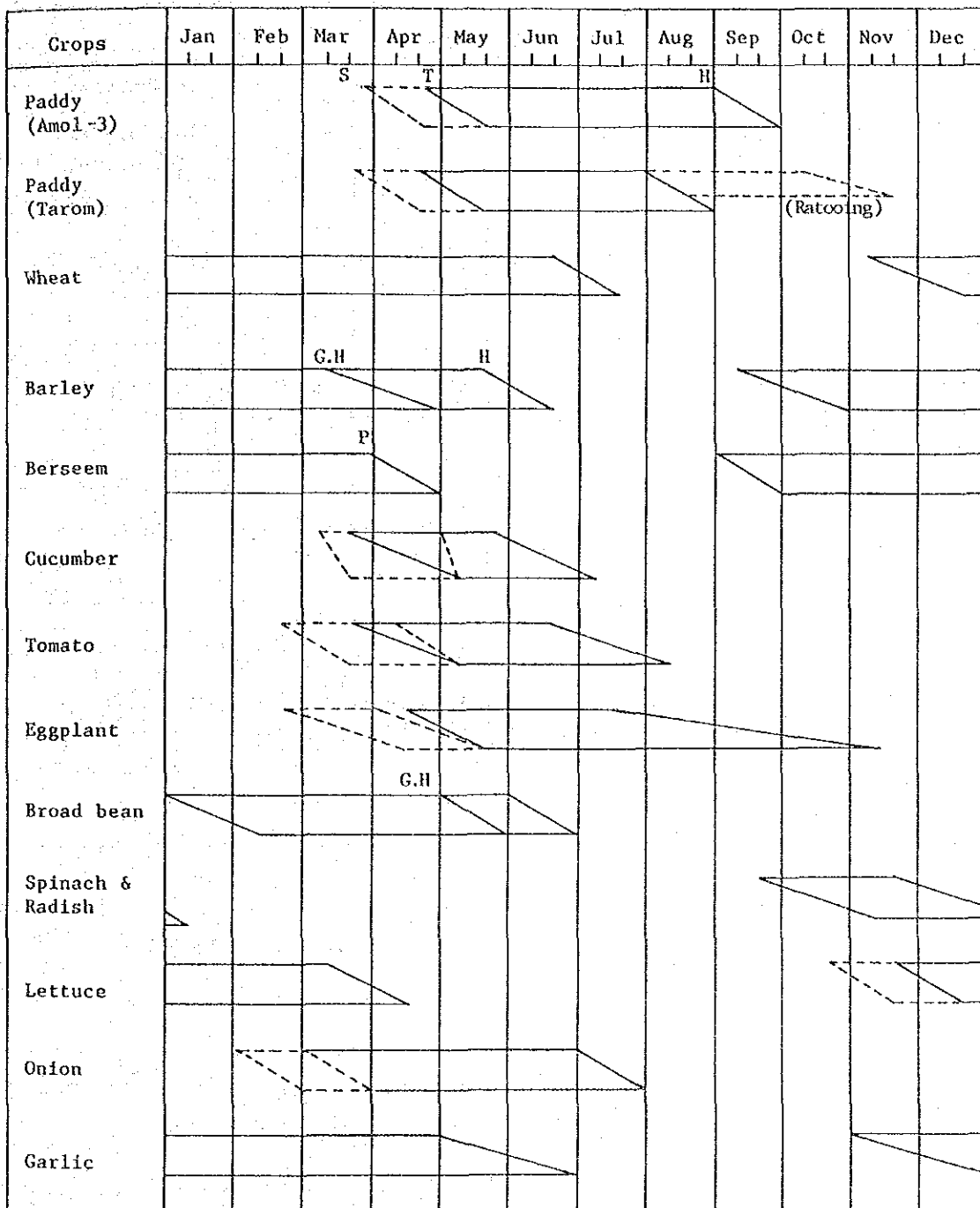
(1) soil fertility and rice growing: jointed with the SWRI.

(2) Pest and disease in rice plant: jointed with the PPDR.

(3) rice breeding: jointed with the IRRI

Note: Source Amol Rice Research Station

Figure C.2.1 Cropping Calendar in the Project Area



Note,

- S: Sowing
- T: Transplanting
- H: Harvesting
- G.H: Harvesting as green
- P: Plowing-in

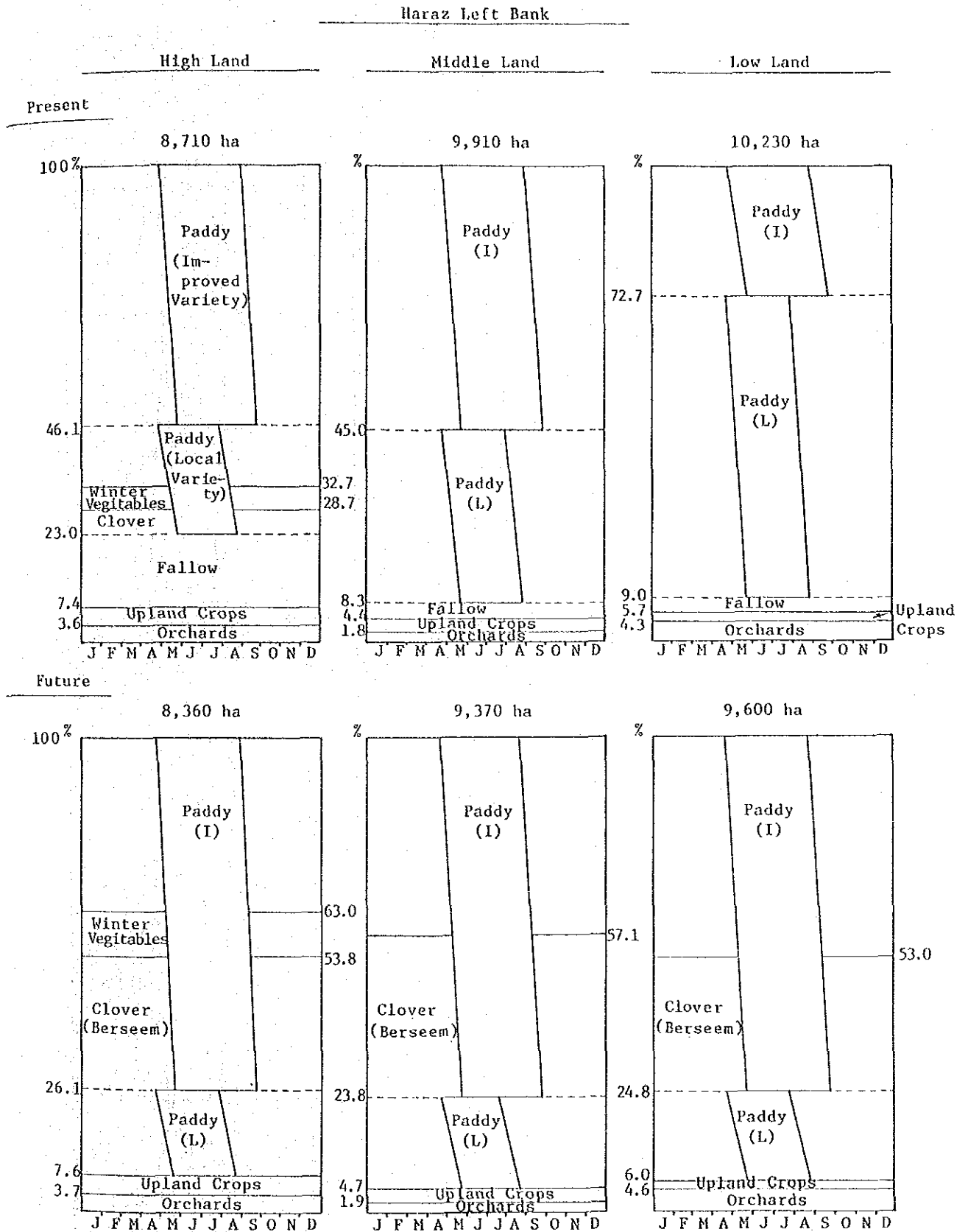
Figure C.2.2 Present Farming Practice (Paddy) in the Project Area

Items	Period												Remarks
	J	F	M	A	M	J	J	A	S	O	N	D	
Nursery Preparation	[]												Seed Selection with Salt Solution (a Few Farmers) Seed Soaking (1-2 days) in Canal Seed Amount: 50 - 60 kg/ha Fertilizer : Urea 10-20 g/m ² , Dap 10-20g/m ²
Plowing	1 - 2 times []												by Tiller with Plow About 40% of farmers plow in ^{*/} winter.
Harrowing & Levelling	2 - 4 times []												by Tiller with Harrow and Cargo Rotary and/or Land Leveller
Transplanting	[]												Random Planting 5-7 Seedlings per Hill by Hand Planting Distance: 25 - 30 cm
Fertilizer Application	1 - 3 times []												Tarom: Urea 144 kg/ha, Dap 141 kg/ha ^{*/} Amol-3: " 259 " " 243 " More than 60% of farmers supply only basal fertilizer.
Weeding	2 - 3 times []												Tarom: Ronstar 3.8 l/ha ^{*/} Amol-3: " 3.3 l/ha
Insecticide Application	2 - 3 times []												Tarom: Diasinon 43 kg/ha ^{*/} Amol-3: " 63 kg/ha
Harvesting	Tarom Amol-3 [] (Ratooning)												by Hand with Sickles Stubble Hight: 30 - 40 cm
Threshing	Tarom Amol-3 []												by Threshing Machine with Tiller's Engine or Large-Scale Combine (a Few Fields in High Land)

^{*/} the Result of Farm Economic Survey

Source: Farm Economic Survey, Village Survey - 1985

Figure C.2.3 Present and Future Cropping Pattern (1)



Source: Village Survey - 1985

Figure C.2.3 Present and Future Cropping Pattern (2)

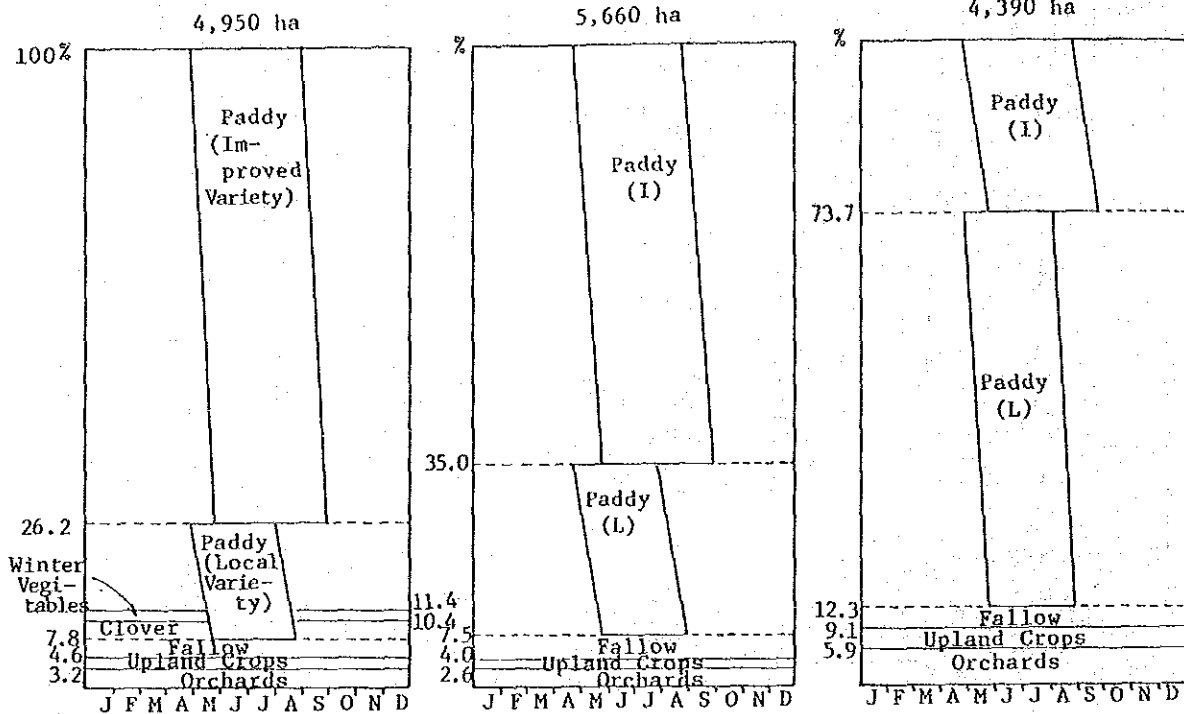
Haraz Right Bank

High Land

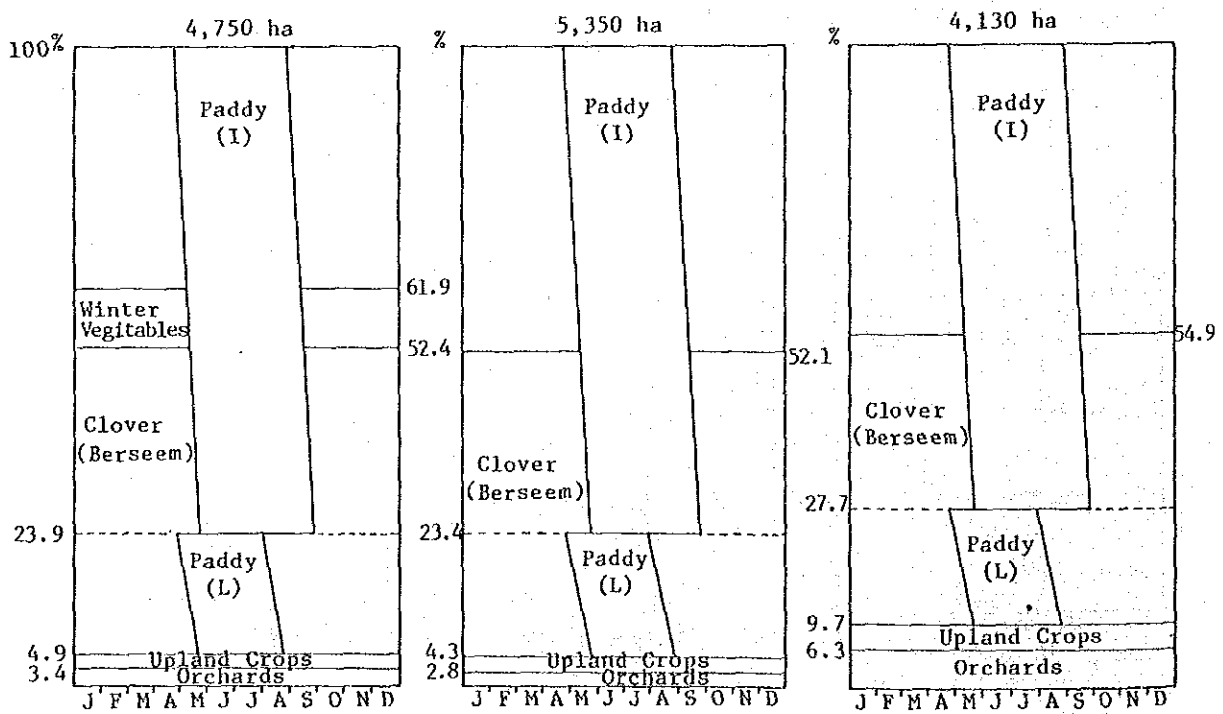
Middle Land

Low Land

Present



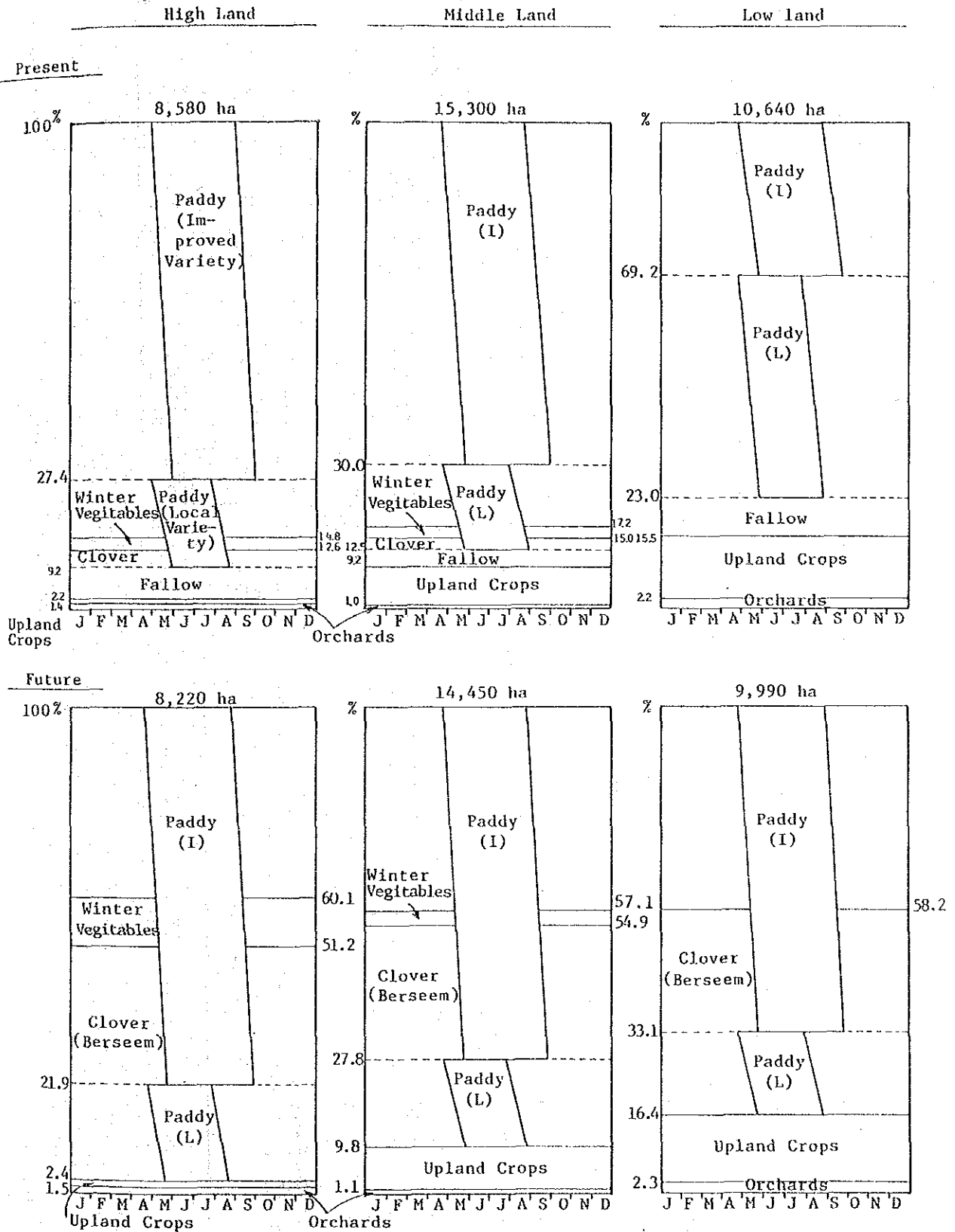
Future



Source: Village Survey - 1985

Figure C.2.3 Present and Future Cropping Pattern (3)

Kari Rud



Source: Village Survey - 1985

Figure C. 2. 4. Growth Pattern

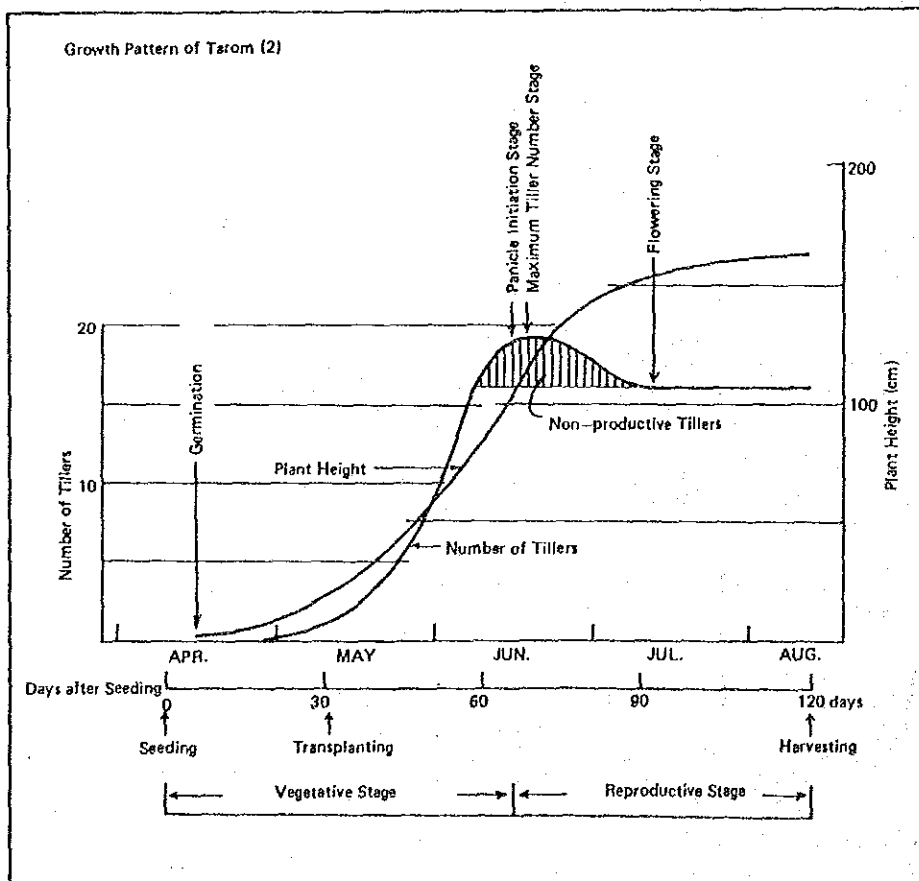
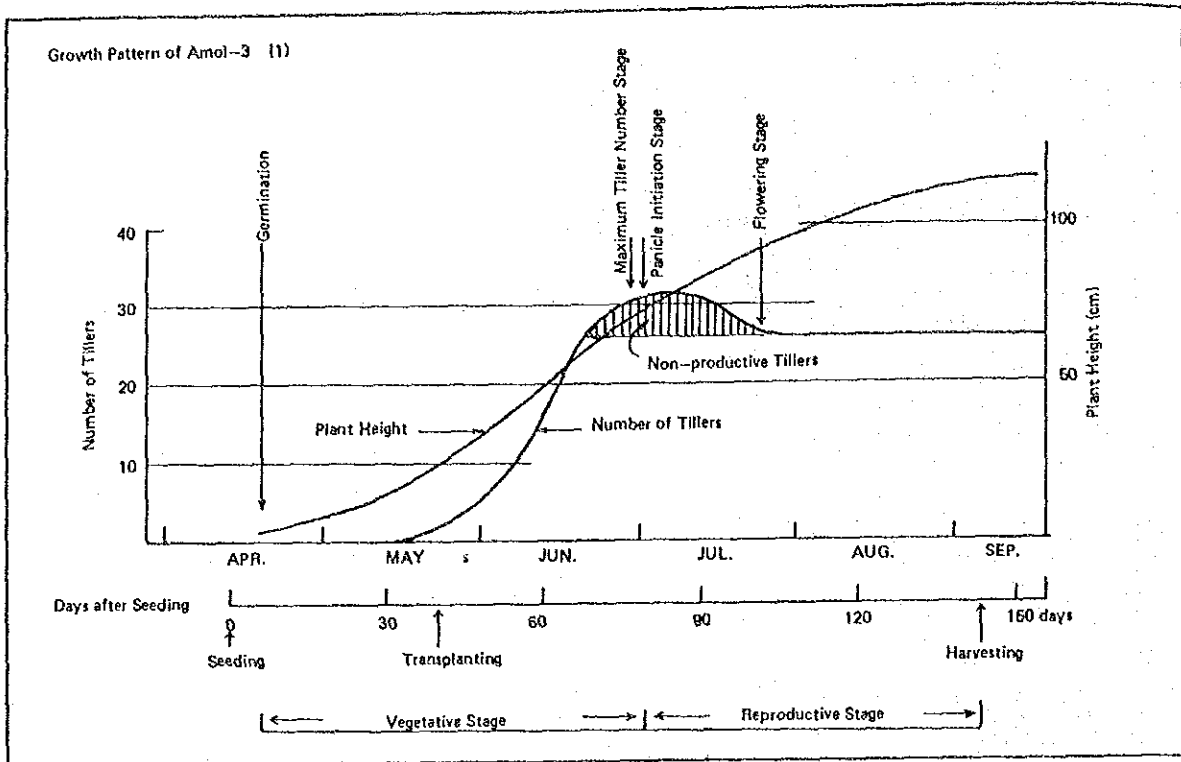


Figure C. 2. 5.

