

On-farm Water Management Practices For Upland Crops

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Introduction

The Upper Talavera River Irrigation System (UTRIS) has an approximate service area of 4,000 hectares. Of the total service area, only 38% is irrigated during the dry season. Questions on why the irrigated area during the dry season is much lower than the service area have been raised. Is the available water supply sufficient only for 38% of the total command area of UTRIS? Do farmers use too much water in irrigating their crops? To answer these questions, there is a need to determine how much water a farmer actually delivers to his field during irrigation. If the amount of water applied and water requirement of the planted crop are determined, availability of excess water throughout the growing season and consequently, increase in irrigated area can also be determined.

A study was then conducted to answer the above questions. The study aimed to: (1) Document and analyze current on-farm water management practices in diversified cropping during the dry season and (2) Develop on-farm water management practices for at least one upland crop.

Methodology

On-farm water management practices employed by farmers were observed. Field observations and actual interviews were conducted to determine the following:

1. Crops that are usually planted during the dry season
 - a) Planting distance between hills and rows
 - b) Yield
2. Size of area planted
3. Sources of irrigation water
 - a) Seepage from adjacent ricefields
 - b) Tailwater from upstream and nearby ditches
 - c) Run-off or drainage water from adjacent ricefields

4. Frequency and interval of irrigation
5. Duration and timing of irrigation
6. Stream size of irrigation
7. Methods of irrigation
8. Availability, density and placement of on-farm channels and Structures

Thirty farmers who planted onions were interviewed starting on 5 April 1987. Six farmer-cooperators were identified. An ocular inspection of the project site was done to facilitate documentation.

Three locations within the UTRIS were selected as study site; these were in Tayabo (upstream), Sibut (midstream) and Calaoan (downstream).

Research Results

Farmers practiced two methods of land preparation: the *dayos* or raised bed and the *latag* or mulched bed methods. The *dayos* method entails three to four plowing and three to four harrowing operations while the *latag* method requires no tillage at all, or, at most, only one plowing and one rotovating operation. Land preparation started as early as November 1987.

Among the upland crops planted were onions, tomato, peanut, eggplant, bush bean, okra, sweet potato, squash and *patola*. However, most farmers planted onions during the dry season. Table 1 summarizes the production parameters of onion.

Farm size ranged from 0.02 to 1.0 hectare.

Farmers obtained water from the main and supplementary farm ditches. Water was not obtained from nearby paddies planted to rice because the elevation of the fields planted to non-rice were higher than the rice fields. There were no seepage, run-off nor drainage water from the adjacent rice fields. Likewise, there was no tail-

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Table 1. Production parameters of onions. UTRIS 1986/87 drv season.

Site	Sample No.	Area (ha)	Seed (kg/ha)	Variety	Hill and row spacing (cm)	Method of Land Prep.	Yield (t/ha)
Calaocan downstream	1	0.50	1.0	Tanduyong		latag	10.0
	2	0.05	4.0	White	14x14	latag	33.0
	3	0.045	11.0	Batanes	14x14	latag	12.7
	4	0.045	11.0	Batanes	15x15	dayos	15.6
	5	0.05		Tanduyong	10x10	latag	5.8
	6	0.019		Tanduyong	10x10	latag	26.3
	7	0.20	8.0	Batanes		latag	3.0
	8	0.15	5.0	Batsinga		latag	2.7
	9	0.25	9.0	Batsinga	10x10	latag	2.4
	10	0.10	10.0	Tanduyong	15x15	latag	4.5
Sibot midstream	1	0.25	4.0	Y. Granex	14x14	dayos	17.6
	2	0.50	4.0	Red Creole	14x14	dayos	25.0
	3	1.00	8.0	Red Creole	14x14	dayos	7.1
	4	0.067		Y. Granex	10x10	dayos	34.3
	5	0.10		Y. Granex	10x10	dayos	32.0
	6	0.15	6.0	White		latag	13.3
	7	0.15	5.0	Y. Granex		latag	13.3
	8	0.20	7.0	White	10x10	dayos	35.0
	9	0.30	8.0	Y. Granex	10x10	latag	15.0
	10	0.05		Red Creole		dayos	34.0
Tayabo upstream	1	0.06	3.3	Red Creole	15x15	dayos	19.4
	2	0.125	4.0	Y. Granex	15x15	latag	14.1
	3	0.15	6.6	Batanes	15x15	latag	18.4
	4	0.05	5.0	Y. Granex	10x10	latag	15.8
	5	0.06	6.0	Y. Granex	10x10	latag	16.3
	6	0.04		Red Creole	11x11	dayos	25.0
	7	0.20	4.0	White	10x10	latag	25.0
	8	0.25	6.0	White		latag	24.4
	10	0.10	5.5	Y. Granex		latag	11.0
			0.15	4.0	Y. Granex	15x15	davos

