

YIELD TRIAL OF UPLAND RICE AT SONGKHLA

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ABSTRACT :- Upland rice varieties and lines were evaluated for certain characters at Hat Yai, Songkhla. The experiment was conducted in four trials according to the source of materials. In the first trial, KU lines were estimated to yield upto 2,685 kg/ha. In other trials, outstanding varieties or lines were identified through the high number of panicles per hill and number of grains per panicle since yield estimate was not possible due to bird damage. Evidence was obtained that upland rice varieties Dokphayom and Zewmaejan were either outstanding in certain characters or well adaptive to the growing conditions at Songkhla.

INTRODUCTION

Southern Thailand is the net importer of rice from other regions of the country. This is due to the fact that only a small portion of the region, confined particularly to the eastern plain, is suitable for this crop. However, upland rice may play an important role in filling this need as it may be grown as an intercrop between rows of immature rubber. It was recommended that all rotations of intercrops in the rubber replanting program should pivot to upland rice for the monsoon season (1). Very recently, a cooperative program between the Rubber Research Center and Rice Department has identified two varieties of upland rice, namely

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Dokphayom and Khumuanglhuang for production in the South (2).

Objectives of this study were to evaluate upland rice varieties obtained from various sources and to identify characters that may be useful for the future breeding program.

MATERIALS AND METHODS

Varieties and lines of upland rice were tested at prince of Songkla University, Hat Yai, Songkhla, in the 1980 rainy season. They were divided into four groups according to the seed sources. The first group consisted of ten varieties obtained from Kasetsart University. The second group were those obtained from Fang Horticultural Experimental Station, Chiang Mai. The third and the fourth groups were from Chiang Rai Field Crop Experimental Station. The last two groups were tested in two separate trials as the number of seed of certain entries was not sufficient. The procedures used for each group are as follows :

TRIAL I. Lines of upland rice in the first group were planted in August. Fertilizer doses of 100.0 kg/ha of N, 43.6 kg/ha of P and 83.0 kg/ha of K, and CaO at a rate of 625 kg/ha were applied before planting. The seed of all entries were planted in a randomized complete-block design with four replications. Each plot consisted of six 6-m rows, spacing 25 cm between rows and 25 cm between hills in the same row. Each hill was planted with 5 - 7 seeds but only three plants were left after emergence. The plot was protected against insect pests by spraying with Malathion at the rate of 0.4 kg a.i./ha. Although the plants in most plots grew well, seed yield determination was not made due to the damage caused by birds. However, many attributes were recorded by using the following procedures :

1. *Days to 50 % flowering.* This trait was recorded as number of days from planting to the date that half of the plants in

a plot had the main panicles in an anthesis stage.

2. *Plant height.* Plant height was measured from the ground level to the tip of the panicle. The measurement was made on 10 random plants, but the average will be presented.

3. *Number of panicles per hill.* Number of panicles per hill was taken as the average of those counted on 10 random hills.

4. *Number of grains per panicle.* Number of grains per panicle was that of the average of the number of grains counted on 10 panicles.

5. *100-grain weight :* Five samples of 100-grains each were weighed for each plot.

TRIAL II. Ninety-six varieties and lines of upland rice obtained from Fang Horticultural Experimental Station, Chiang Mai, were tested in this trial. These materials were planted in August, 1980, at Prince of Songkla University by using a randomized complete-block design with four replications. However, for this experiment, the plot size was reduced to two rows 6 m long due to the limitation of seeds. Land preparation and cultural practices were similar to those of Trial I. Characters recorded in this trial were : days to 50% flowering, plant height, number of panicles per hill, and number of grains per panicle. Blast disease rating also was made in this trial.

TRIAL III. Thirty varieties and lines of upland rice obtained from Chiang Rai Field Crop Experimental Station were planted in August, 1980, at Prince of Songkla University, Hat Yai, Songkhla, in a randomized complete-block design with two replications. Each plot consisted of two 6-m rows. Land preparation and cultural practices were essentially similar to those described in Trial I. Attributes recorded in this experiment were : days to 50% flowering, plant height, number of panicles per hill, and number of grains per panicle.

TRIAL IV. In this trial, twenty five varieties and lines of upland rice obtained from Chiang Rai Field Crop Experimental Station were planted in August, 1980, at Prince of Songkla University by using a randomized complete-block design with four replications. Each plot consisted of four 6-m rows. Characters observed were the same as described in Trial III.