Summary of Sample Distribution (1)

(Based on Yield Survey by MOA at Amol and Babol in 1361 -64)

Total No. of Sample:

Tarom	271
Amol-3	84
Amol-2	82

Selection of Range:

	<u>Range</u>	<u>No. of Sample</u>	<u>Percentage</u>
Tarom	251 - 500	204	75.3%
Amol-3	551 - 900	62	73.8%
Amol-2	401 - 750	66	80.5%

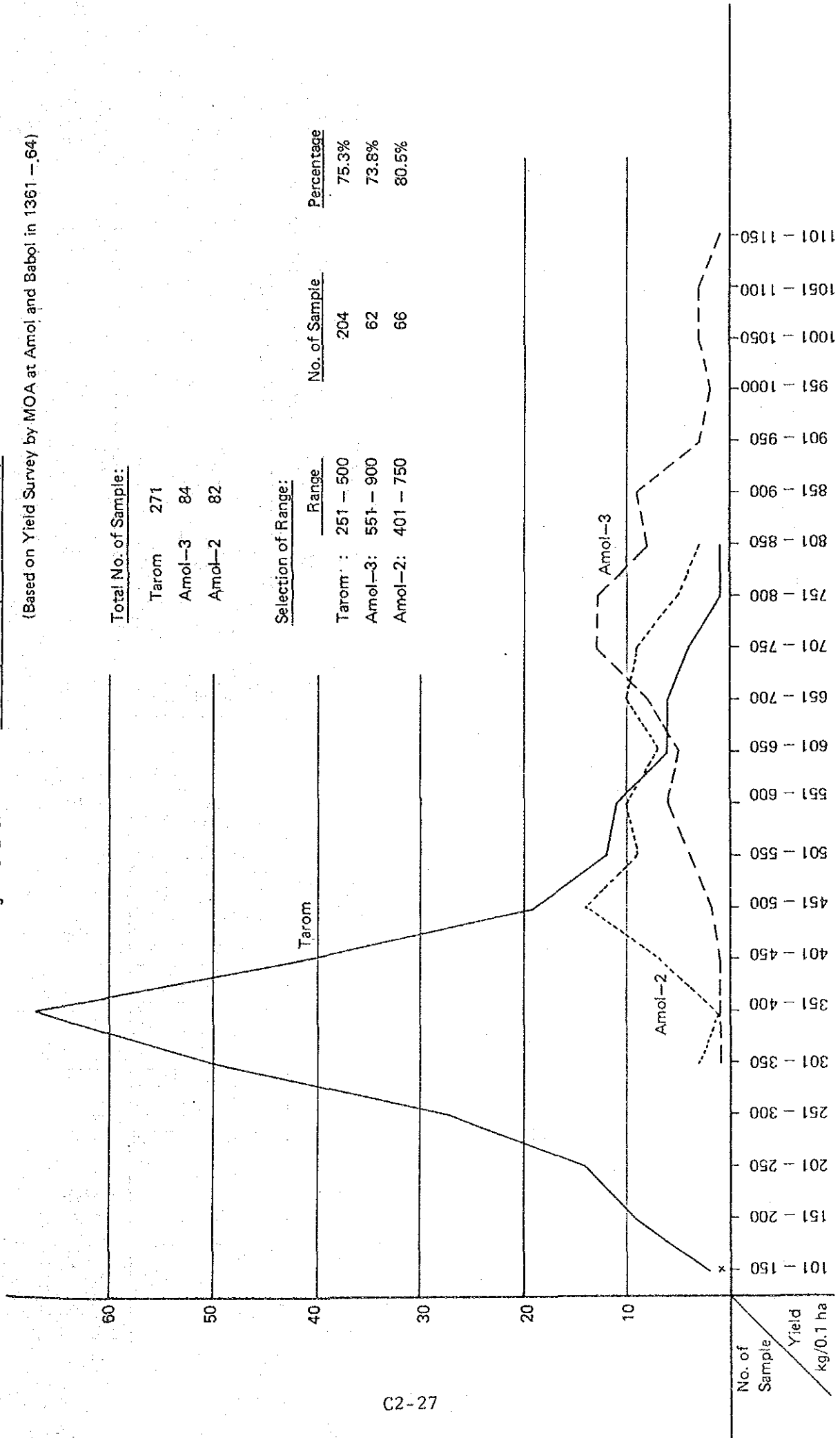
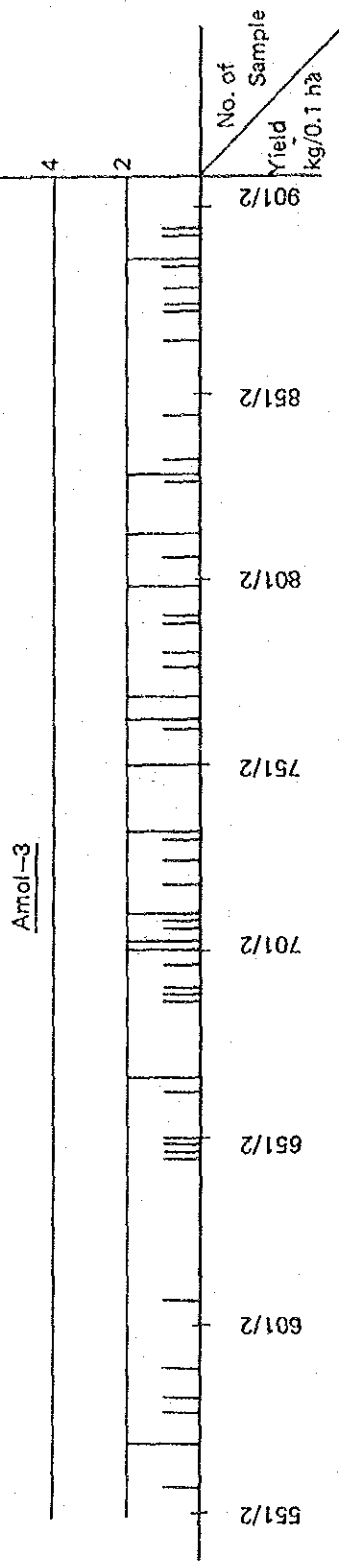


Figure C. 2. 5. Sample Distribution in Selected Ranges (2)

(Distribution by each 20 kg/ha)



Tarom

Judgment:

(1) In case of Amol-3, number of sample is not enough to find out proper mode in the recorded samples.

(2) For Tarom, the recorded samples are mainly concentrated in 289 - 444 kg/0.1 ha

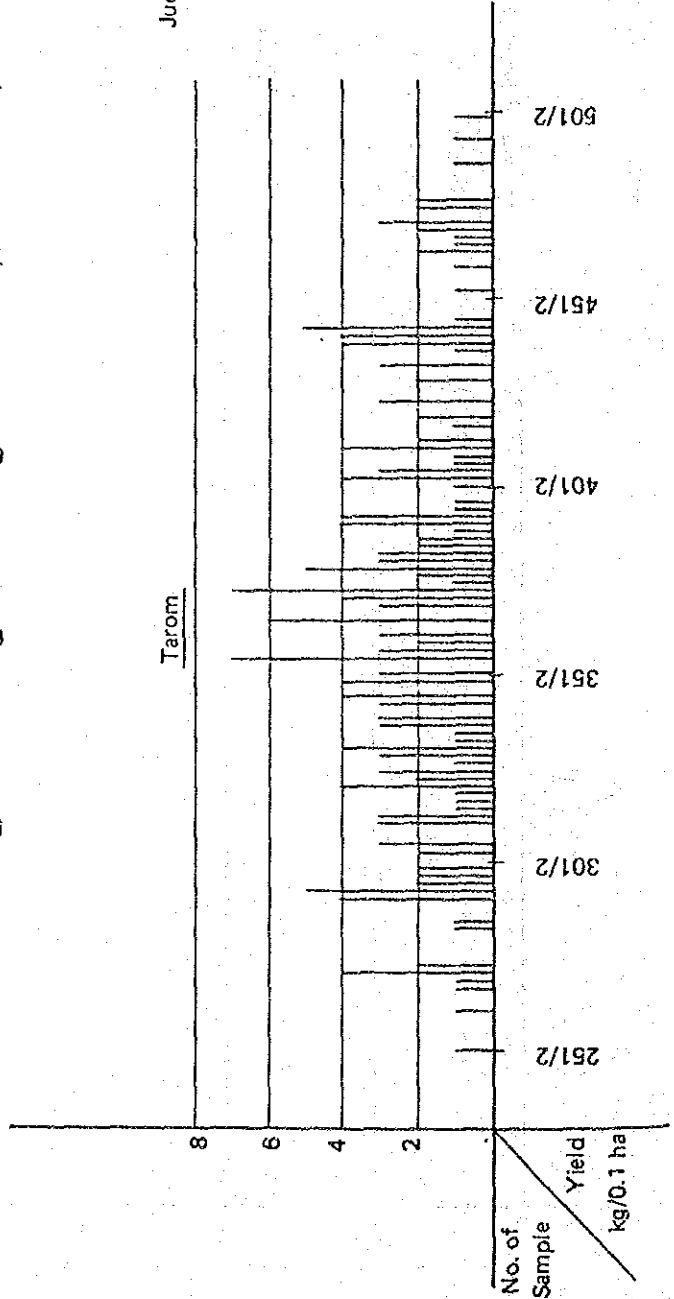
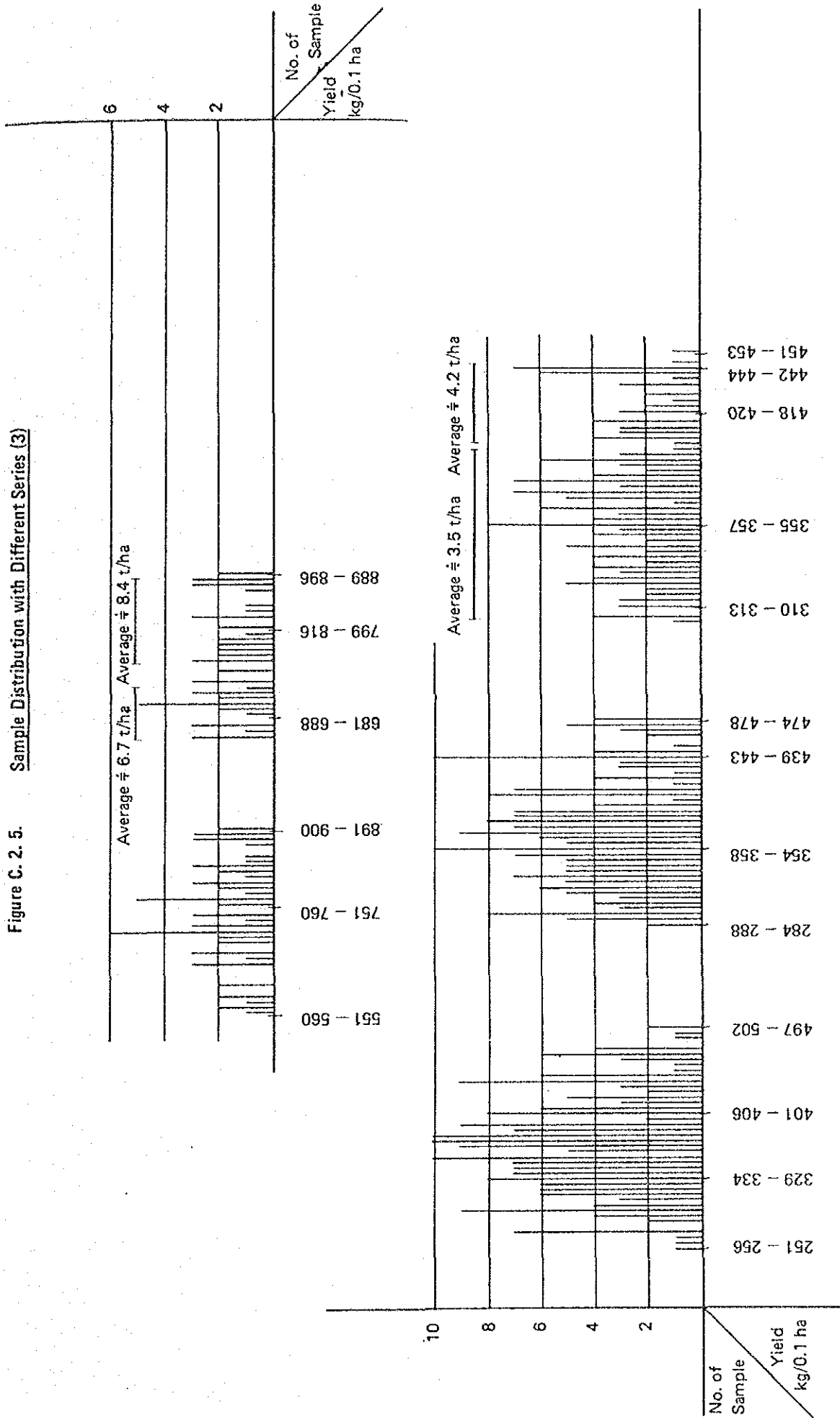


Figure C. 2. 5. Sample Distribution with Different Series (3)



APPENDIX C. 3.

LIVESTOCK

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Table C.3.1. Number of Livestock in Iran

	(Unit: head)	
	1980	1982
Cows	3,599,000	5,102,000
Sheep	30,962,000	34,605,000
Goats	17,358,000	18,663,000
Camels	NA	105,000
Horses	NA	255,000
Donkeys	NA	2,028,000
Poultry	NA	NA

Source: Statistical Center of Iran

Table C.3.2. Meat Production in Iran

	(Unit: tons)			
	1980	1981	1982	1983
Beef	50,323	44,889	54,774	80,893
Sheep Meat	108,024	90,438	92,535	117,615
Goat Meat	17,229	16,018	21,230	24,099

Source: Statistical Center of Iran

Table C.3.3. Number of Slaughtered Livestock in Iran

	(Unit: head)		
	1980	1981	1982
Cows	536,000	484,000	525,000
Buffaloes	23,000	22,000	27,000
Sheep	5,863,000	4,778,000	4,800,000
Goats	1,189,000	1,152,000	1,531,000
Camels	21,000	23,000	27,000

Source: Statistical Center of Iran

Table C.3.4. Number of Livestock in Mazandaran

(Unit: head, birds)

	Mazandaran		Amol Shahrestan		Babol Shahrestan	
	1982	1984	1982	1984	1982	1984
Local Cow	616,800	563,836	117,520	112,000	131,250	164,708
Hybrid Cow	17,000	66,138	NA	9,000	NA	13,085
Pure Cow	6,000	30,639	NA	4,000	NA	4,600
Buffaloe	4,300	NA	NA	NA	NA	NA
Sheep	1,367,900	1,661,300	123,000	200,000	158,000	153,000
Goat	164,910	227,830	36,800	20,000	11,030	11,030
Local Chicken	2,590,000	NA	305,000	NA	520,000	NA
Goose	101,000	NA	30,000	NA	20,000	NA
Turkey	43,000	NA	5,000	NA	19,000	NA
Horse	72,140	NA	4,120	NA	7,740	NA
Donkey	12,540	NA	1,200	NA	800	NA
Modern Bee Hive	NA	133,407	NA	24,260	NA	50,227
Local Bee Hive	NA	1,256	NA	23	NA	NA

Source: The Bulletin of Livestock and Pasture Planning Committee, Amol Agricultural Office

Table C.3.5. Results of Village Survey

Animals	Project Area						Average No. of		
	Amol		Babol		Total		Animal per Farm		
	No. of Farms with Animals	No. of Animals	No. of Farms with Animals	No. of Animals	No. of Farms with Animals	No. of Animals	Amol	Babol	
Milk Cow	3,215	6,825	1,636	2,814	4,851	9,639	2.1	1.7	2.0
(pure, hybrid)									
Milk Cow (local)	19,347	48,086	10,904	22,281	30,251	70,367	2.5	2.1	2.3
Cattle for Meat	4,281	5,634	3,764	5,046	8,045	10,680	1.3	1.3	1.3
Sheep	846	67,557	348	21,149	1,194	88,706	79.9	60.8	74.3
Goat	906	5,503	115	386	1,021	5,889	6.1	3.4	5.8
Chicken (local)	31,528	255,391	17,281	140,199	48,809	395,590	8.1	8.1	8.1
Chicken (Industrial)	105	1,250,500	6	120,100	111	1,370,600	11,909.5	20,016.7	12,347.7
Duck	27,174	228,688	14,640	124,052	41,814	352,740	8.4	8.5	8.4
Goose	15,964	57,440	8,752	28,237	24,716	85,677	3.6	3.2	3.5
Turkey	1,942	7,245	661	4,243	2,603	11,488	3.7	6.4	4.4
Bee	119 boxes	3,328	14	150	133	3,478	28.0	10.7	26.2

Source: Village Survey - 1985.

Note: Usually 3 to 5 rotation have been carried out in the industrial poultry farm.

Table C.3.6. Number of Slaughtered Livestock in Amol and Babol

(Unit: head)

	1981		1982		1983	
	Amol	Babol	Amol	Babol	Amol	Babol
Cows	9,641	16,244	8,862	14,998	11,467	19,511
Buffaloes	0	86	0	221	0	87
Sheep	51,129	32,528	58,270	39,560	75,825	60,034
Goats	23,844	15,962	30,233	18,531	37,240	21,935

Table C.3.7. Meat and Dairy Products Production (Mazandaran)

(Unit: tons)

	1980	1981	1982	1983
Beef	6,343	6,303	7,047	8,661
Sheep Meat	6,999	6,244	7,321	9,233
Goats Meat	2,400	1,909	2,066	2,203
Fresh Milk	1,336	854	749	1,606
Mast	1,319	2,368	2,857	2,691
Dough	400	151	NA	NA
Karehe	78	152	345	514

Note: Mast = Yoghurt, Karehe = Butter, Dough = Drinking Yoghurt

Source: Mazandaran Statistical Center

Table C.3.8. Number of Cattle Inseminated Artificially

(Unit: head)

Mazandaran			Amol Shahrestan			Babol Shahrestan		
1982	1983	1984	1982	1983	1984	1982	1983	1984
1,589	2,527	4,282	335	357	487	336	600	843

Table C.3.9. Farm-gate Price

Fresh Milk	(rials/kg)	70 - 100
Yoghurt	(")	80 - 100
Butter	(")	1,200 - 1,500
Chicken	(")	215
Goose	(rials/bird)	2,500 - 3,000
Duck	(")	1,200 - 1,500
Turkey	(")	4,000 - 4,500
Wool	(rials/kg)	140
Egg	(")	155
Concentrate	(")	32 - 35
Barley Grain	(")	42
Maize Grain	(")	28
Rice Bran	(")	32 - 35
Cotton Seed Cake	(")	52.5

	<u>Pure Cow</u>	<u>Hybrid Cow</u>	<u>Local Cow</u>
Adult Cow (rials/head)	300,000-450,000	200,000-250,000	100,000-150,000
Heifer (")	300,000-400,000	150,000-200,000	80,000-100,000
Bull Calf (")	225,000-250,000	150,000-180,000	70,000- 80,000

Figure C.3.1 Organization Chart of Animal Husbandry Office and Veterinary Office

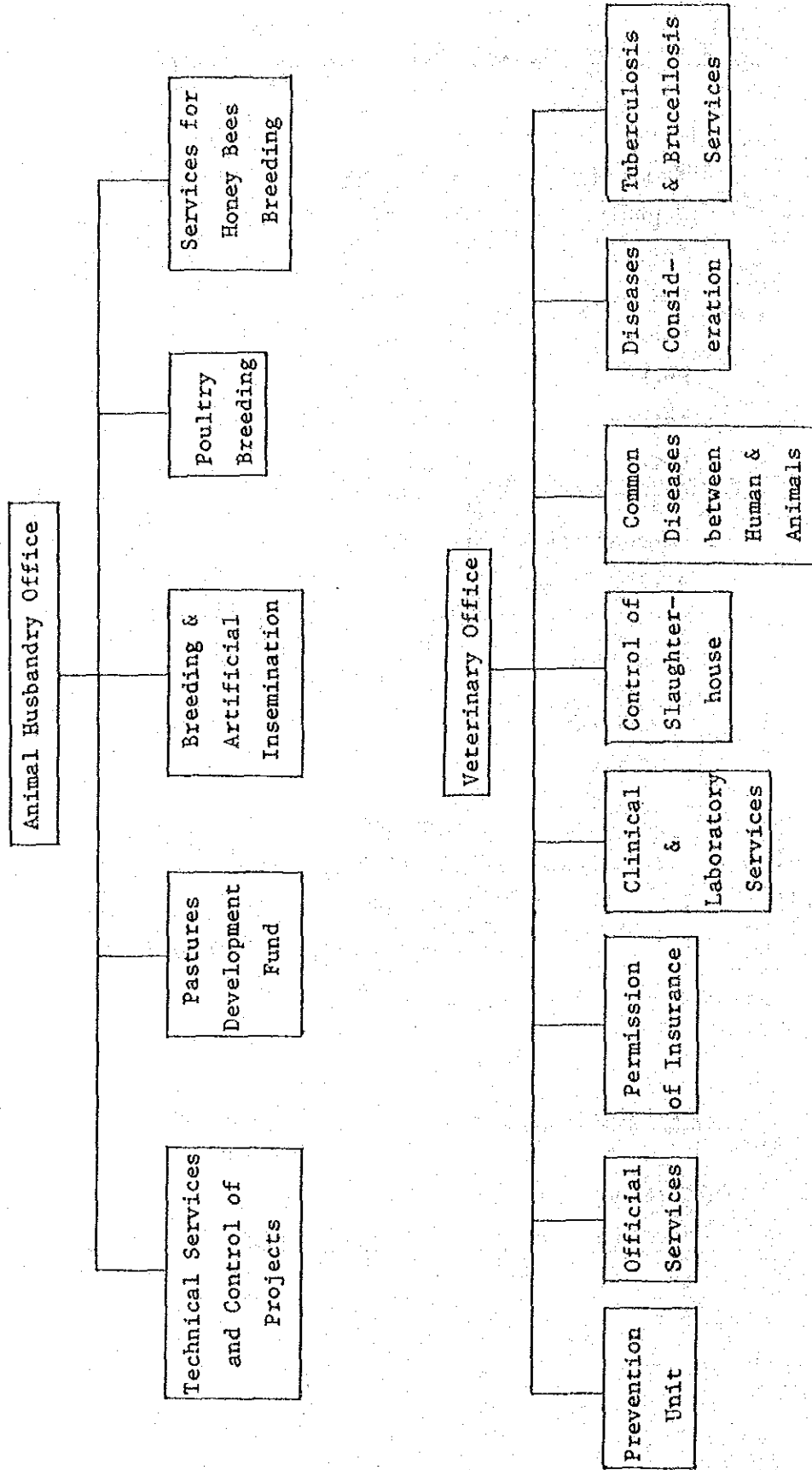


Figure C.3.2 Recipro-Mower for Power Tiller

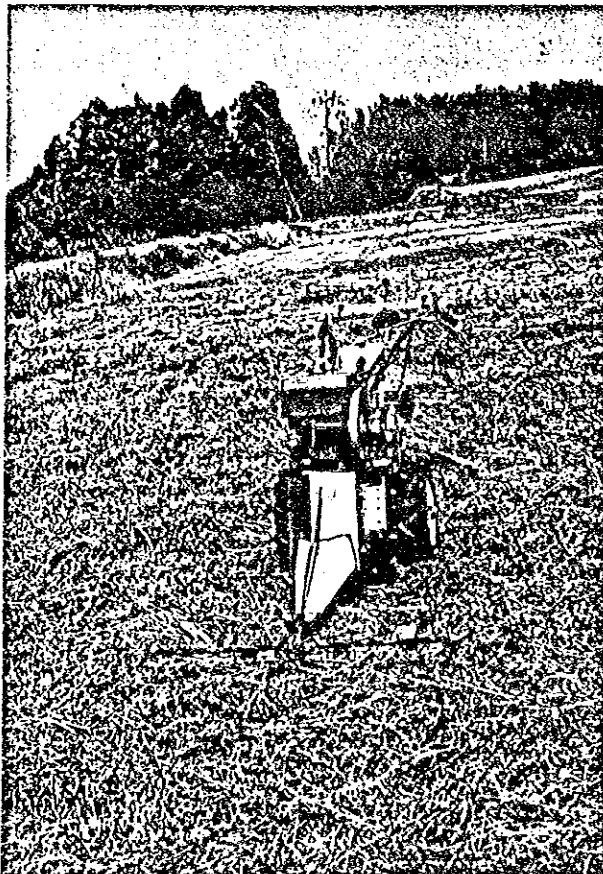
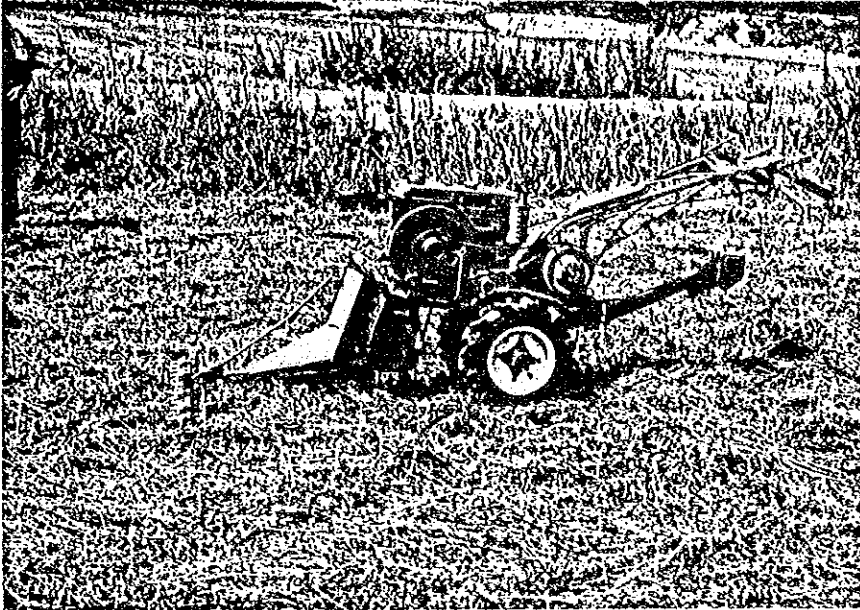