water from the upstream nor nearby ditches that could be a significant source of irrigation water for any crop.

Farmers practiced border irrigation to irrigate their upland crops. Paddy fields were rectangular (about 20x30 meters on the average) and were

surrounded with dikes.

Irrigation application ranged from seven to eight for the dayos method and from four to five for the latag method (Table 2). Irrigation time ranged from 25-68 min (depending on the size of area irrigated) for the **dayos** method and from

Table 2. Total water applied, water use and yield. UTRIS.

Farm Location	Variety	Method of Land Preparation	Area (m ²)	No. of Irrigation	Total Water Applied (mm)	Water Use (mm/day)	Yield (t/ha)
Tayabo	Y. Granex	Latag	471	5	446	5.2	17.42
Tayabo	Y. Granex	Latag	641	5	423	4.8	15.54
Sibot	Y. Granex	Dayos	1,298	7	329	3.6	26.60
Sibot	Y. Granex	Dayos	671	8	502	7.4	37.04
Calnogan	Tanduyong	Latag	546	4	505	5.6	5.49
Calaocan	Tanduyong	Latag	386				14.24
Average					441	5.3	19.39

Table 3. Cultural practices in onion production of the six farmer-cooperators, UTRIS, 1987/88 dry season.

Farm Location	Midstream			Downstream			Upstream		
	Sibot	Sibot	Calaocan	Calaocan	Calaocan	Tayabo	Tayabo	Tayabo	
Land Preparation:									
Date	25 Nov 1987	26 Dec 1987	23 Nov 1987	14 Nov 1987	20 Nov 1987	25 Nov 1987			
Method	Dayos	Dayos	Latag	Latag	Latag	Latag			
No. of plowing	3	4	None	1	None	None			
No. of harrowing	3	4	None	1	None	None			
Onion Variety:	Yellow Granex	Yellow Granex	Tanduyong	Tanduyong	Yellow Granex	Yellow Granex			
Date of Seeding:	1 Dec 1987	31 Dec 1987	28 Nov 1987	16 Nov 1987	25 Nov 1987	29 Nov 1987			
Field Size (m ²):	670.65	1,298.13	546.39	386.23	470.67	647.40			
Transplanting Date:	25 Dec 1987	24 Jan 1988	26 Dec 1987	16 Dec 1987	24 Dec 1987	27 Dec 1987			
Hill and Row Spacing (cm)	10X10	10X10	10X10	11X11	11X11	11X11			
Fertilizer:									
Kind	16-20-0	12-12-12	14-14-14	12-12-12	a) 21-0-0-(24) b) 14-14-14	a) 14-14-14 b) Urea			
Method of application	Broadcast	Broadcast	Broadcast(Basal)	Broadcast(Basal)	Broadcast	Broadcast			
Rate (kg/ha)	335	310	414	378	a) 189 b) 238	a) 140 b) 117			
Date of application	6 Jan 1988	4 Feb 1988	16 Jan 1988	8 Jan 1988	a) 6 Feb 1988 b) 21 Dec 1987	a) 26 Dec 1987 b) 23 Jan 1988			
Weedicide:									
Kind	a) Machete b) Gould	a) Machete b) Gould	Machete	Machete	Machete	Machete			
Date of application	a) 28 Dec 1987 b) 5 Jan 1988	a) 29 Jan 1988 b) 3 Feb 1988	29 Dec 1987	20 Dec 1987	27 Dec 1987	6 Jan 1988			
Manual Weeding:	25-28 Jan 1988	None	None	None	28 Jan 1988	25 Jan 1988 and 11 Feb 1988			
Insecticide/ Pesticide:									
Kind	Mytox (02/05/88)	a) Parapest b) Supreme Foliar	Folidol	a) Supreme 5 b) Supreme Foliar	Parapest	None			
Date of application	5 Feb 1988	a) 4 Feb 1988 b) 15 Feb 1988	30 Jan and 10 Feb 1988	a) 15 Jan 1988 b) 1 Feb 1988	7 Feb 1988				
Fungicide:									
Kind	None	Supreme 5	None	None	Supreme 5	Supreme 5			
Date of application		14 Feb 1988			6 Feb 1988	10 Feb 1988			

