Exp. 2

Effect of seedling take off for space-line on yield and its yield components for germinated direct broadcasting rice.

(1983 Dry)

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From the last wet season trial showing that seedlings taken off for line making plots had vigorous rice plant and increased yield, this trial is needed to confirm of the lasted results.

Material and method

1. Variety RD 23
2. Design L 16 factorial design
3. Plot size 8x4 m = 32 m^2 total 32x16 = 512 m^2
4. (1) Sowing Apr 7, 1983
   (2) P.I.S. May 30, 1983
   (3) Booting Jun 17, 1983
   (4) Heading Jun 21, 1983
   (5) Harvest July 26, 1983
5. Treatment (kg/rai)

Repeat	Plot No.	Seed Rate A	Space line B	Basal N C	Top N D_1	Top N D_2
1	1	16	0	6	4	-
	2	16	0	8	-	4
	3	16	L	6	-	4
	4	16	L	8	4	-
	5	24	0	6	-	4
	6	24	0	8	4	-
	7	24	L	6	4	-
	8	24	L	8	-	4
2	9	16	0	6	-	4
	10	16	0	8	4	-
	11	16	L	6	4	-
	12	16	L	8	-	4
	13	24	0	6	4	-
	14	24	0	8	-	4
	15	24	L	6	-	4
	16	24	L	8	4	-

(1) Space was 20 cm and seedling belt 40 cm, take off date 19 days after sowing.
(2) Basal 19 days after sowing.
(3) D_1 = P.I.S. : Panicle initiation stage was 53 days after sowing.
(4) D_2 = Booting stage was 71 days after sowing.

6. Management Saturn G 5 kg/rai 8 days after sowing
   Furadan 5 kg/rai 11 days after sowing
   Furadan 5 kg/rai P.I.S.

Result

1. Yield

The yield obtained from 8 square metres cutting are given in table 1 and table 2 which show the calculation and analysis by YATE method.

Among treatment of yield, they were not significant on seed rate (16:24) space line (non:line) and basal (6:8 kgN/rai) but top dressing time of nitrogen shows a difference at 5% significant, that is P.I.S. stage top dressing yielded (6,178.8 kg) more than booting stage top dressing (5,616.0 kg).

2. Yield components

Yield components shown in table 3.

Grand mean of each component were number panicles per m^2 468, number of spikelets per panicle 61.2, ripening percentage 73.3, 1,000 grain weight 28.4, ratio of yield:straw = 1:0.78 and calculation yield per square metre by multiple yield components was 575.9 gm/m^2, out of these components only number of panicle per square metre and number of spikelets per panicle shown significant difference at 5% level.

For the number of panicle per square metre seed rate and space line treatment that is 24 kg/rai seed rate plots, the number panicle was 513.1 compared with 16 kg/rai seed rate plots 423.3 and non space plots the number of panicle was 516.1 but the space line plots was 420.3 as shown in table 4.

For the number of spikelets per panicle only 16 kg/rai seed rate plots (70.2) was higher than 24 kg/rai seed rate plots (52.1) but not significant between space line and non space line plots.

Table 1 Yield (Sampling = 8 m^2)

No.	Treatment	kg/ha	kg/rai
1	160-640	6007	961
2	160-804	6312	1010
3	16L-604	5377	860
4	16L-840	6205	993
5	240-604	5608	897
6	240-840	6583	1053
7	24L-640	6126	980
8	24L-804	5880	941
9	160-604	4835	774
10	160-840	5967	955
11	16L-640	6091	975
12	16L-804	6067	971
13	240-640	6022	964
14	240-804	5429	869
15	24L-604	5412	866
16	24L-840	6429	1029
Mean		5897	944

Table 2 Yield per hectare

No.	Data	Yate-4	Effect	V	Fact
1	6007	94350.0	5896.9	556370156	CT
2	6312	-3394.0	-212.1	719952	C
3	5377	-824.0	-51.5	42436	B
4	6205	-244.0	-15.3	3721	BC
5	5608	-628.0	-39.3	24649	A
6	6583	-1088.0	-68.0	73984	AC
7	6126	-414.0	-25.9	10712	AB
8	5880	-1022.0	-63.9	65280	e
9	4835	1846.0	115.4	212982	R
10	5967	-330.0	-20.6	6806	e
11	6091	2668.0	166.8	444889	e
12	6067	-1152.0	-72.0	82944	AD
13	6022	36.0	2.3	81	e
14	5429	280.0	17.5	4900	BD
15	5412	1518.0	94.9	144020	CD
16	6429	4510.0	281.9	1271256	D

Analysis table of yield per hectare

Varia	DF	SS	MS	F	
Total	15	3108613.75			
BL	1	212982.25	212982.25	1.65	ns
A	1	24649.00	24649.00	0.19	ns
B	1	42436.00	42436.00	0.33	ns
C	1	719952.25	719952.25	5.57	ns
D	1	1271256.25	1271256.25	9.83	*
AB	1	10712.25	10712.25	0.08	ns
AC	1	73984.00	73984.00	0.57	ns
AD	1	82944.00	82944.00	0.64	ns
BC	1	3721.00	3721.00	0.03	ns
BD	1	4900.00	4900.00	0.04	ns
CD	1	144020.25	144020.25	1.11	ns
Error	4	517056.50	129264.13		

F(1,4;.05) = 7.71 F(1,4;.01) = 21.2

Factor		Level	Mean	Level	Mean
Seed rate	A	16	5857.6	24	5936.1
Space line	B	0	5845.4	L	5948.4
Basal-N	C	6	5684.8	8	6109.0
Time top-N	D	1	6178.8	2	5615.0

Table 3 Yield components

No.	Treatment	PA	SP/PA	R%	1000 g	Y/m^2	Y/ST
1	160-640	503	68.5	71.6	28.1	693.2	0.85
2	160-804	404	72.3	77.1	28.7	646.3	0.73
3	16L-604	416	68.1	79.1	28.7	643.1	0.80
4	16L-840	374	74.5	62.5	31.2	543.3	0.80
5	240-604	572	46.5	79.0	27.2	571.5	0.70
6	240-840	524	52.6	72.2	28.0	557.2	0.81
7	24L-640	488	56.2	65.8	26.8	483.6	0.72
8	24L-804	484	46.2	78.1	28.8	503.0	0.70
9	160-604	461	52.4	78.3	28.5	539.1	0.74
10	160-840	500	62.2	68.6	28.0	597.4	0.81
11	16L-640	396	81.4	65.2	28.1	590.6	0.78
12	16L-804	332	82.0	76.3	27.7	575.4	0.88
13	240-640	641	45.6	66.1	28.2	544.8	0.69
14	240-804	524	46.8	79.6	28.3	552.4	0.80
15	24L-604	396	64.3	81.5	29.2	606.0	0.81
16	24L-840	476	58.9	71.6	28.3	568.1	0.78
Mean		468	61.2	73.3	28.4	575.9	0.78

PA = Panicle per square meter
SP/PA = Number spikelets per panicle
1000 g = 1000 grains weight
Y/m^2 = Yield per square meter
Y/ST = Ratio of yield and straw
R% = Number good grains divide all number grains

Table 4 Analysis table of number panicle per square meter

Varia	DF	SS	MS	F	
Total	15	94534.44			
BL	1	95.06	95.06	0.03	ns
A	1	32310.06	32310.06	11.41	*
B	1	36768.06	36768.06	12.98	*
C	1	4064.06	4064.06	1.43	ns
D	1	6123.06	6123.06	2.16	ns
AB	1	280.56	280.56	0.10	ns
AC	1	370.56	370.56	0.13	ns
AD	1	3.06	3.06	0.00	ns
BC	1	2376.56	2376.56	0.84	ns
BD	1	637.56	637.56	0.23	ns
CD	1	175.56	175.56	0.06	ns
Error	4	11330.25	2832.56		

F(1,4;.05) = 7.71 F(1,4;.01) = 21.2

Factor		Level	Mean	Level	Mean
Seed rate	A	16	423.3	24	513.1
Space line	B	0	516.1	L	420.3
Basal-N	C	6	484.1	8	452.3
Time top-N	D	1	487.8	2	448.6

Table 5 Analysis table of number spikelets per panicle

Varia	DF	SS	MS	F	
Total	15	2325.76			
BL	1	4.73	4.73	0.05	ns
A	1	1301.41	1301.41	13.46	*
B	1	448.38	448.38	4.64	ns
C	1	9.77	9.77	0.10	ns
D	1	28.36	28.36	0.29	ns
AB	1	17.02	17.02	0.18	ns
AC	1	51.48	51.48	0.53	ns
AD	1	0.33	0.33	0.00	ns
BC	1	53.66	53.66	0.55	ns
BD	1	0.02	0.02	0.00	ns
CD	1	23.77	23.77	0.25	ns
Error	4	386.86	96.71		

F(1,4;.05) = 7.71 F(1,4;.01) = 21.2

Factor		Level	Mean	Level	Mean
Seed rate	A	16	70.2	24	52.1
Space line	B	0	55.9	L	66.5
Basal-N	C	6	60.4	8	61.9
Time top-N	D	1	62.5	2	59.8

General discussion of experiment 1 and 2

1. Correlation among yield and yield components

Table 1 Correlation among yield and yield components from experiment 1 (Table 6).

	Spikelets per panicle	R%	1000 grain weight	Spikelets per m^2	Yield
Panicles	-0.26	-0.00	-0.03	0.39	0.39
Spikelets per panicle	...	-0.43	-0.19	0.78	0.62
R%		...	0.48	-0.41	0.11
1000 grain weight			...	-0.22	0.21
Spikelets per m^2				...	0.84

Table 2 Correlation among yield and yield components from experiment 2 (Table 3).

	Spikelets per panicle	R%	1000 grain weight	Spikelets per m^2	Yield
Panicle	-0.83	-0.09	-0.42	0.00	-0.22
Spikelets per panicle	...	-0.25	0.27	0.53	0.50
R%		...	-0.10	-0.55	0.22
1000 grain weight			...	-0.13	0.08
Spikelets per m^2				...	0.64

The correlation among yield and its yield components from the experiment 1 and 2 as shown in table 1 and 2 can be expressed that yield are closely positive relation to the number of spikelets per unit area and number of spikelets per panicle than the other components.

2. Correlation among number of spikelets per panicle and others

Table 3 Number of spikelets per panicle and others from experiment 1.

	Panicles	Panicles/hill	Spikelets/panicle
Hill	0.66	-0.91	-0.62
Panicles	...	-0.50	-0.25
Panicles/hill		...	0.70

Table 4 Number of spikelets per panicle and others from experiment 2.

	Panicles	Panicles/hill	Spikelets/panicle
Hill	0.96	-0.93	-0.94
Panicles	...	-0.80	-0.81
Panicles/hill		...	0.98

The correlation among number of spikelets per panicle and other yield components in table 3 and 4. It was found that the number of spikelets per panicle have closely positive relation with number of panicle per hill. But have a negative relation with number of hill and number of panicles. It means that if the number of panicles per hill increase, the number of spikelets per panicle will be increased too. In opposite when the number of hill and number of panicle is increased, the number of spikelets per panicle will be decreased. In the case of these result, it is necessary to find out the optimum point which will obtained the highest yield of rice is very important counter measures.

3. Optimum number of hill and number of panicle for increasing spikelets per panicle

Table 5 show the data of number of hills per m^2, panicle per m^2 and spikelet per panicle are picked up from experiment 1 and 2 which using regular top-dressing plot.

Table 5

Expt.	Treatment	Plot No.	Number hill/m^2	Number panicle/m^2	Number spikelets per panicle
1	8-644	2	300	540	70.5
1	8-840	4	260	500	70.7
1	16-640	6	507	553	60.0
1	16-844	8	473	547	68.5
1	8-640	10	240	467	65.9
1	8-844	12	140	427	80.0
1	16-644	14	400	527	74.2
1	16-840	16	560	567	56.6
2	16-640	1	320	513	79.1
2	16L-840	4	240	384	76.1
2	240-840	6	600	640	45.6
2	24L-640	7	548	576	48.4
2	160-840	10	360	480	65.6
2	16L-640	11	204	392	85.7
2	240-640	13	693	733	46.7
2	24L-840	16	484	532	50.4

1. By computing with multiple regression analysis from the experiment 1 and 2 in accordance with the object of catching the optimum point of number of hill and number of panicle from the increasing of spikelets per panicle as shown by each steps of computing as follows.

2. Compute regression between number of hills and number of panicles.

$$\text{Panicle} = 330.279 + 0.489\ (\text{Hills})$$

$$R^2 = 0.809$$

$$R = 0.899$$

Estimate number of panicle from number of hills

Table 6

Seed rate kg/rai	Number hills/m^2	Estimate number panicle/m^2
4	100	379.2
8	200	428.0
12	300	476.9
16	400	525.8
20	500	574.7
24	600	623.6
28	700	672.4

3. Calculate multiple regression among number of hills per m^2, panicle per m^2 and number of spikelets per panicle.

Number spikelets per panicle = 97.237-0.062(hills)
-0.015 (panicle)

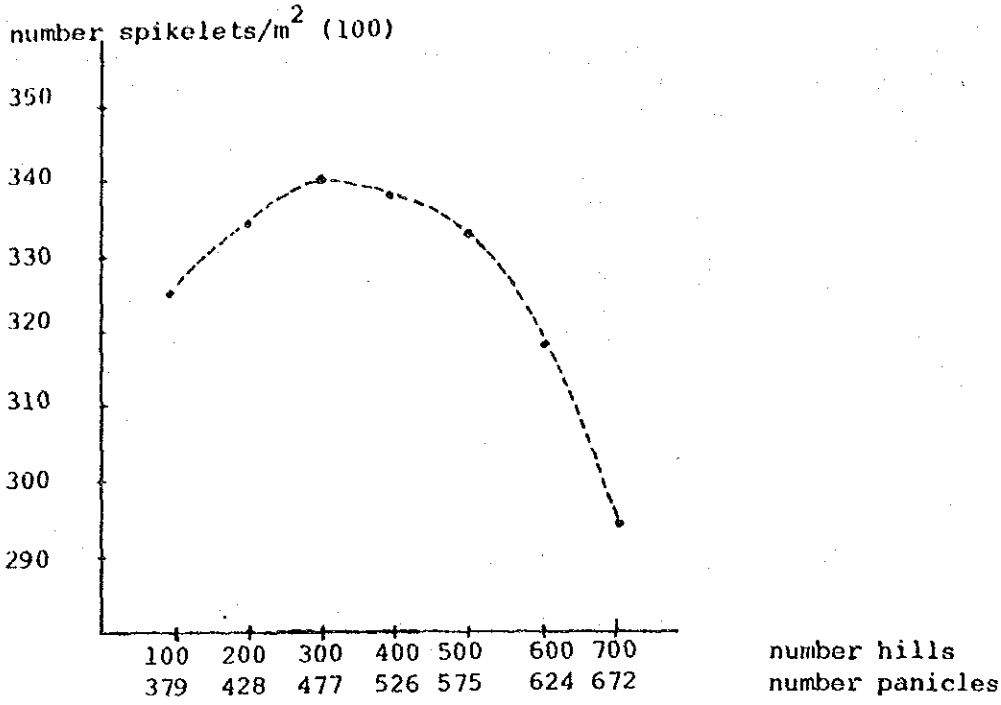
R^2 = 0.762

R = 0.873

Table 7

Seed rate kg/rai	Number hill per m^2	Number panicle per m^2	Estimate (Y)spikelet per panicle	Estimate number spikelet/m^2
4	100	379.2	85.5	32437
8	200	428.0	78.7	33670
12	300	476.9	71.8	34239
16	400	525.8	64.9	34135
20	500	574.7	58.0	33359
24	600	623.6	51.2	31911
28	700	672.4	44.3	29787

Figure 1. Multiple regression of number of hill, panicle and spikelets per m^2.



4. Compute optimum number of hills, panicles and spikelets per panicle.

The first, compute regression between number of hills and panicle from data of table 5 and estimate number of panicle. If number of hills per m^2 are 100, number of panicles/m^2 by estimate will be 379.2 (see table 6).

The second, compute multiple regression among number of hills, panicle and spikelets per panicle from data of table 5 and estimate number of spikelets per panicles. If number of hills are 100, panicles are 379.2, number of spikelets per panicle by estimate will be 85.5 (see table 7).

The last, number of spikelets per m^2 equals to number of spikelet per panicle multiplied by the number of panicle per m^2 (see table 7).

4. Conclusion

From Fig.1 this result shows clearly that if using 24 kg/rai of seed sowing, it may get about 600 hills, 600 panicles, 32000 spikelets per m^2 and about 50 grains of spikelet per panicle.

If using 4 kg/rai of seed sowing, it may get 100 hills, 400 panicles, 80 spikelets per panicle and 32000 spikelets per m^2.

If using 12-16 kg/rai of seed sowing, it may get 300 hills, 500 panicles, 70 spikelets per panicle and 34000 spikelets per m^2. This case gets more number of spikelets per unit on these experiments.

Of course, these result will be varied due to the change in many factors such as amount of fertilizer, soil fertility, management, cultivation techniques and weather conditions, but it is very beneficial to distinguish the result by emphasising the trials on finding out the optimum point to achieve the targeted yield.

Expt. 3

Different quantities of calper coating on rice seed for germinated direct broadcasting rice under submerged condition field.

(Dry season,1983)

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This experiment was designed to study on the effect of Calper (Calcium per oxide) coated seeds with different quantities on the germinating ability, under submerged condition growth and yield of broadcasting rice method.

