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FARMING SYSTEMS DEVELOPMENT PROJECT

EASTERN VISAYAS

A STUDY OF FARMER'S ADAPTATION OF UPLAND RICE TO RAINFED BUNDED CONDITIONS

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INTRODUCTION

Let it not be forgotten that farmer participation is a unique and important concept that distinguishes farming systems research from conventional agriculture research. Thus farming systems on-farm experiments ought to promote farmer participation. Let it not be forgotten that on-farm experiments are not meant to simulate experiment station conditions. Remember: their chief purpose and unique strength is to 'adapt' technologies to local farm conditions.

This research argues that combining conventional and indigenous research methods exploits farmer participation in roles of adapting technical options from other farms as well as research stations to specific farm conditions. Indeed, as Gilbert Norman and Winch emphasize "The concept of FSR explicitly recognizes the value of the farmers experience and their traditional experimentation as inputs into developing strategies for improving the productivity or existing farming systems." (Gilbert et al. 1980, page 14).

Farmers understand the concept of experimentation and implementation of input-output trials and there is no lack of indigenous research. That this offers considerable potential to rural development researchers has been persuasively argued by Howes and Chambers (Howes & Chambers. 197[illegible] pages 5-11). In

support of this contention Johnson cites many instances of farmer experimentation including Conklin's 1957 study of Hanuoo agriculture in the Philippines. Conklin found the Hanuoo grew "cultigens of all sorts especially new or unfamiliar varieties are grown experimentally in small homeyard gardens as single objects of great horticultural interest." (Johnson. 1972, page 154). Moreover, in rural Sierra Leone, Richards saw there was no lack of indigenous research and farmers understood the idea of a controlled input-output trials. He even went on to say "..that expensive supervised on-farm trials for demonstration purposes are not necessary." (Richards. 1981, pages 8-11). Similarly, Bangladesh agricultural communities operate a dynamic and productive informal research system which interacts with any new technology introduced from outside. Indeed, farmers there try out new practices such as fertilizer use on small plots next to their own normal crops just like the researchers simple yes/no trials (Biggs. 1980, pages 25-26). Furthermore, indigenous research systems have generated important technologies. One striking example for its impact in Bihar, India, was farmer development of a bamboo tube well as a replacement of recommended iron irrigation wells (Dommen. 1975, pages 483-489).

METHODS

Methods followed in this study are presented first as a list of activities in chronological order and then in summary form.

1. Stands of UPL-Ri5 were noticed in the lowland rice fields around the target barangays.

2. Farmers were asked about this to verify if the variety was indeed UPL-Ri5. The farmers were asked why they planted UPL-Ri5 in the lowlands and how did it grow.

3. From this questioning it was found that UPL-Ri5 was planted on other farms. The extent of this practice was traced by asking farmers in the neighboring barangays where they got their UPL-Ri5 seed and if they had planted UPL-Ri5 in the lowlands.

4. After identifying the barangays where farmers grew UPL-Ri5 guideline questions were developed. Here, rather than a formal questionnaire the questions were asked in an unstructured informal manner. Questions included were farmers typology to determine if they were typical low resource farmers. Crop husbandry applied was asked to determine their methods of adapting UPL-Ri5 to lowland conditions. Farmers assessment was an important part of the guideline questions. This was done to compare UPL-Ri5 against the IR series farmers had grown previously.

5. At this time it was discovered that there were two sources of seeds, one from FSDP-EV and the other from MAF rehabilitation. As this study was to assess UPL-Ri5 performance in lowlands, no

matter who the seed sources, all farmers who had grown UPL-Ri5 were included in the informal interview, even though we were tempted to ask only those farmers whose source come from FSDP-EV.

6. During the informal interviews it was our experience that the accuracy of farmers responses were improved by actually going to his field where UPL-Ri5 had been grown.

Having farmers dominate experiments leaves researchers with a different set of activities. This piece of work went through three activities. First, research topics were detected by informal consultations and observations. UPL-Ri5 was seen growing in bunded plots and farmers were questioned about this unusual practice. From discovery on one or two farms more farmers were questioned to determine if such practices were widespread and worthy of study. It was at this time that connections were made with Ministry and Project relief provision of seed. Because of the nature of our experience identification of co-operators and provision of seed, our second activity, was largely 'unconscious'. That is seed was distributed as part of another effort and co-operators were those who then engaged in adaptation. In future work, however, factoring in farmer typology when selecting co-operators would be included in this important second activity. Next, the third and last activity, was to develop and administer an informal survey. Here, checklists provided guidelines for gathering information on farmer typology, nature of problems or farmer purposes, description of practices, and farmers assessment. Several farm visits were required to gather all the information.