19-63 min for the *larag* method. Irrigation water was applied every three to four weeks for the *larag* method and one to two weeks for the *dayos* method.

Inflow stream size ranged from 10-35liters per second (*lps*) for the *dayos* method and from 8-50 Ips for the *larag* method depending on the size of area irrigated.

On-farm channels and structures used by the farmers were the main farm, supplementary farm, intercepting or seepage, head, paddy field, and drainage ditches; paddy dikes; checks; and intake and offtake structures (Figures 1 to 5). On-farm structures were usually made of available indigenous materials such as mud, shrubs, weeds, plastic and small tree branches.

The length of the main farm ditch, from the turnout to the farm intake, ranged from 101-452 meters depending on location. Each onion plot or field was provided with a drainage ditch and one to three intakes and/or offtake structures. Two to four checks were also constructed from the main farm ditch to the field whenever irrigation was applied.

Hill and row spacings ranged from 10-15 cm. Fertilizer was applied by broadcasting in either basal or split amounts at the rate of 117-415 kg/ha and using 16-20-0, 21-0-0-(24), Urea, 14-14-14, and 12-12-12.

Manual weeding was done 30-35 days after transplanting. Weedicides were also applied 3-10 days after transplanting.

The onion crop was harvested 86-92 days after transplanting. Table 3 shows the cultural practices in onion production of the six farmercooperators.

Yields ranged from 15-17 t/ha under the *larag* method using Yellow Granex and 5-14 t/ha using *tanduyong*; under the *dayos* method, yields ranged from 26-37 t/ha using Yellow Granex (Table 4).

Summary and Recommendation

Cultural practices varied among the six farmercooperators. Considering yield as index, the cultural practice that was followed by farmers in *Sibut* is recommended. Although laborious and costly, the high yields can still compensate for the costs incurred.

On-farm channels and structures were made by the farmers themselves out of available indigenous materials in the field.

It is perceived that the first objective of the study was already fulfilled. The second objective was not met because the start of the study was later than expected. Adjustment of the calendar of activities was then requested as reflected in the April-June 1987 Progress Report of this study. It is felt however, that satisfying the second objective may no longer be as important as conceived before. Instead, the following changes on the activities to be pursued are proposed.

The title of this study may be changed to "System Water Management Practices for Diversified Crops", the main objective of which is to document and analyze the current system water management for diversified crops during the dry season. The activities will focus on the determination of the available water supply from the diversion dam during the dry season and the actual area devoted to rice and non-rice crops on a system-wide scale. The water use of onion will be based on the result of this study, while the water use of other crops may be estimated from literature. Therefore, it can be determined whether or not the available water supply from the river is being fully utilized, as well as whether or not expansion of the irrigated area during the dry season is possible.

Table 4. Yield of onions under the *larag* and *dayos* methods of land preparation, UTRIS, 1987/88 dry season.