Materials and Method

1. Variety RD 23
2. Design Latin square
3. Plot size 4mx2m = $8m^2$, total $8m^2$x16 plots = 128 m^2
4. Treatment

	Calper	Seed/plot(gm)	Calper/plot(gm)
A)	0%	80	0
B)	60%	80	48
C)	80%	80	64
D)	100%	80	80

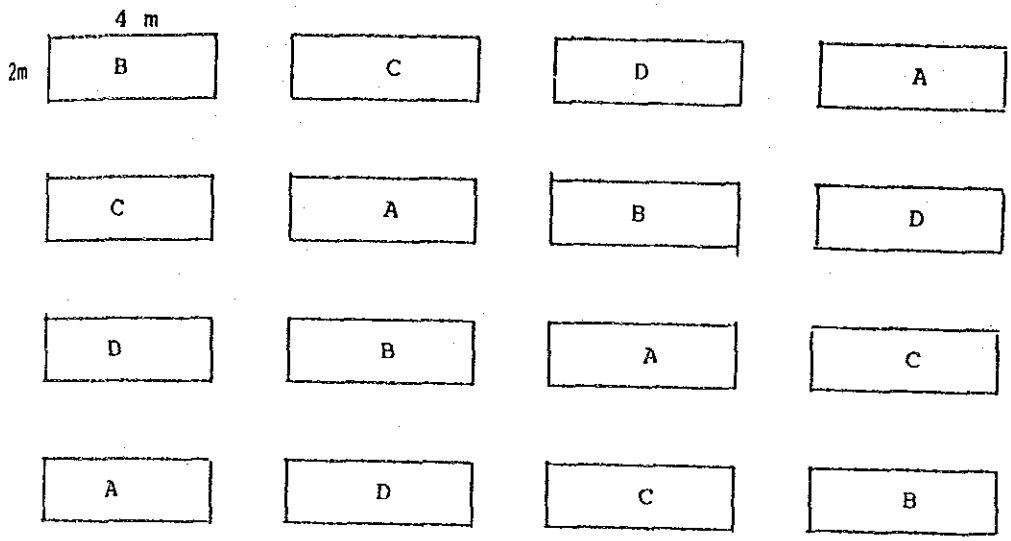
5. (1) Sowing Apr 7, 1983
   (2) P.I.S. stage May 30, 1983
   (3) Heading Jun 25, 1983
   (4) Harvesting Jul 27, 1983

6. Management

This experiment was conducted at Suphan Buri Rice Experiment Station in dry season 1983. The seeds were soaked in fresh water for 12 hrs. and incubated for 24 hrs., after that the seeds was coated with Calper dust. The field was prepared by power tiller, 2 times of ploughing and puddling. The last puddling and leveling, the water was kept at 1-2 cm depth. Sowing of coated seed was done immediately after last

puddling. Pre emergenced granular weedicide (Saturn-G) was applied at the rate 5 kg/rai at 8 days after seed sowing. Furadan 3% G 15 kg/rai was applied twice at 11 and 46 days after sowing. Basal application of fertilizer at the rate of 8 and 6 kg/rai of N and 6 kg/rai of P_2O_5 were applied at 19 days. Top dressing of fertilizer was done at P.I.S. stage with 6 kg/rai of N.

Lay-out



Result

1. Germination ability of seed

Number of germinated seed was investigated at 12 days after sowing as shown in table 1 and 2, indicating that all treatments were non statistically significant that it is number of germinated seed of treatment C (coated with Calper dust 80% by seed weight) which gave higher than other treatments and treatment B (coated with Calper dust 60% by seed weight) gave the lowest. However, this experimental result was shown not-significant difference among treatments, it might be

due to the effect of water level which became dry up as general condition within 2 days after sowing.

2. Yield

On table 3 and 4 shown, for the yield which obtained from 8 square metres, it was found that, among treatments, yield of paddy have no significant different in statistical analysis. The average yield of treatment C, B, D and A were 7502.19, 7487.19, 7465.63 and 7410.63 kilogrames per hecta respectively.

Table 1 Number of germinated seed (30x50 cm)

Row \ Column	1	2	3	4
1	49.5 (B)	73.0 (C)	46.0 (D)	62.5 (A)
2	53.5 (C)	65.5 (A)	40.5(B)	67.5 (D)
3	54.0 (D)	51.5 (B)	52.0(A)	53.5 (C)
4	48.5 (A)	53.0 (D)	52.0(C)	39.5 (B)
Mean	A = 57.1	B = 45.2	C = 58.0	D = 55.1

Table 2 Analysis variance of number of germinated seed

Variat	DF	S.S	MS	F
Row	3	224.7	74.9	
Column	3	384.3	128.1	
Treatment	3	414.1	138.0	3.3 ns
Error	6	247.0	41.1	
Total	15	1270.2		

CV = 11.90 %

Table 3 Yield 1

Row \ Column	1	2	3	4
1	7278.7 (B)	7598.7 (C)	7503.7 (D)	7480.0 (A)
2	7645.0 (C)	7422.5 (A)	7533.7 (B)	7578.7 (D)
3	7196.2 (D)	7626.2 (B)	7233.7 (A)	7588.7 (C)
4	7506.2 (A)	7583.7 (D)	7176.2 (C)	7510.0 (B)
Mean	A = 7410.63	B = 7487.19	C = 7502.19	D = 7465.63

Table 4 Analysis variance of yield

SOV	DF	S.S	M.S	F
Row	3	38878.52	12959.51	
Column	3	112750.39	37583.46	
Treatment	3	19297.27	6432.42	0.19
Error	6	203442.19	33907.03	
Total	15	374368.19		

CV = 2.5%

Expt. 4

Different quantities of Calper coating on rice seed for germinated direct broadcasting rice under general condition field.

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The purpose of this trial was as same as experiment 3, but the field condition, according to recommended practice for germinated direct broadcasting rice, was that all water is completely drained out of the field before seed sowing.

Material and Method

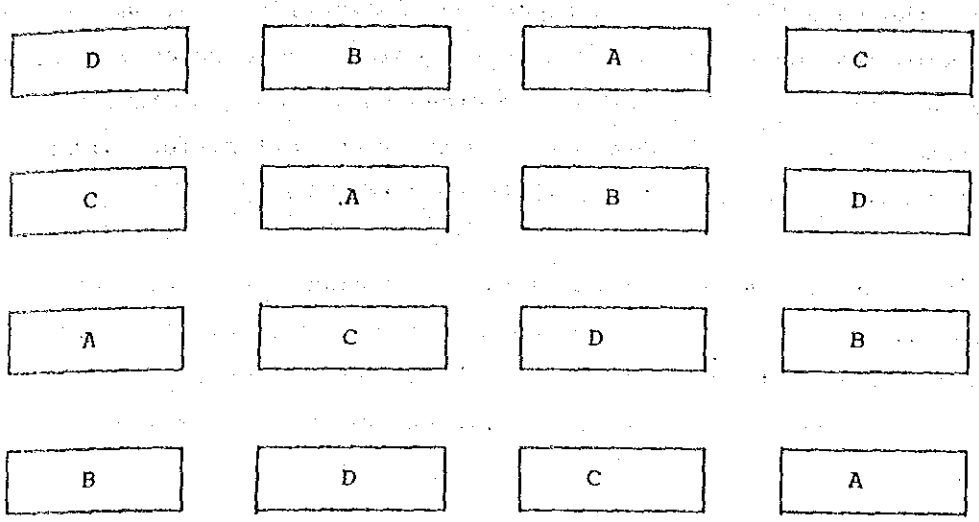
1. Variety RD 23
2. Design Latin square
3. Plot size 4m x 2m = $8m^2$, total $8m^2$ x 16 plots = 128 m^2
4. (1) Sowing Apr 7, 1983
   (2) P.I.S. stage May 30, 1983
   (3) Heading Jun 23, 1983
   (4) Harvesting Jul 27, 1983
5. Treatment

	Calper(%)	Seed/plot(gm)	Calper/plot(gm)
A)	0	80	0
B)	60	80	48
C)	80	80	64
D)	100	80	80

6. Management

This experiment was managed as same as Expe.3 in every aspects such as land prepared, seed rate Calper Dust coating, fertilizer application, insecticide application, weedicide application, etc. but the difference was that field condition which drained out the water from soil surface and control plot (non-coated seed) was sown at 1 day after leveling.

7. Lay-out



Result

1. Germination ability of seeds.

At table 1 and 2 show that, the number of germinated seed of treatment B (60% Calper Dust coating) gave higher than other treatments, but among treatments were no significant differences. The number of germinated seed was investigated from 30x50 cm of sampling area at 12 days after sowing.

2. Yield

In table 3 and 4, it is seen that the analysis of yield gave the similar tendency as Expt.3. There were no significant differences among the treatments. But treatment A gave higher yield than other treatments. It was 7,270.13 kg/ha. By this experimental result, it was found that Calper Dust does not play any important role in the increasing of the seed germinating ability under general recommended practice for germinated direct broadcasting rice.

Discussion

From the result obtained in experiment 3 and 4, it shows no difference among treatments (coated or non coating of Calper dust) in seed germinating ability any yield. In the case of submerged condition, it might be due to the effects of natural draining out of water from soil surface within 2 days. The sowed seed still had ability to germinate.

Especially for general practice by Thai farmers in germinated direct broadcasting rice method as recommended by the department of Agriculture, it is not necessary to coat the seed with Calper dust because under that condition, Oxygen is available and sufficient enough in germinating of rice seed.

Table 1 Number of seed germinated (Sample 30x50 cm)

Column / Row	1	2	3	4
1	58.5(D)	64.0(B)	50.5(A)	57.5(C)
2	53.0(C)	71.5(A)	72.0(B)	41.5(D)
3	53.0(A)	72.0(C)	59.0(D)	66.5(B)
4	72.0(B)	81.5(D)	53.0(C)	71.0(A)
Mean	A=61.5	B=68.6	C=58.8	D=60.1

Table 2 Analysis Variance of Number of seed germinated

SOV	DF	SS	MS	F
Row	3	319.4	106.4	
Column	3	530.6	176.8	
Treatment	3	228.4	76.1	0.7 ns
Error	6	632.9	105.4	
Total	15	1711.4		

CV = 16 %

Table 3 Yield

Column / Row	1	2	3	4
1	6605.0(D)	7791.2(B)	7603.7(A)	7180.0(C)
2	7660.0(C)	7068.7(A)	7161.2(B)	7336.2(D)
3	7926.2(A)	7841.2(C)	7170.0(D)	7081.2(B)
4	7440.0(B)	8250.0(D)	8082.5(C)	8282.5(A)
Mean	A=7720.31	B=7368.44	C=7690.94	D=7340.31

Table 4 Analysis variance of yield

Variat	DF	S.S	M.S	F
Row	3	1359216.41	453072.14	2.04
Column	3	249489.84	83163.28	0.37
Treatment	3	496814.06	165604.69	0.75
Error	6	1332342.19	222057.03	
Total	15	3437862.50		

CV = 6.3%

Exp. 5

Effect of weed control and seedling take-off on the Calper dust seed coating and non coated seed for germinated direct broadcasting rice.

Dry season 1983

Mr. Vichien Sasiprapa
Mr. Opart Chantasuk
Dr. Tetsujiro Sugahara

This trial was conducted for the purpose of reaffirmation of the past experimental results which show some tendencies in improving of cultivation technique for germinated direct broadcasting rice by means of seedling take off to make line and to control weed by weedicide for the success of stable high yield.

Material and Method

1. Variety RD 23
2. Design Split plot design 3 replications
3. Seed rate 16 kg/rai
4. Treatment
   - Main plot general method and Calper dust coated seed method
   - Sub plot
     - Line making (40 cm.seedling belt and 20 cm space)
     - Non-weeding (control)
     - Weed control
   - Area 8000 square meters
5. Fertilizer
   - Basal (N-P-K) 8-6-0 at Apr 26, 1983
   - Top dressing at P.I.S. stage (4 kgN/rai)

6. Line making

- Twice at Apr 26, 1983 and May 3, 1983

7. Weedicide

- Saturn-G 5 kg /rai at 10 days after sowing
- Hand weeding one time of line making treatment

8. (1) Sowing Apr 12, 1983
(2) P.I.S. stage Jun 2, 1983
(3) Heading Jun 30~Jul 2, 1983
(4) Harvesting Aug 3, 1983

9. Management

Land preparation was done by 85 Hp tractor, plowing twice and one time puddling and leveling. The seed was soaked in fresh water for 12 hrs. and incubated for 24 hrs., after that the seeds was coated with Calper dust with the rate of 1:1 of seed weight. But for the general method, seed was incubated for 48 hrs. The coated seed and non coated seed was sowing to the drained field condition. After seedling, well established pre-emergence weedicide (Saturn-G) was applied at 10 days after sowing on the shallow water level field. Basal fertilizer application was done at 2 weeks after sowing at the rate of 8-6-0 kg/rai. Furadan 3%G was applied 5 kg/rai, twice at 16 and 45 days after sowing. Top dressing of nitrogen fertilizer was done at P.I.S. stage at the rate of 4 kgN/rai.

Result

The highest yield was obtained from the weed control and Calper dust coated seed plot (6012.9 kg/ha). The lowest yield was non weeding and non coated seed plot (4355.7 kg/ha) The methods mean yield were 5350.9 and 5661.5 kilograme per hectare of general germinated direct broadcasting and Calper dust coated seed method respectively.

For sub mean yield the results are as followed, line making plot 5878.5, weed control plot 5872.0 and non weedling plot 4768.2 kilograme per hectare.

From the table of analysis of variance, it was found that the general method and coated seed method was not significant different in yield. But the yield were highly significant different at 1% level between line making and weed control with non weeding plot.

Table 1 Data of yield (kg/ha)

Treatment Main	Block / Sub	1	2	3	Treatment Mean	Main Mean
No Calper	Line	5650.37	6429.87	5817.75	5966.00	
	No weeding	4081.37	4687.00	4298.62	4355.66	5350.91
	Weeding	5923.75	6223.00	5046.50	5731.08	
Calper	Line	6060.00	5737.12	5575.87	5791.00	
	No weeding	6068.75	5232.00	4241.37	5180.70	5661.52
	Weeding	6552.12	5437.62	6048.87	6012.87	

Sub mean Line = 5878.50 No weeding = 4768.18 Weeding = 5871.97

Table 2 Analysis of yield

Variation	D.F	S.S	M.S	F	
Block	2	1037334.44			
Main	1	434156.68	434156.68	0.65	ns
Error (a)	2	1318872.77	659436.38		
Sub	2	4902384.82	2451192.41	14.69	**
M x S	2	751931.26	375965.63	2.25	ns
Error (b)	8	1334735.59	166841.94		
Total	17	9779415.57			

Table 3 DMRT

Sub	Mean	different		1% level
Line	5878.50	-		a
Weeding	5871.97	6.52 ns	-	a
No weeding	4768.18	1110.31 **	1103.79 **	b

Exp. 1 Effect of different seed rate and nitrogen fertilizer to the growth and yield of germianted broadcasting rice

(1983 wet)

Mr. Vichien Sasiprapa
Mr. Opart Chantasuk
Dr. Tetsujiro Sugahara

This experiment was carried out to clarify the effect on yield of paddy from different seed rates (4, 8 and 16 kg/rai) times and rates of nitrogen application at different stages such as puddling, 15 days after sowing for basal application and at Panicle Initiation Stage (P.I.S.), Young Panicle formation Stage (Y.P.S.) and Heading Stage.

Material and method

1. Variety R.D. 23
2. Design L27 factorial design
3. Plot 4x8 = 32 m^2 Total 32x27 = 864 m^2
4. Sowing 6th September 1983
   P.I.S. 1st November 1983
   Heading 16th-19th November 1983
   Harvest 21st-26th December 1983
5. Treatment

Plot No.	Seed rate kg/rai	Basal		Top dressing		
		puddling	15 days after sowing	P.I.S.	Y.P.S.	Heading
1.	16	6	-	6	-	-
2.	16	6	-	-	6	-
3.	16	6	-	-	3	3
4.	16	-	6	6	-	-
5.	16	-	6	-	6	-
6.	16	-	6	-	3	3
7.	16	3	3	6	-	-
8.	16	3	3	-	6	-
9.	16	3	3	-	3	3
10.	8	6	-	6	-	-
11.	8	6	-	-	6	-
12.	8	6	-	-	3	3
13.	8	-	6	6	-	-
14.	8	-	6	-	6	-
15.	8	-	6	-	3	3
16.	8	3	3	6	-	-
17.	8	3	3	-	6	-
18.	8	3	3	-	3	3
19.	4	6	-	6	-	-
20.	4	6	-	-	6	-
21.	4	6	-	-	3	3
22.	4	-	6	6	-	-
23.	4	-	6	-	6	-
24.	4	-	6	-	3	3
25.	4	3	3	6	-	-
26.	4	3	3	-	6	-
27.	4	3	3	-	3	3

Note: Phosphate supply at puddling time 6 kg/rai
P.I.S.=Panicle initiation stage Y.P.S.=Young panicle formation (15mm)stage

6. Management Saturn G 5 kg/rai 12 days after sowing
   Furadan 5 kg/rai 15 days after sowing

1 9 8 3 W E T

1. Effect of different seed rate and nitrogen fertilizer to the growth and yield of germinated broadcasting rice
2. Effect of seed rates, times and rates of nitrogen application, coated and uncoated seed with Calper (Calcium peroxide) on yield of germinated broadcasting rice
3. Effect of the rice yield of different methods in cultivation of germinated direct sowing
4. Comparison of different methods of cultivations on the yield of rice

Result

1. Growth

Number of tillers were investigated in 50x50 cm. sampling area on 25,35,45 days after sowing and that result was given in table 1 and figure 1.

It was found that Maximum tillering stage was at 25 days after sowing on 16 kg seed plots and other 8, 4 kg seed plots were at 35 days after sowing. Number of tillers decreased at 45 days after sowing in all plots.

Table 2 shown by F test of each stage for number of tiller, at 25 days there was significant on seed rates and basal treatments that it is compared with mean number of tillers. It shows that, seed rate 16 kg > 8 kg > 4 kg/rai and basal treatments 06>60>33 but at 35, 45 days, they were not significant different among treatments.

2. Yield

Table 3 and figure 2 shown of yield which sampling and calculated from 8 square metres per treatment.

From this experimental result showed that among seed rate treatments, it was 10% significant and seed rate of 4 kg/rai plot had more yield than the other seed rate, 5% level of significant was observed among times of nitrogen application basal dressing at 15 days. After sowing, there was better yield than the before sowing plot and for top dressing times, the best P.I.S. plot.

Although basal and top dressing of nitrogen fertilizer showed an interaction as in table 4 and figure 3, the best yield was obtained from basal dressing at 15 days after sowing with top dressing at P.I.S. (Panicle Initiation Stage). The worst results were B3C3 plots which are splitted 4 times 3 kg/rai each of nitrogen fertilizer application at puddling 15 DAS, Y.P.S. and Heading Stages.

3. Yield components

Yield components sample taken in 50x50 cm. area and results are given in table 5-6

1) Number panicles per square metre

Number panicles are significant at 5% by seed rate, 16 kg/rai are more number panicles than 8,4 kg/rai. Among nitrogen treatments, there are not significant different for number of panicles.

2) Number of spikletes per panicle

This item is more clearly different among treatments because the higher number of spikletes per panicle was 4 kg seed rate, next and 16 kg seed rate respectively. The effect of top dressing for number of spikletes was highest in P.I.S. plots than the others.

3) Ripening percentage (R%)

Top dressing nitrogen effected for R% namely P.I.S. application N plot are lower in R? than the other plots that, when it was higher in number of spikletes it will be caused in lower of R%

4) *Weight of 1,000 grains*

Weight of 1,000 grains was light on 4 kg seed rate plot because 4 kg seed rate plot had *many* number spikletes per panicles.