Unfortunately, our late timing did not permit any biological measurement to corroborate the farmers assessment; something that would be included in any improved method. However, these activities are not presented as finalized methods, but more a place to begin.

RESULTS

The Farmers Circumstances

In this case of farmer adaptation of an upland rice variety to lowland bunded conditions the problem farmers wished to solve arose as a consequence of flash flooding during November 1983 that destroyed much of their lowland bunded rice crop (See Appendix Table A for location of farms). This destruction left their seed supplies of conventional lowland varieties, IR36 and IR42, short. To solve this problem of inadequate seed farmers decided to try the upland rice variety UPL-Ri5 in their lowland bunded plots. UPL-Ri5 had grown poorly in their FSDP-EV experimental upland plots. Seed of UPL-Ri5 was also obtained from other farmers and from a Ministry of Agriculture and Food relief effort (See Appendix Table B for sources of seed). Because these farmers were selected for their adaptation "experiment" in lowland areas they are not typical of our 'small upland rainfed' target group (See Appendix Tables C to G for farm typology criteria). Half of the farmers did not have any upland parcels at all. Notwithstanding, they could still be described as 'small'. Incomes were mainly derived from farming just under one hectare of lowland to which 40% had title, the remainder

sharecropping; and for half the farmer an additional hectare of upland to which 90% had some kind of title. How to adapt this upland variety and what its performance would be like were the central research questions these farmers sought to answer.

The Farmers' Adaptation of Rice

To adapt upland rice to lowland conditions farmer generally followed lowland rice husbandry practices as shown in Table One (See Appendix Table H for details). With the exception of one farmer who grew his crop during the upland season of May to September because he did not get seed on time, upland rice was grown during the traditional lowland rice season of December and April. The traditional lowland rice season in Gandara is May and June to September and October. Before, when HYVs were not yet introduced, people grew their traditional lowland varieties only once a year, that was from May June to October. With the introduction of HYVs people were able to plant a second crop in December and January. They term this second cropping "PANGAMI" from the word "AMIHAN".

In our case, UPL-Ri5 was grown during the second cropping season (pangami) of lowland rice from December to April. This happened because the seeds and seedlings intended for the second cropping were damaged during the floods of November 1982. In addition, this fits the farmers' practice of changing or rotating varieties every cropping seasons. So that during the traditional lowland rice season of May/June to September/October IR 42 and IR 36 were grown.

TABLE ONE: HOW FARMERS ADAPTED UPL-Ri5 TO BUNDED CONDITIONS

FARM	PLANTING METHOD	PLOT SIZE(ha)	SPACING (cms)	PLANTS HILL	WEEDING	FERTILIZER
1	T.DRY	.11	15-20	4-5	2X	none
2	T.WET	.22	15-20	4-5	1X	none
3	T.WET	.25	15-20	4-5	1X	none
4	T.WET	.49	15-20	4-5	1X	none
5	D.DRY	.24	15-20	3-4	1X	none
6	T.WET	.22	15-20	4-5	none	none
7	T.DRY	.44	15-20	4-5	none	none
8	T.DRY	.11	15-20	4-5	none	none
9	T.DRY	.05	15-20	5	none	none
10	T.DRY	.11	15-20	4-5	none	none
11	T.DRY	.49	15-20	4-5	none	none
12	T.WET	.44	15-20	3-4	none	none

SPACING : was random at approximate dimensions given.
PLANTING : methods were Transplanting (T) in either dry or wetbeds and direct seeding (D).

Transplanting dominated the planting technique with about half the farmers wetbed and half drybed planting. Similarly, on all plots between four to five plants were randomly planted at each hill at about fifteen to twenty centimetres apart. Thus plant populations range from 100 to 200 plants per metre, more than twice typical upland plant populations. Other husbandry practices rarely differ between locations, for instance no fertilizer was applied and weeding practice varied from none to twice.

The Farmers' Assessment

Generally, farmers assessed UPL-Ri5's performance to be comparable with lowland varieties IR36 and IR42. Specifically, for production aspects, shown in Table Two (See Appendix Tables I & J for details), farmers noted that UPL-Ri5 produced from 6 to

10 tillers which is less than the IR's, and a disadvantage of this upland variety.