Table C.3.10. Specifications of Recipro-Mower

Items	Specification
Type	Front mounting type Recipro Mower
Applicable model	
Time for mounting	15 (min.)
Dimensions (Reaper only)	
Overall length	700 (m/m)
Overall width	1,070(m/m)
Overall height	500 (m/m)
Weight	57 (kg) (necessary to balance weight 25 kg)
Efficiency	20 - 40 (min./10a)
Applicable crops	Alfalfa and others
Applicable height of crops	up to 900 (m/m)
Reaping Unit	
Type of reaping	Recipro type
Applicable reaping width	1,000 (m/m)
Width of reaping tine	76 (m/m) (3 inch)
Type of reaping clutch	Dog clutch
Crank shaft r.p.m.	665 (r.p.m.)
Reaping tine speed	1.86 (m/s)
Height of reaping	30 - 80(m/m)
Working speed	0.9 (m/s) (Used F-1 speed step only)

Table C.3.11. Present Feed and Feeding

(1) Local Cow

<u>Adult (above 3 years)</u>	<u>Daily Ration (kg/day/head)</u>	
	<u>Spring & Summer</u>	<u>Autumn & Winter</u>
Grazing in forest & pasture	4	2
Stubble grazing in paddy field	-	4
Other forages	3	3
Wheat straw	0.5	-
Rice straw	1	2
Berseem clover	-	3
Rice bran	0.2	0.3
Cotton seed cake	0.1	0.1
Soybean sheath etc.	1	1
<u>Heifer (1-3 years)</u>		
Grazing in forest & pasture	2	1.5
Stubble grazing in paddy field	-	3
Other forages	2	2
Rice straw	0.5	1
Berseem clover	-	2
Soybean sheath etc.	0.5	0.5
<u>Calf (less than 1 year)</u>		
Grazing in forest & pasture	1	1
Stubble grazing in paddy field	-	1.5
Other forages	1	1
Soybean sheath etc.	0.5	0.5
Berseem clover	-	1

(2) Hybrid Cow

<u>Adult (above 3 years)</u>		
Stubble grazing in paddy field	-	2
Soybean sheath	1	1
Other forages	4	2
Alfalfa (fresh)	3	1
Rice straw	2	4
Barley grain	1	1
Wheat straw	3	3
Cotton seed cake	0.5	0.5
Berseem clover	-	8
Rice bran	2	2
Maize	3	2

- Continued -

	Daily Ration (kg/day/head)	
	Spring & Summer	Autumn & Winter
<u>Heifer (1-3 year)</u>		
Stubble grazing in paddy field	-	1.5
Soybean sheath	0.8	0.8
Other forages	3	1
Rice straw	2	3
Wheat straw	1.5	1.5
Berseem clover	-	4
Alfalfa (fresh)	1	1
<u>Calf (less than 1 year)</u>		
Stubble grazing in paddy field	-	1
Soybean sheath	0.5	0.5
Other forages	2	-
Rice straw	0.1	1
Wheat straw	0.5	0.5
Berseem clover	-	2
Alfalfa (fresh)	0.5	0.5
(3) <u>Pure Cow</u>		
<u>Adult (above 3 years)</u>		
Rice straw	-	3
Wheat straw	6	4
Berseem clover	-	10
Rice bran	3	3
Maize	2.5	2.5
Other forages	5	-
Cotton seed cake	1	1
Barley grain	1	1
Alfalfa (fresh)	4	2
<u>Heifer (1 - 3 years)</u>		
Rice Straw	-	2
Wheat straw	4	3
Berseem clover	-	7
Rice bran	1	1
Maize	-	-
Other forages	3	-
Cotton seed cake	-	-
Barley grain	0.5	0.5
Alfalfa (fresh)	3	1.5
<u>Calf (less than 1 year)</u>		
Rice straw	-	2
Wheat straw	1	2
Berseem clover	-	3
Other forages	2	-
Alfalfa (fresh)	1.5	0.5

- Continued -

Table C.3.12. Projected Feed and Feeding

(1) Local Cow

	Daily Ration (kg/day/head)					
	Spring & Summer			Autumn & Winter		
		DCP	TDN		DCP	TDN
<u>Adult</u>						
Rice straw	1	0.01	0.37	1	0.01	0.37
Wheat straw	-	-	-	-	-	-
Berseem (fresh)	-	-	-	20	0.68	2.48
Berseem (hay)	5	0.43	2.48	-	-	-
Rice bran	0.2	0.02	0.16	0.1	0.01	0.08
Cotton seed cake	0.2	0.08	0.16	0.1	0.04	0.08
Green barley	-	-	-	0.5	0.01	0.08
		<u>0.54</u>	<u>3.17</u>		<u>0.75</u>	<u>3.09</u>
<u>Heifer</u>						
Rice straw	0.5	-	0.19	0.5	-	0.19
Wheat straw	-	-	-	-	-	-
Berseem (fresh)	-	-	-	15	0.51	1.86
Berseem (hay)	4	0.34	1.98	-	-	-
Maize (leaf & stalk)	-	-	-	-	-	-
Rice bran	0.1	0.01	0.08	-	-	-
Green barley	-	-	-	0.5	0.01	0.07
		<u>0.35</u>	<u>2.25</u>		<u>0.52</u>	<u>2.12</u>
<u>Calf</u>						
Berseem (fresh)	-	-	-	5	0.17	0.62
Berseem (hay)	3.5	0.30	1.74	2	0.17	0.99
		<u>0.30</u>	<u>1.74</u>		<u>0.34</u>	<u>1.61</u>

(2) Hybrid Cow

		DCP	TDN		DCP	TDN
<u>Adult</u>						
Rice straw	2.5	0.03	0.92	1	0.01	0.37
Wheat straw	1	-	0.34	1	-	0.34
Berseem (fresh)	-	-	-	35	1.19	4.34
Berseem (hay)	8	0.68	3.97	-	-	-
Maize (leaf & stalk)	-	-	-	8	0.06	0.75
Rice bran	0.7	0.07	0.56	0.5	0.05	0.40
Cotton seed cake	0.7	0.26	0.56	0.1	0.04	0.08
Green barley	-	-	-	1	0.02	0.15
		<u>1.04</u>	<u>6.35</u>		<u>1.37</u>	<u>6.43</u>

- Continued -

	Daily Ration (kg/day/head)					
	Spring & Summer		Autumn & Winter			
	DCP	TDN	DCP	TDN		
<u>Heifer</u>						
Rice straw	1.5	0.02	0.56	1.0	0.01	0.37
Berseem (fresh)	-	-	-	20	0.68	2.48
Berseem (hay)	4	0.34	1.98	-	-	-
Rice bran	1.0	0.10	0.80	0.5	0.05	0.40
Cotton seed cake	0.5	0.18	0.40	0.3	0.11	0.24
Green barley	-	-	-	1	0.02	0.15
		<u>0.64</u>	<u>3.74</u>		<u>0.87</u>	<u>3.64</u>

	DCP	TDN	DCP	TDN	
<u>Calf</u>					
Berseem (fresh)	-	-	7	0.24	0.87
Berseem (hay)	4.5	0.38	2	0.17	0.99
Green barley	-	-	2	0.05	0.29
		<u>0.38</u>		<u>0.46</u>	<u>2.15</u>

(3) Pure Cow

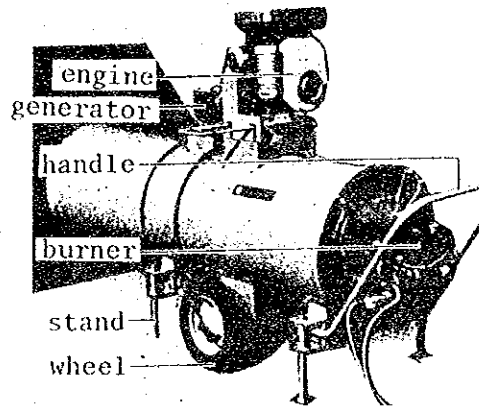
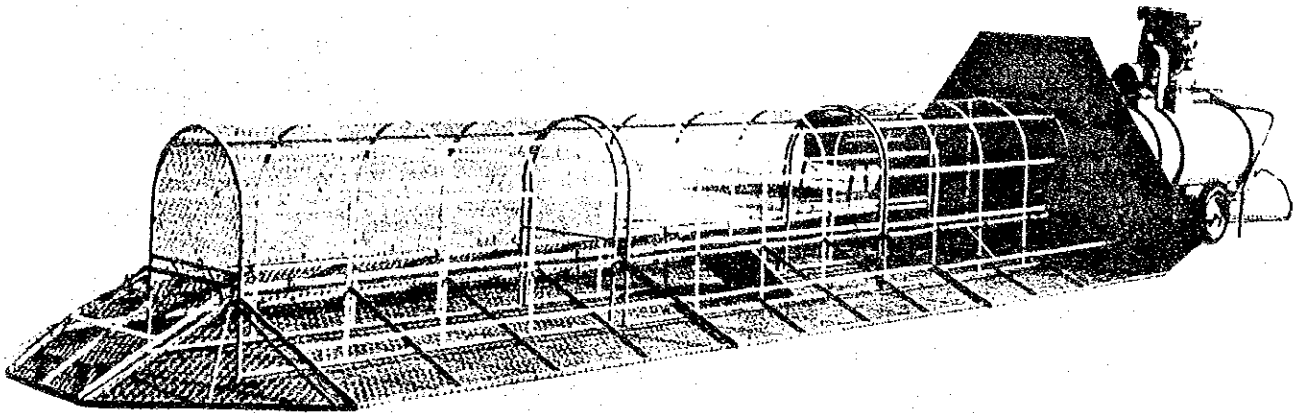
	DCP	TDN	DCP	TDN		
<u>Adult</u>						
Rice straw	3	0.03	1.11	2	0.02	0.74
Wheat straw	1	-	0.34	1	-	0.34
Berseem (fresh)	-	-	-	40	1.36	4.96
Berseem (hay)	10	0.85	4.96	-	-	-
Maize (leaf & stalk)	-	-	-	10	0.07	0.94
Rice bran	1.0	0.10	0.80	0.5	0.05	0.40
Cotton seed cake	1.0	0.40	0.80	0.5	0.20	0.40
Green barley	-	-	-	1	0.02	0.15
		<u>1.38</u>	<u>8.01</u>		<u>1.72</u>	<u>7.93</u>

	DCP	TDN	DCP	TDN		
<u>Heifer</u>						
Rice straw	1.5	0.02	0.56	1.0	0.01	0.37
Berseem (fresh)	-	-	-	25	0.85	3.10
Berseem (hay)	5	0.43	2.48	-	-	-
Rice bran	1.0	0.10	0.80	0.5	0.05	0.40
Cotton seed cakes	0.5	0.18	0.40	0.3	0.11	0.24
Green barley	-	-	-	1.0	0.02	0.15
		<u>0.73</u>	<u>4.24</u>		<u>1.04</u>	<u>4.26</u>

	DCP	TDN	DCP	TDN	
<u>Calf</u>					
Berseem (fresh)	-	-	6	0.20	0.74
Berseem (hay)	5	0.43	3.5	0.30	1.74
		<u>0.43</u>		<u>0.50</u>	<u>2.48</u>

Note: DCP - Digestible Crude Protein
 TDN - Total Digestible Nutrients
 These figures are example, therefore some feeds can be converted into others.

Figure C. 3. 3 Dryer -- Small Type



Body	Length (mm)	1,470
	Width (mm)	830
	Height (mm)	970
	Weight (kg)	115
Wind Blower	Type	Axial Flow Type
	Diameter of Outlet (mm)	580
	Rotation (rpm)	1,800
	Capacity (m ³ /min)	120 (20 mm Aq)
	Power Requirement	1.5 Kw motor or 3.5 PS engine
Burner	Type	Automatic Gun Type
	Maximum (lit./h)	15
	Heat Efficiency (Kcal/h)	120,000
	Fuel	Kerosene
	Length (mm)	5,400
	Width (mm)	615
	Height (mm)	860

Figure C. 3. 4. Dryer — Large Scale Type

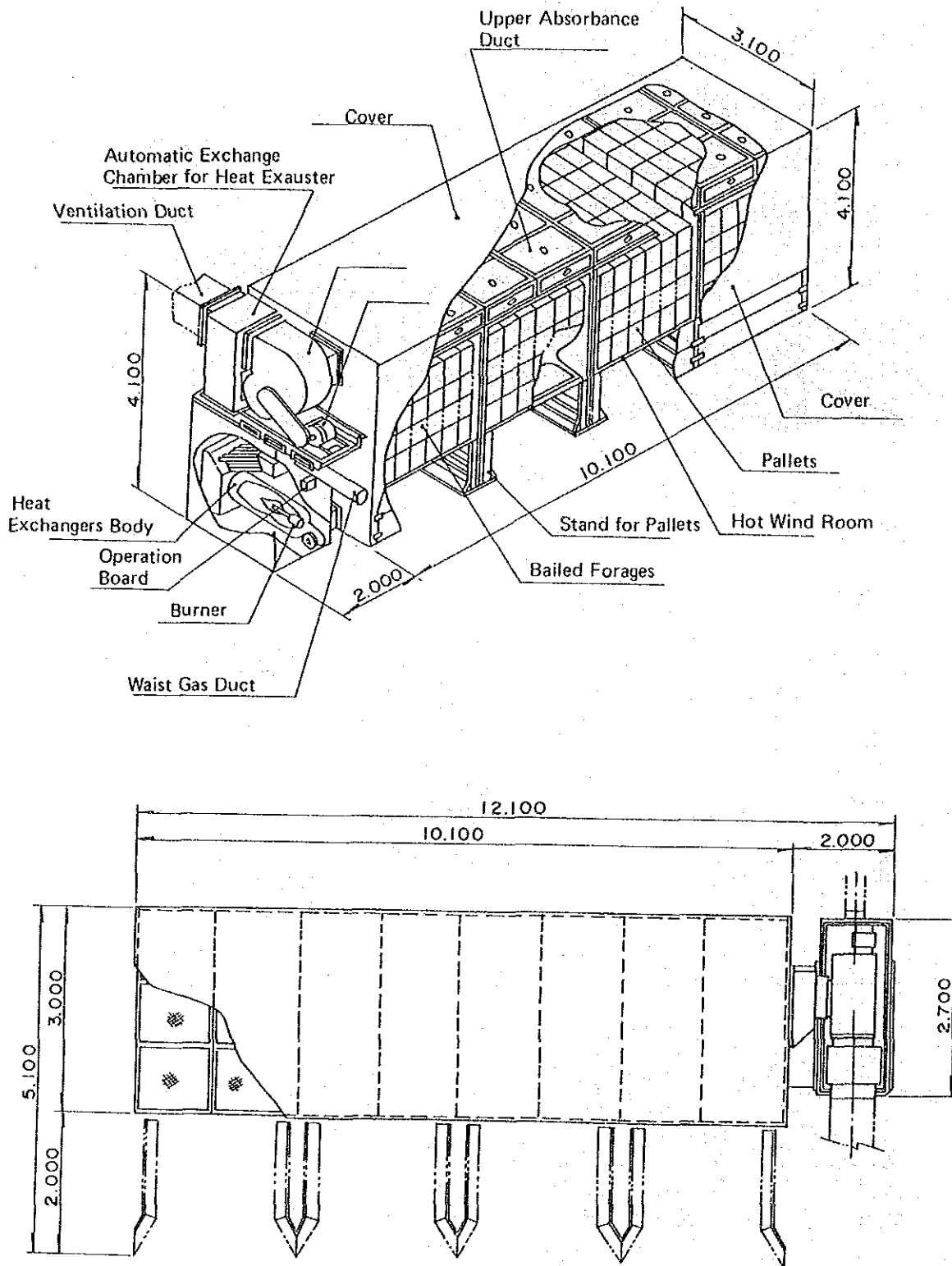


Table C.3.13. Estimation of Net Income (With and Without Project)

1. Local Cow

(1) Without Project

<u>Gross Income</u>		<u>Unit</u>	<u>Yield/unit</u>	<u>Production</u>	<u>Price</u>	<u>Income</u>
			(kg)	(kg)	(rls/kg)	(rls)
Milk	- Local Cow	1	250	250.0	85*	21,250
Meat	- Culled Cow	0.09	250	22.5	365*	8,213
	- Heifer	0.09	175	15.8	385*	6,083
	- Bull Calf	0.18	75	13.5	385*	5,198
<u>Total</u>						<u>40,744</u>

Note: * marks mean a unit price per live body weight.

Gross income from local cow	40,744 rls
Feeding cost	local cow 13,292
	heifer 4,340
	bull calf 375
Miscellaneous cost	1,807
Net income from local cow	<u>20,930</u>

Calving rate 50%

Net milk production per lactation period 500 kg

Mortality rate 7%

(2) With Project

<u>Gross Income</u>		<u>Unit</u>	<u>Yield/unit</u>	<u>Production</u>	<u>Price</u>	<u>Income</u>
			(kg)	(kg)	(rls/kg)	(rls)
Milk	- Local Cow	1	420	420.0	85*	35,700
Meat	- Culled Cow	0.12	250	30.0	365*	10,950
	- Heifer	0.13	175	22.8	385*	8,778
	- Bull Calf	0.25	75	18.8	385*	7,238
<u>Total</u>						<u>62,666</u>

Note: * mark means a unit price per live body weight.

- Continued -

Gross income from local cow		62,666 rls
Feeding cost	local cow	24,917
	heifer	15,305
	bull calf	2,754
Miscellaneous cost		4,300
Net income from local cow		<u>15,390</u>

Calving rate 60%

Net milk production per lactation period 700 kg

Mortality rate 5%

2. Hybrid Cow

(1) Without Project

<u>Gross Income</u>	<u>Unit</u>	<u>Yield/unit</u>	<u>Production</u>	<u>Price</u>	<u>Income</u>
		(kg)	(kg)	(rls/kg)	(rls)
Milk - Hybrid Cow	1	1,400	1,400.0	85*	119,000
Meat - Culled Cow	0.09	450	40.5	375*	15,188
- Heifer	0.16	240	38.4	435*	16,704
- Bull Calf	0.33	200	66.0	435*	28,710
<u>Total</u>					<u>179,602</u>

Note: * mark means a unit price per live body weight.

Gross income from hybrid cow		179,602 rls
Feeding cost	hybrid cow	80,013
	heifer	14,724
	bull calf	1,855
Miscellaneous cost		9,660
Net income from hybrid cow		<u>73,350</u>

Calving rate 70%

Net milk production per lactation period 2,000 kg

Mortality rate 7%

- Continued -

(2) With Project

<u>Gross Income</u>	<u>Unit</u>	<u>Yield/unit</u> (kg)	<u>Production</u> (kg)	<u>Price</u> (rls/kg)	<u>Income</u> (rls)
Milk - Hybrid Cow	1	1,875	1,875.0	85*	159,375
Meat - Culled Cow	0.14	450	63.0	375*	23,625
- Heifer	0.18	240	43.2	435*	18,792
- Bull Calf	0.36	200	72.0	435*	31,320
<u>Total</u>					<u>233,112</u>

Note: * mark means a unit price per live body weight.

Gross income from hybrid cow	233,112 rls
Feeding cost	
hybrid cow	66,618
heifer	38,502
bull calf	4,910
Miscellaneous cost	11,002
Net income from hybrid cow	<u>112,080</u>

Calving rate 75%

Net milk production per lactation period 2,500 kg

Mortality rate 5%

3. Pure Cow

(1) Without Project

<u>Gross Income</u>	<u>Unit</u>	<u>Yield/unit</u> (kg)	<u>Production</u> (kg)	<u>Price</u> (rls/kg)	<u>Income</u> (rls)
Milk - Pure Cow	1	3,200	3,200.0	85*	272,000
Meat - Culled Cow	0.10	550	55.0	395*	21,725
- Heifer	0.19	380	72.2	480*	34,656
- Bull Calf	0.38	250	95.0	480*	45,600
<u>Total</u>					<u>373,981</u>

Note: * mark means a unit price per live body weight.

- Continued -

Gross income from pure cow		373,981 rls
Feeding cost	pure cow	103,913
	heifer	37,936
	bull calf	3,040
Miscellaneous cost		14,492
Net income from pure cow		<u>214,600</u>

Calving rate 80%

Net milk production per lactation period 4,000 kg

Mortality rate 5%

(2) With Project

Gross Income

	<u>Unit</u>	<u>Yield/unit</u> (kg)	<u>Production</u> (kg)	<u>Price</u> (rls/kg)	<u>Income</u> (rls)
Milk - Pure Cow	1	3,655	3,655.0	85*	310,675
Meat - Culled Cow	0.14	550	77.0	395*	30,415
- Heifer	0.20	380	76.0	480*	36,480
- Bull Calf	0.40	250	100.0	480	48,000
<u>Total</u>					<u>425,570</u>

Note: * mark means a unit price per live body weight.