5) Calculation yield from yield-components

Calculation yield was significant on seed rate that is 4 kg seed rate has more yield than 8 and 16 kg seed rate.

4. Correlation among yield components

Correlation among yield components showed on table 7. Yield *more close positive* relation were number of spikletes per unit area, next were spikletes per panicle and number of panicles per unit area.

So, for increasing of ricr yield, the increasing of number of spikletes per unit area are necessary because the number of spikletes per unit area has close relation to the spikletes per panicle, and spikletes per panicle has close relation to the panicle per hill also.

Table 1 Number of tillers per square meter

Plot No.	Seedling	25 days A.S.	35 days A.S.	45 days A.S.	Panicles
1	320	352	372	344	296
2	320	360	420	364	324
3	320	476	468	404	332
4	320	728	536	432	368
5	320	760	540	452	388
6	320	536	416	412	340
7	320	408	364	324	284
8	320	460	436	416	328
9	320	368	392	360	320
Sub mean	320	494	438	390	331
10	160	284	292	260	208
11	160	264	308	304	292
12	160	240	324	276	224
13	160	388	540	416	332
14	160	352	404	340	268
15	160	392	440	388	284
16	160	500	500	436	336
17	160	280	340	316	280
18	160	312	380	324	304
Sub mean	160	334	392	340	280
19	80	156	304	280	240
20	80	320	512	464	352
21	80	204	388	368	304
22	80	276	424	408	312
23	80	232	352	344	284
24	80	200	388	380	308
25	80	88	320	316	288
26	80	232	240	236	180
27	80	232	500	484	328
Sub mean	80	216	381	364	288
Mean	187	348	404	365	300

Figure 1 Number of tillers per square meter

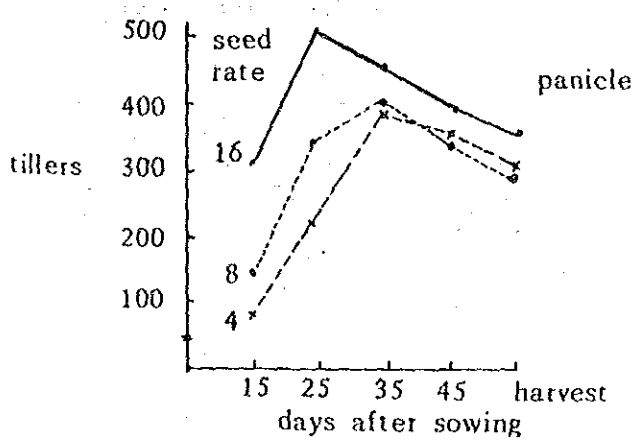


Table 2 Analysis of number of tillers

Days after sowing		25	35	45	F Value
Seed rate	(A)	25.2 **	1.7 ns	1.2 ns	F(.05)=4.46
Basal N	(B)	7.1 *	2.8 ns	1.7 ns	F(.01)=8.61
Top N	(C)	0.4 ns	0.1 ns	0.2 ns	

F Test significant (25 days after sowing) mean of number tillers

level		1	2	3	
Seed rate	(A)	494 a	335 a	216 b	L.S.D.(.05)=111
Basal N	(B)	295 b	433 a	316 b	L.S.D.(.01)=162

Table 3 Relation of seed rate, basal N, top dressing N and yield

Factor/level		1	2	3
Seed rate	(A)	16	8	4
Basal N	(B)	6-0	0-6	3-3
Top N	(C)	6-0-0	0-6-0	0-3-3

Analysis of yield (kg/ha)

Variation	d.f.	S.S.	M.S.	F
A	2	295476.5	147738.3	4.25 * (10% level)
B	2	511744.3	255872.1	7.37 *
C	2	519582.5	259791.3	7.48 *
AB	4	207225.7	51806.4	1.49 ns
AC	4	234678.8	58669.7	1.69 ns
BC	4	594433.7	148608.4	4.28 *
Error	8	277787.0	34723.4	

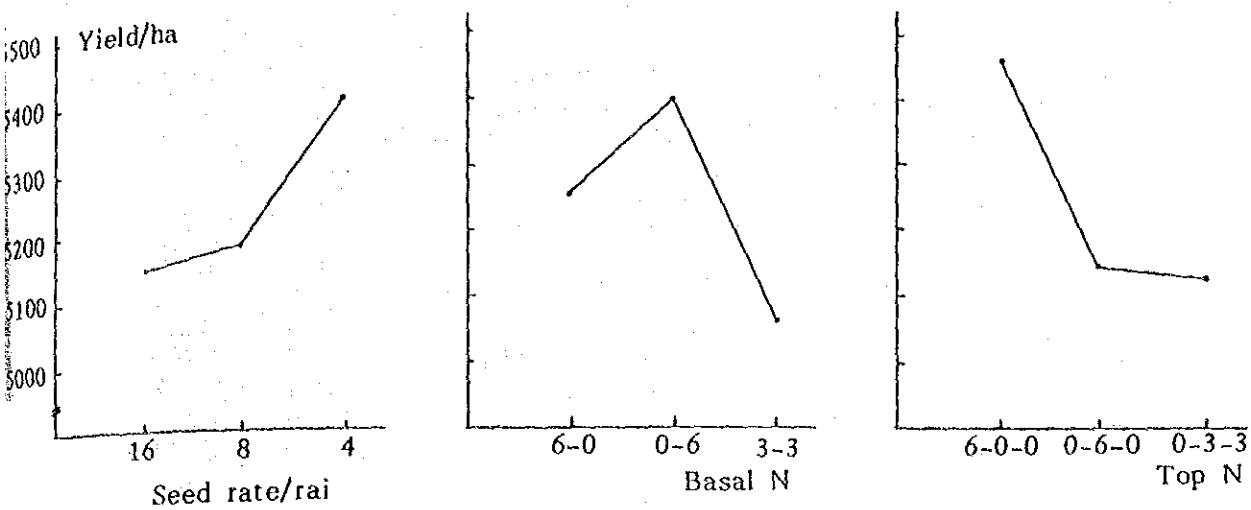
F(2,8 ; .05) = 4.46 F(2,8 ; .01) = 8.65
F(4,8 ; .05) = 3.84 F(4,8 ; .01) = 7.01

Mean of yield

Factor/level		1	2	3
Seed rate	(A)	5132 b	5173 b	5372 a
Basal N	(B)	5252 ab	5380 a	5046 b
Top N	(C)	5421 a	5147 b	5110 b

L.S.D.(.05) = 248.1 L.S.D.(.01) = 360.9

Figure 2 Relation of seed rate, nitrogen basal and top dressing for rice yield



Yield and seed rate Yield and basal N yield and top N

Table 4 Interaction between nitrogen basal and top dressing for yield

Yield (kg/ha)

Basal (B)	Top (C)	Seed rate (A) 16	8	4	Mean	Mark Basal	Top
1	1	4884	5358	5792	5345	60	600
1	2	4930	5064	5345	5113	60	060
1	3	5279	5244	5375	5299	60	033
2	1	5811	5455	6014	5760	06	600
2	2	5152	5008	5200	5120	06	060
2	3	5158	5214	5413	5262	06	033
3	1	4976	5207	5296	5160	33	600
3	2	5192	5003	5431	5209	33	060
3	3	4814	5012	4486	4771	33	033
Mean		5132	5173	5372	5226		

Figure 3 Interaction between nitrogen basal and top dressing for yield

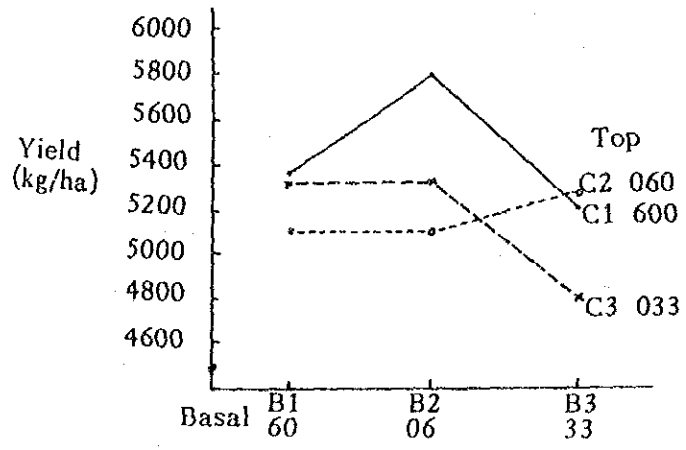


Table 5 Yield components

Plot No.	Panicles/ m^2	Spikletes/ panicle	R%	Weight 1,000 grains	Yield/ m^2	Spikletes/ m^2
1	296	65.5	75.0	29.3	425.4	19376
2	324	57.1	86.6	29.0	464.5	18500
3	332	66.2	86.5	29.5	561.9	21984
4	368	74.5	71.1	30.8	600.4	27420
5	388	68.4	85.3	27.9	631.0	26540
6	340	67.3	87.0	29.2	581.8	22872
7	284	69.9	66.4	28.2	371.4	19840
8	328	56.5	83.8	29.4	456.2	18536
9	320	57.0	88.9	29.5	478.2	18240
10	208	90.3	78.9	29.2	431.9	18776
11	292	99.1	79.9	28.9	669.0	28994
12	224	81.7	80.6	31.3	461.8	18308
13	332	94.8	73.0	29.9	687.9	31472
14	268	76.0	80.6	30.3	496.8	20360
15	284	83.4	82.9	29.6	582.1	23692
16	336	85.7	82.0	31.2	736.5	28800
17	280	90.8	83.8	28.6	610.0	25436
18	304	74.5	84.6	29.7	570.2	22656
19	240	115.9	76.9	28.4	606.3	27804
20	352	110.7	84.4	28.4	932.8	38952
21	304	108.7	83.6	28.5	786.7	33040
22	312	112.8	77.9	29.0	795.6	35180
23	284	96.6	83.5	28.7	657.9	27444
24	308	85.9	81.2	28.6	614.7	26472
25	288	113.0	76.1	27.9	690.0	32544
26	180	109.6	81.4	27.9	448.5	19724
27	328	110.5	80.9	28.2	826.7	36236
Mean	300	86.0	80.8	29.2	599.1	25524

Table 6 Analysis of yield components

6-1 Number of panicles

Variation	d.f.	S.S.	M.S.	F
A	2	13199.5	6599.8	5.2 *
B	2	5882.3	2941.1	2.3 ns
C	2	360.5	180.3	0.1 ns
AB	4	9126.0	2281.5	1.8 ns
AC	4	4621.3	1155.3	0.9 ns
BC	4	14104.0	3526.0	2.8 ns
Error	8	10163.3	1270.4	

$F(2,8 ; .05) = 4.46$ $F(2,8 ; .01) = 8.65$
$F(4,8 ; .05) = 3.84$ $F(4,8 ; .01) = 7.01$

Mean Factor/level		1	2	3	
Seed rate	(A)	331.1 a	280.9 b	288.4 b	L.S.D. (.05) = 47.5

6-2 Spikletes per panicle

Variation	d.f.	S.S.	M.S.	F
A	2	8078.0	4039.0	87.4 **
B	2	77.4	38.7	0.8 ns
C	2	437.0	218.5	4.7 *
AB	4	471.1	117.9	2.6 ns
AC	4	119.7	29.9	0.6 ns
BC	4	141.1	35.3	0.8 ns
Error	8	369.6	46.2	

Mean

Factor/level		1	2	3	
Seed rate	(A)	64.7 c	86.3 b	107.1 a	L.S.D. (.05) = 9.0
Top N	(C)	91.4 a	85.0 b	81.7 b	L.S.D. (.01) = 13.2

6-3 Ripening percentage (R%)

Variation	d.f.	S.S.	M.S.	F
A	2	1.5	0.8	0.1 ns
B	2	5.4	2.7	0.5 ns
C	2	424.3	212.1	37.6 **
AB	4	51.1	12.8	2.3 ns
AC	4	164.1	41.0	7.3 **
BC	4	11.6	2.9	0.5 ns
Error	8	45.1	5.6	

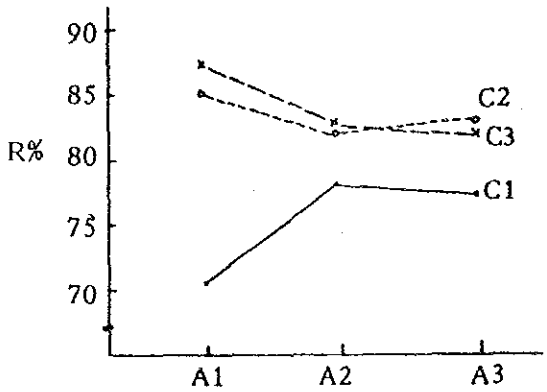
Mean

Factor/level		1	2	3	
Top N	(C)	75.3 b	83.3 a	84.0 a	L.S.D. (.01) = 4.6

6-4 Interaction between seed rate and top N for ripening percentage

Seed rate(A)	Top N(C)	Basal (B) 6-0	0-6	3-3	Mean	Mark Seed	Top
1	1	75.0	71.1	66.4	70.8	16	600
1	2	86.6	85.3	83.8	85.2	16	060
1	3	86.5	87.0	88.9	87.5	16	033
2	1	78.9	73.0	82.0	78.0	8	600
2	2	79.9	80.6	83.8	81.4	8	060
2	3	80.6	82.9	84.6	82.7	8	033
3	1	76.9	77.9	76.1	77.0	4	600
3	2	84.4	83.5	81.4	83.1	4	060
3	3	83.6	81.2	80.9	81.9	4	033

Figure 4 Interaction between seed rate and top N for ripening percentage



6-5 Weight of 1,000 grains

Variation	d.f.	S.S.	M.S.	F
A	2	9.6	4.8	4.6 *
B	2	0.6	0.3	0.3 ns
C	2	1.8	0.9	0.9 ns
AB	4	0.4	0.1	0.1 ns
AC	4	0.7	0.2	0.2 ns
BC	4	1.8	0.5	0.4 ns
Error	8	8.3	1.0	

Mean

Factor/level		1	2	3	
Seed rate	(A)	29.2 ab	29.9 a	28.4 b	L.S.D. (.05)=1.4

6-6 Calculation yield from yield components

Variation	d.f.	S.S.	M.S.	F
A	2	181234.0	90617.0	7.3 *
B	2	12228.5	6114.2	0.5 ns
C	2	890.9	445.4	0.0 ns
AB	4	77309.4	19327.4	1.6 ns
AC	4	24399.4	6099.8	0.5 ns
BC	4	104360.0	26089.9	2.1
Error	8	99289.6	12411.2	

Mean

Factor/level	1	2	3	
Seed rate (A)	507.8 b	582.9 b	706.6 a	L.S.D.(.05)=148.3

Table 7 Correlation of yield components

Yield-components	Spikletes/panicle	R%	1,000 grains weight	Yield/m^2	Spikletes/m^2	Panicle/hill
Panicles/m^2	-0.335	0.168	0.073	0.439	0.379	-0.010
Spikletes/panicle	---	-0.223	-0.389	0.652	0.738	0.827
R%		---	-0.03	0.126	-0.116	0.002
1,000 grains weight			---	-0.183	-0.288	-0.410
Yield/m^2				---	0.962	0.789

Table 8 Exp. 1 Extra plots as reference data

8-1 Treatment and yield

Seed rate	Basal	Top		Yield/ha	
		P.I.S.	Heading		
16	08	8	0	5611	Lodging
16	08	4	4	5927	
16	00	0	0	3678	
8	00	0	0	3939	
4	00	0	0	3600	

8-2 Yield components

Plot	Panicle/m^2	Spikletes/ panicle	R%	1000 GW	Y/m^2	Spikletes/m^2
16-08-80	276	108.2	81.2	29.9	725.2	29864
16-08-44	312	89.4	81.3	28.7	651.6	27900
16-00-00	328	51.2	68.7	27.9	322.0	16804
8-00-00	228	99.4	71.6	28.4	459.8	22660
4-00-00	160	109.4	70.8	29.6	366.5	17508

Exp. 2 Effect of seed rates, times and rates of nitrogen application, coated and uncoated seed with Calper (Calcium peroxide) on yield of germinated broadcasting rice

(1 9 8 3 wet)

Mr. Vichien Sasiprapa
Mr. Opart Chantasuk
Dr. Tetsujiro Sugahara

This experiment was aimed at finding out the yield of rice obta obtained from different seed rates (6 and 8 kg/rai), Calper 50% coat to seed (0 and Calper), basal notrogen (4 and 8 kg/rai) and top dressing (4:4, 8:0 kg/rai) with factorial "L 16" design.

Material and method

1. Variety R.D. 23
2. Design L16 factorial design
3. Plot 10x4 = 40 m^2 Total 40x16 = 640 m^2
4. Sowing 6th September 1983
   P.I.S. 2nd November 1983
   Heading 19th November 1983
   Harvest 26th December 1983
5. Treatment

Replication	No.	Plot name	A seed	B Calper	C Basal N	D P.I.S.	D Heading	Total N
1	1	60-444	6	0	4	4	4	12
	2	60-880	6	0	8	8	0	16
	3	6C-480	6	Ca	4	8	0	12
	4	6C-844	6	Ca	8	4	4	16
	5	80-480	8	0	4	8	0	12
	6	80-844	8	0	8	4	4	16
	7	8C-444	8	Ca	4	4	4	12
	8	8C-880	8	Ca	8	8	0	16
2	9	60-480	6	0	4	8	0	12
	10	60-844	6	0	8	4	4	16
	11	6C-444	6	Ca	4	4	4	12
	12	6C-880	6	Ca	8	8	0	16
	13	80-444	8	0	4	4	4	12
	14	80-880	8	0	8	8	0	16
	15	8C-480	8	Ca	4	8	0	12
	16	8C-844	8	Ca	8	4	4	16

Note: 1. Calper quantity is 50% of dry seed weight
2. Basal P, 6 kg P_2O_5 /rai

6. Management Saturn G 5kg/rai 12 days after sowing
   Furadan 5kg/rai 15 days after sowing

Result

Yield

Result of yield showed in table 1 and analysis of variance in table 2. Due to this experiment has small number of treatments and the effect among each treatment are not greater enough to get significant difference in yield of rice. But it showed the tendency of higher yield in the plot which have a basal dressing of nitrogen fertilizer at higher rate than the lower one and the effect of Calper coated to seed showed better rice yield than non-coated seed plots.