TABLE TWO: HOW FARMERS ASSESSED UPL-Ri5

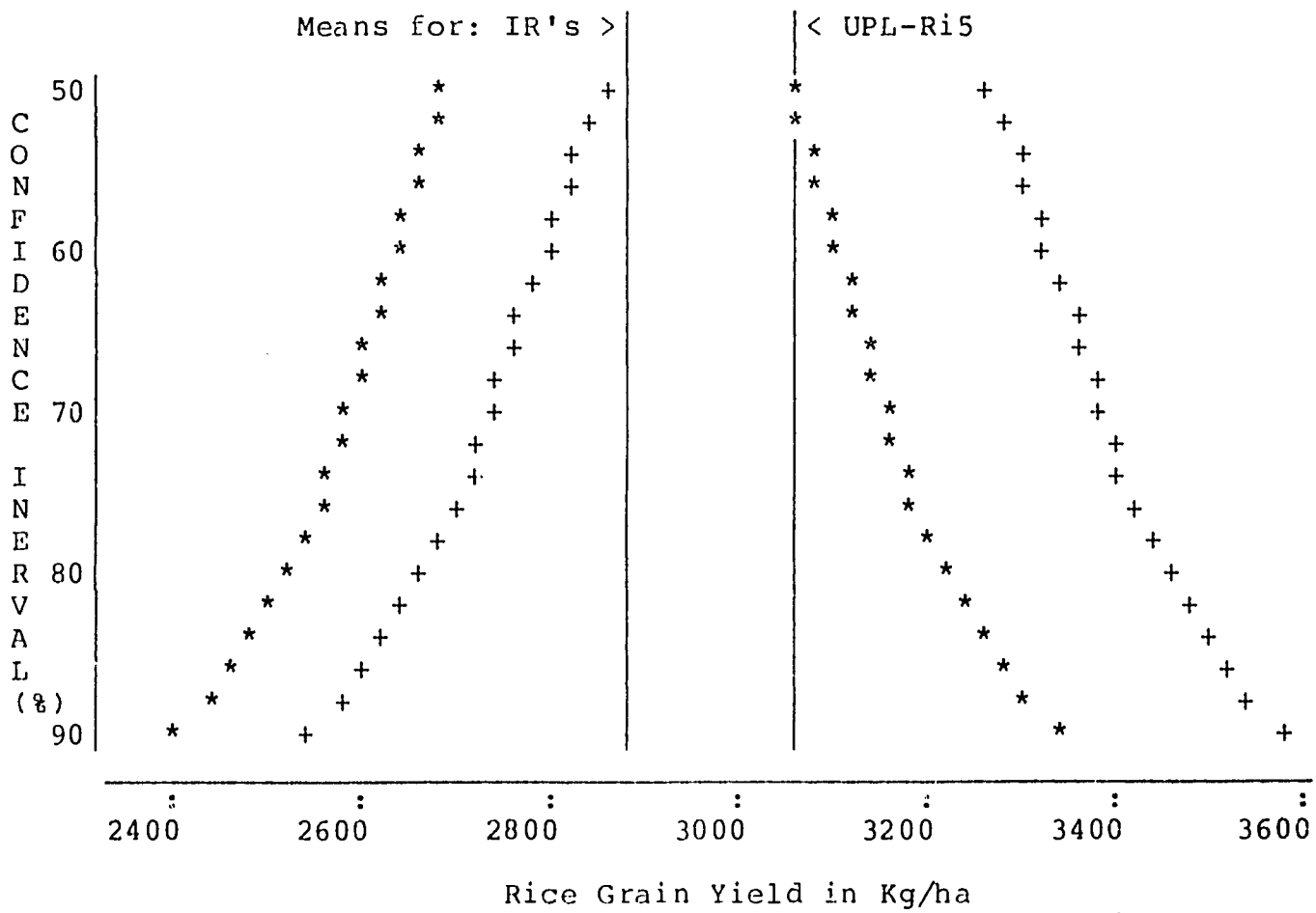
FARM	1	2	3	4	5	6	7	8	9	10	11	12
TILLERING	6-10	L	L	L	6-9	8-10	L	8-10	L	L	8-10	8-
PANICLE exertion	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP	OP
HEAD FILL	GO	GO	GO	GO	GO	GO	GO	GO	GO	GO	GO	PO
MATURITY PERIOD (mo)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	4.0	3.5	3.5	4.0
ACTUAL YIELD(t/ha)	1.7	3.1	3.7	2.1	3.8	3.8	2.6	2.7	3.3	5.1	3.4	1.5
EXPECTED YIELD(t/ha)	1.9	2.1	3.0	2.1	2.9	3.8	2.2	2.7	2.9	5.1	3.4	2.4
WEED TOLERANCE	GO	GO	GO	GO	GO	GO	GO	GO	GO	GO	GO	GO
DISEASE RESISTANCE	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	YES	NO
MILLING RECOVERY	HI	HI	HI	VHI	HI	HI	HI	HI	HI	HI	HI	HI
COOKING QUALITY	ST	ST	ST	ST	ST	ST	ST	ST	ST	ST	ST	ST
PALATA-BILITY	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO	SO