Gross income from pure cow		425,570 rls
Feeding cost	pure cow	86,820
	heifer	42,231
	bull calf	5,733
Miscellaneous cost		13,486
Net income from pure cow		<u>277,300</u>

Calving rate 85%

Net milk production per lactation period 4,300 kg

Mortality rate 5%

- Continued -

4. Sheep

<u>Gross Income</u>	<u>Unit</u>	<u>No. of Units</u>	<u>Unit Price</u> (rls)	<u>Income</u> (rls)
Lamb	head	0.5	8,000	4,000
Wool	kg	1.5	140	210
Culled sheep	head	0.2	15,000	3,000
<u>Total</u>				<u>7,210</u>

Gross income from sheep	7,210 rls
Feeding cost	
ewe	1,976
yearling	1,934
lamb	535
Miscellaneous cost	445
Net income from sheep	<u>2,320</u>

Table C.3.14. Projected Number of Productive Cows

Ratio of Second Crop	(Unit: head)								
	Case 1			Case 2			Case 3		
	<u>Local</u>	<u>Hybrid</u>	<u>Pure</u>	<u>Local</u>	<u>Hybrid</u>	<u>Pure</u>	<u>Local</u>	<u>Hybrid</u>	<u>Pure</u>
20%	16,300	13,000	3,300	8,800	14,800	6,000	20,200	10,100	3,500
30	24,400	19,500	5,000	13,300	22,200	8,900	30,400	15,200	5,100
40	32,600	26,000	6,600	17,800	29,600	11,900	40,600	20,300	6,800
50	40,700	32,600	8,200	22,200	37,000	14,900	50,700	25,300	8,600
60	48,900	39,100	9,900	26,600	44,400	17,900	60,900	30,400	10,200
70	57,100	45,600	11,500	31,100	51,900	20,800	71,100	35,500	11,900

Table C.3.15. Estimation of Projected Production of Cows (With Project)

Intensity of Second Crop	Case 1			Case 2			Case 3			
	Local	Hybrid	Pure	Local	Hybrid	Pure	Local	Hybrid	Pure	
	Total	Total	Total	Total	Total	Total	Total	Total	Total	
20%	250	1,457	915	135	1,658	1,663	310	1,132	970	2,412
30	375	2,185	1,386	204	2,488	2,467	467	1,703	1,414	3,584
40	501	2,914	1,830	273	3,317	3,299	624	2,275	1,885	4,784
50	626	3,653	2,273	341	4,146	4,131	780	2,835	2,384	5,999
60	725	4,382	2,745	409	4,976	4,963	937	3,407	2,828	7,172
70	878	5,110	3,188	478	5,816	5,767	1,094	3,978	3,299	8,371

(Unit: million rials)

Note: Net Production Value (with Project)

Local Cow 15,390 rials/adult female cow unit
 Hybrid Cow 112,080
 Pure Cow 277,300

Table C.3.16. Estimation of Present Production of Cows (Without Project)

Intensity of Second Crop	Case 1			Case 2			Case 3			
	Local	Hybrid	Pure	Local	Hybrid	Pure	Local	Hybrid	Pure	
	Total	Total	Total	Total	Total	Total	Total	Total	Total	
20%	250	1,457	915	135	1,658	1,663	310	1,132	970	2,412
30	375	2,185	1,386	204	2,488	2,467	467	1,703	1,414	3,584
40	501	2,914	1,830	273	3,317	3,299	624	2,275	1,885	4,784
50	626	3,653	2,273	341	4,146	4,131	780	2,835	2,384	5,999
60	725	4,382	2,745	409	4,976	4,963	937	3,407	2,828	7,172
70	878	5,110	3,188	478	5,816	5,767	1,094	3,978	3,299	8,371

GPV

Local Cow 50,520 head x @40,744 rls
 = 2,047 million rials
 Hybrid Cow 2,776 head x @179,602
 = 499
 Pure Cow 675 head x @373,981
 = 252

PC

Local Cow 50,250 head x @19,814 rls
 = 996 million rls
 Hybrid Cow 2,776 head x @106,252
 = 295
 Pure Cow 675 head x @159,381
 = 108

NPC

Local Cow 50,250 head x @20,930 rls
 = 1,052 million rials
 Hybrid Cow 2,776 head x @73,350
 = 204
 Pure Cow 675 head x @214,600
 = 145

Total

1,401 million rials

Note: GPV: Gross Production Value PC: Production Cost NPV: Net Production Value
 Number of cows more than 3 years in the Project Area are estimated based on the results of the
 Village Survey and the Farm Economic Survey.

Table C.3.17. Estimation of NPV of Sheep and Goats

Without Project

Sheep	88,706	
Goats	5,889	
<u>Total</u>	<u>94,595</u>	- based on the Village Survey

Among of the above, 70% is estimated as adults
 $94,595 \times 0.7 = 66,220$ head

Net Production Value
 $66,220 \text{ head} \times 2,320 \text{ rls} = \underline{154 \text{ million rials}}$

With Project

Sheep and Goats 68,200 head

Amount of the above, 70% is estimated as adults
 $68,200 \text{ head} \times 0.7 = 47,740$ head

Net Production Value
 $47,740 \text{ head} \times 2,320 \text{ rls} = \underline{111 \text{ million rials}}$

Table C.3.18. Incremental Benefit from Animal Husbandry

(Unit; million rials)

<u>Crop Intensity</u>	<u>Case-1</u>	<u>Case-2</u>	<u>Case-3</u>
20%	1,178	2,012	968
30	2,502	3,715	2,140
40	3,801	5,445	3,340
50	5,108	7,174	4,555
60	6,408	8,904	5,728
70	7,732	10,617	6,927

Note: Incremental benefit in each crop intensity is calculated as a difference of Net Production Value between present and future.

Additionally, as sheep and goats will be removed to the mountainous area in the future to avoid competition with cows in natural grazing, net production value will be decreased with reduction of number of head in the future in the Project Area.

APPENDIX C. 4.

AGRO-ECONOMY

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Table C.4.1 List of Number of Sample Farm
Economic Survey (by interview)

<u>Shahrestan</u>	<u>Location</u>	<u>Number of Sample Farm</u>
I. Amol	High Land	8
	Middle Land	5
	Low Land	7
	<u>Total</u>	<u>20</u>
II. Babol	High Land	-
	Middle Land	6
	Low Land	4
	<u>Total</u>	<u>10</u>
<u>Total of Sample Farm</u>		<u>50</u>

Note: The above survey was conducted at the second field survey of Master Plan Study from September 1985 to November 1985.

Table C.4.2 Number of Farm Households by Family Size

(Unit: households, persons)

Shahrestan	Family Size											Total Persons	Total Farms	Average Family Size
	below 3	4	5	6	7	8	9	10	Over 11					
I. Amol														
1-1 High Land	-	1	1	2	1	1	1	1	-	-	-	55	8	6.9
1-2 Middle Land	-	-	-	2	-	-	1	-	2	-	-	45	5	9.0
1-3 Low Land	-	-	-	1	-	1	3	-	2	-	-	65	7	9.3
Total	-	1	1	5	1	2	5	1	4	-	-	165	20	8.3
II. Babol														
2-1 High Land	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-2 Middle Land	-	-	-	1	-	3	-	2	-	-	-	49	6	8.2
2-3 Low Land	-	-	-	-	2	1	-	-	1	-	-	37	4	9.3
Total	-	-	-	1	2	4	-	2	1	-	-	86	10	8.6
Total of Sample Farm	-	1	1	6	3	6	5	3	5	-	-	251	30	8.4

Table C.4.3 Number of Population by Age and Sex

(Unit: persons)

Shahrestan	Items	Age									Total
		below 9	10 -14	15 -19	20 -29	30 -39	40 -49	50 -59	60 -69	Over 70	
I. Amol											
1-1 High Land	Male	4	5	9	7	-	4	3	-	-	32
	Female	7	5	-	2	4	2	3	-	-	23
	<u>Total</u>	<u>11</u>	<u>10</u>	<u>9</u>	<u>9</u>	<u>4</u>	<u>6</u>	<u>6</u>	-	-	<u>55</u>
1-2 Middle Land	Male	4	5	8	1	2	2	1	2	-	25
	Female	8	2	1	1	3	1	3	1	-	20
	<u>Total</u>	<u>12</u>	<u>7</u>	<u>9</u>	<u>2</u>	<u>5</u>	<u>3</u>	<u>4</u>	<u>3</u>	-	<u>45</u>
1-3 Low Land	Male	5	4	10	5	2	2	3	1	1	33
	Female	8	4	8	4	2	2	3	1	-	32
	<u>Total</u>	<u>13</u>	<u>8</u>	<u>18</u>	<u>9</u>	<u>4</u>	<u>4</u>	<u>6</u>	<u>2</u>	<u>1</u>	<u>65</u>
<u>Total</u>	Male	13	14	27	13	4	8	7	3	1	90
	Female	23	11	9	7	9	5	9	2	-	75
	<u>Total</u>	<u>36</u>	<u>25</u>	<u>36</u>	<u>20</u>	<u>13</u>	<u>13</u>	<u>16</u>	<u>5</u>	<u>1</u>	<u>165</u>
II. Robat											
2-2 Middle Land	Male	3	8	6	5	-	4	1	1	2	30
	Female	2	4	5	-	3	2	1	1	1	19
	<u>Total</u>	<u>5</u>	<u>12</u>	<u>11</u>	<u>5</u>	<u>3</u>	<u>6</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>49</u>
2-3 Low Land	Male	4	5	2	3	1	1	2	-	-	18
	Female	1	4	7	1	2	-	2	1	1	19
	<u>Total</u>	<u>5</u>	<u>9</u>	<u>9</u>	<u>4</u>	<u>3</u>	<u>1</u>	<u>4</u>	<u>1</u>	<u>1</u>	<u>37</u>
<u>Total</u>	Male	7	13	8	8	1	5	3	1	2	48
	Female	3	8	12	1	5	2	3	2	2	38
	<u>Total</u>	<u>10</u>	<u>21</u>	<u>20</u>	<u>9</u>	<u>6</u>	<u>7</u>	<u>6</u>	<u>3</u>	<u>4</u>	<u>86</u>
<u>Total of Sample Farm</u>	Male	20	27	35	21	5	13	10	4	3	138
	Female	26	19	21	8	14	7	12	4	2	113
	<u>Total</u>	<u>46</u>	<u>46</u>	<u>56</u>	<u>29</u>	<u>19</u>	<u>20</u>	<u>22</u>	<u>8</u>	<u>5</u>	<u>251</u>

Table C.4.4 Working State of Family Member

(Unit: persons)

Items	Farmer	Family Member		Total
		Male	Female	
Working days				
1. Own Farm Occupation				
Under 30 days	-	17	12	29
30 - 50	-	6	2	8
50 - 100	3	12	8	23
100 - 150	-	3	9	12
150 - 200	9	9	2	20
200 - 250	17	7	-	24
Over 250	1	-	-	1
<u>Total</u>	<u>30</u>	<u>54</u>	<u>33</u>	<u>117</u>
2. Other Farm Occupation				
Under 50	-	-	-	-
50 - 100	-	-	-	-
100 - 150	1	-	-	1
Over 150	-	-	-	-
<u>Total</u>	<u>1</u>	<u>-</u>	<u>-</u>	<u>1</u>
3. Non-Farm Occupation				
Under 30	-	-	1	1
30 - 50	-	-	-	-
50 - 100	1	1	-	2
100 - 150	2	-	-	2
150 - 200	4	-	-	4
200 - 300	-	-	-	-
Over 300	-	2	-	2
<u>Total</u>	<u>7</u>	<u>3</u>	<u>1</u>	<u>11</u>

Table C.4.5 Agricultural Gross Returns (1)

Shahrestan-Amol

Farmer No.	Farmer Age	Family Composition person	Land Owned Area ha	Land Operated Area ha	Days Worked of on-farm Occupation day	Agricultural Gross Returns					Non-agricultural Returns		
						Total Rls	Paddy Rls	Vegetables Rls	Orchard Rls	Animal Husbandry Rls	Others (Lents Fee) Rls	Leased Fee Rls	Others Rls
1	40	10	3.0(2.7) ¹	3.0(2.7) ²	720(648) ³	3,764,700	2,992,660	360,000	-	412,000	-	-	612,000
2	46	6	8.7(8.0)	7.7(7.0)	375(353)	6,541,500	6,295,800	-	-	247,500	-	463,100	-
3	49	8	2.9(2.5)	2.9(2.5)	450(405)	1,976,500	1,731,500	-	90,000	155,000	-	-	-
4	51	5	1.2(0.6)	1.2(0.6)	320(302)	1,150,500	744,900	100,000	-	305,600	-	-	-
5	49	9	7.0(6.0)	7.0(6.0)	720(645)	5,169,000	4,409,000	-	700,000	60,000	-	-	-
6	57	6	2.7(2.3)	2.7(2.3)	450(414)	2,716,000	2,412,000	50,000	91,000	185,000	-	-	-
7	44	8	3.2(3.0)	3.2(3.0)	690(477)	2,377,500	2,124,000	-	-	253,500	-	-	-
8	28	6	1.0(1.0)	1.0(1.0)	190(190)	823,560	788,560	-	-	55,000	-	-	126,000
9	34	11	4.1(3.8)	4.1(3.8)	525(429)	4,237,600	3,211,150	-	-	1,026,500	-	-	1,500,000
10	47	6	4.0(4.0)	4.0(4.0)	500(264)	4,268,900	5,491,400	-	-	777,500	-	-	-
11	54	7	2.5(2.0)	2.0(2.0)	240(228)	3,627,000	1,478,000	80,000	-	2,069,000	-	-	600,000
12	58	4	3.2(3.0)	3.2(3.0)	450(387)	2,642,500	2,085,500	-	-	557,000	-	-	-
13	60	6	1.7(1.5)	1.7(1.5)	450(414)	1,719,600	1,454,600	-	265,200	-	-	-	-
14	58	9	0.5(0.3)	0.8(0.8)	520(482)	565,500	507,000	-	-	-	58,500	-	480,000
15	40	9	5.5(5.4)	2.5(2.4)	510(284)	2,263,700	2,074,200	-	100,000	89,500	-	743,800	-
16	65	13	9.5(8.5)	1.0(-)	60(48)	879,000	-	-	700,000	179,000	-	6,050,000	600,000
17	51	10	1.5(1.5)	2.0(2.0)	540(486)	1,953,100	1,758,000	-	29,100	-	166,000	-	870,000
18	40	12	1.3(1.5)	1.3(1.5)	450(427)	1,443,700	1,359,800	-	-	85,900	-	-	420,000
19	30	9	3.2(2.5)	3.2(2.5)	490(400)	2,428,500	1,908,000	-	20,000	500,500	-	-	-
20	37	12	2.0(2.0)	2.0(2.0)	450(441)	2,030,600	2,002,800	-	-	27,800	-	-	-

Note: 1. *1, *2 () Paddy area

2. *3 () Converted days by labor unit

Table C.4.5 Agricultural Gross Returns (2)

Shahrestan-Baboi

Farmer No.	Farmer Age	Family Composition person	Land Owned Area ha	Land Operated Area ha	Days Worked of Own-farm Occupation day	Agricultural Gross Returns						Non-agricultural Returns	
						Total Rls	Paddy Rls	Vegetables Rls	Orchard Rls	Animal Husbandry Rls	Others (Lents' Fee) Rls	Leased Fee Rls	Others Rls
1	40	8	1.5 (1.5)	1.5 (1.5)	460 (369)	1,187,700	1,112,000	-	-	75,700	-	-	20,000
2	62	8	2.1 (1.7)	3.4 (3.0)	858 (645)	2,815,900	1,829,350	-	280,000	74,700	629,850	-	50,000
3	55	5	3.3 (3.0)	1.8 (1.5)	260 (245)	1,194,400	978,400	-	196,000	20,000	-	585,000	-
4	43	10	2.0 (2.0)	2.0 (2.0)	390 (356)	1,278,800	1,115,000	-	-	163,750	-	-	-
5	52	7	3.5 (3.5)	3.5 (3.5)	250 (235)	3,855,500	3,346,000	-	-	509,500	-	-	-
6	61	15	6.0 (4.0)	6.0 (4.0)	580 (568)	4,056,500	3,472,000	212,000 (Wheat)	-	372,500	-	-	-
7	40	7	1.5 (1.5)	1.5 (1.5)	330 (282)	1,405,300	1,348,300	-	-	57,000	-	-	-
8	38	8	0.5 (0.5)	2.0 (2.0)	420 (395)	2,446,000	1,520,000	-	-	97,200	828,800	-	480,000
9	40	10	1.2 (1.2)	2.6 (2.6)	530 (493)	2,826,800	1,678,500	-	-	165,500	982,800	-	200,000
10	47	8	8.2 (8.0)	8.2 (8.0)	600 (575)	12,102,500	11,869,500	-	-	235,000	-	-	800,000

Table C.4.6 Agricultural Management Costs

Farmer No.	Rice	Vegetable	Orchard	Livestock	Total
	Rls	Rls	Rls	Rls	Rls
A1	570,982	98,500	-	-	669,500
A2	3,424,183	-	-	34,680	3,458,900
A3	143,278	-	35,500	43,260	222,000
A4	139,311	107,400	-	163,000	409,700
A5	1,444,449	-	44,390	-	1,488,800
A6	355,378	61,200	-	17,210	433,800
A7	361,037	-	-	35,400	396,400
A8	123,297	-	-	-	123,300
A9	883,049	-	-	287,770	1,170,800
A10	903,659	-	-	190,340	1,094,000
A11	413,463	48,200	-	530,060	991,700
A12	533,208	-	-	35,120	566,300
A13	305,334	-	9,000	-	314,300
A14	167,840	-	-	-	167,800
A15	198,442	-	41,420	20,200	260,100
A16	-	-	59,980	28,770	88,800
A17	288,274	-	-	-	288,300
A18	115,873	-	-	20,200	136,100
A19	468,307	-	-	172,850	641,200
A20	197,392	-	-	-	197,400
B1	236,075	-	-	28,340	264,400
B2	1,055,528	-	35,500	17,540	1,108,600
B3	252,933	-	18,000	-	270,900
B4	355,987	-	-	60,630	416,600
B5	720,026	-	-	51,860	771,900
B6	340,990	21,860	-	103,720	466,600
B7	101,160	-	-	-	101,200
B8	949,793	-	-	31,830	981,600
B9	1,188,974	-	-	30,400	1,219,400
B10	783,813	-	-	28,970	812,800

Table C.4.7 Household Expenditures - 1

(Unit: Rls)

Farmer No.	Land Area ha	Family Composition person	Food			Taste	Housing	Fuel Light Water	Clothing	Medical and Communication	Person-Transportation	Recreation	Education	Tax	Others	Family Consumption	Total
			Sub Total	Products	Eggs Meat Dairy												
1	3.0	10	1,174,200	871,200	42,000	300,000	72,000	240,000	60,000	234,000	30,000	270,000	-	-	419,000	2,841,000	
2	8.8	6	632,400	476,400	48,000	168,400	12,000	120,000	12,000	198,000	-	60,000	150,000	51,600	992,800	2,294,800	
3	2.9	8	492,000	432,000	126,000	60,000	20,000	150,000	150,000	50,000	-	20,000	-	-	493,000	1,561,000	
4	1.2	5	345,000	300,000	35,000	-	10,000	80,000	10,000	20,000	-	10,000	-	-	500,600	1,010,600	
5	7.0	9	363,000	284,000	90,000	160,000	30,000	180,000	20,000	25,000	-	30,000	-	-	445,000	1,448,000	
6	2.7	6	258,000	95,000	12,000	-	22,000	150,000	10,000	10,000	30,000	-	-	-	511,500	1,003,500	
7	3.2	8	518,000	480,000	200,000	-	15,000	20,000	15,000	50,000	20,000	25,000	-	-	513,500	1,356,500	
8	1.0	6	162,000	110,000	102,000	80,000	5,000	50,000	15,000	-	20,000	-	-	-	149,000	583,000	
9	4.2	11	426,000	291,000	38,000	140,000	18,000	330,000	10,000	60,000	-	240,000	-	(religion) 60,000	1,178,900	2,500,900	
10	4.2	6	422,000	318,000	720,000	300,000	15,000	200,000	20,000	100,000	-	130,000	50,000	-	817,500	2,066,500	
11	2.5 (29.7)	7	353,000	280,000	210,000	-	15,000	80,000	10,000	54,000	100,000	40,000	-	-	765,000	1,607,000	
12	3.2	4	372,000	315,000	40,000	16,000	16,000	100,000	10,000	20,000	60,000	10,000	-	-	511,000	1,155,000	
13	1.7	6	416,000	359,000	58,000	-	9,000	100,000	150,000	50,000	-	50,000	-	-	399,200	1,212,200	
14	0.3 (0.8)*2	9	90,000	65,000	20,000	-	9,000	50,000	20,000	50,000	20,000	20,000	-	-	351,000	610,000	
15	5.5 (2.5)	9	397,000	282,000	20,000	33,000	10,000	200,000	20,000	150,000	300,000	30,000	-	-	547,500	1,707,500	
16	9.5 (1.0)	13	645,000	430,000	70,000	-	20,000	250,000	100,000	300,000	300,000	100,000	-	-	1,159,000	2,944,000	
17	1.5 (2.0)	9	235,000	190,000	50,000	-	5,000	150,000	100,000	100,000	20,000	-	-	-	505,100	1,145,100	
18	1.5	12	270,000	185,000	79,000	-	10,000	180,000	150,000	50,000	-	10,000	-	-	508,900	1,257,900	
19	3.2	9	270,000	207,000	60,000	-	15,000	100,000	80,000	50,000	30,000	20,000	-	-	960,500	1,585,500	
20	2.0	12	246,000	160,000	39m999	300,000	10,000	100,000	50,000	50,000	20,000	20,000	-	-	567,800	1,373,800	

Note: *1 (1) Winter season tenancy 20ha, (2) Long period tenancy from Government without rent 6.7 ha.

*2 () Land operated area.