Table 1 Yield and analysis

No. plot	A	B	C	D		Yield/ha
				1	2	
1	6	0	4	4	4	4853
2	6	0	8	8	0	5717
3	6	Ca	4	8	0	5243
4	6	Ca	8	4	4	5765
5	8	0	4	8	0	5476
6	8	0	8	4	4	5644
7	8	Ca	4	4	4	4944
8	8	Ca	8	8	0	5364
9	6	0	4	8	0	4746
10	6	0	8	4	4	4664
11	6	Ca	4	4	4	4951
12	6	Ca	8	8	0	5273
13	8	0	4	4	4	4991
14	8	0	8	8	0	4334
15	8	Ca	4	8	0	4758
16	8	Ca	8	4	4	5350

Table 2 Analysis of yield

Variation	d.f.	S.S.	M.S.	F
Total	15	2567375.94		
Block	1	969732.56	969732.56	6.75 ns
Seed (A)	1	7700.06	7700.06	0.05 ns
Calper (B)	1	93483.06	93483.06	0.65 ns
Basal (C)	1	288637.56	288637.56	2.01 ns
Top N (D)	1	3937.56	3937.56	0.03 ns
AB	1	102560.06	102560.06	0.71 ns
AC	1	76038.06	76038.06	0.53 ns
AD	1	189878.06	189878.06	1.32 ns
BC	1	152685.56	152685.56	1.06 ns
BD	1	15190.56	15190.56	0.11 ns
CD	1	92872.56	92872.56	0.65 ns
Error	4	574660.25	143665.06	

$F(1,4 ; .05) = 7.71$ $F(1,4 ; .01) = 21.2$

Mean of yield

Factor/level		1		2	
Seed rate	(A)	6kg	5152	8kg	5108
Calper	(B)	0kg	5053	Ca	5206
Basal N	(C)	4kg	4995	8kg	5264
Top N	(D)	4:4	5145	8:0	5114

Exp. 3 Effect of the rice yield of different methods in cultivation of germinated direct sowing

(1983 wet)

Mr. Vichien Sasiprapa
Mr. Opart Chantasuk
Dr. Tetsujiro Sugahara

This experiment was carried out to compare different methods of direct sowing, that is "General broadcasting", "Calper coating seed broadcasting" and "Calper coating seed drilling by row seeder".

Material and method

1. Variety R.D. 23
2. Design RCB 3 replications
3. Plot 30x10 = 300 m^2 Block = 900 m^2 Total = 2700 m^2
4. Sowing 1st September 1983
   P.I.S. 2nd November 1983
   Heading 21st November 1983
   Harvest 26th December 1983
5. Seed rate and fertilizer : Seed rate 8.0 kg/rai
   Seeder 5.7 kg/rai
   Calper quantity is 50% of dry seed

   Fertilizer : Water level high in field could not supply basal. Top dressing on P.I.S. gave N-8kg and P-6kg/rai and Heading N-4kg.
6. Treatment
   G = Broadcasting general method
   R = Broadcasting Calper coating seed by roller
   S = Calper coating seed by row seeder machine
7. Management
   Saturn G 5 kg/rai 12 days after sowing
   Furadan 5 kg/rai 15 days after sowing

Result

Yield and analysis of yield

This experiment yields were not significant. General menthod is as same as roller with Calper coating seed but seeder plot was less yield because of unskillfulness due to first used machine, so germination of seed are not good and inirrigular spacing of row.

Table 1 Yield and analysis of yield per hectare

Treatment/block	1	2	3	Mean
General	4888	5366	4843	5032
Seeder with Calper	4789	4320	4553	4554
Roller with Calper	4860	4713	4948	4840

Analysis of yield

Variation	d.f.	S.S.	M.S.	F
Block	2	6590.88	3295.44	
Treatment	2	347653.55	173826.77	2.32 ns
Error	4	299596.44	74899.11	
Total	8	653840.88		

Exp. 4 Comparison of different methods of cultivations on the yield of rice.

(1983 wet)

Mr. Vichien Sasiprapa
Mr. Opart Chantasuk
Dr. Tetsujiro Sugahara

This experiment was carried out for the purpose of comparing the effect of cultivation methods on the yield of rice, "Transplanter, Hand transplanting, Direct sowing by seeder machine with Calper seed, Broadcasting with Calper seed and general method direct sowing".

Material and method

1. Variety R.D. 23
2. Design RCB 3 replications
3. Treatment

Method	Sowing	Trans plant	Seed rate	Basal date	Top date	Heading	Harvest
Transplantor	18 Aug	7 Sep	160 gm/ box	23 Sep	10 Oct	17 Nov	19 Dec
Hand transplant	18 Aug	7 Sep	80 gm/ m^2 bed	23 Sep	10 Oct	7 Nov	19 Dec
Direct seeder with Calper	8 Sep	---	8 kg/rai	23 Sep	2 Nov	26 Nov	29 Dec
Direct roller with Calper	8 Sep	---	8 kg/rai	23 Sep	2 Nov	24 Nov	28 Dec
Direct general	9 Sep	---	16 kg/rai	23 Sep	2 Nov	24 Nov	28 Dec

Note : Basal = N-8 : P-6 Top (P.I.S.) = N-4 or 8 kg/rai

4. Management

Saturn G	5 kg/rai	16th September 1983
Furadan	5 kg/rai	supply last paddling

Result

Yield and analysis of yield

Its results showed that, in table 1 was yield, table 2 was analysis of yield and table 3 was dancan's multiple range test.

These experiments were significant at 1% among cultivation methods but top dressing of nitrogen was not significant between 4 and 8 kg level.

Highest yield was the transplantor plots, next is hand transplanting, this experiment in general speaking, less yield was obtained by direct sowing methods, and the effect of Calper coating is not clear.

Table 1 Yield (kg per hectare)

Name	Top N/block	1	2	3	Mean	Method mean
Transplantor	low	4993	5531	5044	5189	
	high	5000	5756	5189	5133	5161
Hand transplant	low	4681	3231	5288	4400	
	high	5338	4238	4983	4838	4619
Direct seeder	low	4401	3547	4841	4263	
	high	4728	4092	3706	4175	4219
Direct Calper 8 kg seed	low	3609	3758	3750	3706	
	high	4196	3968	3263	3809	3757
Direct Calper 16 kg seed	low	3665	3459	3763	3629	
	high	3196	3251	3786	3411	3520
Direct general 16 kg seed	low	4100	3773	3939	3937	
	high	2505	4040	2641	3062	3500

Top dressing N mean low = 4187 high = 4071

Table 2 Analysis of yield

Variation	d.f.	S.S.	M.S.	F
Block	2	130555.16		
Method	5	13314111.91	2662822.38	8.14 **
Top N	1	120988.02	120988.02	0.37 ns
Method * Top N	5	1419625.47	283925.09	0.86 ns
Error	22	7188556.16	32652.55	
Total	35	22173836.75		

Table 3 Dancan's multiple range test

Method	Mean	Significant	DMRT(0.01)	
Transplantor	5161	a		
Hand planting	4619	ab	2	931.1
Seeder	4219	abc	3	973.1
Direct Calper 8 kg	3757	bc	4	998.8
Direct Calper 16 kg	3520	c	5	1017.4
Direct general 16 kg	3500	c	6	1031.4

1 9 8 4 D R Y

1. Effect of different seed rates and nitrogen fertilization on the growth and yield of germinated broadcasting rice

2. Effect of seed rates and nitrogen fertilizer quantities for yield on germinated direct sowing rice

3. Effect of Calper coating quantities of rice seed to the amount of survival seedling in germinated broadcasting rice

4. Effect of different seed rates in germinated direct sowing

Exp. 1 Effect of different seed rates and nitrogen fertilization on the growth and yield of germinated broadcasting rice.

(1984 dry season)

Mr. Vichien Sasiprapa
Mr. Pairat Duangpiboon
Dr. Tetsujiro Sugahara

This experiment is carried out to clarify the effect of different seed rates (4, 8 and 16 kg/rai), basal nitrogen (0, 4 and 8 kg/rai) and top dressing nitrogen (4-0, 8-0, 4-4 kg/rai) on the growth and yield of germinated direct sowing rice by L_{27} design.

Material and method

1. Variety : RD 23
2. Design : L_{27} (3 factors x 3 levels)
3. Plot size : 4m x 8m = $32m^2$
4. Sowing : March 23rd, 1984.
   Harvest : July 10-16th, 1984.
5. Pre-seed treatment : seed selection by salt water (specific gravity 1.10)
6. Adjust the number of seedling in 50cm x 50cm of frame area for yield components.

Seed rate	Adjust the number of seedling in 50cm x 50cm of frame area
4kg/rai	20
8kg/rai	40
16kg/rai	80

7. Treatment

Plot	Seed rate kg/rai	#Basal N kg/rai	Top N P.I.S. - Heading
1	16	0	4-0
2	16	0	8-0
3	16	0	4-4
4	16	4	4-0
5	16	4	8-0
6	16	4	4-4
7	16	8	4-0
8	16	8	8-0
9	16	8	4-4
10	8	0	4-0
11	8	0	8-0
12	8	0	4-4
13	8	4	4-0
14	8	4	8-0
15	8	4	4-4
16	8	8	4-0
17	8	8	8-0
18	8	8	4-4
19	4	0	4-0
20	4	0	8-0
21	4	0	4-4
22	4	4	4-0
23	4	4	8-0
24	4	4	4-4
25	4	8	4-0
26	4	8	8-0
27	4	8	4-4

#Basal P (6kg/rai) supply all plots ,
#Basal supply at 15 days after sowing.

8. Sampling : Yield by area cutting of 2m x 4m
Yield component by the frame area of 50cm x50cm

Result

1. Growth

The number of tillers is investigated in the sampling area of 50cm x50cm at one week interval after sowing, as the datas shown in table 1 and figure 1-1.

It is found that, the maximum number of tiller is at 6 weeks after sowing. By comparison with 1983 wet season (shown in figure 1-2), the number of tiller in 1984 dry season increases more than the wet season and the increasing rate of tillering is also slower.

Table 2-1 shows the number of tillers has been calculated and analysed by F-test table, in each stage.

The number of tillers of seed rate is significant during 2-6 weeks. Basal treatments is significant at 5% level and no any significance different on top dressing plots.

Table 2-2 shows the significant difference among the number of tiller of seed rates.

For the number of tillers, 16 kg/rai and 8 kg/rai seed rate plots are higher than 4 kg/rai one. The number of tiller is significant at the period of 2-6 weeks after sowing but not significant difference at the 7th week.

Table 2-3 shows the significant difference among the number of tiller of basal nitrogen.

The number of tiller of 8 kg/rai basal nitrogen plot is more than the 0 kg/rai. They are significant during 4-7 weeks after sowing.

2. Yield

Table 3-1 and figure 2 show the yield of different seed rate, basal and top dressing nitrogen.

The yield among basal treatments is significant at 5% level. There is not significant between 8 and 4 kg/rai of basal treatment plots and both of them are more productive than 0 kg/rai one.

From figure 2, the yield of seed rates and top dressing treatments is not significant. The yield of basal plots are 8>4>0 kg/rai and 8-0 ≈ 4-4>4-0 kg/rai for top dressing ones. They show that, the best rate for basal and top dressing nitrogen is 8 kg/rai.

3. Yield component

Yield component is investigated in the sampling area of 50cm x 50cm, as the data shown in table 4.

(1) The number of spikelets per panicle

Table 4-1 shows the yield component of the number of spikelets per panicle.

Among treatments, A seed rate only is significant at 5% level. The number of spikelets of 4 kg/rai seed rate plot is more than 8 and 16 kg/rai ones.

(2) Ripening percentage analysis

Table 4-2 shows the ripening percentage analysis among treatments.

Among treatments, the best rate for nitrogen fertilization is 8 kg/rai and 2 time-divided fertilization is better than one time. Top dressing nitrogen shows the different at 5% of significance.

4. Correlation among yield components

The correlation among yield components are shown in table 5. By these results, yield, the number of panicle per unit area, the number of spikelets per unit area and ripening percentage are closely positive relation.

By comparison, the number of spikelets per unit area is the most correlative in both of wet and dry season. Besides, the number of spikelets per panicle is the highest relation, the second is the number of panicle, in wet season. But in the dry season, the number of panicle and 1000 grains weight are close relation.

5. Extra plots as the reference data

Table 6 and figure 3 show the data of the extra plots. There is not nitrogen fertilization for as the indicator of fertile soil.

In the dry season, the yield of 16 kg/rai seed rate plot is more than 8 and 4 kg/rai ones. That means, the less of soil fertility, the more of seed sowing.

Table 1 The number of tiller per square meter

Plot No.	Seedling/week 1	2	3	4	5	6	7	Panicle
1	320	332	444	472	476	476	428	320
2	320	348	396	400	464	496	480	312
3	320	336	348	396	400	480	480	264
4	320	328	676	700	700	768	764	368
5	320	460	460	976	996	996	996	356
6	320	368	572	700	704	704	704	368
7	320	328	484	544	568	568	572	400
8	320	344	496	632	636	636	636	292
9	320	320	708	776	780	812	812	312
mean	320	352	509	622	636	660	652	332
10	160	168	272	632	668	668	656	232
11	160	176	480	684	724	744	724	404
12	160	180	380	436	472	472	480	364
13	160	172	512	520	544	544	508	244
14	160	160	412	476	556	592	596	272
15	160	160	504	548	592	592	616	304
16	160	180	472	724	752	752	752	332
17	160	160	652	884	884	884	884	360
18	160	160	500	676	676	676	676	352
mean	160	168	465	620	652	658	655	318
19	80	80	296	492	492	492	500	296
20	80	92	200	280	292	292	300	244
21	80	80	400	552	552	552	552	328
22	80	116	360	408	464	448	456	276
23	80	100	364	460	476	572	572	284
24	80	136	312	520	520	580	592	352
25	80	160	424	556	564	568	568	276
26	80	84	380	392	396	560	560	348
27	80	100	304	608	652	652	652	252
mean	80	105	338	474	490	524	528	295
MEAN	187	208	437	572	593	614	612	315

Figure 1-1 The number of tillers one week interval after sowing

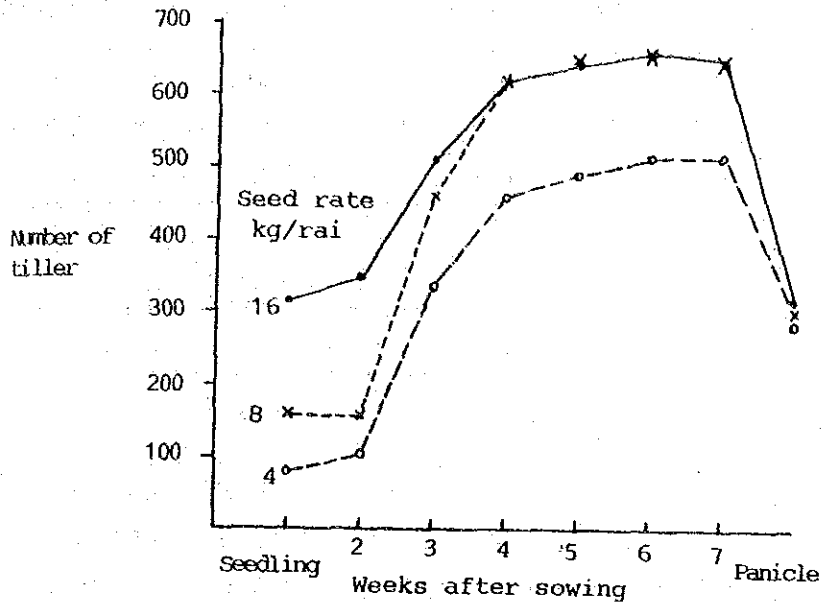


Figure 1-2 Compare the growth number of tiller between 1983 wet and 1984 dry season

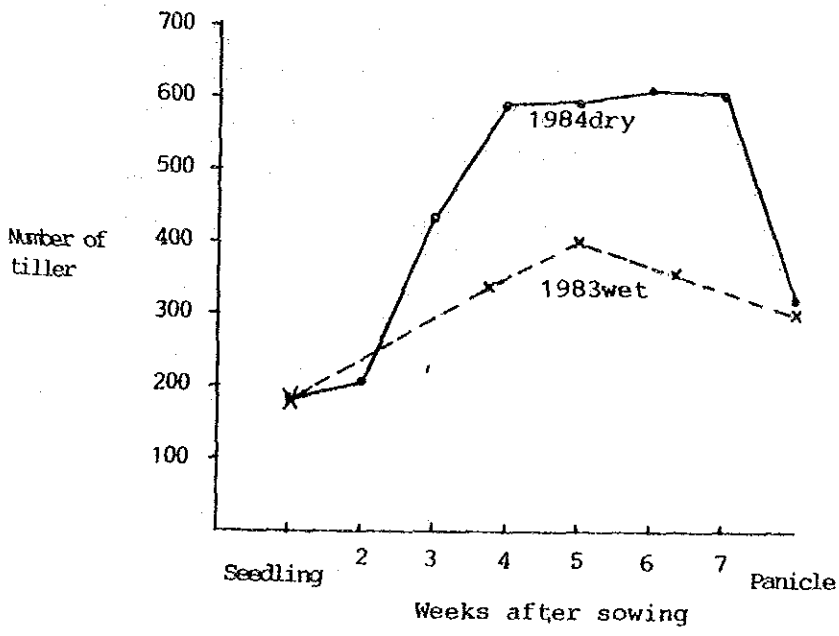


Table 2-1 F-scale of the number of tillers

Treatment \ Weeks after sowing	2	3	4	5	6	7	F-table
Seed rate (A)	251.7**	7.0*	5.5*	7.4*	5.0*	4.3	F(.05)=4.46
Basal N (B)	2.3	4.4	5.2*	5.8*	5.9*	6.5*	F(.01)=8.61
Top N (C)	0.4	0.1	0.1	0.1	0.6	0.8	

Table 2-2 The significance of the number of tiller among seed rates

Seed rate \ Weeks after sowing	2**	3*	4*	5*	6*	7
16kg/rai	352 a	509 a	622 a	636 a	660 a	652
8kg/rai	168 b	465 ab	620 a	652 a	658 ab	655
4kg/rai	105 c	338 b	474 b	490 b	524 b	528
L.S.D .05	32	135	144	131	139	139
L.S.D .01	47	196	209	191	202	203

Table 2-3 The significance among the number of tiller on basal N

Basal N \ Weeks after sowing	2	3	4*	5*	6*	7*
0kg/rai	199	357	483 b	504 b	519 b	511 b
4kg/rai	222	464	590 ab	617 ab	644 ab	645 ab
8kg/rai	204	491	644 a	656 a	679 a	679 a
L.S.D .05	32	135	144	131	139	139
L.S.D .01	47	196	209	191	202	203