TILLERING (L) less than IR's. PANICLE EXERTION (OP) open display.
HEAD FILL (GO/PO) good/poor. WEED TOLERANCE (GO) good can stand weeds
DISEASE RESISTANCE (NO/YES) to infestation.
MILLING RECOVERY (V/HT) higher (very) than IR's.
COOKING (ST) sticky, PALATABILITY (SO) soft.

All farmers commented on the favourability of UPL-Ri5's good panicle exertion for judging ripeness and yield; accepting its susceptibility to bird damage if it is the only crop around. Again, all farmers reported good head fill except one farmer whose crop was damaged by flooding after flowering. Maturity periods between three and five months were comparable with IR36's three months and IR42's four months. In terms of grain yield a

comparison of farmers estimated actual yields of UPL-Ri5 with farmers expected yield of IR36 and IR42 showed no significant differences (mean difference of 192kg/ha with 't' of 1.9 at df. 11. - See Appendix Table K for full analysis) Indeed, there was a great deal of overlap in likely yields. For instance as shown in Figure One, at 80% confidence level UPL-Ri5 yields range from 3.4 to 2.6 tons per hectare while IR expected yields range from 3.2 to 2.6 tons per hectare (See Appendix Table L).

FIGURE ONE: CONFIDENCE LEVELS FOR YIELD PERFORMANCE OF RICE VARIETIES



From the point of view of stability all farmers agreed that UPL-Ri5 can stand weeds and is a better competitor than the IR's because of its taller habit. In addition, most farmers, even though they observed no diseases, think UPL-Ri5 is strong. Significant here was the absence of Tungro to which UPl-Ri5 is reported susceptible. Of the farmer who did experience pests they said UPL-Ri5 tolerated the attacks. Farmers also included milling recovery, cooking quality and palatability in their assessment. All farmers agreed that UPL-Ri5 had a high, some said very high, milling recovery that was superior to the IR's. Farmers also agreed that UPL-Ri5 had a good sticky cooking quality and was soft and palatable.

CONCLUSIONS

On balance, these largely favorable assessment were supported by continued use or adoption of UPL-Ri5 in lowland bunded conditions. However, farmers defined specific strategies for this practice. UPL-Ri5 is grown in rotation with IR's because farmers note declining yields when the same variety is grown continuously on one piece of land. UPL-Ri5 is grown on the driest parts of the parcel because it is less tolerant of waterlogging than IR's.

The kind of farmer adaptation studied here is probably quite common. Several people have recounted similar experiences from elsewhere in the Philippines. It is certainly similar to that reported by Biggs who found that "after official demonstration were made in farmers fields to show the potential of the new

seeds, often under optimal or high input conditions, it was frequently the farmers themselves who adapted those packages to their own conditions." (Biggs, 1980, page 24). In cropping pattern trials, it has been FSDP-EV's, and I am sure many others, experience that farmers take one or two items and adapt them to their farm strategies.