Variety	Latag		Dayos	
	Yield	Fertilizer	Yield	Fertilizer
Yellow Granex	17.42	428	37.04	646
	15.54	256	26.60	310
Average	16.48		31.82	
<i>Tanduyong</i>	5.49	414		
	14.24	378		
Average	9.86			

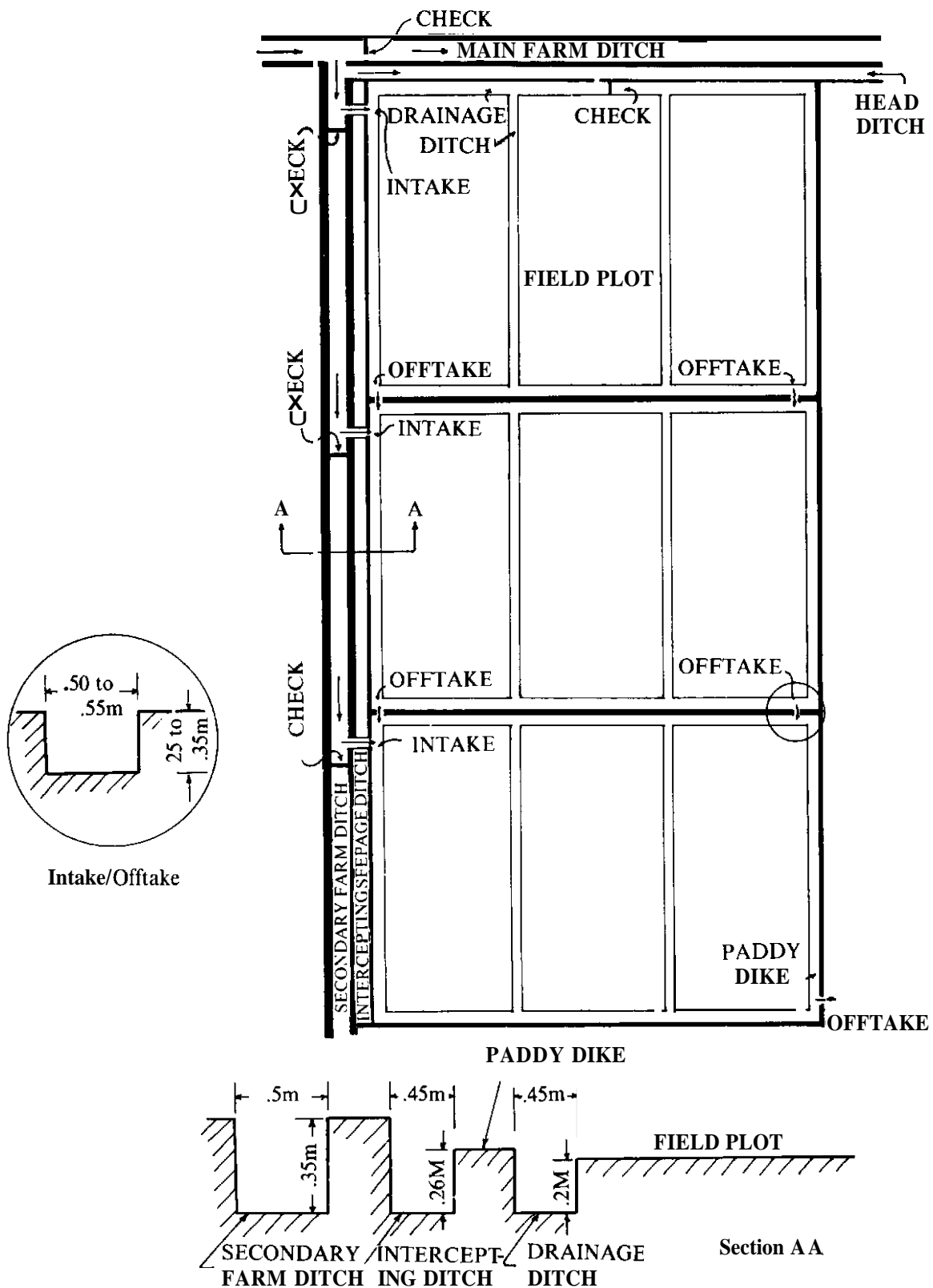


Figure 1. On-farm channels and structures used in growing onions.
 Locations: Tayabo, Farmers: M. Biluan, Sample plot area=470.67 m²
 (Drawn not to scale).