Table 3 The yield of seed rate, basal and top dressing nitrogen

Factor/level (kg/rai)	1	2	3
Seed rate (A)	16	8	4
Basal N (B)	0	4	8
Top N (C)	4-0	8-0	4-4

Analysis of yield (kg/ha)

Variation	df	SS	MS	F
A	2	1256960	628480	2.5
B	2	3633220	1816610	7.2 *
C	2	610432	305216	1.2
AB	4	1030140	257536	1.0
AC	4	131904	32976	0.1
BC	4	1602750	400688	1.6
Error	8	2023420	252928	

F (2.8 ; .05) = 4.46 F (2.8 ; .01) = 8.65

F (4.8 ; .05) = 3.84 F (4.8 ; .01) = 7.01

Mean of yield

Factor/level	1	2	3
Seed rate (A)	5078	5549	5520
Basal N (B)	4968 b	5319 ab	5860 a
Top N (C)	5176	5530	5441

L.S.D (.05) = 670

L.S.D (.01) = 974

Figure 2 Relation of seed rate, basal nitrogen and top dressing of yield

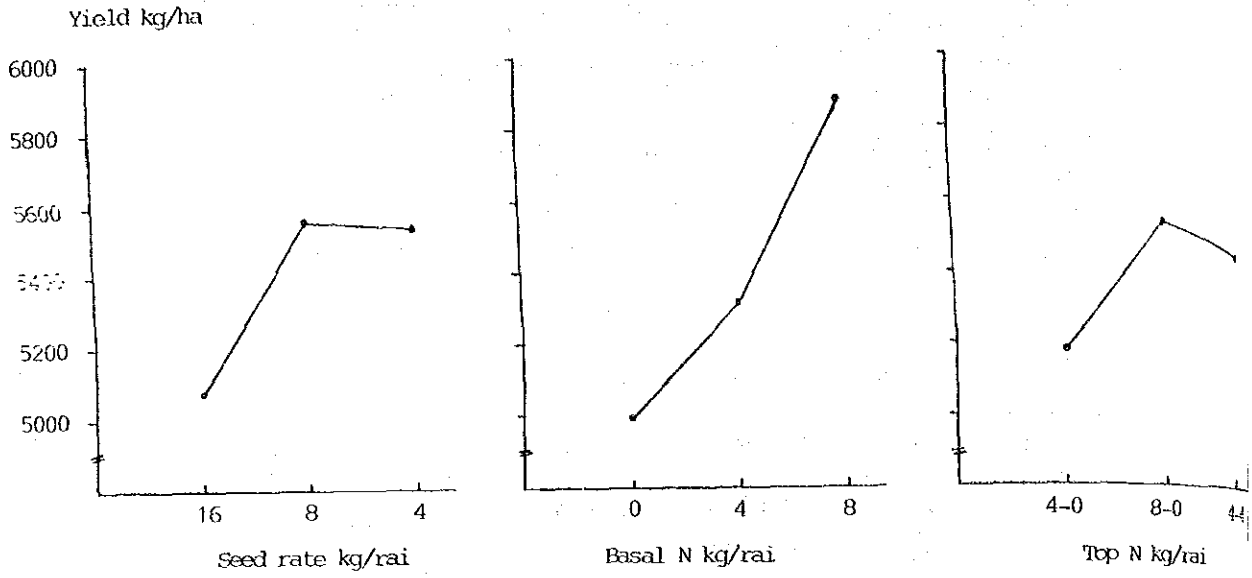


Table 4-1 The yield component

No.	Panicle	Spikelet	R%	1000GW	Yield/m^2	Spikelet/m^2	Yield/ha
1	326	72.4	74.1	25.6	439.5	23168	4829
2	312	70.1	75.6	25.5	421.6	21871	4652
3	264	66.8	80.3	25.3	358.3	17635	5057
4	368	68.1	76.7	25.7	494.0	25061	5193
5	356	78.4	74.4	26.2	544.1	27910	5457
6	368	71.8	79.1	25.2	526.7	26422	4810
7	400	78.7	69.6	25.6	560.9	31480	4673
8	292	81.5	76.0	26.4	477.5	23798	5444
9	312	73.7	84.5	25.7	499.4	22994	5583
10	232	87.4	70.7	24.9	357.0	20227	4021
11	404	66.8	84.3	25.9	589.2	26987	5214
12	364	75.5	81.6	26.3	589.8	27482	5325
13	244	78.8	80.7	25.3	392.6	19227	5659
14	272	80.3	79.8	24.6	428.8	21842	5442
15	304	88.2	79.0	25.4	538.0	26813	5431
16	332	85.0	77.4	26.6	581.0	28220	6508
17	360	74.8	82.3	26.6	589.5	26928	6149
18	352	74.3	81.8	26.5	566.9	26154	6194
19	296	82.6	68.4	25.5	426.4	24450	5002
20	244	89.2	78.8	25.6	439.1	21765	5238
21	328	76.0	80.6	25.7	516.4	24928	5375
22	276	93.2	78.9	25.0	507.4	25723	5319
23	284	91.8	82.6	25.9	557.8	26071	6119
24	352	80.4	79.3	25.7	576.8	28301	4438
25	276	93.5	76.2	25.7	505.4	25806	5378
26	348	71.2	74.6	25.2	465.8	24778	6051
27	252	110.8	74.8	26.2	547.2	27922	6759
Mean	315.3	80.8	77.9	25.7	499.9	24963	
S.D	48.7	10.0	4.2	0.5	71.4	3115	

Table 4-2 Analysis of the number of spikelet per panicle

Variation	df	SS	MS	F
A	2	913.4	456.7	4.1 +(10%)
B	2	197.2	98.6	0.9
C	2	71.9	35.9	0.3
AB	4	93.0	23.2	0.2
AC	4	182.8	45.7	0.4
BC	4	259.5	64.9	0.6
Error	8	859.3	112.4	

F(2,8 ; .05) = 4.46

Mean

Factor/level	1	2	3
Seed rate (A)	73.5 b	79.0 bc	87.6 a
Basal N (B)	76.3	81.2	82.6
Top N (C)	82.2	78.2	79.7

L.S.D (.05) = 14.1

Table 4-3 Analysis of ripening percentage

Variation	df	SS	MS	F
A	2	48.4	24.2	2.2
B	2	16.4	8.2	0.7
C	2	139.5	69.7	6.4 *
AB	4	32.5	8.1	0.7
AC	4	49.1	12.3	1.1
BC	4	83.4	20.9	1.9
Error	8	87.6	11.0	

F(2,8 ; .05) = 4.46 F(2,8 ; .01) = 8.65

Mean

Factor/level	1	2	3
Seed rate (A)	76.7	79.7	77.1
Basal N (B)	77.2	78.9	77.5
Top N (C)	74.7 b	78.7 ab	80.1 a

L.S.D (.05) = 4.4

Table 5-1 Correlation of yield components in 1984 dry season

Yield components	Spikelets/ panicle	R%	1000 grains weight	Yield/ m^2	Spikelets/ m^2	Panicle/ hill
Panicle/m^2	-0.580	0.113	0.382	0.670	0.669	-0.053
Spikelet/panicle	---	-0.226	0.042	0.104	0.210	0.396
R%		---	0.203	0.344	-0.079	0.042
1000 grains weight			---	0.658	0.502	0.004
Yield/m^2				---	0.899	0.278

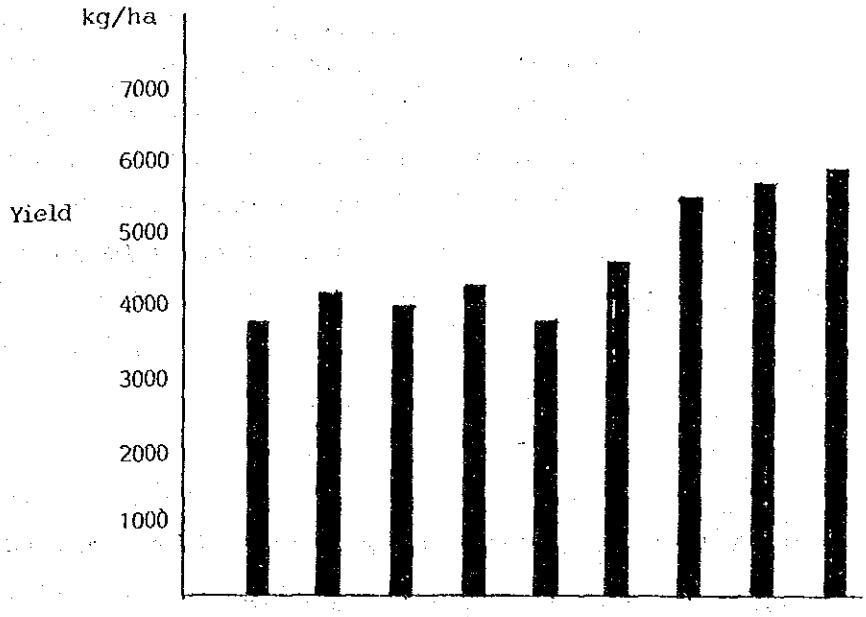
Table 5-2 Correlation of yield components in 1983 wet season

Yield components	Spikelets/ panicle	R%	1000 grains weight	Yield/ m^2	Spikelets/ m^2	Panicle/ hill
Panicle/m^2	-0.335	0.168	0.073	0.439	0.379	-0.010
Spikelet/panicle	---	-0.223	-0.389	0.652	0.738	0.827
R%		---	-0.030	0.126	-0.116	0.002
1000 grains weight			---	-0.183	-0.288	-0.410
Yield/m^2				---	0.962	0.789

Table 6 Extra plots as reference data in 1984 dry and 1983 wet season

Year	Seed rate	Nitrogen Basal	Nitrogen Top	Yield(kg/ha)
84-Dry	4	0	0	4241
"	8	0	0	4393
"	16	0	0	4685
"	12	8	8-0	5755
"	20	8	8-0	4686
83-Wet	4	0	0	3600
"	8	0	0	3939
"	16	0	0	3678
"	16	8	8-0	5611 Lodging
"	16	8	4-4	5927

Figure 3 Yield of extra treatments



Year		83	84	83	84	83	84	83	84	83
Wet Dry	Season	W	D	W	D	W	D	W	D	W
Seed rate		4	4	8	8	16	16	16	12	16
Basal N		0	0	0	0	0	0	8	8	8
Top N		0	0	0	0	0	0	8-0	8-0	4-4

Exp. 2 Effect of seed rates and nitrogen fertilizer quantities for yield on germinated direct sowing rice.

(1984 dry season)

Mr. Vichien Sasiprapa
Mr. Pairat Duangpiboon
Dr. Tetsujiro Sugahara

This experiment is carried out the effect of extreme seed rates (4, 20 kg/rai) and nitrogen fertilizer quantities at basal (4, 8 kg/rai), P.I.S. (4, 8 kg/rai) and heading (0, 4 kg/rai) to yield on germinated direct sowing rice.

Material and method

1. Variety : RD 23
2. Design : L_{16} (4 factors x 2 levels x 2 replications)
3. Plot size and field : 4m x 10m No. 2-5
4. Sowing date : March 23rd, 1984.
   Harvest : Seed rate 20 kg/rai, July 10th, 1984.
   Seed rate 4 kg/rai, July 16th, 1984.
5. Pre-seed treatment : Seed selection by salt water (specific gravity 1.10)
6. Treatment

Plot No.	Repeat	Seed rate(A)	Nitrogen (kg/rai)		
			Basal(B)	P.I.S.(C)	Heading(D)
1	1	4	4	4	0
2	1	4	4	8	4
3	1	4	8	4	4
4	1	4	8	8	0
5	1	20	4	4	4
6	1	20	4	8	0
7	1	20	8	4	0
8	1	20	8	8	4
9	2	4	4	4	4
10	2	4	4	8	0
11	2	4	8	4	0
12	2	4	8	8	4
13	2	20	4	4	0
14	2	20	4	8	4
15	2	20	8	4	4
16	2	20	8	8	0

At basal, supply P_2O_5 6kg/rai all plots at 15 days after sowing

Result

Table 1 and table 2 show the yield and yield analysis.

From table 1 and table 2, yield is not significant among seed rates, basal and top dressing nitrogen in this experiment. But there are some interaction between C and D. This interaction shows that nitrogen application is significant at the level of 5%, at the panicle initiation stage (P.I.S.) and Heading stage. (See table 2)

Table 3 and figure 1 show the calculation and analysis of interaction between C and D.

In this experiment, there are 2 types of fertilizer application at P.I.S. that is 4 and 8 kg/rai. From figure 1, it shows the effect between fertilization at P.I.S. (C_1 and C_2) and nitrogen supply at Heading stage (D_1 and D_2). Heading stage at the rate of 4 kg/rai (D_2) gives more yield than 0 kg/rai. (D_1), of fertilizer application at the rate of 4 kg/rai (C_1) at P.I.S. But for the 8 kg/rai of fertilization at P.I.S. (C_2) gives highly yield at Heading stage of 0 kg/rai fertilization (D_1).

Table 1 Computation of factorial effect total

No.	Treatment	Yield(kg/ha)	Yate-4	Effect	Variance	Factor
1	4-440	4154	78503	4906.4	5374089.9	CT
2	4-484	3565	141	8.8	1242.6	C
3	4-844	5864	-4139	-258.7	1070707.6	B
4	4-880	5821	-1169	-73.1	85410.1	BC
5	20-444	4788	-813	-50.8	41310.6	A
6	20-480	5564	-851	-53.2	45262.6	AC
7	20-840	5025	-4483	-280.2	1256080.6	AB
8	20-884	4472	2515	157.2	395326.6	e
9	4-444	4559	3	0.2	0.6	R
10	4-480	4989	677	42.3	28645.6	e
11	4-840	4668	-2083	-130.2	271180.6	e
12	4-884	5225	-397	-24.8	9850.6	AD
13	20-440	4833	-77	-4.8	370.6	e
14	20-484	4730	2561	160.1	409920.1	BD
15	20-844	5431	-5159	-322.4	1663455.1	CD
16	20-880	4815	1235	77.2	95326.6	D

Table 2 Analysis table

Variation	df	SS	MS	F
Tatal	15	5374089.94		
BL	1	0.56	0.56	0.00
A	1	41310.56	41310.56	0.24
B	1	1070707.56	1070707.56	6.16
C	1	1242.56	1242.56	0.01
D	1	95326.56	95326.56	0.55
AB	1	1256080.56	1256080.56	7.22
AC	1	45262.56	45262.56	0.26
AD	1	9850.56	9850.56	0.06
BC	1	85410.06	85410.06	0.49
BD	1	409920.06	409920.06	2.36
CD	1	1663455.06	1663455.06	9.57*
Error	4	695523.25	173880.81	

F(1,4;.05) = 7.71 F(1,4;.01) = 21.2

Factor	Level 1	Mean	Level 2	Mean
A	1	4855.6	2	4957.3
B	1	4647.8	2	5165.1
C	1	4915.3	2	4897.6
D	1	4983.6	2	4829.3

Table 3 Analysis of interaction factors

1. Inverse Yate algorithm

Mark	Yate-4	Yate method (1)	Yate method (2)	(2)/16	Combination
Total	78503	78644	74720	4670	C_1D_1
C	141	-3924	84756	5297	C_2D_1
D	1235	78362	82568	5160	C_1D_2
CD	-5159	6394	71968	4498	C_2D_2

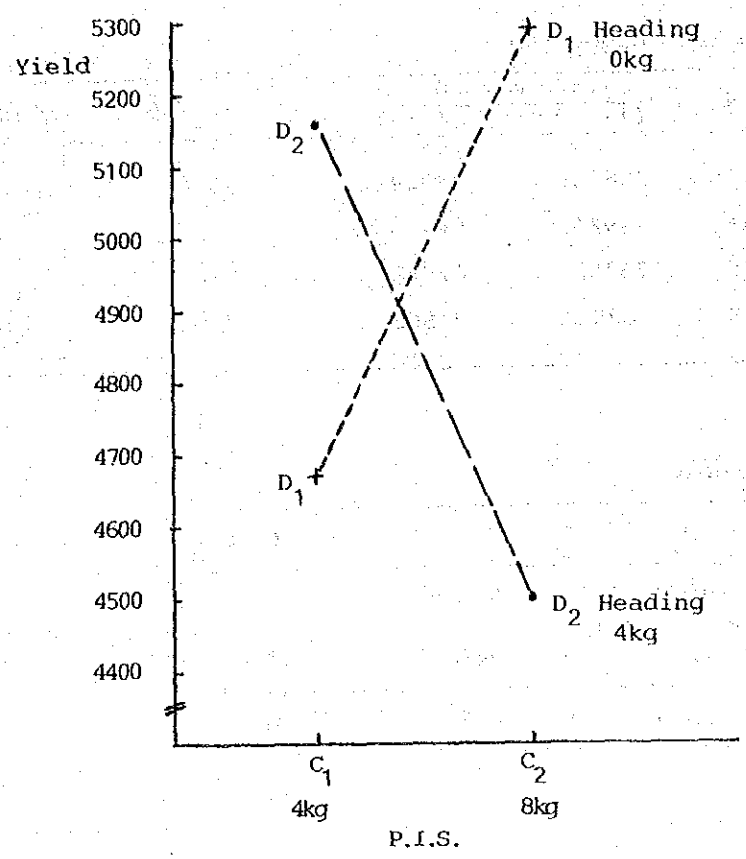
2. Two-way table

	D_1	D_2	Mean
C_1	4670	5160	4915
C_2	5297	4498	4898
Mean	4984	4829	(4907)

3. L.S.D

$$\text{L.S.D} = t(4:0.05)\sqrt{2(\text{error MS})/4} = 2.776\sqrt{(173880.8)/2} = 818.5$$

Figure 1 Interaction of top dressing and yield



Exp. 3 Effect of Calper coating quantities of rice seed to the amount of survival seedling in germinated broadcasting rice.

(1984 dry season)

Mr. Vichien Sasiprapa
Mr. Pairat Duangpiboon
Dr. Tetsuiro Sugahara

Paddy fields in irrigated areas are good for irrigated control. Farmers prefergerminated broadcasting rice cultivation becasue they can reduce the process of planting such as nursery, uprooting and transplanting. Besides, it reduces labour problem because of wage competition by lacking of labour. However, patchs must be smoothened in order to no bogs on the plots. Boggy lands cause ungerminated seedlings because they are lack of Oxygen. Therefore, Calper utilization for adding Oxygen should be a good choice in germinated broadcasting rice.

Objective

1. To study the appropriate quantity of Calper dust coated rice seed before broadcasting.
2. To study the efficiency of Calper dust under the submerged condition.