Table C.4.7 Household Expenditures (2)

(Unit: RIs)

No.	Land Owned Farmer Area	Family Compo- sition	Land Area ha.	Food			Housing	Clothing	Medical and com- munication	Transportation	Recreation	Education	Tax	Others	Family Consumption	Total
				Sub Total	Products	Taste										
1	1.5	8	367,560	355,560	36,000	150,000	12,000	240,000	90,000	12,000	-	36,000	-	-	265,700	1,207,500
2	3.5	8	481,400	361,000	165,000	30,000	18,000	150,000	170,000	-	200,000	25,000	-	-	482,700	1,722,100
3	3.3	5	495,000	425,000	140,000	-	45,000	100,000	60,000	50,000	30,000	10,000	-	-	299,600	1,227,600
4	2.0	10	177,000	130,000	30,000	-	20,000	100,000	20,000	20,000	-	-	-	-	368,800	755,800
5	3.5	7	245,000	215,000	30,000	-	35,000	250,000	10,000	50,000	-	40,000	-	-	1,167,500	1,817,500
6	6.0	15	115,000	60,000	25,000	50,000	25,000	500,000	20,000	50,000	20,000	30,000	-	-	1,032,500	1,667,500
7	1.5	7	328,000	259,000	12,000	-	6,000	80,000	50,000	30,000	50,000	20,000	-	-	345,000	921,000
8	0.5 (2.0)	8	258,000	210,000	15,000	300,000	10,000	150,000	20,000	-	150,000	20,000	-	-	655,200	1,558,200
9	1.2 (2.6)	10	200,000	135,000	60,000	180,000	8,000	180,000	50,000	100,000	20,000	20,000	-	-	585,500	1,405,500
10	8.3	8	529,000	250,000	50,000	-	25,000	160,000	50,000	50,000	200,000	20,000	-	-	745,400	1,629,400

Table C.4.8 Farmhouse Economy - 1

Farmer No.	Land Owned Area ha	Land Operated Area ha	Family Composition ha person	Farmhouse Income		Agricultural Income		Agricultural Gross Returns	Agricultural Management Costs		Debt Interest etc.	Tax	Disposable Income	Household Expenditures	Farmhouse Economic Surplus
				Ris	Ris	Ris	Ris		Ris	Ris					
1	3.0(2.7)	3.0(2.7)	10	3,707,200	3,095,200	5,764,700	669,500	612,000	320,000	-	3,587,200	2,841,000	546,200		
2	8.7(8.0)	7.7(7.0)	6	3,545,500	3,082,400	6,541,300	3,458,900	463,100	-	150,000	3,395,500	2,294,800	1,100,700		
3	2.9(2.5)	2.9(2.5)	8	1,754,500	1,754,500	1,976,500	222,000	-	-	-	1,754,500	1,561,000	193,500		
4	1.2(0.6)	1.2(0.6)	5	740,800	740,800	1,150,500	409,700	-	-	-	740,800	1,010,600	-269,800		
5	7.0(6.0)	7.0(6.0)	9	3,680,200	3,680,200	5,169,000	1,488,800	-	300,000	-	3,380,200	1,448,000	1,932,200		
6	2.7(2.3)	2.7(2.3)	6	2,282,200	2,282,200	2,716,000	453,800	-	-	-	2,282,200	1,003,500	1,278,700		
7	3.2(3.0)	3.2(3.0)	8	1,981,100	1,981,100	2,377,500	396,400	-	-	-	1,981,100	1,356,500	624,600		
8	1.0(1.0)	1.0(1.0)	6	826,100	700,100	825,360	123,300	126,000	40,000	-	786,100	583,000	203,100		
9	4.1(3.8)	4.1(3.8)	11	4,566,800	3,066,800	4,237,600	1,170,800	1,500,000	-	-	4,566,800	2,500,900	2,065,900		
10	4.0(4.0)	4.0(4.0)	6	3,174,900	3,174,900	4,268,900	1,094,000	-	-	50,000	3,124,900	2,066,500	1,058,400		
11	2.5(2.0)	2.0(2.0)	7	3,235,300	2,635,300	3,627,000	991,700	600,000	-	-	3,235,300	1,607,000	1,628,300		
12	3.2(3.0)	3.2(3.0)	4	2,076,200	2,076,200	2,642,500	566,300	-	50,000	-	2,026,200	1,155,000	871,200		
13	1.7(1.5)	1.7(1.5)	6	1,405,300	1,405,300	1,719,600	314,300	-	-	-	1,405,300	1,212,200	193,100		
14	0.3(0.3)	0.3(0.3)	9	877,700	397,700	585,500	167,800	480,000	148,000	-	729,700	610,000	119,700		
15	5.5(5.4)	2.5(2.4)	9	2,747,400	2,003,600	2,263,700	260,100	743,800	-	-	2,747,400	1,707,500	1,039,900		
16	9.5(8.5)	1.0(-)	13	7,440,200	780,200	879,000	88,800	6,650,000	-	-	7,440,200	2,944,000	4,496,200		
17	1.5(1.5)	2.0(2.0)	10	2,554,800	1,664,800	1,953,100	288,300	870,000	600,000	-	1,934,800	1,145,100	789,700		
18	1.3(1.3)	1.3(1.3)	12	1,727,600	1,307,600	1,443,700	136,100	420,000	-	-	1,727,600	1,257,900	469,700		
19	3.2(2.5)	3.2(2.5)	9	1,787,300	1,787,300	2,428,500	641,200	-	300,000	-	1,487,300	1,585,500	-98,200		
20	2.0(2.0)	2.0(2.0)	12	1,833,200	1,833,200	2,030,600	197,400	-	-	-	1,833,200	1,373,800	459,400		

Note: *1 () Paddy area.

Table C.4.8 Farmhouse Economy - 2

Shahrestan Babol

Farmer No.	Land Owned Area ha	Land Operating Area ha	Family Composition ha person	Farmhouse Income		Agricultural Income		Agricultural Returns		Agricultural Management Costs		Not-Farm Income		Debt Interests etc.		Tax		Disposable Income		Household Expenditures		Farmhouse Economic Surplus	
				Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris	Ris
1	1.5(1.5)	1.5(1.5)	8	943,300	923,300	1,187,700	264,400	20,000	-	-	943,300	1,207,300	-264,000	-	-	943,300	1,207,300	-264,000	-	-	943,300	1,207,300	-264,000
2	2.1(1.7)	3.4(3.0)	8	1,705,300	1,705,300	2,813,900	1,108,600	-	100,000	-	1,605,500	1,722,100	-116,800	-	-	1,605,500	1,722,100	-116,800	-	-	1,605,500	1,722,100	-116,800
3	3.3(3.0)	1.8(1.5)	5	1,508,500	923,500	1,194,400	270,900	585,000	100,000	-	1,408,500	1,227,600	180,900	-	-	1,408,500	1,227,600	180,900	-	-	1,408,500	1,227,600	180,900
4	2.0(2.0)	2.0(2.0)	10	862,200	862,200	1,278,800	416,600	-	-	-	862,200	735,800	126,400	-	-	862,200	735,800	126,400	-	-	862,200	735,800	126,400
5	3.5(3.5)	3.5(3.5)	7	3,083,600	3,085,600	3,855,500	771,900	-	-	-	3,083,600	1,817,500	1,266,100	-	-	3,083,600	1,817,500	1,266,100	-	-	3,083,600	1,817,500	1,266,100
6	6.0(4.0)	6.0(4.0)	15	5,589,900	5,589,900	4,056,500	466,600	-	-	-	5,589,900	1,667,500	1,922,400	-	-	5,589,900	1,667,500	1,922,400	-	-	5,589,900	1,667,500	1,922,400
7	1.5(1.5)	1.5(1.5)	7	1,304,100	1,304,100	1,405,300	101,200	-	-	-	1,304,100	921,000	385,100	-	-	1,304,100	921,000	385,100	-	-	1,304,100	921,000	385,100
8	0.5(0.5)	2.0(2.0)	8	1,944,400	1,464,400	2,446,000	981,600	480,000	880,000	-	1,064,400	1,558,200	-493,800	-	-	1,064,400	1,558,200	-493,800	-	-	1,064,400	1,558,200	-493,800
9	1.2(1.2)	2.6(2.6)	10	1,807,400	1,607,400	2,826,800	1,219,400	200,000	-	-	1,807,400	1,403,500	405,900	-	-	1,807,400	1,403,500	405,900	-	-	1,807,400	1,403,500	405,900
10	8.2(8.0)	8.2(8.0)	8	12,089,700	11,289,700	12,102,500	812,800	800,000	-	-	12,089,700	1,629,400	10,460,300	-	-	12,089,700	1,629,400	10,460,300	-	-	12,089,700	1,629,400	10,460,300

Table C.4.9 Production Costs (1)

Rice Variety Amol-3
Shahrestan-Amol

(Unit: Rs)

Farm- er No	Land Oper- ated Area No	Loca- tion ha	Expenses										Self-support		Produc- tion Cost/ha			
			Ferti- lizer	Pesti- cide	Fuel	Water	Manage- ment	Fee	Agri- machine	Hired Labor	Rental	Rice Mill	Others	Sub Total		Seed	Labor	Ferti- lizer
A1	3.0 High (2.7) Land(K) ^{*2}	21,144	18,450	21,144	2,918	11,160	-	145,000	220,000	-	125,120	27,190	570,982	21,060	937,989	-	959,049	1,530,031
A2	7.7 High (7.0) Land(K) (Amol3 6.3)	75,613	29,778	75,613	4,523	9,000	-	306,360	2,267,550	-	252,800	147,181	5,090,805	49,400	692,058	-	741,458	5,832,263
A3	2.9 High (2.5) Land(H.L) (Amol3 1.0)	10,548	2,940	10,548	1,027	2,900	-	15,040	69,600	-	54,400	6,823	143,278	6,500	270,000	-	276,500	419,778
A4	1.2 High (0.6) Land(H.L)	6,750	8,400	6,750	547	9,780	-	76,000	-	-	31,200	6,654	139,511	3,400	288,692	-	292,092	431,403
A5	7.0 High (6.0) Land(H.L)	85,340	23,100	85,340	2,438	59,588	-	221,200	800,000	-	184,000	68,783	1,444,449	39,000	980,849	-	1,019,849	2,464,298
A8	1.0 High (1.0) Land(H.R)	15,798	10,500	15,798	590	10,505	-	46,280	-	-	32,800	5,824	123,297	9,360	240,960	-	250,320	573,617
A9	4.2 Mid (3.8) Land(H.R)	37,699	29,400	37,699	1,480	1,140	-	74,000	560,000	-	137,280	42,050	883,049	34,500	453,000	-	487,900	1,370,949
A10	4.0 Mid (4.0) Land(H.R) (Amol3 2.0)	19,133	6,300	19,133	1,776	600	-	27,000	310,000	-	95,600	22,720	477,129	18,000	445,215	-	461,215	938,344
A11	29.7 High (2.0) Land(H.L) (Amol3 0.7)	9,348	5,360	9,348	904	12,640	-	52,000	110,150	-	27,200	9,780	205,382	6,000	200,200	-	206,200	411,582
A12	3.2 High (3.0) Land(K)	50,117	10,500	50,117	2,228	20,863	-	73,710	215,325	-	70,400	22,157	465,300	19,500	626,369	-	645,869	1,111,169
A15	5.5 Middle (5.4) Land (3.0 leased) (Amol3 0.7)	3,774	5,150	3,774	398	7,312	13,224	14,616	-	-	27,200	5,479	73,053	3,900	214,398	-	218,298	291,351
A18	1.3 Low (1.5) Land(H.L) (Amol3 0.6) (Amol3 328.4 ha	16,115	2,625	16,115	253	8,636	-	10,120	-	-	24,000	3,087	64,836	3,900	321,600	-	325,500	390,336

*2 13,565,112
*2 477,645Note: *1 : () ... Paddy area
*2 : () ... K: Kari Rud, H.L; Haruz River Left Bank, H.R Haruz River Right Bank.
*3 : exclude tenancy farmers

Table C.4.9 Production Costs (2)

Rice Variety Amol-3
Shahrestan-Babol (Unit: Rls)

Land Oper-ated Area No	Land Loca-tion	Expenses											Self-support			Produc-tion Cost/ha
		Ferri-lizer	Seed	Fee lease	Agri-machine	Hired Labor	Rental	Rice Mill	Others	Sub Total	Seed	Labor	Ferri-lizer	Sub Total	Total	
B1	1.5 Middle (1.5) Land(K)	5,250	23,755	725	18,525	30,600	100,000	46,000	11,243	236,075	10,400	515,984	-	524,584	560,459	
B2	5.4 Middle (5.0) Land(K)	17,850	110,870	14,518	11,100	6,250	76,700	95,000	629,850	75,520	20,270	1,055,528	26,000	1,529,150	2,384,658	
B3	3.0 Middle (3.0) Land(K) (1.5 leased) (Amol3 1.5)	10,500	19,983	691	19,115	56,000	97,000	57,600	12,044	252,955	11,700	346,569	-	558,269	611,202	
B4	2.0 Middle (2.0) Land(K)	7,350	30,459	3,926	4,000	93,500	194,000	5,800	16,952	555,987	11,700	620,718	-	632,418	988,405	
B7	1.5 Low (1.5) Land(K) (Amol3 0.5)	1,575	6,990	328	2,150	6,000	-	6,240	24,000	2,364	49,647	4,500	154,421	158,921	188,568	
B9	2.6 Middle (2.6) Land(K) (1.4 rented) (Amol3 2.6)	14,700	19,860	10,958	17,784	129,675	36,550	889,200	56,000	14,227	1,188,974	24,700	725,564	748,064	1,957,058	
B10	8.2 Middle (8.0) Land(K) (Amol3 5.5)	13,125	105,288	1,166	18,080	57,130	551,700	-	37,324	783,815	51,200	998,197	-	1,029,397	1,813,210	
(Babol) 10.5 ha														5,975,276	578,407	
Amol3 (Amol + Babol) 38.9 ha														17,558,388	450,858	

Table C.4.9 Production Costs (3)

Rice Variety-Tarom		Expenses												Self-support		Production		
Shahrestan-Amol		Land Oper- Land	Ferti- Herbi- Fuel Water	Agri- machine	Hired Labor	Rental	Rice Mill	Others	Sub Total	Seed	Labor	Ferti- lizer	Sub Total	Total	Cost/ha	Cost/ha		
Farm- er No	Area Loca- tion	Seed	icide	icide	Management	Fee Lease												
A2	7.7 High (7.0) Land(K) (Tarom 0.7)	-	1,113	8,306	534	1,000	-	34,040	251,950	-	20,560	15,875	355,578	12,000	251,950	-	263,950	597,528
A6	2.7 Middle (2.5) Land(H.L)	-	6,500	25,596	1,469	12,690	-	94,800	140,000	-	57,600	16,923	355,578	20,640	492,084	-	512,724	868,102
A7	3.2 Low (3.0) Land(H.L)	-	6,500	28,233	950	21,282	28,080	50,600	162,000	-	48,400	17,192	361,037	36,000	492,521	-	528,521	889,558
A10	4.0 Mid (4.0) Land(H.L) (Tarom 2.0)	-	5,250	15,133	1,868	600	-	27,000	310,000	-	46,400	20,313	426,564	30,000	493,090	-	503,090	929,654
A11	29.7 High (2.0) Land(H.L) (Tarom 0.7)	-	5,040	15,422	1,200	18,960	-	46,000	132,360	-	27,200	9,909	208,081	15,000	132,350	-	147,350	355,451
A12	3.2 High (3.0) Land(K) (Tarom 0.4)	-	1,500	6,569	316	5,202	-	11,512	32,175	-	9,600	3,234	67,908	12,000	105,481	-	115,481	185,389
A13	1.7 Low (1.5) Land(H.R)	-	7,350	14,522	780	17,542	-	74,800	140,000	-	36,000	14,540	305,334	15,000	413,779	-	428,779	734,115
A14	0.8 Low (0.8) Land(H.R)	-	2,520	11,298	190	1,000	-	50,400	-	81,240	15,200	7,992	167,840	12,500	153,875	-	166,375	334,215
A15	5.5 Middle (5.4) Land(H.L) (2.4 man) (Tarom 1.2)	-	6,500	14,117	691	12,406	26,520	25,200	10,000	-	24,184	5,971	125,389	12,000	369,586	-	381,586	506,975
A17	2.0 Low (2.0) Land(H.L)	-	5,250	13,596	701	22,080	26,520	29,600	136,000	-	40,800	15,727	286,274	24,000	471,985	-	495,985	784,259
A18	1.3 Low (1.5) Land(H.L) (Tarom 0.7)	-	2,175	10,570	257	10,125	-	11,880	-	-	15,600	2,430	51,037	8,400	309,756	-	318,156	369,195
A19	3.2 Low (2.5) Land(H.L)	-	12,600	21,507	1,100	28,500	-	61,700	279,000	-	41,600	22,300	468,307	36,000	480,332	-	516,332	984,639
A20	2.0 Low (2.0) Land(H.L)	-	4,200	27,096	917	29,280	-	50,500	32,000	-	44,000	9,400	197,592	22,800	748,808	-	771,608	969,001

(Amol) 19 ha 8,171,641,430,086

Table C.4.9 Production Costs (4)

Rice Variety-Tarom
Shahrestan-Babol

(Unit: RIs)

Farm- er No	Land Area - ha	Expenses										Self-support		Produc- tion Cost/ha					
		Oper- ated Loca- tion	Fertil- izer	Herbi- cide	Pesti- cide	Fuel	Water Manage- ment	Lease Fee	Agri- machine	Hired Labor	Rental	Rice Mill	Others		Sub Total	Seed	Labor	Ferti- lizer	Sub Total
B5	3.5 (5.5)	Low Land(K)	-	7,350	18,483	7,700	22,800	-	109,300	442,500	-	77,600	34,087	720,026	43,750	451,700	-	495,450	1,215,476
B6	4.0 (4.0)	Low Land(K)	-	8,400	45,384	1,468	31,200	-	156,300	-	-	80,000	16,238	340,990	55,000	882,000	-	937,000	1,277,990
B7	1.5 (1.5)	Low Land(K)	-	2,625	7,343	552	4,300	-	12,000	-	6,240	16,000	2,455	57,513	15,000	209,654	-	224,654	276,167
B8	2.0 (2.0)	Low Land(K)	-	4,200	13,983	1,152	1,808	165,593	8,000	74,000	663,000	4,400	13,657	949,793	24,000	359,593	-	383,593	1,333,386

(Babol) 7.5 ha

2,493,466 332,462

Tarom (Amol + Babol)

26.5 ha

10,665,107 402,457

Table C.4.10 Farmhouse Economy by Farm Size - 1

Shahrestan-Amol

Farm Farmer Size ha	Land Owned Area ha	Land Operated Area ha	Family Com-position person	Farmhouse Income		Debt Inter-ests etc. Rls	Tax Rls	Disposable Income Rls	Household Expenditures Rls	Farmhouse Economic Surplus Rls
				Agricultural Income Rls	Non-farm Income Rls					
1 under 14	0.5(0.3)	0.8(0.8)	9	397,700	480,000	148,000	-	729,700	610,000	119,700
Total and Ave/ one farm †	0.3(0.3)*1	0.8(0.8)	9	397,700	480,000	148,000	-	729,700	610,000	119,700
1-2	1.2(0.6)	1.2(0.6)	5	740,800	-	-	-	740,800	1,010,600	-269,800
8	1.0(1.0)	1.0(1.0)	6	700,100	126,000	40,000	-	786,100	585,000	203,100
13	1.7(1.5)	1.7(1.5)	6	1,405,300	-	-	-	1,405,300	1,212,200	195,100
18	1.3(1.3)	1.3(1.3)	12	1,307,600	420,000	-	-	1,727,600	1,257,900	469,700
Total numbers of farm	5.2(4.4)	5.2(4.4)	29	4,153,800	546,000	40,000	-	4,659,800	4,063,700	596,100
Ave/ one farm	1.3(1.1)	1.3(1.1)	7	1,038,500	136,500	10,000	-	1,164,000	1,015,000	149,000
2-3	2.9(2.5)	2.9(2.5)	8	1,754,500	-	-	-	1,754,500	1,561,000	195,500
6	2.7(2.3)	2.7(2.3)	6	2,282,200	-	-	-	2,282,200	1,003,500	1,278,700
15	5.5(5.4)	2.5(2.4)	9	2,005,600	743,800	-	-	2,747,400	1,707,500	1,039,900
17	1.5(1.5)	2.0(2.0)	10	1,664,800	870,000	600,000	-	1,934,800	1,145,100	789,700
20	2.0(2.0)	2.0(2.0)	12	1,855,200	-	-	-	1,855,200	1,373,800	459,400
Total numbers of farm	14.6(13.7)	12.1(11.2)	45	9,536,500	1,615,800	600,000	-	10,552,100	6,790,900	5,761,200
Ave/ one farm	2.9(2.7)	2.4(2.2)	9	1,907,700	322,800	120,000	-	2,110,400	1,358,200	752,200

Note: †1 () ... Paddy area

Table C.4.10 Farmhouse Economy by Farm Size (2)

Shahrestan-Amol

Farm Farmer Size ha	No.	Land Owned Area ha	Land Operated Area ha	Family Com-position person	Agricultural Income Rls		Total Income Rls	Debt Inter-ests etc. Rls	Tax Rls	Disposable Income Rls	Household Expenditures Rls	Farmhouse Economic Surplus Rls
					Income Rls	Non-farm Income Rls						
5-5	1	3.0(2.7)	3.0(2.7)	10	3,095,200	612,000	5,707,200	320,000	-	3,387,200	2,841,000	546,200
	7	3.2(3.0)	3.2(3.0)	8	1,981,100	-	1,981,100	-	-	1,981,100	1,356,500	624,600
	12	3.2(3.0)	3.2(3.0)	4	2,076,200	-	2,076,200	50,000	-	2,026,200	1,155,000	871,200
	19	3.2(2.5)	3.2(2.5)	9	1,787,500	-	1,787,500	500,000	-	1,487,500	1,585,500	-98,200
	9	4.1(3.8)	4.1(3.8)	11	3,066,800	1,500,000	4,566,800	-	-	4,566,800	2,500,900	2,065,900
	10	4.0(4.0)	4.0(4.0)	6	3,174,900	-	3,174,900	-	50,000	5,124,900	2,066,500	1,058,400
Total numbers of farm	6	20.7(19.0)	20.7(19.0)	48	15,181,500	2,112,000	17,293,500	670,000	50,000	16,573,500	11,505,400	5,068,100
Ave/one farm		3.5(3.2)	3.5(3.2)	8	2,530,500	352,000	2,882,500	111,700	8,500	2,762,500	1,917,600	844,700
5 and over	2	8.7(8.0)	7.7(7.0)	6	3,082,400	465,100	3,547,500	-	150,000	3,397,500	2,294,800	1,102,700
	5	7.0(6.0)	7.0(6.0)	9	3,680,200	-	3,680,200	500,000	-	3,180,200	1,448,000	1,732,200
	11	2.5(2.0)	2.0(2.0)	7	2,635,300	600,000	3,235,300	-	-	3,235,300	1,607,000	1,628,300
	16	9.5(8.5)	1.0(-)	15	790,200	6,650,000	7,440,200	-	-	7,440,200	2,944,000	4,496,200
Total numbers of farm	4	27.7(24.5)	36.4(15.0)	35	10,188,100	7,715,100	17,903,200	300,000	150,000	17,453,200	8,293,800	9,159,400
Ave/one farm		6.9(6.1)	9.1(3.8)	9	2,547,000	1,928,300	4,475,300	75,000	37,500	4,562,800	2,073,500	2,289,300

Table C.4.10 Farmhouse Economy by Farm Size (3)

Shahrestan Babol

Farm Size ha	Farmer No.	Land Owned Area ha	Land Operated Area ha	Family Com- position person	Farmhouse Income			Debt Inter- ests etc. RIS	Tax RIS	Disposable Income RIS	Household Expenditures RIS	Farmhouse Economic Surplus RIS
					Agricultural Income RIS	Non-farm Income RIS	Total RIS					
1-2	1	1.5(1.5)	1.5(1.5)	8	923,300	20,000	943,300	-	-	943,320	1,207,300	-264,000
	3	3.3(3.0)	1.8(1.5)	5	923,500	585,000	1,508,500	100,000	-	1,408,500	1,227,600	180,900
	7	1.5(1.5)	1.5(1.5)	7	1,304,100	-	1,304,100	-	-	1,304,100	921,000	383,100
Total numbers of farm	3	6.3(6.0)	4.8(4.5)	20	3,150,900	605,000	3,755,900	100,000	-	3,655,900	3,355,900	300,000
Ave/ one farm		2.1(2.0)	1.6(1.5)	7	1,050,300	201,700	1,252,000	33,300	-	1,218,600	1,118,600	100,000
2-3	4	2.0(2.0)	2.0(2.0)	10	862,200	-	862,200	-	-	862,200	735,800	126,400
	8	0.5(0.5)	2.0(2.0)	8	1,464,400	480,000	1,944,400	880,000	-	1,064,400	1,558,200	-493,800
	9	1.2(1.2)	2.6(2.6)	10	1,607,400	200,000	1,807,400	-	-	1,807,400	1,403,500	403,900
	3	3.7(3.7)	6.6(6.6)	28	3,934,000	680,000	4,614,000	880,000	-	3,734,000	3,697,500	36,500
Ave/ one farm		1.2(1.2)	2.2(2.2)	9	1,311,500	226,700	1,538,000	293,500	-	1,244,700	1,232,500	12,200
3-5	2	2.1(1.7)	3.4(3.0)	8	1,705,300	-	1,705,300	100,000	-	1,605,300	1,722,100	-116,800
	5	3.5(3.5)	3.5(3.5)	7	3,085,600	-	3,085,600	-	-	3,085,600	1,817,500	1,266,100
Total numbers of farm	2	5.6(5.2)	6.9(6.5)	15	4,788,900	-	4,788,900	100,000	-	4,688,900	3,539,600	1,149,300
Ave/ one farm		2.8(2.6)	3.5(3.3)	8	2,394,500	-	2,394,500	50,000	-	2,344,500	1,769,800	574,700
5 and over	6	6.0(4.0)	6.0(4.0)	15	3,589,900	-	3,589,900	-	-	3,589,900	1,667,500	1,922,400
	10	8.2(8.0)	8.2(8.0)	8	11,289,700	800,000	12,089,700	-	-	12,089,700	1,629,400	10,460,300
Total numbers of farm	2	14.2(12.0)	14.2(12.0)	23	14,879,600	800,000	15,679,600	-	-	15,679,600	3,296,900	12,382,700
Ave/ one farm		7.1(6.0)	7.1(6.0)	12	7,439,800	400,000	7,839,800	-	-	7,839,800	1,648,500	6,191,300