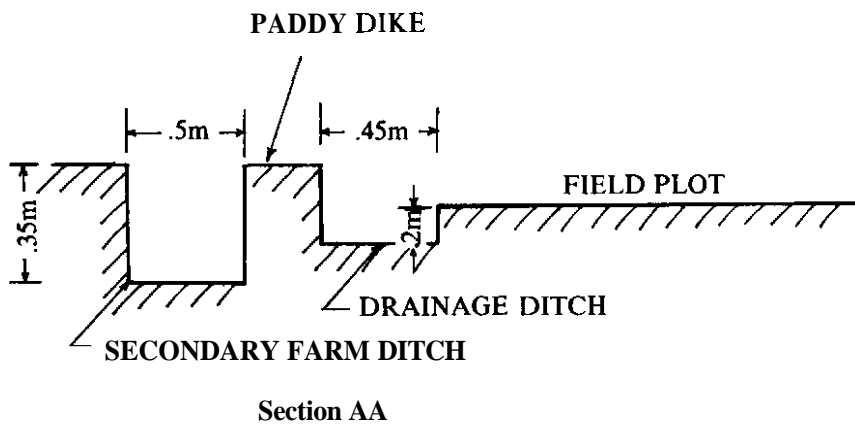
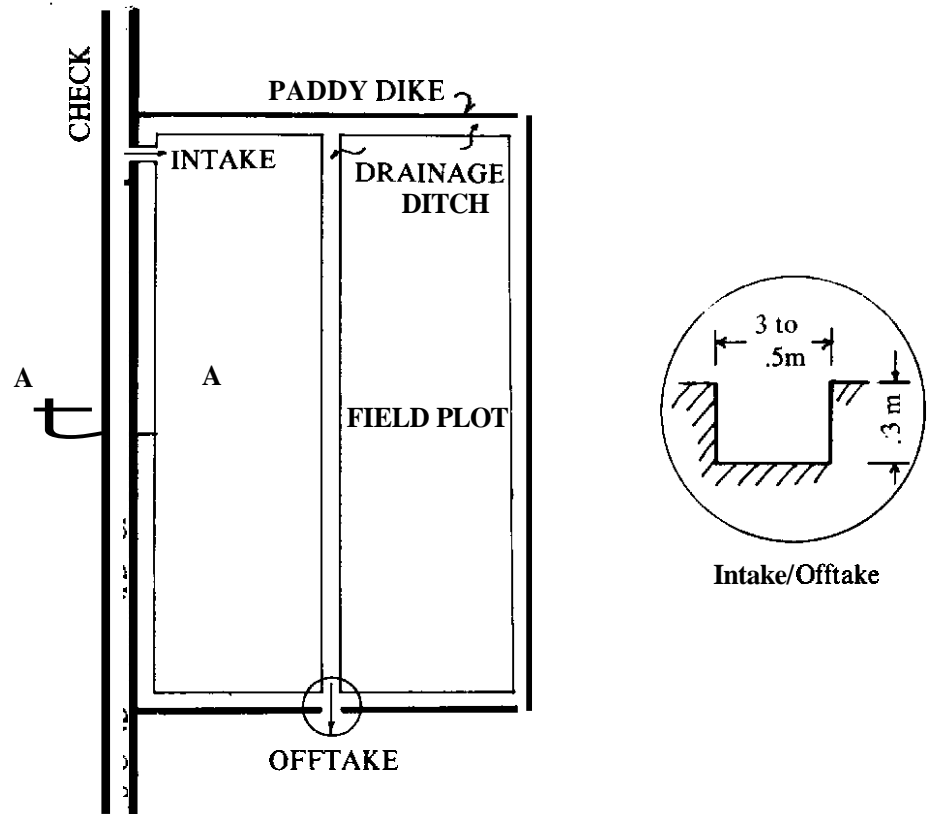