Material

1. Variety : RD 23
2. Calper dust
3. Soil and sand
4. Chemical fertilizer : Ammophos (16-20-0)
   Ammonium Sulphate (21-0-0)

Method

1. Spilt-plot design, 2 replications

   Main-plot : 10, 20 cm of water level treatment

   Sub-plot : 8, 16 kg/rai of seed rate

   The rate of Calper coating :

   Calper : dry seed : soil+sand = ½:1:3+1

   Calper : dry seed : soil+sand = 1:1:3+1

2. Sub-plot size : 10m x 6.5m = $65m^2$

3. Chemical fertilizer

   Basal application 8-6-0 kg/rai, 15 days after sowing

   Top application 8-0-0 kg/rai, at panicle initiation stage

4. Rice pest control by chemical

   Broadcast Furadan with the rate of 5 kg/rai when the rice is 20 days oldand when it is necessary by spraying Azodrin with the rate of 15 cc/20 liters of water.

5. Water level control

   10 cm and 20 cm of water level control in the period of sowing date up to the rice is 30 days old.

Place Suphan Buri Rice Experiment Station plot.

Duration Sowing : March 31st, 1984.

Harvest : July 26th, 1984.

Result

Table 1 shows the yield of RD 23 (kg/ha)

From table 1, it is found that the yields are not any different on seed rates coated with Calper dust at the rate of dry seed : Calper dust = 1:½ or 1:1 by weight. Not only that, the average yield of every method are not significant too.

At the 10 cm and 20 cm of water level control, the yield is highly significance different at the level of 99% in the period of 30 days after sowing. 10 cm of water level control, gives the highest yield that is 6221.57 kg/ha and 6051.10 kg/ha for the 20 cm one.

Summary

1. In germinated broadcasting rice in irrigated area, the yield can be raised by water level control especially, in the period of 30 days after sowing. It is not good for damming up much of water on the plots because it reduces the yield. By the result, the yield of water level control at 10 cm is higher than the 20 cm one that is 170.47 kg/ha.

2. The quantity of Calper dust coated rice seed at 50 or 100% are not show the tendency of higher yield, in the seed rates of 8 or 16 kg/rai.

3. In the submerged condition, usually found the unsurvival seedling. There are many causes concern to this problem. One of the main causes have to be shortage of Oxygen during emerging from water level. From this phenomenon could say that Calper dust effected to seedling establishment under submerge condition. The Calper dust which are coated at the surface of sprouted seed will contact with water at the time of direct sowing. Result of this chemical reaction will release Oxygen to supply sprouted seed until growing through water level.

Table 1 Yield (kg/ha)

Main water level (cm)	Sub Seed rate (kg/rai)	and Calper quantity (seed:Calper)	Replication I	Replication II	Average (Sub)	Average (Main)
10	8	- ½	6501.25	6113.75	6307.50	6221.57
	8	- 1	6147.50	6315.00	6231.25	
	16	- ½	6045.00	6443.75	6244.38	
	16	- 1	6622.50	5583.75	6103.13	
20	8	- ½	6330.00	6152.50	6241.25	6051.10
	8	- 1	6397.50	6013.75	6205.63	
	16	- ½	6006.25	5886.25	5946.25	
	16	- 1	5767.50	5855.00	5811.25	

Table 2 Analysis of variance on yield

variation	df	SS	MS	F
Block	1	132086.816	-	-
Water level	1	116238.379	116238.379	26.24 **
Error (a)	1	4430.566	4430.566	-
Seed rate and Calper quantity	3	238290.136	79430.045	0.71 ns
Water level x seed rate	3	62876.856	20958.952	0.19 ns
Error (b)	6	672003.711	112000.619	-
Total	15	1225926.465	-	-

Exp. 4 Effect of different seed rates in germinated direct sowing.

(1984 dry season)

Mr. Vichien Sasiprapa
Mr. Pairat Duangpiboon
Dr. Tetsujiro Sugahara

Weed problems are reduced by soil smoothening in germinated direct sowing and the number of panicle per unit area can be increased easier than transplanting rice cultivation by increasing the rate of sowing. But, this method is limitted by the fertile of soil and variety because too much plant density causes the problem of absorbed mineral competition. It causes the small panicles, less amount of grains per panicles, lean seed and lodging. Therefore, seed rate utilization is considered for germinated direct sowing in each local.

Objective

1. To compare the yields between low seed rates (4, 8 and 12 kg/rai) and 16 kg/rai which is recommeded by government official.

Material

1. Variety : RD 23
2. Chemical fertilizer : Ammophos 16-20-0
   Ammonium Sulphate 21-0-0
3. Salt water : Specific gravity 1.10
4. Pest control chemical : Furadan and Azodrin
5. Weed control chemical : Saturn G

Method

1. Randomized Complete Block Design, 3 replications
2. Sub-plot size : 5m x 35m = $175m^2$
3. Seed rates : 4, 8, 12 and 16 kg/rai
4. Fertilizer application
   Basal : 8-6-0 kg/rai, when the rice is 15 days old
   Top : Ammonium Sulphate 8-0-0 kg/rai,
   at panicle initiation stage
5. Weed control
   Dress Furadan at the rate of 5 kg/rai or spray Azodrin at the rate of 15 cc/20 liters of water when it is necessary.

Place Suphan Buri Experiment Station plot

Duration Sowing : March 22nd, 1984.
Harvest : July 10th, 1984.

Result

Table 1 shows the average yield in each seed rate.

From table 1, the yield average of seed rate 16 kg/rai is the highest (6110.31 kg/ha), the second is 8 kg/rai(6062.81 kg/ha) and the others are 4 and 12 kg/rai (6040.63 and 5940.63 kg/ha) respectively.

However, 16 kg/rai of seed rate gives the highest yield but there is not significance different among the seed rates of 4-16 kg/rai.

Summary

1. There is not significande different among seed rates. But the yield of RD 23 at the seed rate 16 kg/rai tends to be more than others.

2. Weed problem occurs when using the low seed rate because there is too much of vacant land on the plots. Therefore, the appropriate seed rate, for weed control and high yield, is considered. Not only that, the increasing of plant population per unit area is limitted. So, the rate of fertilizer application is also considered because it causes lodging.

Table 1 Yield (kg/ha)

Seed rate (kg/rai)	Replication I	II	III	IV	Average
4	6586.25	5732.50	6161.25	5682.50	6040.63
8	5918.75	6827.50	6440.00	5065.00	6062.81
12	6136.25	5852.50	6043.75	5730.00	5940.63
16	5503.75	6551.25	6816.25	5570.00	6110.31

Table 2 Analysis of variance on yield

variation	df	SS	MS	F	Tabular F 5%	1%
Block	3	1700505.08	566835.03	2.51 ns	3.86	6.99
Treatment	3	61328.52	20442.84	0.09 ns	3.86	6.99
Error	9	2032009.77	225778.86	-	-	-
Total	15	3793843.36				

C.V. = 7.87 %

1 9 8 5

** Result of the average treatment data

1. Development of Cantaloupe cultivation technique

Result of the average treatment data

Outline

The series of the experiments were continuously carried out between 1980 and 1984 at the fields of the Suphan Buri Experiment Station. The yearly and subject-wide experimental results together with the statistical analysis were reported every year.

The following results are compared among these means in evey subject through the year. The results from the transplanting were derived from the 60 treatments from 1980 to 1982 and these from direct-sowing were derived from the 110 ones from 1982 to 1984.

The analytical subjects were divided into transplanting direct-sowing, wet and dry season, plant densities, grain yields, nitrogen applications and etc.

The datas are as follow :

1) the paddy yield from the crop-cutting of 8 m^2
2) the yield components data sampling from 50 cm x 50 cm area
3) the number of panicles and spikelets per panicle
4) the percentages of ripened grains defined by specific gravity 1.06
5) the 1,000 grain weights
6) the calculation yield and number of spikelets per m^2

Results

Table 1 shows the results of the transplanting experiments with the means and standard deviations and table 2 shows the these of the direct-sowing.

1. Comparison between transplanting and direct-sowing

In table 1 and 2, the crop-cutting yield from the direct-sowing method is 5,474 kg/ha and it from the transplanting is 5,333 kg/ha. The former one exceeds the latter by 140 kg. The opposite way is more common for ordinary farmers' fields.

2. Comparison between dry and wet seasons

Table 3 shows the comparison. As far as the crop-cutting survey result is concerned, the dry season crops show better results than the wet season ones in both of transplanting and direct-sowing. The transplanting and direct-sowing in the dry season are 845 kg and 285 kg respectively bigger than them in the wet season.

According to the yield component of the respective data, in terms of grain quantities, the dry season is bigger than the wet season. Consequently, the grain quantities per unit acreage, which significantly effects the yield, is considered as the most important factor.

The Suphan Buri Experiment Station, defines March to July as the dry season and August to December as the wet season.

3. Comparison between plant densities and sowing rates

Table 3 shows these comparisons.

In transplanting, the plant density of 25 hills per m^2 (20 cm x 20 cm) gained the most yield. The second most one is 32 hills per m^2

In direct-sowing, 8 kg of seed per rai (1,600 m^2) gained the most yield. The more amounts tend to get less yields.

These results were obtained from the well-managed field like the Station but it is required that the further research should be made at the farmers' fields.

4. Comparisons among nitrogen applications

In transplanting, 18 kg per rai of the nitrogen application gained the most yield, but 24 kg got less. The less amount of the applications than 18 kg tend to correspondly lose the yields.

In direct-sowing, 14 to 16 kg per rai gained the most yield.

The more applications tend to accerelate the lodging and to reduce the percentage of the ripened grains.

The less applications than 14 kg per rai significnatly reduce the yields. If the comparisons between the transplanting and direct-sowing at the same level of application are made, the efficiency of the fertilizer absorption is better for the direct-sowing. Namely, in the transplanting 12 kg gained 5,083 kg per ha of rice grains, 16 kg did 5,279, and 18 kg did 6,257 kg but in the direct-sowing, 10 to 12 kg did 5,545 kg and 14 to 16 kg did 6,256 kg.

Secondly the economical optimum level of the nitrogen application was shown in table 7. The control with 3 plots in both of the dry and wet seasons were allocated and the average yield was 4,089 kg per ha. The table shows the different levels of the application on the condition of the same cost other than the nitrogen fertilizer cost. If the control level is 100, the application of 6 kg, 11 kg and 21 kg per ha are 125, 128, 143 and 101 respectively. Therefore, 15 kg applcation gained the most yield.

5. Correlation between yields and yield components

Table 5 and 6 show the correlation matrixes concerning transplanting and direct-sowing respectively. The most correlated factor with the yield is the grain quantity per unit area, i.e. the correlation ratio in transplanting is 0.983 and it in direct-sowing 0.846

These datas analyzed by T value of multiple regressions with the factors related to the yield.

The most significant factors to increase the yield are the number of panicles per m^2 and next is the number of spikelets per panicle in transplanting but at direct-sowing the number of panicles and spikelets of per panicle, the both are equally important.

Conclusion

The above-mentioned analysis may conclude the following items as the instruction for the farming in the Central Zone around Suphan Buri.

In transplanting ;

1) The plant density is 25 hills per m^2 (20 cm x 20 cm)

2) The nitrogen application amount; 18 kg per rai is recommended. For basal and top dressing, half is applied respectively, and the top dressing should be applied the panicle initiation stage.

In direct-sowing ;

1) The seed rate is good, 8 kg per rai on experiment but usually 10 to 12 kg should be recommended for farmers.

2) Best quantities 14 to 16 kg per rai of nitrogen is applied. The half for basal is recommended to be applied 15 to 20 days after sowing and for top dressing at the panicle initiation stage. Wherever lodging is an ordinary problem, the application for top dressing is devided into twice, once at the panicle initiation stage and once at the booting stage.

Table 1 Yield component data (transplanting)

No. D or W	Year mark	hills /m^2	kgN /rai	Panicle (1)	Spikelet (2)	R% (3)	1000GW (4)	Yield/m^2 1x2x3x4	Spikelet/m^2 1x2	Yield /ha
1 W	80UC	25 0	18	272	110.0	75.0	27.4	614.9	29920	6436
2 W	80UD	25.0	18	270	109.0	76.0	27.4	612.9	29430	6609
3 W	80UD	25.0	18	277	104.0	78.9	27.4	622.8	28808	6576
4 W	80UC	16.0	18	239	120.0	75.6	27.4	594.1	28680	6359
5 W	80UD	16.0	18	256	115.0	75.5	26.5	589.0	29440	6690
6 W	80UD	16.0	18	246	120.0	78.0	26.8	617.1	29520	6178
7 D	81VP	25.0	16	307	84.7	76.4	27.8	552.3	26003	5435
8 D	81VS	25.0	16	243	102.7	75.5	27.2	512.5	24956	5144
9 D	81VR	25.0	16	249	100.2	75.4	27.4	515.5	24950	5039
10 D	81VC	25.0	16	273	96.4	76.6	27.7	558.4	26317	5675
11 D	81GP	25.0	16	336	74.1	75.9	27.8	525.3	24898	5208
12 D	81GS	25.0	16	258	100.5	72.9	27.6	521.7	25929	5368
13 D	81GR	25.0	16	274	88.1	76.5	27.4	506.0	24139	5184
14 D	81GC	25.0	16	263	80.0	76.3	27.4	439.9	21040	5378
15 D	81D2	16.0	16	233	110.4	77.2	27.6	548.1	25723	4842
16 D	81D2	25.0	16	288	93.7	77.1	28.0	582.6	26986	5730
17 D	81W2	16.0	16	244	104.8	76.3	27.5	536.5	25571	5187
18 D	81W2	25.0	16	283	97.6	76.6	27.6	583.9	27621	5274
19 D	81D1	16.0	16	221	102.3	75.0	27.4	464.6	22608	4786
20 D	81D2	25.0	16	247	103.0	77.4	27.5	541.5	25441	5212
21 D	81D3	32.0	16	259	94.2	74.8	27.5	501.9	24398	5187
22 D	81D5	50.0	16	335	88.1	75.7	27.4	612.2	29514	5818
23 W	81T1	20.0	12	194	118.8	75.6	27.5	479.2	23047	5240
24 W	81T2	20.0	12	204	117.9	75.8	27.9	508.6	24052	5298
25 W	81T3	20.0	12	196	120.5	77.7	28.0	513.8	23618	4674
26 W	81T1	20.0	18	210	126.1	74.7	27.6	546.0	26481	5229
27 W	81T2	20.0	18	230	117.7	70.9	28.0	537.4	27071	5688
28 W	81T3	20.0	18	216	123.9	74.9	27.8	557.3	26762	5478
29 W	81T1	20.0	24	224	114.2	72.5	27.8	515.6	25581	4250
30 W	81T2	20.0	24	232	120.0	68.9	28.4	544.8	27840	4806
31 W	81T3	20.0	24	204	130.3	74.2	28.2	556.2	26581	5361
32 W	81C1	25.0	12	231	93.4	80.7	27.9	485.8	21575	4763
33 W	81C1	25.0	18	223	108.4	76.4	28.0	517.1	24173	4618
34 W	81RD	32.0	24	190	108.0	71.5	29.8	437.2	20520	4643
35 W	81RD	32.0	24	258	102.3	65.6	29.4	509.0	26393	5349
36 W	81R2	32.0	24	233	123.3	72.0	28.7	593.7	28729	4995
37 W	81R2	32.0	24	273	104.5	77.2	27.2	599.1	28529	5582
38 W	81RD	22.2	24	210	116.1	75.4	27.7	509.2	24381	4673
39 W	81RD	22.2	24	235	123.9	72.9	26.8	568.9	29117	5083
40 D	82DN	16.0	12	225	112.7	82.6	25.7	538.3	25358	6222
41 D	82DN	16.0	18	242	126.1	83.1	26.5	672.0	30516	6757
42 D	82DN	16.0	24	261	125.1	81.5	26.3	699.9	32651	6947
43 D	82DN	32.0	12	253	109.3	84.9	25.9	608.1	27653	7085
44 D	82DN	32.0	18	261	116.7	84.0	26.7	683.1	30459	7959
45 D	82DN	32.0	24	293	114.2	80.0	27.3	730.8	33461	6859
46 D	82DN	50.0	12	316	108.4	82.6	26.3	744.1	34254	6277
47 D	82DN	50.0	18	319	109.1	82.0	27.0	770.5	34803	6760
48 D	82DN	50.0	24	348	113.8	80.6	26.8	855.4	39602	6309
49 W	82MG	16.0	6	158	107.7	80.9	26.0	357.9	17017	3810
50 W	82MG	32.0	6	194	108.8	80.3	26.6	450.8	21107	4364
51 W	82MG	16.0	12	178	113.9	82.5	26.7	446.6	20274	4339
52 W	82MG	32.0	12	208	93.8	81.2	26.8	424.6	19510	4271
53 W	82CO	16.0	6	161	102.8	78.8	25.2	328.7	16551	3388
54 W	82CO	32.0	6	189	100.1	81.0	25.4	389.2	18919	4151
55 W	82CO	16.0	12	159	122.0	82.0	26.2	416.7	19398	4331
56 W	82CO	32.0	12	203	114.5	82.1	27.4	522.9	23244	5312
57 W	82NO	16.0	6	169	106.9	77.2	25.4	354.3	18066	3631
58 W	82NO	32.0	6	201	95.5	78.3	25.0	377.3	19276	3888
59 W	82NO	16.0	12	170	108.2	81.3	25.9	387.3	18394	4147
60 W	82NO	32.0	12	197	95.1	81.1	26.1	396.6	18735	4124
Mean		25.2	16.2	239.0	107.9	77.3	27.2	538.1	25593	5333
S.D.		8.9	5.3	45.1	12.1	3.8	0.9	104.0	4667	960

Table 2 Yield component data (direct sowing)