RESULTS AND DISCUSSION

TRIAL I. The agronomic traits of upland rice tested in this trial are presented in Table 1. The number of days from planting to 50% flowering of all entries ranged from 57 to 91 days, indicating substantial variation of the days to maturity. Most of the varieties tested were moderately tall, about 100 cm or more, with the exception of one line, C 46-15/IR 24², which was considerably shorter (88 cm). Line IR 2053-276-2-2 had the highest tillering capacity and consequently the highest number of panicles per hill. In spite of its medium height, this line tended to lodge heavily.

The three KU lines included in this study showed good plant types, and all of them have the japonica grain type. Their seed size, as indicated by 100-grain weight, was significantly larger than that of MRC 172-9, the check variety.

The number of grains per panicle of most varieties was lower than that of the check variety. There was only one variety, R258, which showed significantly higher grain number than the check.

In general, the KU lines observed in this study tended to give higher yield than others. Grain yield of KU 1030 in four replications ranged from 2,307 to 2,685 kg/ha at 12.5% moisture content. In one replication, KU 1089 yielded 2,497 kg/ha at 12.5%

Table 1. Means for agronomic characters of 10 upland rice varieties tested at Prince of Songkla University, 1980.

Line	Days to 50% flowering	Height (cm)	Panicles/ hill	Grains/ panicle	100-grain weight (g)
KU 1089	70	133	10	147	3.11
KU 1030	71	140	8	155	3.80
KU 1115	69	147	9	162	3.27
R 258	79	129	9	194	3.75
R 263	57	109	11	82	-
BPI 76	86	105	12	168	1.94
C46-15/IR24 ²	85	88	14	138	2.41
IR2053-276-2-2	90	116	16	135	2.35
C 22	84	126	14	143	2.13
MRC 172-9 (check)	91	104	15	160	1.93
CV. (%)	1.9	4.6	15.4	14.7	9.98
LSD.05	2	8	3	32	0.39
LSD.01	3	11	4	43	0.54

moisture content. These figures gave a rough estimate of yield since the loss of yield due to bird damage could not be measured.

TRIAL II. Agronomic characters of upland rice tested in this trial are presented in Table 2. The range of number of days from planting to 50% flowering was 63 to 98 days, with the average of 86 days. More than half of the varieties flowered in 81-90 days. Plant height of upland rice included in this trial varied from 81 to 140 cm. In spite of their height, varieties in this group did not lodge heavily.

Most of the varieties had fewer panicles per hill than

MRC 172-9, the check variety. The number of grains per panicle of these varieties was quite low, partly due to the delayed harvest. However, the variation in this trait was small.

TRIAL III. Data for yield components and for other agronomic traits of the lines tested in this trial are presented in Table 3. Twenty-eight out of 32 lines were the selections of BKNBR 1105. The others were Dokphayom, (a local variety), C-22, IR 2053-276-2-2, and MRC 172-9. Days to 50% flowering of most lines ranged from 89 to 97 days. The latest was Dokphayom which flowered in 107 days. Most of the lines in this group had short stature.

No significant difference in panicles per hill was found between all lines and the check variety. There was also no significant difference in number of grains per panicle among the lines tested. BKNBR 1105-28-1-1-3-2-1 and Dokphayom had high number of grains, being 168 and 164 grains per panicle, respectively. In general, there was no line in this trial superior to MRC 172-9, the check, and Dokphayom, a local variety.

TRIAL IV. Twenty-five varieties and lines were tested in this trial. Ten of them were of the IRUC group, while the rest were local and introduced varieties. Means for certain characters recorded in the trial are presented in Table 4. Varieties in this group flowered earlier than those in group 3. Most of the varieties were tall and tended to lodge, especially after heavy rain. Varieties which lodge heavily were IRUC 2103, 7014, and Gbante 4003.

Most of the varieties in this trial had lower number of panicles per hill than MRC 172-9. The difference in this trait between the check and varieties 9D, 10C, and Dokphayom was significant. Many varieties in this group have high number of grains per panicle. Among these, Dokphayom and 7014 were very outstanding in this character.

Table 2. Means for certain agronomic characters of 96 upland rice varieties and lines tested at Prince of Songkla University, 1980.