Table C.4.10 Farmhouse Economy by Farm Size (4)

Project Area	Farm Size	Farm NO.	Land Owned Area ha	Land Oper- ha	Family Com- position person	Farmhouse Income		Debt inter- ests etc.	Tax	Disposable Income	Household Expenditures	Farmhouse Economic Surplus
						Agricultural Income	Non-farm Income					
						Ris	Ris	Ris	Ris	Ris	Ris	Ris
	1 under	1	0.3(0.3)	0.8(0.8)	9	397,700	480,000	877,700	-	799,700	610,000	119,700
	Total and Ave/one farm					(44,200)		(97,500)		(81,100)	(67,800)	
	1-2	4	5.2(4.4)	5.2(4.4)	29	4,153,800	546,000	4,699,800	-	4,659,800	4,063,700	596,100
	3	5	6.3(6.0)	4.8(4.5)	20	3,150,900	605,000	3,755,900	-	3,655,900	3,355,900	300,000
	Total	7	11.5(10.4)	10.0(8.9)	49	7,304,700	1,151,000	8,455,700	-	8,315,700	7,419,600	896,100
	Ave/one farm		1.6(1.5)	1.4(1.3)	7	1,045,500	164,400	1,207,900	-	1,187,900	1,059,900	128,000
	Ave/one person					(149,100)		(172,600)		(169,700)	(151,400)	
	2-5	5	14.6(13.7)	12.1(11.2)	45	9,536,800	1,613,800	11,152,100	-	10,552,100	6,790,900	3,761,200
	3	3	5.7(3.7)	6.6(6.6)	28	3,934,000	680,000	4,614,000	-	3,734,000	3,697,500	36,500
	Total	8	18.3(17.4)	18.7(17.8)	73	15,472,300	2,293,800	15,766,100	-	14,286,100	10,488,400	3,797,700
	Ave/one farm		2.3(2.2)	2.5(2.2)	9	1,684,000	286,700	1,970,700	-	1,785,800	1,311,000	474,800
	Ave/one person					(187,100)		(219,000)		(198,400)	(143,700)	
	3-5	6	20.7(19.0)	20.7(19.0)	48	15,181,500	2,112,000	17,293,500	50,000	16,573,500	11,505,400	5,068,100
	2	2	5.6(5.2)	6.9(6.5)	15	4,788,900	-	4,788,900	-	4,688,900	5,539,600	1,149,300
	Total	8	26.3(24.2)	27.6(25.5)	63	19,970,400	2,112,000	22,082,400	50,000	21,262,400	15,045,000	6,217,400
	Ave/one farm		3.3(3.0)	3.5(3.2)	8	2,496,300	264,000	2,760,300	6,200	2,657,800	1,880,600	777,200
	Ave/one person					(317,000)		(350,500)		(337,500)	(238,800)	
	5 and over	4	27.7(24.5)	36.4(15.0)	35	10,188,100	7,713,100	17,901,200	150,000	17,451,200	8,293,800	9,157,400
	1	1	6.0(4.0)	6.0(4.0)	15	3,589,900	-	3,589,900	-	3,589,900	635,000	2,954,900
	Total	5	33.7(28.5)	42.4(19.0)	50	13,778,000	7,713,100	21,491,100	150,000	21,041,100	8,928,800	12,112,300
	Ave/one farm		6.7(5.7)	8.5(3.8)	10	2,755,600	1,542,600	4,298,200	30,000	4,208,200	1,785,800	2,422,400
	Ave/one person					(275,600)		(429,800)		(420,800)	(178,600)	

Table C.4.11 Labor Requirement per Hectare (1)

Farmer No.	Land Oper- ated Area ha	Days Worked of Own farm occupation	Operation												Total																		
			Seed Bedding		Plowing		Harrowing Levelling		Trans- planting		Weeding		Fertilizing		Spraying		Water Management		Harvesting		Threshing		Transport		Family Hired		Total						
			F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H			
1	3.0 (2.7)*	720 (666)*2	71 (4)	-	269 (136)*5	-	136 (42)	-	151 (-)	89	230	-	44	-	40	-	28	-	89	149	-	37	-	1,425 (1,367)	178 (178)	1,603 (1,545)	239						
2	7.7 (7.0)	375 (353)	11 (1)	23 (-)	69 (34)	69	69	69	23	120	10	86	3	2	6	18	32	-	300	48	86	-	10	295 (285)	783 (783)	1,078 (1,066)	159						
3	2.9 (2.5)	480 (405)	30 (-)	-	348 (174)	-	144 (-)	-	96 (-)	96	216	-	12	-	18	-	40	-	210	120	-	10	-	1,244 (1,179)	306 (306)	1,550 (1,485)	214						
4	1.2 (0.6)	320 (302)	20 (-)	-	320 (160)	-	40 (-)	-	250 (-)	-	500	-	50	-	40	-	70	-	400	100	-	40	-	1,830 (1,753)	-	1,830 (1,754)	190						
5	7.0 (6.0)	720 (645)	18 (2)	-	76 (56)	18	56	18	72	90	110	-	6	-	32	-	36	-	200	96	-	3	-	587 (547)	346 (346)	933 (893)	85						
6	(all Tarom)																																
7	(all Tarom)																																
8	1.0 (1.0)	190 (190)	24 (-)	-	132 (96)	-	12 (-)	-	120 (-)	-	188	-	16	-	10	-	130	-	120	144	-	6	-	780 (780)	120 (120)	900 (900)	123						
9	4.1 (3.6)	525 (429)	27 (2)	-	109 (54)	-	39 (2)	-	34 (-)	134	74	-	14	-	29	-	17	-	143	39	77	6	-	462 (421)	354 (354)	816 (775)	95						
10	4.0 (4.0)	300 (264)	6 (-)	-	125 (125)	-	48 (18)	-	35 (-)	175	98	-	11	-	16	-	2	-	300	100	75	5	-	746 (681)	727 (727)	1,473 (1,408)	171						
11	29.7 (2.6)	240 (228)	12 (-)	-	312 (156)	-	30 (-)	-	48 (-)	120	96	-	12	-	24	-	150	-	60	90	90	6	-	840 (813)	456 (456)	1,296 (1,269)	219						
12	3.2 (3.0)	450 (387)	24 (-)	-	266 (430)	-	40 (-)	-	120 (-)	84	313	-	24	-	24	-	90	-	65	111	37	19	-	1,091 (1,047)	232 (232)	1,323 (1,279)	181						
13	(all Tarom)																																
14	(all Tarom)																																
15	2.5 (2.4)	310 (284)	20 (-)	-	98 (98)	-	45 (-)	-	127 (-)	10	195	-	17	-	27	-	133	-	343	80	40	6	-	1,081 (1,031)	50 (50)	1,131 (1,081)	120						
16	(Lessee)																																
17	(all Tarom)																																
18	1.3 (1.3)	430 (427)	23 (-)	-	64 (64)	-	28 (-)	-	239 (-)	-	258	-	14	-	23	-	161	-	598	110	-	12	-	1,530 (1,530)	-	1,530 (1,530)	103						
19	(all Tarom)																																
20	(all Tarom)																																
Average (1)	5.030 (4.580)		24 (1)	2	182 (107)		21 (8)		110 (1)	77	184		23	19	24	2	74		218	99	34	13	1	995 (939)	298 (298)	1,293 (1,237)	158						
(2) Max.			21	2	177		21	42	10	95	163		23	17	24	2	73		196	100	29	11	1	919 (868)	293 (293)	1,212 (1,161)	152						
Min. exclude			(-)		(105)		(8)		(1)		(-)		(-)	(-)	(1)		(-)		(2)	(28)	(6)	(6)											

Note: *1....() paddy area *2....() Days converted by labor unit *3....Operated hours of Machines *4.... F; Family, H; Hired

Table C.4.11 Labor Requirement per Hectare (2)

Rice Variety	Area occupied (ha)	Days Worked of Own farm	Operation												Total										
			Seed bed		Plowing		Harrowing		Trans-planting		Weeding		Fertilizing			Spraying		Management		Harvesting		Threshing		Transport	
			F	H	F	H	F	H	F	H	F	H	F	H		F	H	F	H	F	H	F	H	F	H
Shahrestan Babil	1	1.5	460 (385)	8 (4)	33 (17)	16 (8)	253 (120)	67 (38)	16 (8)	5 (2)	7 (4)	147 (70)	120 (60)	135 (70)	11 (6)	753 (385)	187 (93)	920 (478)	183 (93)						
	2	3.0	858 (696)	16 (8)	384 (82)	54 (27)	136 (68)	40 (20)	5 (2)	10 (5)	540 (270)	80 (40)	120 (60)	35 (17)	1,594 (797)	125 (62)	1,572 (786)	870 (435)							
	3	1.8	260 (248)	24 (12)	128 (64)	32 (16)	80 (40)	120 (60)	24 (12)	40 (20)	96 (48)	144 (72)	120 (60)	64 (32)	864 (432)	264 (132)	1,128 (564)	681 (340)							
	4	2.0	390 (336)	36 (18)	126 (63)	18 (9)	180 (90)	180 (90)	24 (12)	42 (21)	144 (72)	180 (90)	60 (30)	8 (4)	1,208 (604)	486 (243)	1,694 (847)	984 (492)							
	5	(all Tarom)																							
	6	(all Tarom)																							
	7	1.5 (1.5)	330 (282)	48 (24)	87 (43)	17 (8)	106 (53)	253 (126)	8 (4)	24 (12)	360 (180)	288 (144)	6 (3)	1,296 (648)	115 (57)	1,144 (572)	115 (57)								
	8	(all Tarom)																							
	9	2.6 (2.6)	530 (493)	23 (11)	146 (73)	18 (9)	120 (60)	300 (150)	18 (9)	30 (15)	210 (105)	2 (1)	8 (4)	981 (490)	10 (5)	991 (495)	774 (387)								
	10	8.2 (8.0)	600 (573)	9 (4)	107 (53)	30 (15)	72 (36)	53 (26)	68 (34)	17 (8)	130 (65)	157 (78)	55 (27)	7 (3)	592 (296)	308 (154)	900 (450)	61 (30)							
	Average (1)	3,428 (3,013)	23 (11)	113 (56)	26 (13)	135 (67)	66 (33)	290 (145)	14 (7)	24 (12)	204 (102)	98 (49)	112 (56)	19 (9)	1,050 (525)	198 (99)	1,248 (624)	476 (238)							
	(2) Maximum/Minimum	exclude (1)	22 (1)	126 (63)	23 (11)	132 (66)	56 (28)	258 (129)	14 (7)	24 (12)	175 (87)	120 (60)	98 (49)	13 (6)	952 (476)	191 (95)	1,143 (571)	486 (243)							
	Total (Amol-Babil)																								
	Average (1)	8,458 (7,593)	24 (12)	157 (78)	37 (18)	119 (59)	73 (36)	223 (111)	18 (9)	24 (12)	213 (106)	116 (58)	104 (52)	15 (7)	1,013 (506)	261 (130)	1,274 (637)	153 (76)							
	(2) Maximum/Minimum	exclude (1)	21 (1)	158 (79)	34 (17)	109 (54)	69 (34)	198 (99)	20 (10)	24 (12)	188 (94)	124 (62)	99 (49)	13 (6)	932 (466)	255 (127)	1,157 (578)	156 (78)							

Note: *1.... () Operated hours of Pump

Rice Variety Tarom
Shahrestan Anol

Table C.4.11 Labor Requirement per Hectare (3)

(Unit: hour)

Farmer Land Oper- ated Area, ha	Days Worked of Own farm occupation days	Operation												Transport H	Total Family Hired Total Machine									
		Seed bedding		Plowing		Harrowing Leveling		Trans- planting		Weeding		Fertilizing				Spraying		Water Management		Harvesting		Threshing		
		F	H	F	H	F	H	F	H	F	H	F	H			F	H	F	H	F	H	F	H	F
2	7.7	375 (333)	11 (-)	69 (34)	69 (-)	23 (-)	120 (-)	10 (-)	86 (-)	3 (-)	3 (-)	7 (3)	19 (-)	33 (-)	-	93 (20)	300 (49)	86 (49)	10 (10)	298 (265)	785 (785)	1,083 (1,065)	150	
6	2.7 (2.5)	450 (414)	10 (-)	104 (104)	-	240 (-)	-	146 (-)	-	10 (-)	-	13 (-)	-	96 (-)	-	43 (-)	183 (5)	125 (5)	5 (3)	-	813 (768)	183 (183)	996 (954)	117
7	3.2 (3.0)	690 (477)	8 (-)	72 (48)	-	16 (-)	-	144 (-)	-	8 (-)	-	15 (-)	-	38 (-)	-	180 (-)	144 (96)	96 (16)	4 (2)	-	701 (532)	144 (144)	845 (676)	66
10	4.0 (4.0)	300 (264)	6 (-)	125 (125)	-	18 (18)	-	175 (-)	-	49 (-)	-	11 (-)	-	2 (-)	-	420 (-)	210 (28)	112 (28)	24 (24)	-	809 (752)	594 (594)	1,403 (1,326)	195
11	29.7 (2.0)	240 (228)	12 (-)	312 (186)	-	30 (-)	-	120 (-)	-	96 (-)	-	24 (-)	-	135 (-)	-	86 (-)	171 (86)	129 (86)	9 (4)	-	893 (875)	558 (558)	1,451 (1,433)	246
12	3.2 (3.0)	450 (387)	24 (-)	259 (130)	-	40 (-)	-	120 (-)	-	511 (-)	-	24 (4)	-	90 (-)	-	480 (-)	-	90 (30)	15 (8)	-	1,477 (1,335)	84 (84)	1,561 (1,419)	172
13	1.7 (1.5)	450 (414)	64 (-)	112 (112)	-	20 (-)	-	176 (-)	-	64 (-)	-	24 (-)	-	90 (-)	-	80 (-)	160 (16)	40 (16)	4 (2)	-	1,010 (955)	240 (240)	1,250 (1,195)	130
14	0.8 (0.8)	520 (482)	88 (-)	93 (46)	-	15 (-)	-	150 (-)	-	180 (-)	-	30 (-)	-	138 (-)	-	150 (-)	-	120 (30)	5 (3)	-	984 (754)	-	984 (-)	79
15	2.5 (2.4)	310 (284)	20 (-)	98 (98)	-	45 (-)	-	128 (-)	-	196 (-)	-	27 (-)	-	133 (-)	-	400 (-)	-	80 (20)	5 (2)	-	1,152 (932)	50 (50)	1,202 (982)	120
17	2.0 (2.0)	540 (486)	24 (-)	48 (48)	-	66 (-)	-	180 (-)	-	144 (-)	-	6 (-)	-	108 (-)	-	144 (-)	204 (24)	120 (24)	3 (2)	-	855 (796)	204 (204)	1,059 (1,000)	74
18	1.3 (1.3)	430 (427)	23 (-)	65 (65)	-	28 (-)	-	241 (-)	-	259 (-)	-	23 (-)	-	162 (-)	-	514 (-)	-	69 (17)	9 (4)	-	1,407 (1,407)	-	1,407 (-)	86
19	3.2 (2.5)	490 (400)	19 (-)	62 (62)	-	29 (-)	-	134 (-)	-	175 (-)	-	24 (-)	-	104 (-)	-	58 (-)	259 (24)	144 (24)	4 (2)	-	769 (677)	317 (317)	1,086 (994)	88
20	2.0 (2.0)	450 (441)	24 (-)	141 (69)	-	72 (-)	-	288 (-)	-	192 (-)	-	18 (-)	-	92 (-)	-	240 (-)	48 (24)	168 (24)	5 (3)	-	1,252 (1,234)	48 (48)	1,300 (1,282)	96
Average (1)		5,695 (4,875)	26 (-)	120 (84)	15 (4)	31 (4)	9 (-)	147 (-)	49 (-)	174 (-)	18 (-)	13 (-)	1 (-)	19 (-)	2 (-)	222 (-)	329 (28)	103 (28)	7 (5)	956 (865)	247 (247)	1,203 (1,112)	121	
(2) Maximum Minimum	exclude		22 (-)	109 (81)	18 (4)	28 (4)	11 (-)	136 (-)	56 (-)	170 (-)	13 (-)	13 (-)	1 (-)	19 (-)	3 (-)	211 (-)	133 (24)	107 (24)	6 (3)	917 (829)	250 (250)	1,167 (1,079)	112	

Rice Variety Taron
Shahrestan Babol

Table C.4.11 Labor Requirement per Hectare (4)

(Unit : hour)

Farmer Land Oper- ated Area No. H _a	Days Worked of Own farm occupation days	Operation																Total Family Hired Total Machine								
		Seed bedding		Plowing		Harrowing Leveling		Trans- planting		Weeding		Fertilizing		Spraying		Water Management Pump			Harvesting		Threshing		Transport			
		F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H		F	H	F	H	F	H	F	H
5	3.5 (3.5)	46 (-)	250 (235)	-	101 (101)	-	82 (-)	-	17 (-)	120 (-)	-	54 (-)	7 (-)	7 (-)	60 (291)	-	51 (-)	189 (-)	86 (17)	-	7 (3)	-	464 (454)	363 (363)	827 (817)	412 (291)
6	6.0 (4.0)	36 (-)	580 (568)	-	60 (60)	-	12 (-)	-	240 (-)	-	54 (-)	12 (-)	9 (-)	53 (-)	-	180 (-)	-	36 (15)	-	3 (2)	-	695 (685)	-	695 (685)	77 (-)	
7	1.5 (1.5)	48 (-)	330 (282)	-	88 (88)	-	17 (-)	-	107 (-)	-	257 (-)	8 (-)	24 (-)	90 (-)	-	288 (-)	-	144 (16)	-	6 (2)	-	1,077 (957)	-	1,077 (957)	106 (-)	
8	2.0 (2.0)	15 (-)	420 (393)	-	84 (84)	-	66 (15)	-	108 (-)	12 (-)	115 (-)	5 (-)	6 (-)	113 (-)	-	114 (-)	66 (-)	80 (20)	-	3 (1)	-	707 (682)	78 (78)	785 (760)	120 (-)	
Average		36	1,580 (1,478)	-	83 (83)	-	44 (4)	-	118 (-)	33 (-)	106 (-)	14 (-)	12 (-)	79 (-)	-	158 (-)	64 (-)	87 (17)	-	5 (2)	-	736 (708)	111 (111)	847 (819)	106 (pump outside)	
(2) Maximum Minimum		41 (-)	-	-	86 (86)	-	42 (4)	-	65 (-)	66 (-)	84 (-)	27 (-)	8 (-)	75 (-)	-	116 (-)	95 (-)	83 (19)	-	5 (2)	-	611 (590)	188 (188)	799 (778)	111 (pump outside)	
Total (Amol + Babol)		28	7,275 (6,353)	-	111 (78)	-	34 (4)	-	140 (-)	45 (-)	158 (-)	17 (-)	17 (-)	2 (-)	90 (-)	-	207 (-)	114 (-)	99 (23)	-	7 (4)	-	903 (824)	216 (216)	1,119 (1,040)	111 (pump exclude)
(2) Maximum Minimum		26	-	-	104 (82)	-	31 (4)	-	119 (-)	58 (-)	150 (-)	16 (-)	16 (-)	2 (-)	91 (-)	-	189 (-)	124 (-)	101 (23)	-	6 (3)	-	845 (772)	234 (234)	1,079 (1,006)	112 (pump exclude)

Table C.4.12 Production Cost per hectare - 1Rice Variety-Tarom

<u>Item</u>	<u>Quantity</u>	<u>Rec (Rls)</u>	<u>Total (Rls)</u>	<u>Note</u>
Repairing the canals	3 person	2,500	7,500	
Plowing	Twice	15,000	30,000	
Land leveling	-	-	15,000	
Delimitation and land pre-paring	4 person	2,500	10,000	
Seed	60 kg	150	9,000	
Seed bedding	4 person	2,500	10,000	
Care and arranging the water in seed-bed	one month	-	10,000	
Take out the seeding	2 person	2,500	5,000	
Transfer from seed-bed to main field	4 person	2,500	10,000	
Transplanting	15 person	2,000	30,000	
Spraying and pesticide and herbicide	-	-	17,500	
Fertilizer and fertilizing	-	-	50,000	
Cutting the grass around the field	2 person	2,500	5,000	
Weeding (twice)	16 person	2,000	32,000	
Water management	-	-	25,000	
Harvesting and collecting	24 person	3,000	72,000	
Transport to corner of farm or storage	3 person	2,500	7,500	
Threshing	7 person	3,000	21,000	
Thresher rent	-	-	14,000	
Transport to ricemill factory	-	-	10,000	
Drying and ricemilling	-	-	15,000	
<u>Sub Total</u>			<u>370,500</u>	
Others (10%)			37,050	
<u>Total</u>			<u>407,550</u>	

- Note: 1. Sources ... Rice Planning Committee
 2. Date 1363 Rice production year

Table C.4.12 Production Cost per hectare - 2

Rice Variety Anol-3

<u>Item</u>	<u>Quantity</u>	<u>Fee (Rls)</u>	<u>Total (Rls)</u>	<u>Note</u>
Repairing the canals	3 person	2,500	7,500	
Plowing	twice	15,000	30,000	
Land leveling	-	-	15,000	
Delimitation and land pre-paring	4 person	2,500	10,000	
Seed	60 kg	150	9,000	
Seed bedding	4 person	2,500	10,000	
Care and arranging the water in seed-bed	one month	-	10,000	
Take out the seeding	2 person	2,500	5,000	
Transfer from seed-bed to main field	4 person	2,500	10,000	
Transplanting	15 person	2,000	30,000	
Spraying and pesticide and herbicide	-	-	17,500	
Fertilizer and fertilizing	-	-	50,000	
Cutting the grass around the field and plot	2 person	2,500	5,000	
Weeding (twice)	16 person	2,000	32,000	
Water management	-	-	25,000	
Harvesting and collecting	30 person	3,000	90,000	
Transport to farm or storage the corner	4 person	2,500	10,000	
Threshing	9 person	3,000	27,000	
Thresher rent	-	-	14,000	
Transport to ricemill factory	-	-	10,000	
Drying and ricemilling	-	-	15,000	
<u>Sub Total</u>			<u>416,000</u>	
Others (10%)			41,600	
<u>Total</u>			<u>457,600</u>	