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APPENDIX TABLE A
The Location of Farms

FARM	BARANGAYS STO.NINO	NATIMONAN	BURABAD	CASANDIG	sidmun
1	+				
2	+				
3	+				
4		+			
5		+			
6			+		
7			+		
8			+		
9				+	
10				+	
11					+
12	+				

APPENDIX TABLE B
The Farmers Source of UPL-Ri5

FARM	SOURCE OF SEED FSDP -EV	MAF	OTHER FARMS
1	+		
2	+		
3	+	+	
4		+	+
5	+		
6			+
7			+
8			+
9			+
10		+	+
11	+		
12			+

APPENDIX TABLE C
The Farmers Source of Cash

FARM	SOURCES OF CASH FARM	KABULIG	OTHERS
1	+	+	
2	+	+	
3	+	+*	
4	+	+	
5	+		+**
6	+	+	
7	+	+	
8	+		
9	+	+	
10	+		
11	+		
12	+	+	

** - carpentry
* - Kabulig owner

APPENDIX TABLE D
The Number of Household Members

FARM	HOUSEHOLD MEMBERS
1	6
2	6
3	5
4	11
5	8
6	5
7	6
8	8
9	6
10	11
11	4
12	7

APPENDIX TABLE E
The Farm Implements Owned

FARM	FARM IMPLEMENTS	
	PLOW	HARROW
1	1	1
2	1	1
3	0	0
4	1	1
5	0	0
6	1	1
7	0	0
8	1	1
9	1	1
10	1	1
11	1	1
12	1	1

APPENDIX TABLE F
The Livestock Ownership

FARM	OWNED		SHARED		TOTAL
	MALE	FEMALE	MALE	FEMALE	
1	1	2	0	2	5
2	1	0	0	0	1
3	0	0	0	0	0
4	1	0	0	0	1
5	0	0	0	0	0
6	1	0	0	0	1
7	0	0	0	0	0
8	1	1	0	0	2
9	0	0	0	1	1
10	1	0	0	0	1
11	1	2	0	0	3
12	1	0	2	2	5

APPENDIX TABLE G
The Total Cultivated Area, Land Tenure
and Crops Planted

FARM	CULTIVATED UPLAND AREA			CULTIVATED LOWLAND AREA		
	CROPS PLANTED	LAND TENURE	TOTAL AREA (ha)	CROPS PLANTED	LAND TENURE	TOTAL AREA (ha)
1	Corn, Mungo Peanut, Sitao Eggplant Corn+Peanut	Erensia-les	1.14	Lowland Rice	Share-cropper	0.55
2	eggplant, peanut, mungo camote	Erensia-les	0.44	Lowland Rice	Share-cropper	0.22
3	-	-	-	Lowland Rice	Owner	1.50
4	-	-	-	Lowland Rice	Share-cropper	0.69
5	-	-	-	Lowland Rice	Erensia-les	0.24
6	corn and Kalinayan	Share-cropper	2.6	Lowland Rice	Owner	1.50
7	-	-	-	Lowland Rice	Share-cropper	0.44
8	-	-	-	Lowland Rice	Rented	1.99
9	Kalinayan	Rented	0.22	Lowland Rice	Share-cropper	0.46
10	corn and peanut	Owner	0.44	Lowland Rice	Owner	0.55
11	corn, eggplant mungo, peanut	Owner	2.41	Lowland Rice	Owner	0.99
12	corn, peanut eggplant	Erensia-les	0.66	Lowland Rice	Share-cropper	0.88

APPENDIX TABLE H
How Farmers Adapt UPL-Ri5 to Bunded Conditions

FARM	PLANTING METHOD	PLOT SIZE (ha)	SPACING (cm)	WEED -ING	FERT iliz ER	PLANT /HILL	DATE of PLANTING -HARVEST
1	Transplant Drybed	0.11 Sikapat	15-20	2	none	4 - 5	12/27/84 04/15/85
2	Transplant Wetbed	0.22 kahati	Random	1	none	4 - 5	12/20/83 04/05/84
3	Transplant Wetbed	0.25	Random	1	none	4 - 5	12/15/83 04/01/84
4	Transplant Wetbed	0.49 Tigkapa-tan pordiez	Random	1	none	4 - 5	01/05/85 04/30/85
5	Direct seed	0.24 kahati por diez	Random	1	none	4 - 5	12/30/83 04/17/84
6	Transplant Wetbed	0.22 kahati	Random 15-20	1	none	4 - 5	01/10/85 04/20/85
7	Transplant DryBed	0.44 Tigkapa-tan	Random 15-20	1	none	4 - 5	12/20/84 04/10/85
8	Transplant DryBed	0.11 Sikapat	Random	1	none	4 - 5	12/03/84 03/18/85
9	Transplant DryBed	0.05 Sikawalo	Random	1	none	5	01/04/85 04/04/85
10	Transplant DryBed	0.11 Sikapat	Random 15-20	1	none	4 - 5	12/21/84 04/07/85
11	Transplant Wet&DryBed	0.49 Tigkapa-tan Sikawalo	Random	none	none	4 - 5	05/15/84 09/02/84
12	Transplant	0.44 Tigkapa-tan	Random	none	none	3 - 4	01/07/85 04/30/85