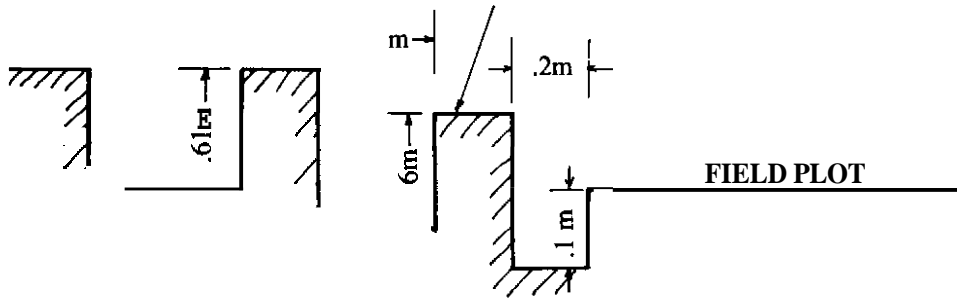
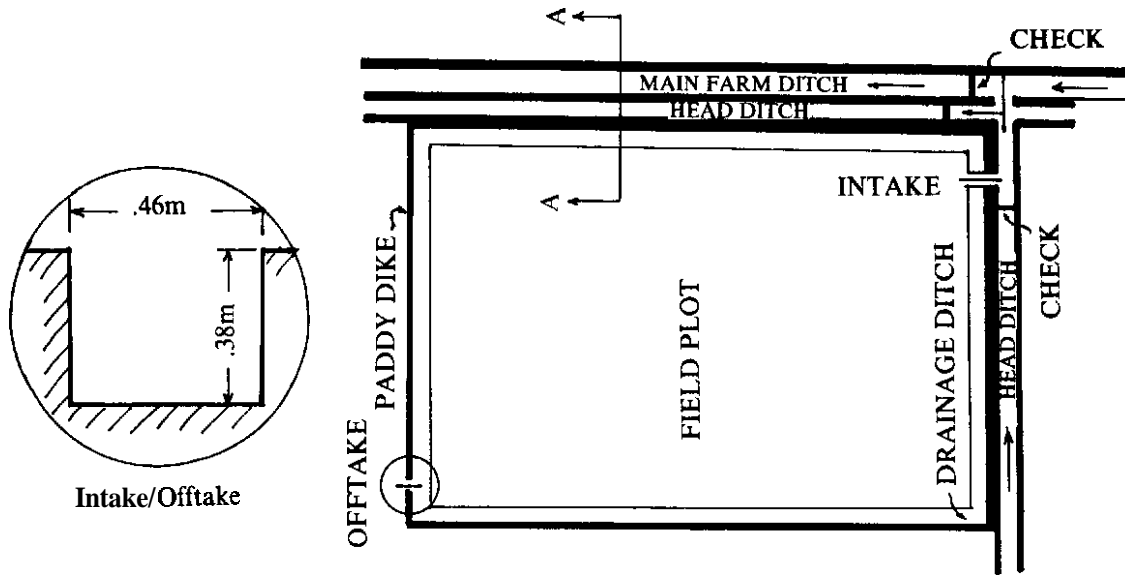