- Note: 1. Source ... Rice Planning Committee
 2. Date 1363 Rice production year

Table C.4.13 Farmer's Intention for Land Condition Improvement - 1

Shahrestan Amol

Farmer No.	Land Condition				Farmers Intention for Land Improvement										Farmers Intention for Utilize Surplus Labor Force						Farmers Intention for Agri-producti										
	Land Owned Area ha	Land Operated Area ha	Days Worked of Own Farm Occupation day	Irrigation	Water Shortage Frequency	Drainage	Inundation Frequency	Farm-plot Distribution No.	Area of Each-plot ha	Distance from House m	Condition on Farm lot	Irrigation	Drainage	Land consolidation	Gather Each-plot	Farm Roads	Own-farm Occupation				Non-farm Occupation			Introduce of Second Crops	Seed Multiplication	Post Harvest Improvement					
																	Animal Husbandry	Fruits Cropping	Vegetable Cropping	Others	Other Farm Occupation	Working away from House	Regular Employment				Others				
1	3.0 (2.7) ^{*1}	3.0 (2.7) ^{*1}	720 (648) ^{*2}	No.P ^{*3}	-	Yes	Once in every years	13	Max.-Min. 0.5-0.04	Max.-Min. 500-0	Bad	o	o	o	o	(No.*/length Width,Pavement)	o	x	o	x	x	x	x	x	x	x	x	o	o	o	o
2	8.7 (8.0)	7.7 (7.0)	375 (333)	"	-	No.P	-	35	0.5-0.1	1,000-700	"	p	x	o	o	(width)	o	x	x	x	x	x	x	x	x	x	o	o	o	x	
3	2.9 (2.5)	2.9 (2.5)	450 (396)	"	-	"	-	12	0.2-0.05	300-100	Not Bad	x	x	o	o	x	x	x	o	x	x	x	x	x	x	x	o	o	o	x	
4	1.2 (0.6)	1.2 (0.6)	320 (287)	"	-	"	-	4	0.3-0.1	2,000-1,500	"	x	x	o	x	(width)	o	o	x	x	x	x	x	x	x	o	o	o	x		
5	7.0 (6.0)	7.0 (6.0)	720 (624)	"	-	"	-	28	0.7-0.1	300-20	Good	x	x	x	o	x	x	x	o	(without hired labor)	x	x	x	x	x	x	o	o	o	x	
6	2.7 (2.3)	2.7 (2.3)	450 (414)	"	-	"	-	15	0.3-0.05	550-500	Bad	x	x	o	o	o	x	x	o	(without hired labor)	x	x	x	x	x	x	o	o	o	x	
7	3.2 (3.0)	3.2 (3.0)	690 (477)	"	-	"	-	51	0.1-0.01	1,000-200	Not Bad	x	x	o	o	o	o	x	x	x	x	x	x	x	x	o	o	o	x		
8	1.0 (1.0)	1.0 (1.0)	190 (190)	"	-	"	-	5	0.33-0.05	800-500	Good	x	x	o	o	x	x	x	x	o	x	x	x	x	x	o	o	o	x		
9	4.1 (3.8)	4.1 (3.8)	525 (393)	Yes	-	Yes	Once in 2 - 3 years	15	0.4-0.1	1,000-300	Not Bad	o	o	o	o	(width,pavement)	o	x	x	x	x	x	x	x	x	o	o	o	o		
10	4.0 (4.0)	4.0 (4.0)	300 (252)	No.P	-	No.P	-	lot Plot 31 (4) pieces	0.2-0.07	1,000-500	"	o	o	o	o	(width,pavement)	o	x	x	x	x	x	x	x	x	o	o	o	o		
11	2.5 (2.0)	29.7 (2.0)	240 (228)	"	-	"	-	20 (4)	0.15-0.03	600-500	"	x	o	o	o	(width 3 m)	o	o	x	o	(without hired labor)	x	x	x	x	x	o	o	o		
12	3.2 (3.0)	3.2 (3.0)	450 (387)	"	-	"	-	34	0.3-0.02	2,000-1,000	Good	x	x	o	o	x	o	x	o	x	x	x	x	x	x	o	o	o	x		
13	1.7 (1.5)	1.7 (1.5)	450 (414)	"	-	Yes	Once in every years (80 ^d , 10 ^{cm} , 15 ^{ha})	3	0.6-0.45	2,000-1,800	"	o	x	x	x	x	o	x	x	x	x	x	x	x	x	o	o	o	x		
14	0.3 (0.3)	0.8 (0.8)	520 (320)	Yes	Once in every years Transplanting	"	Once in every years (80 ^d , 60 ^{cm})	5	0.3-0.1	4,000-3,000	Not Bad	o	o	o	o	(width)	o	x	x	x	x	x	x	x	x	o	o	o	o		
15	5.5 (5.4)	2.5 (2.1)	310 (284)	No.P	-	No.P	-	20	0.3-0.05	1,000-700	"	x	x	o	o	(width)	x	x	x	o	(I work in my land myself)	x	x	x	x	x	o	o	o		
16	9.5 (8.5)	1.0 (-)	-	Yes	Once in every years Transplanting	Yes	Once in every years (60 ^d , 50 ^{cm} , 65 ^{ha})	170	0.3-0.02	2,000-200	"	o	o	o	o	(width)	x	x	x	x	x	x	x	x	x	o	o	o	o		
17	1.5 (1.5)	2.0 (2.0)	540 (486)	"	"	"	Once in every years (90 ^d , 20 ^{cm} , 2 ^{ha})	40	0.2-0.06	1,000-800	"	o	o	o	o	(No./length Width)	o	x	x	x	x	x	x	x	x	o	o	o	x		
18	1.3 (1.3)	1.3 (1.3)	430 (427)	"	"	"	Once in every years (90 ^d , 10 ^{cm} , 1 ^{ha})	11	0.15-0.05	150	"	o	o	o	o	(width)	o	x	x	x	x	x	x	x	x	o	o	o	x		
19	3.2 (2.5)	3.2 (2.5)	490 (400)	"	"	"	Once in every years (60 ^d , 20 ^{cm} , 0.5 ^{ha})	13 (5)	0.6-0.05	1,000-500	Bad	o	o	o	o	(No./length Width)	o	x	x	x	x	x	x	x	x	o	o	o	o		
20	2.0 (2.0)	2.0 (2.0)	450 (441)	"	"	"	Once in every years (60 ^d , 20 ^{cm} , 2 ^{ha})	14	0.35-0.15	1,000-800	Not Bad	o	o	o	o	(width)	o	x	x	x	x	x	x	x	x	o	o	o	o		

Note: *1() Paddy area
 *2() Days converted by labor unit
 *3 no problem
 *4 days
 *5 numbers

Table C.4.13 Farmer's Intention for Land Condition Improvement - 1

Farmers Intention for Utilize Surplus Labor Force																								
Farmers Intention for Land Improvement							On-farm Occupation				Non-farm Occupation				Farmers Intention for Agri-producing Promotion Scheme									
No. of h-lot	Distance from House	Condition on Farm	Irri-gation	Drain-age	Land con-solidation	Gather Each-lot	Farm Roads	Animal hus-bandry	Fruits Cropping	Vege-table Cropping	Others	Other Farm Occu-pation	Day la-bourer	Working away from House	Regular Employ-ment	Others	Introduce of Secord Crops	Seed Mul-tiplication	Post Harvest Improve-ment	Farm Mechani-zation	Strengthening of Agricultural Research	Agricultural Extension Service	Management Land Location	
ha	m	loot																						
1-0.04	Max.-Min. 500-0	Bad	o	o	o	o	o (No. 5/length width, Pavement)	o	x	o	x	x	x	x	x	x	o (Clover, Vegetables)	o	o	o	o	o	o	Salar-Rud Tule-Rud, High Land
2-0.1	1,000-700	"	o	x	o	o	o (width)	o	x	x	x	x	x	x	x	x	o (Clover)	o	x	o	x	o	o	Katal Kash, Seid-Rud, High Land
3-0.05	300-100	Not Bad	x	x	o	o	x	x	x	o	x	x	x	x	x	x	o (Clover, Vegetables)	o	x	o	x	x	x	Shah-Rud, High Land
4-0.1	2,000-1,500	"	x	x	o	x	o (width)	o	o	x	x	x	x	x	x	x	o	o	x	o	o	o	o	Shah-Rud, High Land
5-0.1	300-20	Good	x	x	x	o	x	x	x	o	o (without hired labor)	x	x	x	x	x	x	o	x	o	o	x	x	Shah-Rud, Middle Land
6-0.05	550-500	Bad	x	x	o	o	o	x	x	o	o (without hired labor)	x	x	x	x	x	o (not Fence)	o	x	o	o	x	x	Shah-Rud, Low Land
7-0.01	1,000-200	Not Bad	x	x	o	o	o	o	x	x	x	x	x	x	x	x	o (Clover-labor require-ment is small and cropping is easy)	o	x	o	x	x	x	Haraz River, High Land
8-0.05	800-500	Good	x	x	o	o	x	x	x	x	o	x	x	x	x	x	o (Clover-labor require-ment is small and cropping is easy)	o	x	o	o	o	o	Zan-O-Mard, Middle Land
9-0.1	1,000-300	Not Bad	o	o	o	o	o (width, pavement)	o	x	x	x	x	x	x	x	x	o (Clover, Animal nusbandry)	o	o	o	o	o	o	Zan-O-Mard, Middle Land
10-0.07	1,000-500	"	o	o	o	o	o (width, pavement)	o	x	x	x	x	x	x	x	x	o (Clover, Animal nusbandry)	o	o	o	o	o	o	Shah-Rud, High Land
11-0.03	600-500	"	x	o	o	o	o (width 3 m)	o	o	x	o (without hired labor)	x	x	x	x	x	o (Clover, Animal nusbandry)	x	o	o	x	x	x	Sand Rud, High Land
12-0.02	2,000-1,000	Good	x	x	o	o	x	o	x	o	x	x	x	x	x	x	o (Barley, Clover)	x	x	o	x	x	x	Kachab-Rud, Low Land
13-0.45	2,000-1,800	"	o	x	x	x	x	o	x	x	x	x	x	x	x	x	o (Clover, Vegetables)	x	x	o	x	x	x	Keykavous-ou Low Land
14-0.1	4,000-3,000	Not Bad	o	o	o	o	o (width)	o	x	x	x	x	x	x	x	x	o (Clover, Vegetables)	o	o	o	x	x	x	Hardz 2.4 ha Middle Land
15-0.05	1,000-700	"	x	x	o	o	o (width)	x	x	x	o (I work in my land myself)	x	x	x	x	x	o (Clover time of cropping)	o	o	x	x	x	x	Spring 8.5 ha (Semi-deep 4.0) Middle Land
16-0.02	2,000-200	"	o	o	o	o	o (width)	x	x	x	x	x	x	x	x	x	o (Clover, Vegetables)	o	x	o	x	o	o	Taje-Rud, Low Land
17-0.06	1,000-800	"	o	o	o	o	o (No./length width)	o	x	x	x	x	x	x	x	x	o (Clover)	o	x	o	x	o	o	Ali Rud, Low Land
18-0.05	150	"	o	o	o	o	o (width)	o	x	x	x	x	x	x	x	x	o (Clover, Vegetables)	o	o	o	x	x	x	Ali Rud, Low Land
19-0.05	1,000-500	Bad	o	o	o	o	o (No./length width)	o	x	x	x	x	x	x	x	x	o (Clover)	x	o	o	x	x	x	Zungeh Rud, Low Land
20-0.15	1,000-800	Not Bad	o	o	o	o	o (width)	o	x	x	x	x	x	x	x	x	o (Clover)	x	o	o	x	x	x	Zungeh Rud, Low Land

Table C.4.13 Farmer's Intention for Land Condition Improvement - 2

Land Condition	Farmers Intention for Utilize Surplus Labor Force																							
	Farmers Intention for Land Improvement								Own-farm Occupation				Non-farm Occupation				Farmers Intention for Agri-production				Promotion Scheme			
Foundation Frequency	Farm-lot Distribution No.	Area of Each-lot (ha)	Distance from House (m)	Condition on Farm lot	Irrigation	Drainage	Land consolidation	Gather Each-lot	Farm Roads	Animal Husbandry	Fruits Cropping	Vegetable Cropping	Others	Other Farm Occupation	Day Labourer	Working away from House	Regular Employment	Others	Introduce of Second Crops	Seed Multiplication	Post Harvest Improvement	Farm Mechanization	Strengthening of Agricultural Research	Agricultural Extension Service
		(Not Hearing)			o	o	o	(Not Hearing)	o	x	x	x	x	x	o	x	x	x	o	(Clover, Vegetable)	o	o	o	o
	30	Max. 0.2-0.07	Min. 300-100	Good	o	o	o	o	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	o
in 6 months (90 days)			500-100	"	o	o	o	o	x	o	x	x	o (cultivate all) owned area	x	x	x	x	x	o	(marshy-there are) no livestock	o	x	o	x
in every (90 days)	8	0.4-0.2	1,000-40	"	x	o	o	o	x	x	x	x	o (without hired labor)	x	x	x	x	x	x	x	o	x	o	o
in every (90 days)	7	0.9-0.4	2,000-1,500	Bad	x	o	o	o	o	x	x	x	o (without hired labor)	x	x	x	x	x	x	x	o	o	o	x
in every (5cm, 4ha)	12	0.5-0.1	1,500-500	Not Bad	x	o	o	x	o (Number, Width)	o	x	x	x	x	x	x	x	x	o (Clover)	o	x	x	x	x
in every years (20cm, 1.5ha)	3	0.6-0.3	500	"	o	o	x	o	o (Number, Width)	o	x	o	x	x	x	x	x	x	o (price) (Vegetable, Clover)	o	o	o	x	x
in every (20cm, 2ha) (20cm, 2ha)	11	1.5-0.1	1,000-700	"	o	o	x	o	o (Width)	o	x	x	x	x	x	o	x	x	o (Clover)	x	x	o	x	x
	30	1.5-0.05	1,000-20	Bad	x	x	o	x	o (No./Length) (Width)	x	x	x	o	x	x	x	x	x	o (Clover)	o	o	o	x	x
	33	0.9-0.05	7,000-3,000	"	x	x	o	o	o (Width)	o	x	x	x	x	x	x	x	x	o (Clover)	o	o	o	x	x

Table C.4.14 Labor Requirement by Month - Rice (1)
(Present)

Variety Amol-5	(Unit: hours/ha)												
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Seed bedding	24 (-)	-	-	-	-	-	-	-	-	-	-	-	24 (-)
Plowing	45 (5)	44 (5)	-	-	-	-	-	-	-	-	-	88 (10)	177 (20)
Harrowing & Levelling	-	45 (8)	-	-	-	-	-	-	-	-	-	-	45 (8)
Transplanting	-	181 (73)	-	-	-	-	-	-	-	-	-	-	181 (73)
Weeding	-	-	109 (9)	109 (9)	-	-	-	-	-	-	-	-	218 (18)
Fertilizing	-	18 (1)	-	-	-	-	-	-	-	-	-	-	18 (1)
Spraying	-	6 (2)	7 (-)	6 (-)	7 (-)	-	-	-	-	-	-	-	26 (2)
Water Management	8 (-)	16 (-)	16 (-)	16 (-)	16 (-)	8 (-)	-	-	-	-	-	-	80 (-)
Harvesting	-	-	-	-	-	308 (116)	-	-	-	-	-	-	308 (116)
Threshing	-	-	-	-	-	116 (22)	-	-	-	-	-	-	116 (22)
Transport	-	-	-	-	-	14 (1)	-	-	-	-	-	-	14 (1)
<u>Total</u>	77 (5)	310 (89)	152 (9)	151 (9)	25 (-)	446 (139)	-	-	-	-	-	88 (10)	1,207 (261)

Note: 1. Family labor's hours are converted by labor unit.
2. Parenthesis figures are hired labor's hours.

Source: Farm Economic Survey

Table C.4.14 Labor Requirement by Month - Rice (2)
(With Project)

Variety Amol-3	(Unit: hours/ha)												
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Seed bedding	-	-	-	-	-	-	-	-	-	-	-	-	-
Plowing	45 (5)	44 (5)	-	-	-	-	-	-	-	-	-	88 (10)	177 (20)
Harrowing & Levelling	-	45 (8)	-	-	-	-	-	-	-	-	-	-	45 (8)
Transplanting	-	37 (-)	-	-	-	-	-	-	-	-	-	-	37 (-)
Weeding	-	-	109 (9)	109 (9)	-	-	-	-	-	-	-	-	218 (18)
Fertilizing	-	18 (1)	-	-	-	-	-	-	-	-	-	-	18 (1)
Spraying	-	6 (2)	7 (-)	6 (-)	7 (-)	-	-	-	-	-	-	-	26 (2)
Water Management	8 (-)	16 (-)	16 (-)	16 (-)	16 (-)	8 (-)	-	-	-	-	-	-	80 (-)
Harvesting	-	-	-	-	-	-	-	-	-	-	-	-	107 (-)
Threshing	-	-	-	-	-	107 (-)	-	-	-	-	-	-	107 (-)
Transport	-	-	-	-	-	14 (1)	-	-	-	-	-	-	14 (1)
<u>Total</u>	53 (5)	166 (16)	132 (9)	131 (9)	23 (-)	129 (1)	-	-	-	-	-	88 (10)	722 (50)

Note: 1. Family labor's hours are converted by labor unit.
2. Parenthesis figures are hired labor's hours.

Source: Farā Economic Survey

Table C.4.14 Labor Requirement by Month - Rice (3)
(With Project)

Variety Tarom	(Unit: hours/ha)												
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Seed bedding	30 (2)	-	-	-	-	-	-	-	-	-	-	-	50 (2)
Plowing	31 (5)	30 (2)	-	-	-	-	-	-	-	-	-	61 (6)	122 (11)
Harrowing & Levelling	-	41 (7)	-	-	-	-	-	-	-	-	-	-	41 (7)
Transplanting	-	167 (45)	-	-	-	-	-	-	-	-	-	-	167 (45)
Weeding	-	78 (9)	77 (8)	-	-	-	-	-	-	-	-	-	155 (17)
Fertilizing	-	13 (1)	-	-	-	-	-	-	-	-	-	-	13 (1)
Spraying	-	6 (2)	7 (-)	6 (-)	-	-	-	-	-	-	-	-	19 (2)
Water Management	12 (-)	22 (-)	22 (-)	22 (-)	12 (-)	-	-	-	-	-	-	-	90 (-)
Harvesting	-	-	-	-	295 (114)	-	-	-	-	-	-	-	295 (114)
Threshing	-	-	-	-	101 (16)	-	-	-	-	-	-	-	101 (16)
Transport	-	-	-	-	7 (1)	-	-	-	-	-	-	-	7 (1)
<u>Total</u>	73 (5)	357 (66)	106 (8)	28 (-)	415 (131)	-	-	-	-	-	-	61 (6)	1,040 (216)

Note: 1. Family labor's hours are converted by labor unit.
2. Parenthesis figures are hired labor's hours.

Source: Farm Economic Survey

Table C.4.14 Labor Requirement by Month - Rice (4)
(Without Project)

Variety Tarom	(Unit: hours/ha)												
	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Seed bedding	-	-	-	-	-	-	-	-	-	-	-	-	-
Plowing	31 (3)	30 (2)	-	-	-	-	-	-	-	-	-	61 (6)	122 (11)
Harrowing & Levelling	-	41 (7)	-	-	-	-	-	-	-	-	-	-	41 (7)
Transplanting	-	37 (-)	-	-	-	-	-	-	-	-	-	-	37 (-)
Weeding	-	78 (9)	77 (8)	-	-	-	-	-	-	-	-	-	155 (17)
Fertilizing	-	15 (1)	-	-	-	-	-	-	-	-	-	-	13 (1)
Spraying	-	6 (2)	7 (-)	6 (-)	-	-	-	-	-	-	-	-	19 (2)
Water Management	12 (-)	22 (-)	22 (-)	22 (-)	12 (-)	-	-	-	-	-	-	-	90 (-)
Harvesting	-	-	-	-	-	-	-	-	-	-	-	-	107 (-)
Threshing	-	-	-	-	107 (-)	-	-	-	-	-	-	-	107 (-)
Transport	-	-	-	-	7 (1)	-	-	-	-	-	-	-	7 (1)
<u>Total</u>	43 (3)	227 (21)	106 (8)	28 (-)	126 (-)	-	-	-	-	-	-	61 (6)	591 (39)

Note: 1. Family labor's hours are converted by labor unit.
2. Parenthesis figures are hired labor's hours.

Source: Farm Economic Survey

Table C.4.15 Farm Labor Balance in Project Area - Rice (1)

Variety Amol-5

	Apr.	May	Jun.	Jul.	Aug.	Sep.	Mar.	Total
Per hectare (man-day)								
At present	9.6 (0.6)	38.8 (11.1)	16.5 (1.1)	16.4 (1.0)	2.9 (-)	55.8 (17.4)	11.0 (1.3)	151.0 (32.5)
With Project	6.6 (0.6)	20.8 (2.0)	16.5 (1.1)	16.4 (1.0)	2.9 (-)	16.1 (0.1)	11.0 (1.3)	90.3 (6.1)
Present (10 thousand man-day)	389,472	1,574,116	669,405	665,348	117,653	2,263,806	446,270	6,126,070
Labor Requirement								
Hired Labor	24,342	450,527	44,627	40,570	-	705,918	52,741	1,318,525
Family Labor	365,130	1,123,789	624,778	624,778	117,653	1,557,888	393,529	4,807,545
With Project (10 thousand man-days)	267,762	843,856	669,405	665,348	117,653	653,177	446,270	3,663,471
Labor Requirement								
Hired Labor	24,342	81,140	44,627	40,570	-	4,057	52,741	247,477
Family Labor	243,420	762,716	624,778	624,778	117,653	649,120	393,529	3,415,994
(1) - (2) (10 thousand man-day)	121,710	730,260	-	-	-	1,610,629	-	2,462,599
Labor Requirement								
Hired Labor	-	369,187	-	-	-	701,861	-	1,071,048
Family Labor	121,710	361,073	-	-	-	908,768	-	1,391,551

Note: 1. Family labor's hours are converted by labor unit.
2. Parenthesis figures are hired labor's hours.

Source: Farm Economic Survey

Table C.4.15 Farm Labor Balance in Project Area - Rice (2)

Variety Tarom

	Apr.	May	Jun.	Jul.	Aug.	Sep.	Mar.	Total
Per hectare (man-day)								
At present	9.1 (0.6)	44.5 (8.3)	13.3 (1.0)	3.5 (-)	52.0 (16.5)	-	7.6 (0.8)	130.0 (27.0)
With project	5.4 (0.4)	28.4 (2.6)	13.3 (1.0)	3.5 (-)	15.8 (0.1)	-	7.6 (0.8)	74.0 (4.9)
Present Labor Requirement (10 thousand man-day)	245,700	1,201,500	359,100	94,500	1,404,000	-	205,200	3,510,000
Hired Labor	16,200	224,100	27,000	-	440,100	-	21,600	729,000
Family Labor	229,500	977,400	332,100	94,500	963,900	-	183,600	2,781,000
Labor Requirement	145,800	766,800	359,100	94,500	426,600	-	205,200	1,998,000
With Project (10 thousand man-day)								
Hired Labor	10,800	70,200	27,000	-	2,700	-	21,600	132,300
Family Labor	155,000	696,600	332,100	94,500	423,900	-	183,600	1,865,700
Labor Requirement (10 thousand man-day)	99,900	454,700	-	-	977,400	-	-	1,512,000
Hired Labor	5,400	153,900	-	-	437,400	-	-	596,700
Family Labor	94,500	280,800	-	-	540,000	-	-	915,300

Note: 1. Family labor's hours are converted by labor unit.