APPENDIX TABLE I
How Farmers Assessed UPL-Ri5

FARM	DISEASE RESISTANCE a	WEED TOLERANCE b	PALATABILITY c	COOKING QUALITY d	MATURITY PERIOD	TILLERING e	MILLING RECOVERY f	HEAD FILL	PANICLE DISPLAY
1	No	Can	Soft	Sticky	3.5	8-10	High	Good	Open
2	No	Can	Soft	Sticky	3.5	Less	V.High	Good	Open
3	No	Can	Soft	Sticky	3.0	Less	High	Good	Open
4	Ragoso	Can	Soft	Sticky	3.5	Less	V.High	Good	Open
5	No	Can	Soft	Sticky	3.5	6-9	High	Good	Open
6	No	Can	Soft	Sticky	3.5	8-10	High	Good	Open
7	No	Can	Soft	Sticky	3.5	Less	High	Good	Open
8	No	Can	Soft	Sticky	3.5	8-10	High	Good	Open
9	No	Can	Soft	Sticky	4.0	Less	High	Good	Open
10	Rice Bug	Can	Soft	Sticky	3.5	Less	High	Good	Open
11	Stem-Borer	Can	Soft	Sticky	3.5	8-10	High	Good	Open
12	No	Can	Soft	Sticky	4.0	8	High	Good	Open

NOTES
a. DISEASE RESISTANCE - no diseases or tolerated named pest.
b. WEED TOLERANCE - can stand weeds.
c. PALATABILITY - good, soft taste.
d. COOKING QUALITY - good and sticky.
e. TILLERING - less than IR36 or IR42.
f. MILLING RECOVERY - higher than IR42.

APPENDIX TABLE J
Farmers Estimated Actual Yields of UPL-Ri5
and Expected Yields of IR36/42

FARM	AREA (ha)	ACTUAL UPL-Ri5 YIELD cavans	ACTUAL UPL-Ri5 YIELD kg/ha	EXPECTED IR36/42 YIELD cavans	EXPECTED IR36/42 YIELD kg/ha	DIFFER-RENCE
1	0.11	4.5	1708	5.0	1898	-190
2	0.22	16.5	3134	11.0	2090	1044
3	0.25	22.0	3674	18.0	3006	668
4	0.49	24.3	2070	24.3	2070	0
5	0.24	21.6	3760	16.5	2873	888
6	0.22	20.0	3799	20.0	3799	0
7	0.44	27.0	2559	23.5	2227	332
8	0.11	7.0	2657	7.0	2656	1
9	0.05	4.0	3340	3.5	2923	417
10	0.11	13.5	5120	13.5	5123	0
11	0.49	40.0	3407	40.0	3407	0
12	0.44	16.0	1516	25.0	2369	-853

APPENDIX TABLE K
Statistical Analysis

'T' TEST	UPL-Ri5 ACTUAL YIELD	IR36/42 EXPECTED YIELD	DIFFER -ENCE
MEAN	3062	2870	19
NUMBER	12	12	12
STANDARD DEVIATION	1021	912	510
variance	1043641	832014	266273

CALCULATED 'T' VALUE = 1.29
TABULATED 'T' VALUE(11df) are:
95% = 2.20, 90% = 1.79, 80% = 1.36

APPENDIX TABLE L
Confidence Intervals and 'T' Test for Farmers Actual Yields of UPL-Ri5 and Expected Yields of IR36/42

CONFI-DENCE LEVEL	'T' VALUE	UPL-Ri5 ACTUAL YIELD (kg/ha) HIGHEST	UPL-Ri5 ACTUAL YIELD (kg/ha) LOWEST	IR36/42 EXPECTED YIELD(kg/ha) HIGHEST	IR36/42 EXPECTED YIELD(kg/ha) LOWEST
90	1.79	3590	2534	3341	2399
80	1.36	3463	2661	3228	2512
70	1.08	3381	2743	3154	2586
60	0.87	3319	2805	3099	2641
50	0.69	3266	2858	3051	2689