Figure 2. On-farm channels and structures used in growing onions.
 Location: Tayabo, Farmers: M. Cabanayan, Sample Plot area=647.4 m²
 (Drawn not to scale).



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Figure 3. On farm channels and structures used in growing onions.
 Location: Sibot, Farmer R. Satulan, Sample plot area=670.7 m²
 (Drawn not to scale).

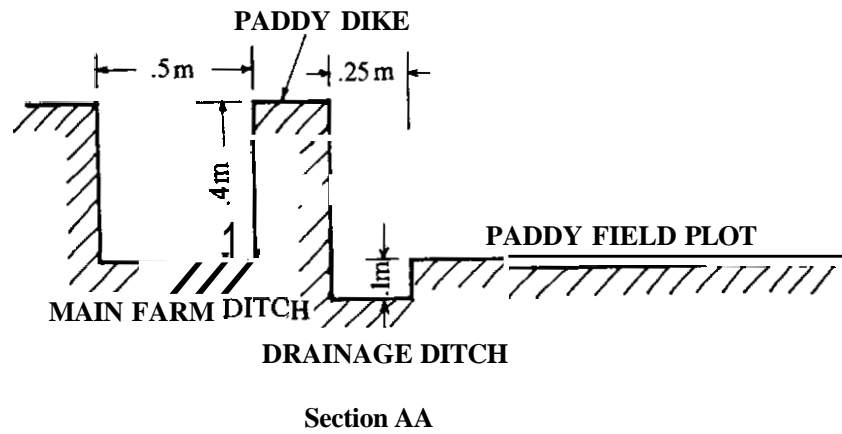
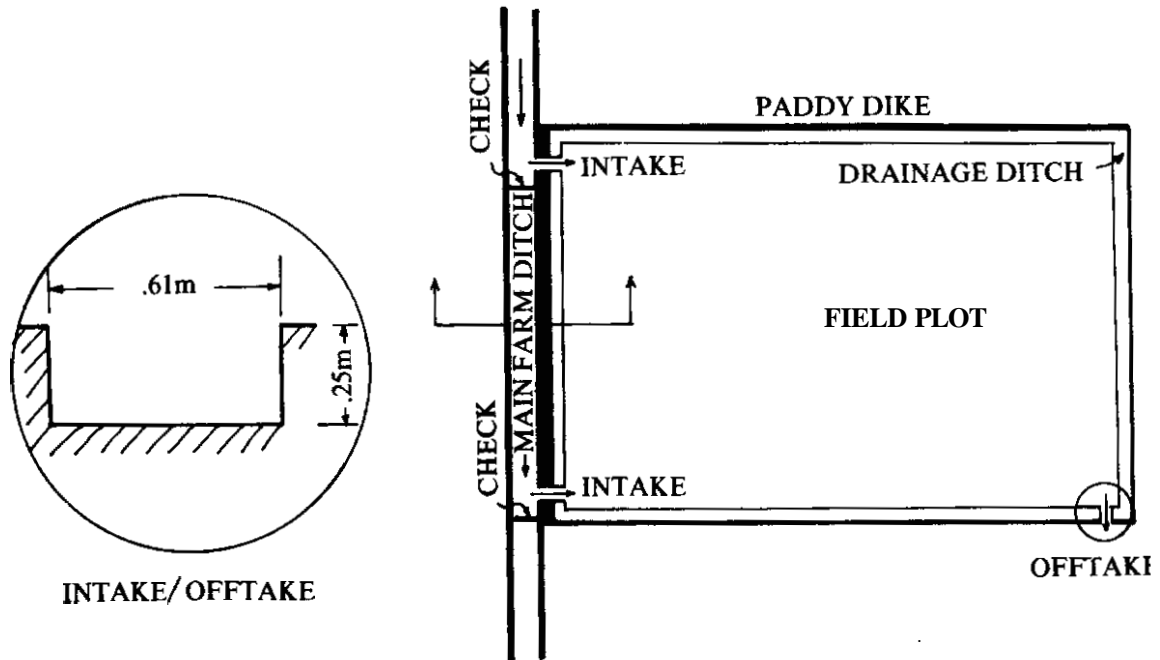


Figure 4. On-farm channels and structures used in growing onions. Location: Sibot; Farmer: B. Toralba; Sample plot area=1,298.1 m² (Drawn not to scale).