2. Parenthesis figures are hired labor's hours.

Source: Farm Economic Survey

Table C.4.15 Farm Labor Balance in Project Area - Rice (3)

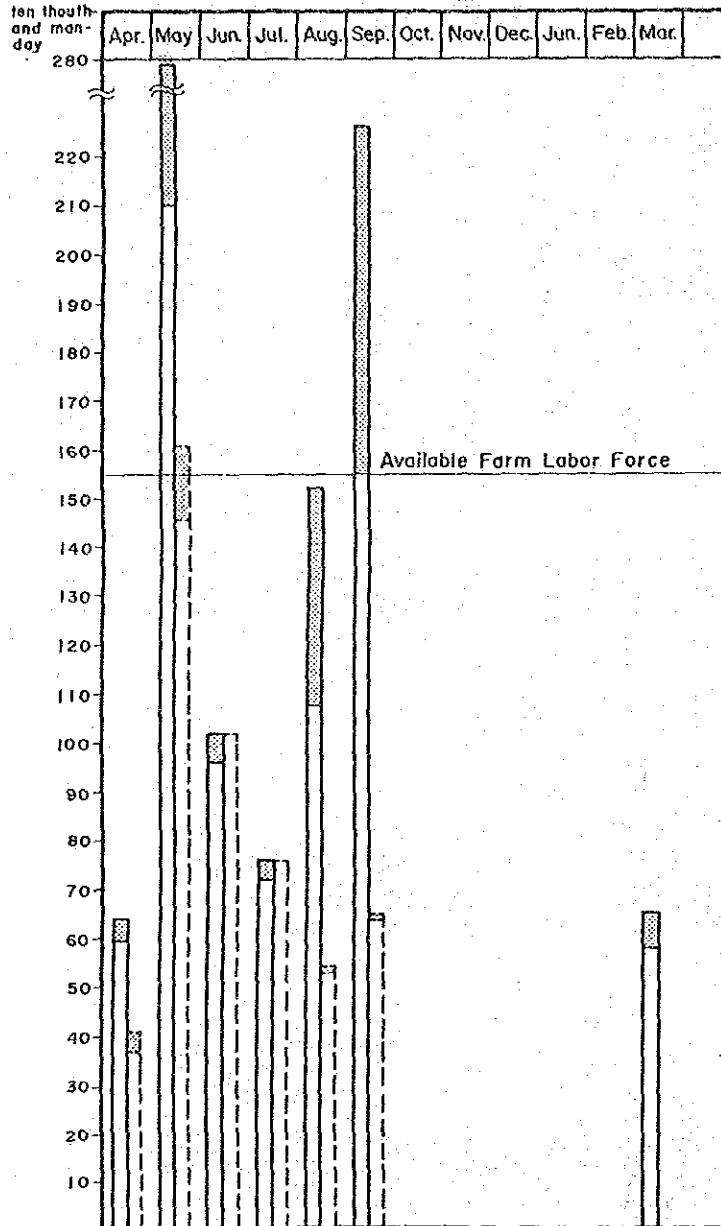
(Unit: 10 Thousand man-days)

Variety	Apr.	May	Jun.	Jul.	Aug.	Scp.	Mar.	Total
Amol-3 + Tarom								
Present Labor Requirement	655,172	2,775,616	1,028,505	759,848	1,521,655	2,263,806	651,470	9,636,070
Hired Labor	40,542	674,427	71,627	40,570	440,100	705,918	74,341	2,047,525
Family Labor	594,630	2,101,189	956,878	719,278	1,081,555	1,557,888	577,129	7,588,545
With Labor Requirement	415,562	1,610,656	1,028,505	759,848	544,253	653,177	651,470	5,661,471
Hired Labor	35,142	151,340	71,627	40,570	2,700	4,057	74,341	379,777
Family Labor	378,420	1,459,316	956,878	719,278	541,553	649,120	577,129	5,281,694
Family Labor Power (*)	1,550,000	1,550,000	1,550,000	1,550,000	1,550,000	1,550,000	1,550,000	

Note: (*) The available farm labor force per month is estimated for the farm households as follows:

- Number of farm labor force per household; 2.0 man-days (converted into adult male)
- Number of working days per month ; 25 days/month
- Number of farm households ; 51 thousand households (Land owner-farmer)

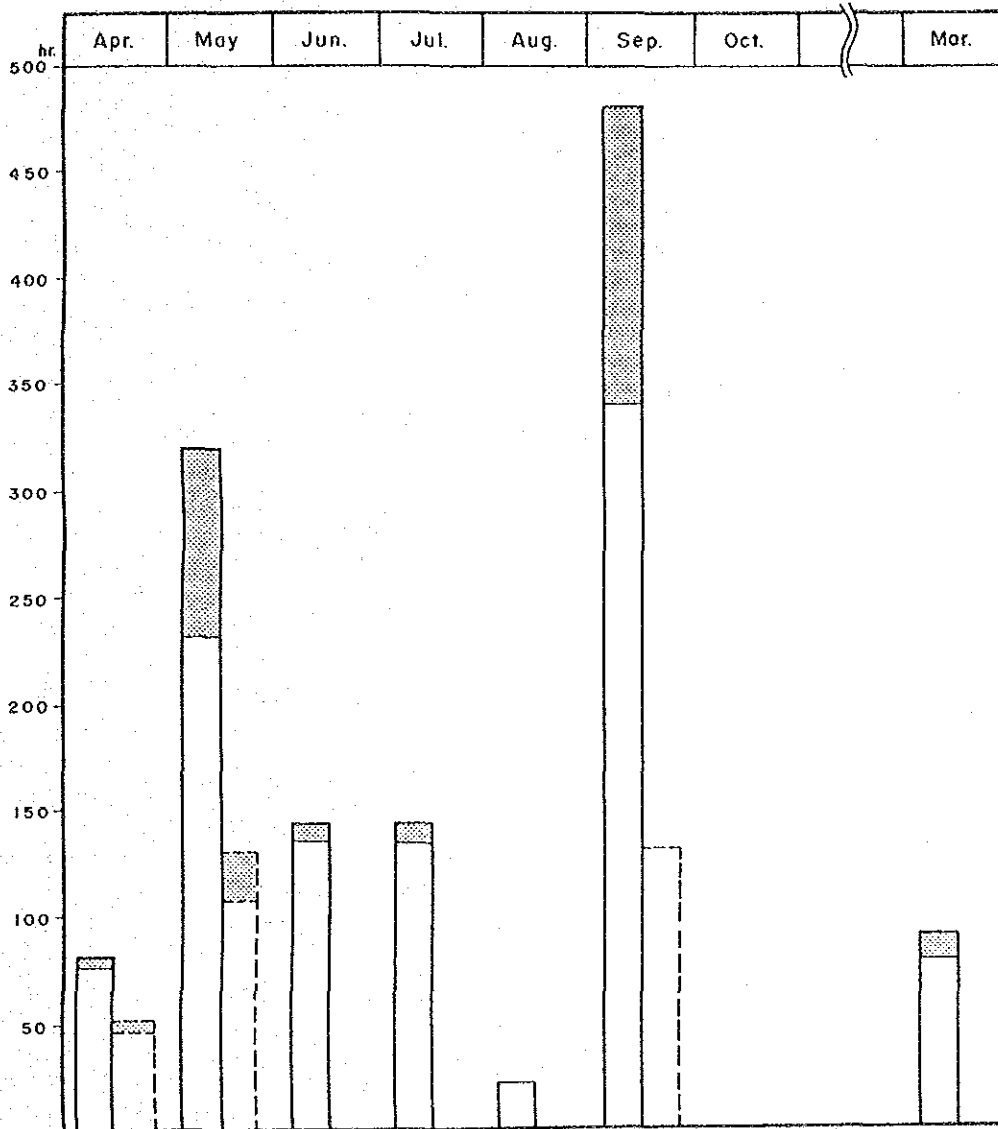
Figure C.4.1 Farm Labor Balance in the Project Area – Rice Only



(Note)

- 1) Labor Requirement at Present
 Labor Requirement with Project
- 2) The available farm labor force per month is estimated as follows.
 Number of farm labor force per household 2.0 man-day
 Number of working days per month 25 days/month
 Number of farm household 31 thousand farms.

Figure C.4.2 Farm Labor Balance, with the Small Mechanization System in Rice Production (per hectare)



(Note)

Labor Requirement at Present. Blackly plotted parts within the frame are hire labors.

Labor Requirement with the Small Mechanization System.

APPENDIX C. 5.

SURVEY OF RICE CULTIVATING FARMERS
AND SOME IMPROVEMENTS

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C.5. Survey of Rice Cultivating Farmers and Some Improvements

C.5.1. General

June through July, 1986, interview surveys on rice cultivating farmers were carried out on present rice cultivation with each 15 farm households selected among those in the high, middle, and low lands, respectively. This section discusses the actual status of rice cultivation in the Project Area and several points to be improved according to the survey results and the data/information collected through the field works.

C.5.2. Raising Seedlings (ref. to Table C.5.7.)

(1) Selection and Pretreatment of Seeds

The seed selection has been made mainly by winnowing or with water, and the selection by specific gravity is applied by very few farmers in using manure solution. Seed soaking is generally practised by putting seed-packed bags into flowing water for five to seven days.

(2) Seed Disinfection

As far as this survey, no farmers practise the seed disinfection at present. As mentioned later, however, the agri-chemical survey has revealed that there are some farmers employing "Linden", which is applied mainly to disinfection of seeds. Consequently, some farmers in the Project Area to carry out the seed disinfection in this sense.

(3) Nursery Bed (ref. to Table C.5.7.)

Rice nursery is practised by lowland nursery with flat seed beds.

Although some farmers in the middle and low lands employ the raised seed beds; such farmers are minority and rather exception to the whole farmers in the Project Area.

According to the data, there have been some vinyl-sheet covered protected nursery used in the high land; however, the survey has not been able to clarify the actual status of the protected nursery due to off-season for nursery.

The nursery acreage to one hectare of paddy field is about 180 to 300 m², and the acreage is prone to be larger in the low land. Such nursery acreage to paddy fields for transplanting has much fluctuation by farmers and the survey has found that the total Project Area, 83 m² is the minimum, while 500 m² is the maximum.

(4) Season and Quantity for Seeding

The seeding season lasts for about one month, late March through late April. More than half of the farmers in the Project Area have practised to seed in the beginning of April. And the farmers who practise to seed in the end of March are found more in the low land than in the others, while the farmers who practise to seed in the end of April are found more in the high land. It is clear that the staggering in seeding has resulted from difference in local atmospheric temperature by areas as well as in varieties to be cultivated.

More than half of the total farmers have seeded by 170 gr to 330 gr (in dry paddy) per square meter, although some difference exists by farmers. (ref. to Table C.5.7.) The seeding ratio more

than 250 gr seems too dense for seeding per square meter in taking germination percentage by 90 percent. Such dense seeding, however, will be allowable for a nursery period around 35 days, while healthy seedling raise will become considerably difficult if a nursery period exceeds 35 days.

(5) Some Improvements on Seedling Raise

- a) Encouragement of practising seed disinfection.
- b) Employment of raised seed beds, for easy water management.
- c) Encouragement of sowing with reasonable density by less than 100 gr per square meter.
- d) Promotion of providing protection nursery in the high land for preventing seedlings from low temperature.
- e) Practice of thorough weed control so as not to bring weeds into paddy fields through transplanting (Control of barnyard millet)

C.5.3. Preparation of Paddy Fields for Transplanting

(1) Plowing

Usually, plowing works by two to four times are required for transplanting. The first plowing is mostly carried out at the end of January and the second/third, etc. will be followed at every 30 to 40 days interval.

Ordinarily, tillers are used for plowing, whereas some large scale farmers employ large-size tractors in the high and middle lands. Plowing depth is commonly 20 cm to 25 cm. Frequent plowings will bring advantages to paddy cropping, and farmers know well about this fact.

(2) Levelling and Puddling

The tillers equipped with wheels are usually employed for land levelling and puddling. Generally, the farmers carry out rough puddling and final puddling in consecutive works a day before or on due day of transplanting, although some farmers do three or four days before transplanting. For final puddling, some farmers have prepared home-made simple levelers, which are equipped with their tillers at the backside for successful and smooth levelling works.

(3) Fertilization Basal Dressing (ref. to Table C.5.9.)

Basal dressing is carried out three to seven days before final puddling, and only urea (N - 46%) and diammonium phosphate (DAP) (N - 18%, P_2O_5 - 46%) are applied.

Amount of basal fertilizers is largely different by farmers, and such difference is observed quite remarkably in the high land in particular. This will be because the agricultural infrastructures of farm land have been promoted at farmers' level and the second crops to paddy cropping have been positively introduced in the high land. Among the farmers interviewed, the heaviest fertilizer doser is found in the high land. The said farmer has dosed about 550 kg each of urea and diammonium phosphate for basal dressing per hectare. On the contrary, the lightest doser is found in the lowland, giving 75 kg of urea and 50 kg of diammonium phosphate per hectare, respectively. These extremely heavy and light fertilizer dosing are deemed exceptional. And the average amount of dosing by three areas is 330 kg/ha in the high, 212 kg/ha in the middle and 143 kg/ha in the low land with urea, while 276 kg/ha in the high, 149 kg/ha in the middle and 140 kg/ha in the low land with diammonium phosphate, respectively.

On the other hand, the Soil and Water Research Institute in Sari has recommended the amount of fertilizers applied in the

western Mazandaran by 100 kg/ha of urea and 100 kg/ha of diammonium phosphate for local varieties, and 200 kg/ha and 100 kg/ha for improved varieties.

In comparison of the actual average amount dosed in the three areas with the amount recommended by the Research Institute, most of the farmers in the Project Area, excepting for some in the middle and low lands, are prone to practise excessive fertilization, and especially, almost of all farmers in the high land have dosed fertilizers 1.5 to 2.5 times as much as those recommended.

In other respect, when comparison is made by areas, the high, middle and low lands, a certain clear tendency is observed in amount of fertilization. In detailing, the amount dosed is heaviest in the high land, that in the middle land follows, and least in the low land. In other words, the amount dosed decreases as elevation changes from high to low in the land. It is rather difficult to presume the reason why such a tendency is observed in the amount of fertilization. This may, however, result from the heavy amount of urea dosed and the rice cultivation under the flowing irrigation in the Project Area.

Generally speaking, in a certain area with same homogeneous condition in soils and climate, an excessive fertilization will cause some troubles in paddy growth to adversely affect the yield. In the current survey, only one example of such troubles is found in the middle land, and in the high land, contrarily, there are several farmers found in even saying the more fertilization, the more yield.

Furthermore, in the middle and low lands, difference in fertilization amount between that dosed actually and that recommended by the Research Institute in Sari is not so large as the difference in the case of the high land, and it may be expected to have an yield increase in years when the weather conditions are favourable.

(4) Some Improvements on Preparation of Paddy Fields

First of all, the existing standard of fertilization should be restudied to revise by areas or irrigation commands, and the thorough guidance of this revision to the farmers will raise the technical level for safety increase of rice yield in the Project Area.

Further studies, however, are required to ensure the healthy growth of rice plants and to improve pest resistance and ripening ratio in consideration of application of potassic fertilizer which has not been dosed in the Area.

C.5.4. Transplanting (ref. to Table C.5.8)

(1) Seedling Age

For transplanting, the seedlings with age of 6.0 to 6.5 (nursery period of 35 day through 40 days) are used suitable for early maturing varieties, while those with age of 7.0 to 8.0 (45 days through 50 days) for late maturing varieties. There are some farmers found who transplant the over-matured seedlings with age more than 8.0.

(2) Transplanting

The random transplanting is most commonly practised as a whole, although the individual transplanters keep their own space and intervals between seedlings to make transplanting in good balance by individual rules. Under the condition that the transplanters have their own thumb rules for planting works, there have been some thinly planted areas found between different transplanters. And additional transplanting is necessary for supplementing the thinly planted areas. A skillful planter can cover about 0.1 ha per day.

(3) Transplanting Ratio and Number of Seedlings per Hill

The transplanting ratio in the Area can not be clearly estimated due to practice of random transplanting. The farmers in the Area, however, plant 12 to 15 hills per square meter on an average, and the number of seedlings per hill ranges from three to seven on an average; three to four for high tillering improved varieties like Amol-3 and four to seven for low tillering local varieties like Tarom.

(4) Some Improvements on Transplanting

- a) Transplanting with seedlings in suitable age for planting.
- b) Encouragement of regular transplanting for keeping plant growth in uniform and easy management of farming, although the random transplanting can not always be wrong definitely.
- c) Improvement of the current transplanting for increase in the ratio, in taking into account the study results by the Amol Rice Research Station, and thorough restudies on higher transplanting ratio which is directly related with yield increase from the viewpoint free from traditional way of transplanting.

C.5.5. Rice Varieties (ref. to Table C.5.15.)

(1) Rice Varieties Cultivated in the Area

The survey has carried out the study on the rice varieties grown currently in the Project Area, and the results are shown in Table C.5.15.

The said table indicates that besides Amol-3 as the representative improved variety and Tarom as the representative local variety, two other improved varieties and eight other local varieties are grown in the Project Area. Characteristically, many farmers in the high and middle lands have grown in considerably wide fields the variety of Harza, which has not been recommended yet by authorities concerned with some yet-unconfirmed specific features, although recognized as superior variety. This fact seems to show clearly that most of the farmers have a will to do their best for yield increase.

In the other respect, the study of the distribution of cropping areas of Amol-3 and Tarom by three respective areas suggests the different tendency in contrast. Briefly, for Amol-3 cropping, all the farmers in the high land grow Amol-3, a slightly over 60 percent of the total farmers in the middle land, and only about 23 percent in the low land.

Quite contrarily, the cropping area of Tarom and the number of cropping farmers are largest in the low land and show the declining tendency as the land elevation goes higher. And almost of all the farmers in the low land totally agree in saying as follows.

"We can fully understand that Amol-3 is the high yielding variety which is easier in growing than other varieties. Since Amol-3, however, has a longer growth period, irrigation water supply from the upper stream has been reduced in amount in the latter half of the growth period, and successful cropping of Amol-3 has become difficult.

Due to the fact, we have grown Tarom which can be harvested early August through middle August. Fortunately, Tarom is quite high in its palatability and in market reputation at high price. So, we do not need to grow Amol-3 which has the yield almost two times as much as Tarom so as to manage home economy in good balance."

Therefore, it can be said that the farmers' deep thought has enabled to draw the area-wise cropping maps of Amol-3 and Tarom.

For further reference, the cropping acreages of other local varieties than Tarom and the number of the related farmers can not be neglected and the cropping of such local varieties is found considerably in the high and middle areas in particular. This tendency, though undeniable as traditional practices, would have resulted from due consideration for integrated interest expected from multi-farming and farming with side-job.

(2) Some Improvements on Selection of Rice Varieties

- a) The farmers should have thorough knowledge on characteristic features and cropping techniques of the improved varieties before their introduction, although interested in high yielding varieties.
- b) Since a considerable number of the local farmers have grown other local varieties than Tarom, these varieties should not be neglected as the old varieties. Contrarily, the useful guideline for cultivation should be prepared and the adequate guidance should be given to the farmers for making best use of the special quality of the varieties. This is specially recommended for those farmers in the high and middle lands where many local varieties other than Tarom are grown.

C.5.6. Paddy Field Management

(1) Water Management

The rice cultivation in the Area is carried out generally under the flowing irrigation which has to keep incessant water supply and drainage. Consequently, the many farmers control the ponding and draining of water for depth control as each growing stage and agri-chemical application by controlling the notches and outlets. And successful water management has not been practised yet in the Area under the existing irrigation method. Since most of the farmers show much interest in deep ponding, they are interesting in irrigation than drainage. The flowing irrigation has some defects as well as advantages.

The advantages are that oxygen (O_2) in soils can be incessantly supplied and richly maintained by the dissolved oxygen in the water, and this method can prevent occurrence of such harmful materials to paddy roots as sulfates, and furthermore, can curb the soil temperature rise in the summer season to keep paddy roots healthy. Therefore, this irrigation method can favourably work or healthy growth of paddy plants with the aforesaid synergy effect to ensure yield increase.

According to the test result by the Amol Rice Research Station, there is no effect of mid-summer drainage observed and it can be said that this comes from the flowing irrigation.

Naturally, however, there are many defects with flowing irrigation as well. First of all, the irrigation water is prone to be wasted; in other words, irrigation is always practised even in the period of paddy growth which does not need much water. Especially, shallow water should be kept in those period after the rooting stage, before the maximum tillering stage and at the young panicle developing stage, when deep flooding over paddy fields should be avoided and contrarily intermittent irrigation is required.

Secondly, there are some doubts on this method in view of fertilization effects. Particularly, the farmers in the Project Area use urea for nitrogen fertilizer; however, urea takes a considerably long time in soil adsorption and ammonification and it is expected that the fertilizer will be washed away for such a time. This is because urea application is possibly avoided in the pluvius areas or those with high groundwater table. Therefore, it is assumed that the reason why excessive fertilization in the high land has rarely resulted in remarkable troubles with paddy growth.

Thirdly, there are some kinds of agri-chemicals and weed killers which are affected, to different extent, in their efficacy by water conditions over the fields such as drained up, flooding, or flowing. Especially, many of weed killers are quite sensitive to water conditions over the fields. Consequently, such water-sensitive chemicals will be limited in their application as well as efficacy.

(2) Top-dressing (ref. to Table C.5.10. to 13)

Most of the farmers have practised top-dressing with urea. Those farmers who apply diammonium phosphate account for slightly less than 30 percent of the total.

The dosing amount in top-dressing is heaviest in the high land with the similar tendency to the basal fertilization. The average amount applied by surveyed farmers is 186kg/ha for urea and 172 kg/ha for diammonium phosphate in the high land, 150 kg/ha and 72.5 kg/ha in the middle land, and 148 kg/ha and 115 kg/ha in the low land, respectively. The heaviest fertilizer doser has applied 500 kg/ha for urea and 300 kg/ha for diammonium phosphate. These figures, however, may be quoted on the wrong data/information judging from too excessiveness as top-dressing.

As for frequency of top-dressing, more than half of the farmers in the Area, have practised one top-dressing for one cropping, while those who have made two top-dressings account for 20 to 30 percent. A few farmers who have carried out three top-dressing for one cropping are found in the high land.

More than 60 percent of the surveyed farmers practise top-dressing within 20 days after transplanting, and few farmers do later than the aforesaid time.

Top-dressing is one of the important works in the paddy cropping, but will give some adverse effects to the plants if dosing is made improperly in time and amount. In general, top-dressing is specified into top-dressing and ear-manuring by its dosing time. The former is practised in the vegetative stage in expecting the good efficacy for increase in vegetative growth, especially largely increase in tillering. Therefore, top-dressing should be made in the early stage of tillering (immediately after plant rooting), although depending upon the amount of basal fertilizers dosed. The latter, ear-manuring, should be made in the reproductive stage so as to ensure good ripening and to help grain thickening.

The study in these views suggests that the farmers in the Project Area have practised top-dressing mainly for encouraging the vegetative growth of paddy plants. The top-dressing for such purpose should be made definitely within 20 days after transplanting. And there may be some adverse effects given on the differentiation of ears, if delayed top-dressing is made to the above recommended period.

In this respect, it should be noted that there are some farmers in the Project Area who have practised top-dressing about 40 days after transplanting (10% in the high land, 16% in the middle and 6% in the low), and such delayed top-dressing will surely give adverse effect on paddy plants, although different in fertilizer amount dosed by varieties.

In other respect, diammonium is used in top-dressing, but there may be a problem in such practice, if the farmers give it for supplemental supply of phosphoric acid to the crop. Because, even though phosphoric acid is supplementally supplied, the growing paddy plants will not take it into themselves. And it is recommended that diammonium phosphate should be dosed as basal fertilizer with sufficient amount for one crop.

(3) Weeds and Weed Control

The weeds found in the paddy fields of the Project Area are as few as eight in their kinds, including a kind of weed growing only on the ridges and extending its stems into the paddy fields. These eight kinds of weeds are shown in Table C.5.16.

The most popular weed in the Area is *Panicum Crus-Galli* L, which can be found in many paddy fields. And judging from the fact that some of this kind are found together with paddy plants in their hills, they may be transplanted by mistake together with paddy seedlings from nursery beds.

Among the weeds found in the Project Area, there are found remarkably some marsh-loving perennial weeds like *Sagittaria Trifolia*, *Alisma Plantago-aquatica*, and *Scirpus Juncooides*. Wide distribution of these weeds suggests that many paddy fields are under considerably wet conditions throughout the year due to rainfall in winter and irrigation in summer.

Weed control in the Area have been carried out with herbicides and by man-power as well. The herbicides are sprayed over the paddy fields immediately after puddling so as to curb germination of weeds and Ronstar is used commonly as efficacious chemical in the early stage of weed growth, although Saturn is used in the low land.

These weed killers work efficaciously to perennial weeds in their young seedling stages, but it should be noted that efficacy of these chemicals will be reduced, if the fields are drained - the water is flow in and out of the fields, or the field surface is exposed within three to four days after spraying.

Actually in the Project Area, man-power weeding has been practised two or three times even after spraying herbicides, and the farmers have to throw hired labour into weeding works in addition to family labour. This fact suggests that flowing irrigation would weaken the efficacy of the herbicides.

(4) Disease and Insect Damage and Their Control

The major diseases which the farmers primarily pointed out is rice blast, and there were some farmers to add brown spot disease and stripe disease to it.

The rice blast can be specified into leafblast, blast on neck of spike, unhulled rice blast, and rachis branch blast, among which leaf blast and blast on neck of spike commonly bring damages most seriously, and the Project Area is not an exception.

The farmers surveyed have first taken up Hinozan and Benlate as fungicides, particularly Hinozan.

Hinozan, having Ethyl Diphenyl Dithio Phosphate (EDDP) as main component, is an organic phosphorus compound which can be used both for preventive spraying before disease occurrence and curb spraying after occurrence, and furthermore, can be used for sesame leaf blight and sheath blight besides rice blast.

Benlate, used for disinfection of seeds and nursery beds, is efficacious for damping-off disease as preventive chemicals, besides rice blast.