Variety or line	Days to 50% flowering	Plant height	Panicles/ hill	Grains/ panicle	Blast rating
	(no.)	(cm)	(no.)	(no.)	(score) ^{1a}
FNUR 7701	92	123.2	14	87	1
" 7703	93	124.9	13	84	1
" 7704	95	113.8	11	82	2
" 7712	87	112.3	12	67	1
" 7716	92	105.5	13	70	1
" 7717	90	97.0	13	61	2
" 7718	93	88.3	12	72	2
" 7719	95	108.6	14	140	1
" 7722	83	81.0	13	66	1
7409 - 49	85	123.9	12	58	1
" - 60	86	112.2	13	72	1
" - 61	78	122.3	12	81	1
" - 107	82	114.9	11	106	2
" - 143	89	121.3	10	82	1
" - 144	88	124.9	11	76	1
" - 145	90	124.0	11	70	1
" - 147	87	119.5	14	78	1
" - 154	92	119.9	11	92	1
" - 155	86	134.0	10	117	1
" - 156	80	140.0	14	101	1
" - 159	90	116.4	13	83	1
" - 160	81	118.5	14	67	1
" - 178	88	116.5	15	62	2
" - 179	83	113.5	13	58	1



Table 2. (continued)

Variety or line	Days to 50% flowering	Plant height	Panicles/ hill	Grains/ panicle	Blast rating
	(no.)	(cm)	(no.)	(no.)	(score) ^{1a}
7409 - 184	86	116.1	12	68	1
" - 186	88	133.2	14	69	1
" - 210	90	120.7	12	98	1
" - 225	93	123.4	15	57	1
" - 237	85	107.8	15	73	1
FNRB 74-102	85	128.5	11	66	1
" -110	79	118.8	13	93	1
" -111	81	129.5	12	64	1
" -149	87	102.8	12	70	1
" -155	91	82.2	12	74	1
" -162	89	84.8	16	74	1
" -163	88	135.3	12	122	1
" -165	95	79.1	14	70	1
" -173	90	84.9	14	80	1
" -176	81	106.0	14	113	1
" -177	91	81.5	13	63	1
IRUC 1015	87	120.0	13	76	1
" 1019	72	111.9	11	81	1
" 1030	88	116.2	11	74	1
" 1041	89	111.7	14	75	1
" 1053	76	112.4	12	66	2
" 1096	93	109.6	14	86	1
" 1112	86	105.8	14	53	1
" 1113	88	115.7	12	72	1
" 1121	88	110.2	12	74	1
" 1126	86	108.4	12	109	1

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Table 2. (continued)

Variety or line	Days to 50% flowering	Plant height	Panicles/ hill	Grains/ panicle	Blast rating
	(no.)	(cm)	(no.)	(no.)	(score) ^{1a}
IRUC 1136	92	100.3	14	79	1
" 1141	88	95.0	14	63	1
" 1158	85	128.5	12	82	1
" 1160	87	126.2	13	85	1
" 2018	92	127.5	12	102	2
" 2027	85	131.4	13	71	1
" 2063	90	126.0	11	85	1
" 2084	91	118.5	14	106	1
" 2114	90	119.6	14	68	1
" 2132	83	129.2	11	79	1
" 2080	88	100.4	12	77	1
" 2187	90	118.8	11	80	2
" 2189	89	126.0	11	102	1
" 3046	89	118.4	11	81	3
" 3060	88	110.4	14	60	1
" 4064	90	133.8	14	102	1
" 4096	86	122.3	13	87	1
" 4115	84	115.2	12	70	1
" 4147	84	120.0	13	89	1
" 4159	90	118.9	13	87	1
" 4160	93	120.7	14	84	1
" 4164	93	100.8	16	85	1
" 1094	87	118.8	11	76	1
" 1001	80	115.3	13	63	1
" 3062	81	100.0	12	73	2
" 1097	92	116.4	15	83	2
" 3069	93	112.7	14	91	1

Table 2. (continued)

Variety or line	Days to 50% flowering	Plant height	Panicles/ hill	Grains/ panicle	Blast rating
	(no.)	(cm)	(no.)	(no.)	(score) ^a
IRUC 3094	89	116.6	12	91	1
" 3096	92	123.0	12	103	2
" 3098	71	120.1	13	69	1
" 4056	93	110.0	13	87	1
7014	84	139.8	10	90	1
BPI 76	89	104.1	13	79	2
CHAO KHAO	74	133.7	11	63	1
PHA MANN	73	96.1	13	59	1
MAKHOKPEE	81	135.8	10	74	1
HAW NOI	69	118.5	12	78	1
ZEW 273-8-4	73	111.8	14	61	1
RAI KHAO	69	107.6	13	64	1
CHAN	71	112.8	11	50	1
KHAO SAMPRAN	94	112.1	12	71	1
ZEW MAECHAN	74	111.1	11	56	1
C 22 - 51	87	122.8	12	84	1
C 22	93	120.2	13	77	1
IR 2053-276-2-2	91	109.2	14	81	1
MRC 172-9 (check)	92	103.4	14	77	1
CV. (%)	7.8	10.9	18.3	8.4	
LSD.05	9	17.5	3	9	
LSD.01	12	23.0	4	12	

^a Blast rating scores were 1-4 : 1 = no infection or slight damage, 4 = severe damage; averages of four replications were presented.