No. D or W	Year mark	Seed rate	kgN /rai	Panicle (1)	Spikelet (2)	R% (3)	1000GW (4)	Yield/m^2 1x2x3x4	Spikelet/m^2 1x2	Yield /ha
1 D	286	8	6	330	86.0	81.6	26.3	609.1	28380	6193
2 D	2166	16	6	389	74.6	85.8	26.8	667.3	29019	5806
3 D	2246	24	6	384	72.4	83.2	26.6	615.3	27802	5908
4 D	2326	32	6	497	55.4	88.1	27.1	657.4	27534	5721
5 D	2812	8	12	407	80.5	78.8	28.2	728.1	32764	6675
6 D	2161	16	12	374	86.2	82.4	27.1	719.9	32239	5805
7 D	2241	24	12	408	71.7	81.2	27.4	650.9	29254	5555
8 D	2321	32	12	352	69.5	68.5	26.8	449.1	24464	5615
9 D	2818	8	18	337	94.7	71.9	27.2	624.1	31914	6399
10 D	2161	16	18	367	75.6	67.9	27.6	520.0	27745	4873
11 D	2241	24	18	316	84.4	63.5	26.8	453.9	26670	3895
12 D	2321	32	18	315	81.2	71.5	27.2	497.4	25578	4527
13 D	2824	8	24	259	100.4	65.0	27.2	459.7	26004	4351
14 D	2162	16	24	295	70.6	57.5	26.8	320.9	20827	3413
15 D	2242	24	24	251	72.0	55.1	27.3	271.8	18072	3499
16 D	2322	32	24	228	71.7	59.0	26.1	251.7	16348	3295
17 W	212c	16	12	293	91.9	82.9	25.5	569.2	26927	5319
18 W	212l	16	12	248	115.2	83.0	24.1	571.5	28570	5442
19 W	212d	16	12	295	81.2	85.3	24.8	506.7	23954	4970
20 W	224d	16	12	302	86.8	85.0	25.6	570.4	26214	5617
21 W	218c	16	18	264	95.0	84.9	25.5	543.0	25080	5286
22 W	218l	16	18	275	107.1	84.6	25.6	637.9	29453	6373
23 W	218d	16	18	299	79.5	86.3	26.3	539.5	23771	5353
24 W	224d	16	18	261	95.7	85.2	25.9	551.2	24978	5331
25 D	386	8	6	415	68.4	66.5	26.3	496.5	28386	5140
26 D	3814	8	14	476	79.9	66.9	26.3	669.2	38032	6409
27 D	3812	8	12	444	66.1	71.0	28.0	583.4	29348	6098
28 D	3812	8	12	480	70.7	71.9	27.8	678.3	33936	6790
29 D	3161	16	10	461	56.1	77.9	27.7	558.1	25862	5770
30 D	3161	16	10	541	59.2	67.4	26.9	580.7	32027	5692
31 D	3168	16	8	385	61.5	68.4	27.3	442.1	23678	5128
32 D	3161	16	14	456	69.6	70.5	28.0	626.5	31738	6823
33 D	3810	8	10	434	61.5	77.9	27.7	575.9	26691	5817
34 D	3810	8	10	410	68.7	70.2	27.2	537.8	28167	6198
35 D	388	8	8	469	60.3	76.7	27.6	598.7	28281	5874
36 D	3816	8	16	406	80.5	71.3	28.4	661.8	32683	7021
37 D	3166	16	6	441	57.6	77.8	27.8	549.4	25402	5261
38 D	3161	16	14	452	73.0	71.5	27.9	658.2	32996	6213
39 D	3161	16	12	493	54.8	72.8	28.4	558.6	27016	6144
40 D	3161	16	12	456	60.5	67.2	27.9	517.2	27588	5804
41 D	3161	16	10	503	68.5	71.6	28.1	693.2	34456	6007
42 D	3161	16	12	404	72.3	77.1	28.7	646.3	29209	6312
43 D	3161	16	10	416	68.1	79.1	28.7	643.1	28330	5377
44 D	3161	16	12	374	74.5	62.5	31.2	543.3	27863	6205
45 D	3241	24	10	572	46.5	79.0	27.2	571.5	26598	5608
46 D	3241	24	12	524	52.6	72.2	28.0	557.2	27562	6583
47 D	3241	24	10	488	56.2	65.8	26.8	483.6	27426	6126
48 D	3241	24	12	484	46.2	78.1	28.8	503.0	22361	5880
49 D	3161	16	10	461	52.4	78.3	28.5	539.1	24156	4835
50 D	3161	16	12	500	62.2	68.6	28.0	597.4	31100	5967
51 D	3161	16	10	396	81.4	65.2	28.1	590.6	32234	6091
52 D	3161	16	12	332	82.0	76.3	27.7	575.4	27224	6067
53 D	3241	24	10	641	45.6	66.1	28.2	544.8	29230	6022
54 D	3241	24	12	524	46.8	79.6	28.3	552.4	24523	5429
55 D	3241	24	10	396	64.3	81.5	29.2	606.0	25463	5412
56 D	3241	24	12	476	58.9	71.6	28.3	568.1	28036	6429

No. D or W	Year mark	Seed rate	kgN /rai	Panicle (1)	Spikelet (2)	R% (3)	1000GW (4)	Yield/m^2 1x2x3x4	Spikelet/m^2 1x2	Yield /ha
57 W	3111	16	12	296	65.5	75.0	29.3	426.1	19388	4884
58 W	3211	8	12	324	57.1	86.6	29.0	464.6	18500	5358
59 W	3311	4	12	332	66.2	86.5	29.5	560.8	21978	5792
60 W	3112	16	12	368	74.5	71.1	30.8	600.4	27416	4930
61 W	3212	8	12	388	68.4	85.3	27.9	631.6	26539	5064
62 W	3312	4	12	340	67.3	87.0	29.2	581.3	22882	5345
63 W	3113	16	12	284	69.9	66.4	28.2	371.7	19852	5279
64 W	3213	8	12	328	56.5	83.8	29.4	456.6	18532	5244
65 W	3313	4	12	320	57.0	88.9	29.5	478.4	18240	5375
66 W	3121	16	12	208	90.3	78.9	29.2	432.7	18782	5811
67 W	3221	8	12	292	99.1	79.9	28.9	668.2	28937	5455
68 W	3321	4	12	224	81.7	80.6	31.3	461.7	18301	6014
69 W	3122	16	12	332	94.8	73.0	29.9	687.0	31474	5152
70 W	3222	8	12	268	76.0	80.6	30.3	497.4	20368	5008
71 W	3322	4	12	284	83.4	82.9	29.6	581.2	23686	5200
72 W	3123	16	12	336	85.7	82.0	31.2	736.7	28795	5158
73 W	3223	8	12	280	90.8	83.8	28.6	609.3	25424	5214
74 W	3323	4	12	304	74.5	84.6	29.7	569.1	22648	5413
75 W	3131	16	12	240	115.9	76.9	28.4	607.5	27816	4976
76 W	3231	8	12	352	110.7	84.4	28.4	934.0	38966	5207
77 W	3331	4	12	304	108.7	83.6	28.5	787.3	33045	5296
78 W	3132	16	12	312	112.8	77.9	29.0	795.1	35194	5192
79 W	3232	8	12	284	96.6	83.5	28.7	657.5	27434	5003
80 W	3332	4	12	308	85.9	81.2	28.6	614.4	26457	5431
81 W	3133	16	12	288	113.0	76.1	27.9	691.0	32544	4814
82 W	3233	8	12	180	109.6	81.4	27.9	448.0	19728	5012
83 W	3333	4	12	328	110.5	80.9	28.2	826.9	36244	4486
84 D	401	16	4	320	72.4	74.1	25.6	439.5	23168	4829
85 D	402	16	8	312	70.1	75.6	25.5	421.6	21871	4652
86 D	403	16	8	264	66.8	80.3	25.3	358.3	17635	5057
87 D	404	16	8	368	68.1	76.7	25.7	494.0	25061	5193
88 D	405	16	12	356	78.4	74.4	26.2	544.1	27910	5457
89 D	406	16	12	368	71.8	79.1	25.2	526.7	26422	4810
90 D	407	16	12	400	78.7	69.6	25.6	560.9	31480	4673
91 D	408	16	16	292	81.5	76.0	26.4	477.5	23798	5444
92 D	409	16	16	312	73.7	84.5	25.7	499.4	22994	5583
93 D	410	8	4	232	87.4	70.7	24.9	357.0	20277	4021
94 D	411	8	8	404	66.8	84.3	25.9	589.2	26987	5214
95 D	412	8	8	364	75.5	81.6	26.3	589.8	27482	5325
96 D	413	8	8	244	78.8	80.7	25.3	392.6	19227	5659
97 D	414	8	12	272	80.3	79.8	24.6	428.8	21842	5442
98 D	415	8	12	304	88.2	79.0	25.4	538.0	26813	5431
99 D	416	8	12	332	85.0	77.4	26.6	581.0	28220	6508
100 D	417	8	16	360	74.8	82.3	26.6	589.5	26928	6149
101 D	418	8	16	352	74.3	81.8	26.5	566.9	26154	6194
102 D	419	4	4	296	82.6	68.4	25.5	426.4	24450	5002
103 D	420	4	8	244	89.2	78.8	25.6	439.1	21765	5238
104 D	421	4	8	328	76.0	80.6	25.7	516.4	24928	5375
105 D	422	4	8	276	93.2	78.9	25.0	507.4	25723	5319
106 D	423	4	12	284	91.8	82.6	25.9	557.8	26071	6119
107 D	424	4	12	352	80.4	79.3	25.7	576.8	28301	4438
108 D	425	4	12	276	93.5	76.2	25.7	505.4	25806	5378
109 D	426	4	16	348	71.2	74.6	25.2	465.8	24778	6051
110 D	427	4	16	252	110.8	74.8	26.2	547.2	27922	6759
Mean		13.3	12.0	355.2	77.4	76.7	27.4	556.1	26494	5474
S.D.		7.1	3.9	87.4	16.4	7.2	1.6	107.8	4503	695

Table 3 Yield components (transplanting) and yield

Item	Sample No.	Panicle (1)	Spikelet (2)	R% (3)	1000GW (4)	Spikelet/m^2 1x2	Yield/m^2 1x2x3x4	Yield/ha (area cut)
All	60	239	107.9	77.3	27.2	25593	538.1	5333
Dry	25	273	102.2	78.3	27.2	27794	592.2	5826
Wet	35	214	111.9	76.6	27.2	24021	499.5	4981
16hills	15	210	113.2	79.2	26.5	23985	503.4	5147
20-22	11	214	120.9	74.0	27.8	25866	530.6	5071
25	16	268	96.6	76.5	27.6	25762	543.3	5478
32	14	229	105.8	78.1	27.1	24352	516.0	5269
50	4	329	104.9	80.2	26.9	34543	745.6	6291
6kgN	6	179	103.7	79.4	25.6	18489	376.4	3872
12	13	210	109.9	80.8	26.8	23009	497.9	5083
16	16	270	95.1	76.0	27.6	25381	531.4	5279
18	13	251	115.8	77.3	27.3	28928	610.3	6257
24	12	247	116.3	74.4	27.9	28615	593.3	5405

Yield components (direct sowing) and yield

Item	Sample No.	Panicle (1)	Spikelet (2)	R% (3)	1000GW (4)	Spikelet/m^2 1x2	Yield/m^2 1x2x3x4	Yield/ha (area cut)
All	110	355	77.4	76.7	27.4	26494	556.1	5474
Dry	75	383	72.5	74.4	27.0	26883	540.0	5565
Wet	35	296	87.9	81.7	28.3	25660	590.4	5280
4kg	18	300	84.7	80.6	27.5	25179	555.7	5446
8seed	30	348	79.8	77.9	27.3	27098	574.1	5649
16rate	46	356	78.2	75.9	27.3	26984	558.8	5417
24	12	455	59.8	73.1	27.7	26083	531.5	5529
32	4	348	69.5	71.8	26.8	23481	463.9	4790
4-8kgN	20	348	73.2	77.9	26.1	24853	508.3	5296
10-12	68	367	76.9	77.6	28.0	26953	581.9	5545
14-16	10	371	78.9	75.4	26.7	28802	576.2	6265
18-24	12	289	85.7	71.0	26.6	24703	472.6	4716

Table 4 Standard deviation

Item		Panicle	Spikelet	R%	1000GW	Spikelet/m^2	Yield/m^2	Yield/ha
Transplanting	Dry	36.0	13.1	3.4	0.6	4357	104.2	837
	Wet	33.7	9.8	4.0	1.1	4276	86.1	893
Direct sowing	Dry	89.0	13.0	6.9	1.2	3968	96.4	794
	Wet	43.0	18.1	4.9	1.8	5445	123.7	350

Table 5 Correlation table (transplanting)

Name	Panicle/m^2	Spikelet/panicle	R%	1000GW	Yield/m^2	Spikelet/m^2
Panicle	1.000	-0.360	-0.057	0.248	0.772	0.779
Spikelet/panicle		1.000	-0.001	0.013	0.277	0.294
Ripening percentage(R%)			1.000	-0.700	0.113	-0.035
1000 grains weight				1.000	0.194	0.226
Yield/m^2					1.000	0.983

Multiple regression

		4factors	3factors	2factors
	Correlation(r)	0.993	0.990	0.975
Coefficient regression	Constant	-1477.98	-974.37	-604.52
	X(1) Panicle	2.27	2.34	2.31
	X(2) Spikelet	5.40	5.50	5.47
	X(3) R%	6.87	4.65	-
	X(4) 1000GW	13.21	-	-
T value	X(1)	56.0	50.3	31.9
	X(2)	37.6	31.9	20.3
	X(3)	11.5	9.1	-
	X(4)	5.2	-	-

Table 6 Correlation table (direct-sowing)

Name	Panicle/m^2	Spikelet/panicle	R%	1000GW	Yield/m^2	Spikelet/m^2
Panicle	1.000	-0.694	-0.222	0.173	0.325	0.464
Spikelet/panicle		1.000	0.180	-0.154	0.307	0.274
Ripening percentage(R%)			1.000	0.002	0.368	-0.089
1000 grains weight				1.000	0.311	0.048
Yield/m^2					1.000	0.846

Multiple regression

		4factors	3factors	2factors
	Correlation(r)	0.953	0.912	0.808
Coefficient regression	Constant	-1456.35	-949.80	-421.07
	X(1)	1.33	1.38	1.28
	X(2)	6.73	6.61	6.75
	X(3)	6.38	6.57	-
	X(4)	19.29	-	-
T value	X(1)	26.0	20.0	13.1
	X(2)	24.9	18.2	13.0
	X(3)	13.9	10.7	-
	X(4)	9.3	-	-

Table 7 Economical degree of nitrogen fertilizer application on direct-sowing

Nitrogen kg/rai	Ammonium Sulphate as 20%N kg/rai	Price ฿	Yield rai	Yield (ha)	Paddy ฿/rai	Net income	Income ratio
0	0	0	654	(4089)	1831	1831	100
6(4-8kg average)	30	78	847	(5296)	2372	2294	125
11(10-12kg average)	55	143	887	(5545)	2484	2341	128
15(14-16kg average)	75	195	1002	(6265)	2806	2611	143
21(18-24kg average)	105	273	755	(4716)	2114	1841	101

The price of Ammonium Sulphate = 2.6 ฿/kg

The price of Paddy = 2.8 ฿/kg

Development of Cantaloupe Cultivation Technique
at
Suphan Buri Experiment and Training Center
October 1984 - January 1985

This experiment is carried out for establishment of Melon cultivation techniques, economical methods and fertilizer application in Thailand.

Method and material

1. Variety

Fukamidori F1 and Homerunstar

2. Sowing date and method

Oct. 15th, 1984. by direct sowing

3. Cultivation type

1) Stand type (one stem) 40x80 cm between hill and width

2) Ground type (two stems) 80x200 cm between hill and width

4. Fertilization

(N=16 - P=24 - K=16 kg/rai)

(N=10 - P=15 - K=10 g/m^2)

Organic manure or chemical fertilizer

1) Organic manure plot

Bottom fertilization

Lay the bottom of the hole with organic manure and compound fertilizer (15-15-15) at the rate of 2 hands : 3 g/hole. Place a can on the bottom and fill with sand and compost at the rate of 1:1. Take the can out, then watering and sowing by using 1 seed/hole.

Basal dressing

Use chicken dung and rice bran dust with the rate of 1 : 2 mixed with water and cover it with vinyl film. Leave it for a period of one month. Supply this organic manure before sowing and after ploughing at the rate of 500 g/m^2.

Top dressing

Supply organic manure (the same as basal) at the rate of 250 g/m^2.

Top 1 one week before flowering (25 days after sowing)

Top 2 after fruit setting (tennis ball size or 40 days after sowing)

2) Chemical fertilizer plot

Compost 2 kg/m^2

one month before sowing

Basal : Compound (15=15=15) 33 g/m^2 before sowing.