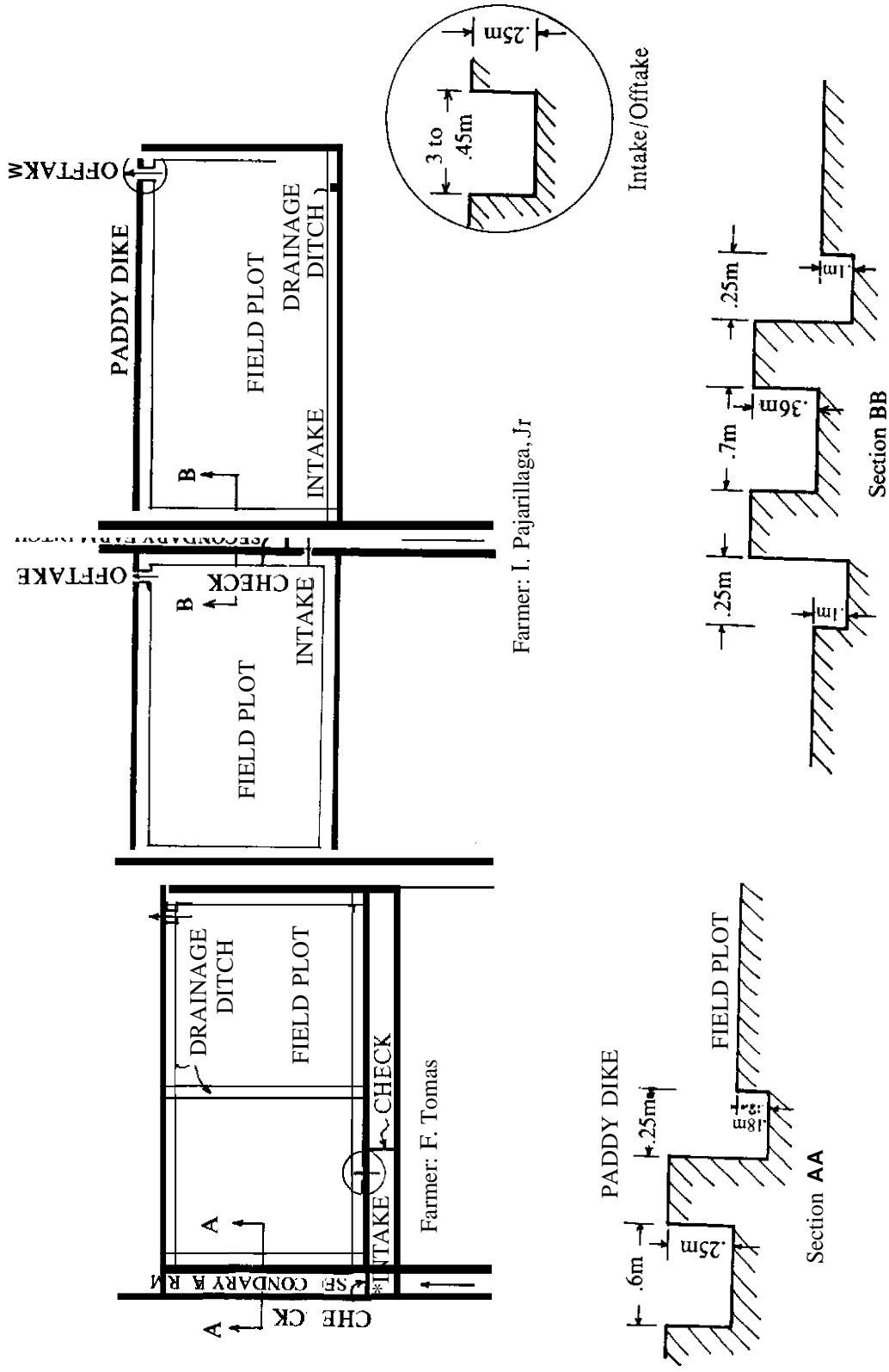


Figure 5. On-farm channels and structures used in growing onions. Location: Calaoacan, Farmers: F. Tomas and I. Pajarillaga, Jr., Sample plot area = 546.4 m² and 386.2 m² for F. Tomas and I. Pajarillaga, respectively. (Drawn not to scale)