Table 3. Means for certain agronomic characters of upland rice selections of BKNBR 1105 tested at Prince of Songkla University, 1980.

Variety or selection	Days to 50% flowering	Plant height	Panicles/ hill	Grains/ panicle
	(no.)	(cm)	(no.)	(no.)
BKNBR 1105-28-1-1-3-2-1	96	86.1	15	168
-19-2-1-3-1-1	97	88.0	15	104
- 2-6-1-3-3-1	97	109.7	13	92
-19-3-1-1-2-1	93	101.0	12	89
-43-4-4-2-2-1	96	91.1	12	158
-25-1-3-1-1-1	94	96.9	12	96
-27-2-1-3-1-1	94	86.9	18	78
-19-2-1-1-1-1	91	92.8	13	91
-20-3-1-2-1-1	97	94.2	18	86
- 2-6-1-3-5-1	89	103.0	14	96
-30-1-1-3-1-1(1)	91	100.2	17	82
- 2-6-1-3-4-1	91	109.3	15	84
-20-5-1-1-3-1	94	99.7	15	133
-43-3-2-3-1-1	93	108.4	11	103
-43-4-1-3-1-1	95	102.9	12	86
-19-1-1-2-1-1	91	95.5	13	94
-19-1-1-2-3-1	93	91.7	15	93
-19-3-1-1-2-1	91	106.8	12	98
-19-2-1-1-3-1	93	89.3	16	84
-19-1-1-1-1-1	91	101.4	8	97
- 2-5-1-3-3-1	89	84.3	10	97
-41-2-1-1-2-1	89	122.4	14	81
- 2-6-1-3-2-1	93	109.5	15	100

Table 3. (continued)

Variety or selection	Days to 50% flowering	Plant height	Panicles/ hill	Grains/ panicle
	(no.)	(cm)	(no.)	(no.)
BKNBR 1105-19-1-1-2-2-1	93	88.8	13	90
-27-2-1-2-1-1	91	89.8	13	62
-27-2-1-1-1-1	91	89.3	13	103
-30-1-1-3-1-1(2)	93	97.6	13	91
- 8-2-1-1-1-1	92	112.5	11	82
Dokphayom	107	142.6	10	164
C -22	91	117.3	16	80
IR 2053-276-2-2	93	115.6	13	106
MRC 172-9 (check)	95	103.2	13	101
CV. (%)	2.9	4.4	20.6	31.8
LSD.05	5	9	6	64
LSD.01	7	12	7	85

Table 4. Means of some agronomic characters of 25 upland rice varieties, tested at Prince of Songkla University, 1980.

Variety or line	Days to 50% flowering	Plant height	Panicles/ hill	Grains/ panicle
	(no.)	(cm)	(no.)	(no.)
IRUC 2114	86	139.8	14	103
" 2077	84	102.8	11	91
" 2189	86	137.5	12	120
" 2112	86	120.7	10	105
" 1078	79	129.3	11	100

Table 4 (continued)

Variety of line	Days to 50% flowering	Plant height	Panicles/ hill	Grains/ panicle
	(no.)	(cm)	(no.)	(no.)
" 2099	100	175.1	9	146
" 2187	87	125.2	11	151
" 2132	84	141.6	10	137
" 2103	73	134.8	11	95
" 2027	86	111.1	14	104
BPI 76	89	112.5	12	102
Simdum	56	92.0	11	80
Nhaew 1	70	122.5	12	89
7014	88	157.7	9	195
Gbante 4003	94	173.0	10	137
30 E	98	168.1	7	172
9 D	98	159.3	8	165
10 C	97	145.1	6	160
Zewmaejan	67	114.2	12	127
Dokphayom	103	153.7	8	202
Khoomaonglhuang	101	172.5	14	111
Karhiang	115	-	-	217
C 22	89	119.3	12	111
IR 2053-276-2-2	93	113.9	15	107
MRC 172-9(check)	94	105.3	12	111
CV. (%)	4.5	5.5	17.1	29.5
LSD.05	6	10.4	3	54
LSD.01	7	13.8	4	71



Among the varieties tested in this experiment, Zewmaejan, a local glutinous variety of the North, was proven to be highly adaptive to environmental conditions in Southern Thailand. The variety flowered in mid October when grown in the North and still performed so when grown in the South.

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