Top :

Top 1 Compound (15=15=15) 33 g/m^2 + Phostphate (0=40=0) 12.5 g/m^2

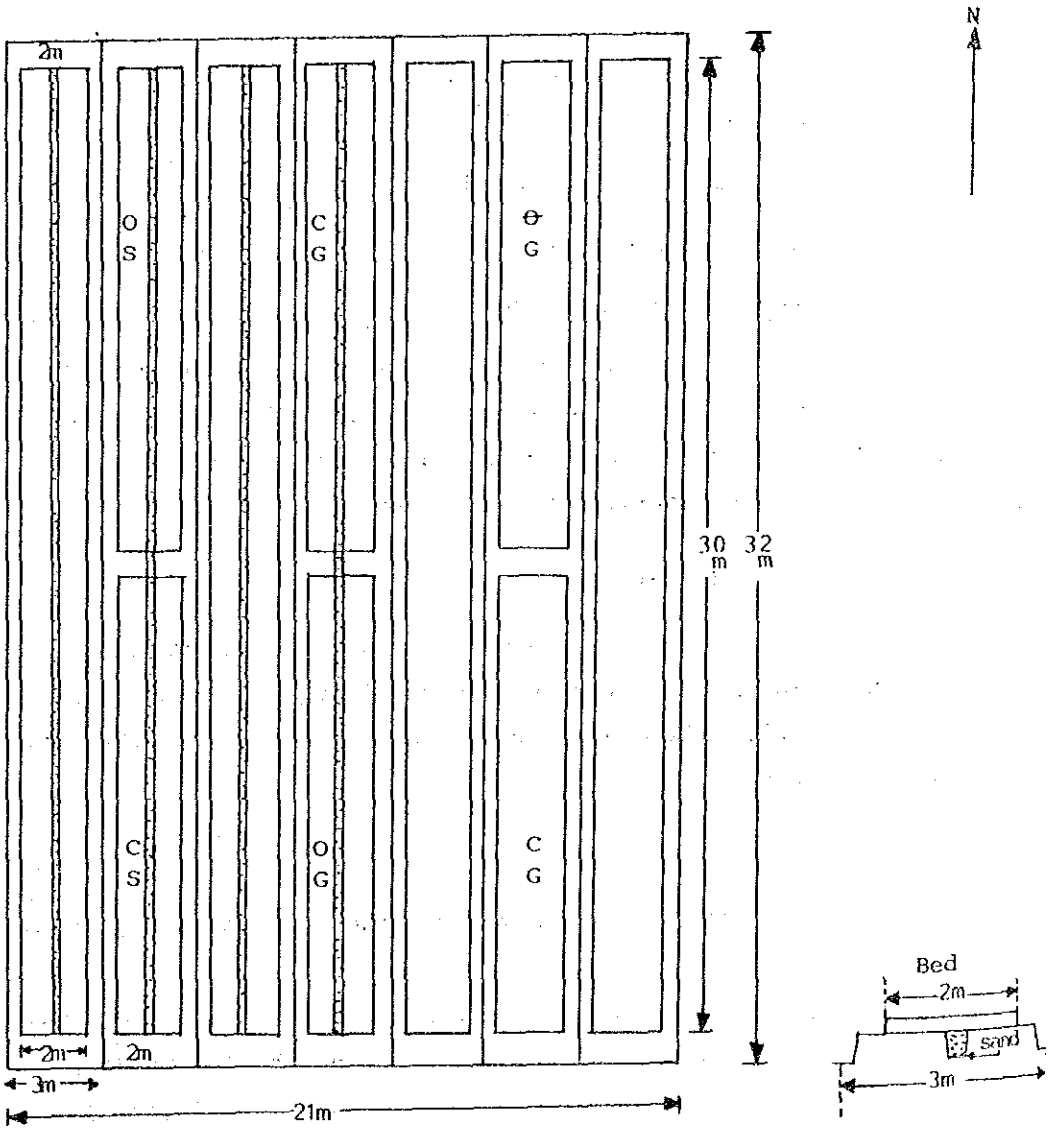
one week before flowering

Top 2 Compound (15=15=15) 10 g/m^2

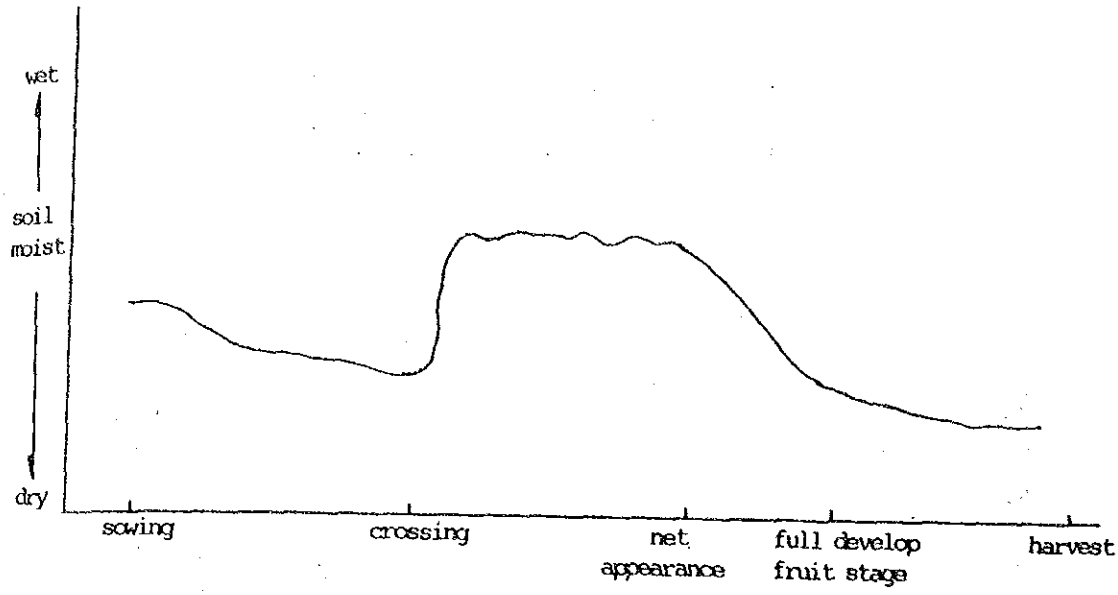
after fruit setting (tenis ball)

5. Lay out ⊖ = Organic manure plot S = Stand type

C = Chemical plot G = Ground type



6. Irrigation



7. Harvest and maturity

Just by flower crossing date on the label.

Fukamidori is about 50-55 days after crossing in November.

Homerunstar is about 45-50 days after crossing in November.

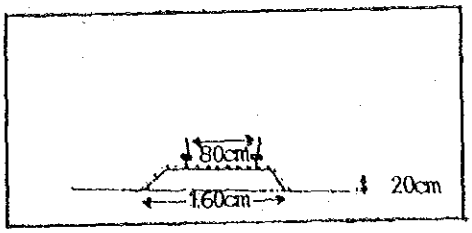
Just by fruits' color and smell

Fukamidori a little turns to yellowish.

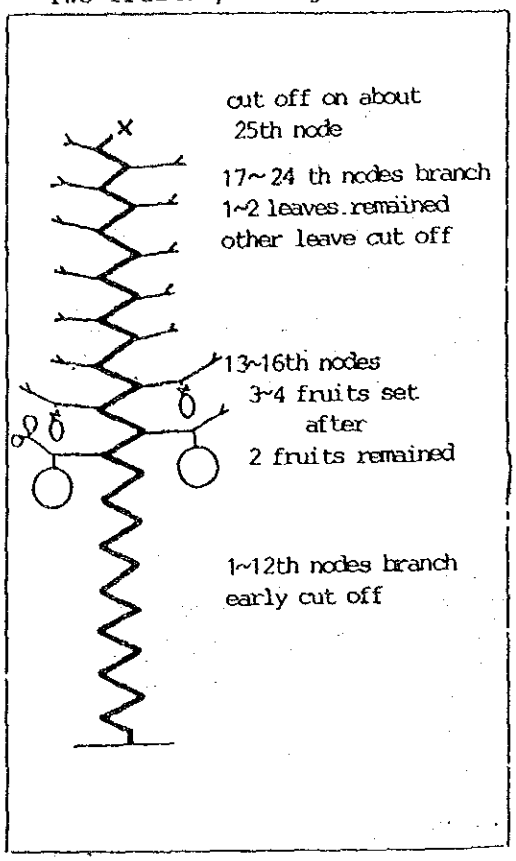
Homerunstar a little turns to cream color.

Good taste for eating by storing melons at the room temperature for a period of 5~10 days after harvest.

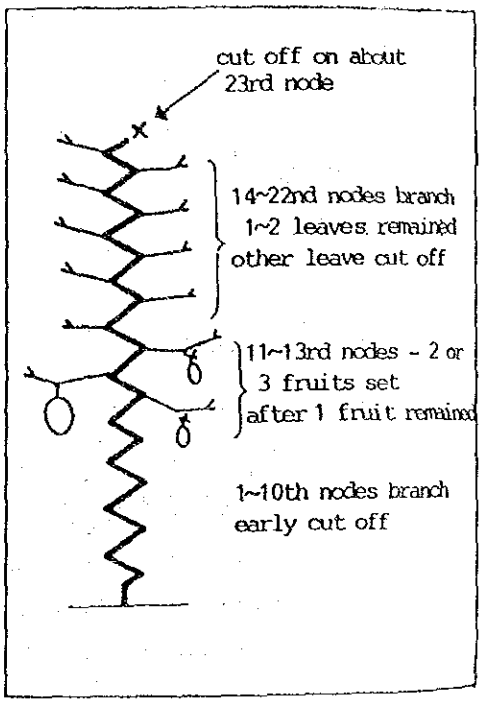
8. Stand type



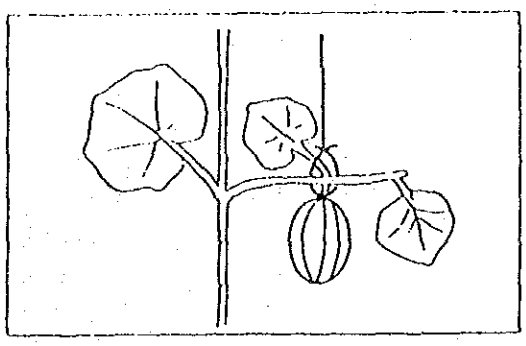
Two fruits pruning



One fruit pruning

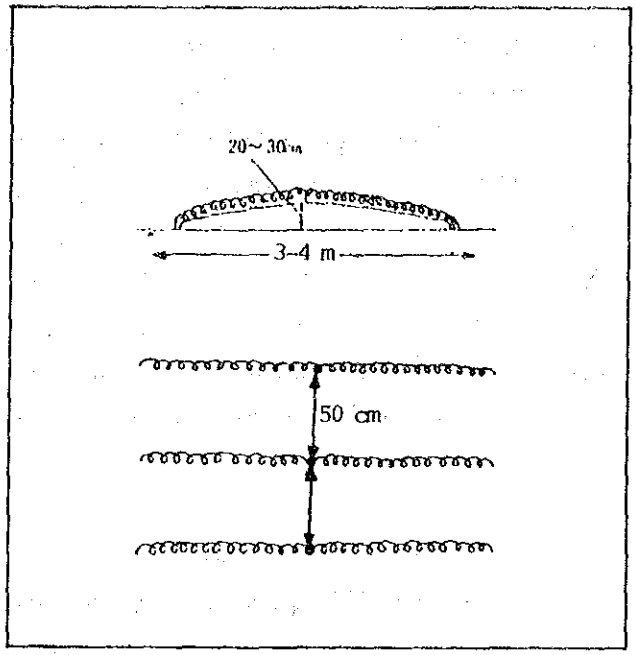


Hunger fruit

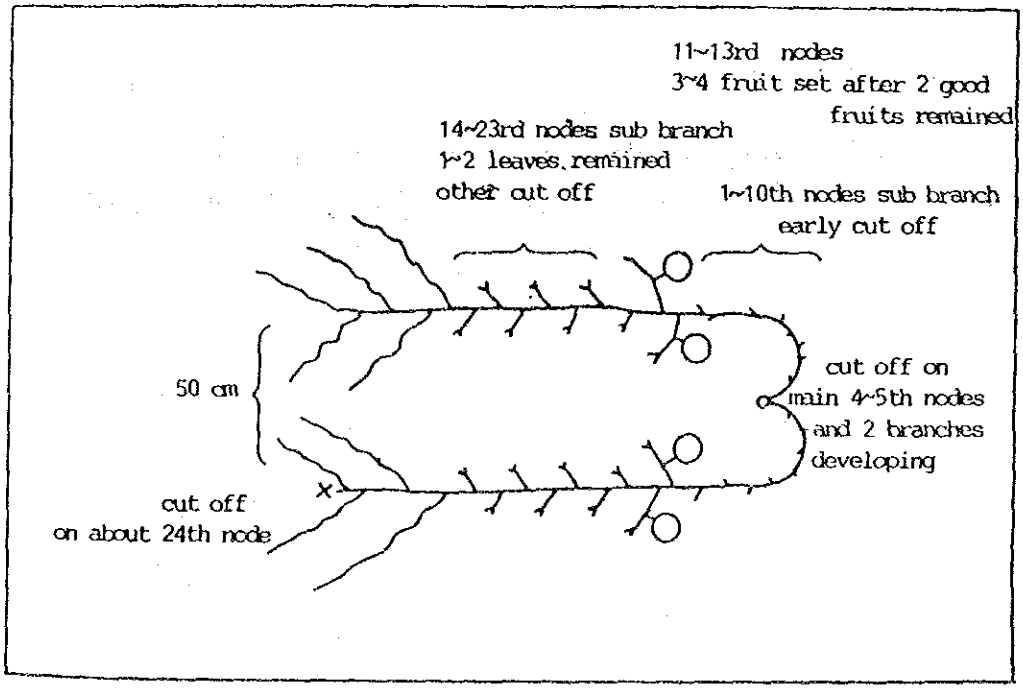


9. Ground type pruning

Bed width and between hill



Vine arrangement of ground type



10. Insect control

1 Melon thrips

This insect causes distorted of leaves and the top of the vine by sucking the plant's juice. This is an important problem. The controlling method is using insecticide such as Zolone, Posse or Lannate to spray.

2 Mite

This mite causes the damage symptom like Melon thrips. Use Kelthane or Dicofole C.P. for controlling of this mite.

3 Aphid

It can eliminate easily by spraying Sevin 85, Lannate or etc.

4 White fly

It carries the Tobacco mosiac virus to cantaloupe. Use Posse or Lannate for elimination this insect.

5 Oriental fruit fly

This insect can damage the fruit only when planting without net. Spraying Nasiman plus Malathion on the plant nearby the plot is also one of the control measure.

11. Diseases control

1 Tobacco mosiac virus

This disease makes the top of plant wrinkled, the leaves turn yellow sported and the plant can't produce the fruit.

.2 Damping off, Fusarium wilt

Use Antigro for soil treatment one week seeding and one more time at 7 weeks after germination. Only by this counter measure the disease can be controlled all the period of planting.

.3 Downy mildew

Spray Saprol plus Kerzet M after germination and every time when the disease is founded or every 1-2 weeks. All these case depend on rain-fall and moisture condition.

4 Gummy stem blight

Spray Benlate and Topsin M or coat by condensed Topsin M solution on the wounded area.

12. DAILY ACTIVITY WORK

Sep. 1984 - Jan. 1985

Sep. 15th — Organic manure preparation
(chicken dung 1 : dust of rice bran 2)

Sep. 16th — Organic plot : supply organic manure and plough, then cover with vinyl sheet

---

Oct. 12nd — Basal application

Oct. 15th — Bottom fertilization, sowing 1 seed/hole

Oct. 19th — Full germinated

Oct. 24th — Cucumber beetle control by spraying Sevin 85

Oct. 31st — Spraying Kerzeth M plus Saprol and Zolone
Ground type : main vine top cutting
Stand type ; branch vine thinning

Nov. 4th (W) — Making supporter
Irrigation
Giving Ammonium Sulphate for the delayed growth plant

Nov. 5th — Spraying Kerzeth M, Saprol and Zolone

Nov. 8th (W) — Top dressing I
Irrigation
Ground type : Supply Padan - Mipsin and cover by vinyl sheet

Nov. 10th — There are nine leaves per plant
Plant height 50-70 cm.

Nov. 11st (W) — Stand type : watering at bed side

Nov. 13rd (W) — Stand type : supplying Padan-Mipsin 4g/m^2
Ground type.: watering at bed side

Nov. 14th — Spraying Posse and Kerzeth M

Nov. 17-18th (W) — Flower crossing by bee
Plant height 1 m 60 cm

Nov 19th — Stand type : net covering
Spraying Benlate and Tokuthion

Nov. 20th	Ground type : thinning
Nov. 21st	Gummy stem blight control by spraying and coating Topsin M
Nov. 22nd (W)	Stand type : Hanging the fruit and fixing label Irrigation
Nov. 24th	40 days after sowing fruit becomes egg size Thinning
Nov. 26th (W)	Top dressing II Irrigation
Nov. 28th	Ground type : spraying Lannate, Benlate and Derosal 60
Nov. 30th (W)	Irrigation
Dec. 3rd (W)	Taking the net off Irrigation Some fruits appearance net
Dec. 4th	Spraying Topsin M plus Dipterex and Fruit fly control by spraying Nasiman plus Malathion around the field
Dec. 7th (W)	Irrigation
Dec. 11st (W)	Irrigation Spraying Lannate and Derosal 60
Dec. 13rd	Fruit is completely net
Dec. 14th (W)	Ground type : Powdery and Downy mildew damage the lower leaves Irrigation and watering at bed side
Dec. 20th (W)	Ground type : irrigation then stop watering
Dec. 25th (W)	Upper leaves die Stand type : irrigation
Dec. 28th	Taking the die leaves off Downy mildew control by spraying Antracol and Captan Ground type : Homerunstar harvest
Dec. 29th (W)	Stand type : a little irrigation
Jan. 4th	Ground type : Homerunstar harvest
Jan. 4-8th	Ground type : Fukamidori harvest
Jan. 14th	Stand type : Fukamidori harvest

(W) = Watering.

Result

The experiment results for all 5 years are given in table 1.

At the first 3 years, some experiments succeeded but some failed because grafting method was used in these experiments. This method delays the growth and the plants are seriously attacked by diseases and insects.

The good month for sowing is October. It is better than September and November because there is mild weather and suitable moisture in the soil, in these months. For the last 2 years, the cultivation changed to direct sowing and net covering method. After this, every experiment succeeded.

Experiment results in 1984-1985 are shown in table 2.

There are two varieties of experiment that is Homerunstar and Fukamidore. The cultivation method were divided into 2 types those are ground type and stand type. There are 38 plants per 60 m^2 (one row per bed) for ground type and 152 plants per 60 m^2 (two row per bed)

For Homerunstar, the flower crossing date is November 10-20th, harvest date is December 21st - January 14th, the total yield is 65 fruits, the total weight is 70 kg and the average weight is 1.08 kg.

Otherwise Fukamidori the flower crossing date is November 10-24th, harvest date is December 23rd - January 14th, the total yield is 254 in the area of 112 m^2, the total weight is 327 kg and the average weight is 1.29 kg.

Fertilizer matter comparison, the fruits planted by organic fertilizer are 1% sweeter than the ones from chemical fertilizer.

Ground type and stand type comparison, Melons in ground type grow more rapidly and need less seed than the stand type. Melons get 4 fruits per plant by ground type and at the same time they get 2 fruits per plant by stand type.

Table 1 RESULT OF MELON CULTIVATION 1980-1984

Suphan Buri Experiment and Training Center

Year	1980	1981	1982	1983			1984	
				1st	2nd	3rd	1st	2nd
Sowing	Oct19	Oct17	Oct3	Sep12	Oct30	Dec19	May22	Oct15
Grafting	Nov3	Oct31	Oct21	Sep24	---	---	---	---
Planting	Nov7	Nov8	Oct30	Oct7	Nov23	---	---	---
Flowering	Nov30-	Dec9-	Nov20-	Nov10-	Jan27-84	Feb7-84	Jul1-84	Nov16-84
Harvest	Jan8 immature	Jan20-	Jan10-immature		Feb24-84	Mar25-84	Aug17-84	Jan11-85

Table 2 The result of melon cultivation in 1984.

Sowing date : October 15th, 1984.

Variety	Type	Area m^2	Number plant	Flowering	Harvest	Number	Weight(kg) total	Weight(kg) mean	Brix
Home-runstar	ground	60	38	Nov 10-15	Dec 21 Jan 4	56	62	1.11	-
	stand	4	10	Nov 15-20	Jan 11-14	9	8	0.88	-
Total		64	48			65	70	1.08	
Fuka-midori	ground	60	38	Nov 10-20	Dec 23 Jan 8	119	150	1.26	-
	stand	52	132	Nov 16-24	Jan 11-14	135	177	1.31	C=11.2 O=12.3%
Total		112	170			254	327	1.29	11.7

Training Activities

CONTENTS

** This report is translated from Thai language written by the Director of Training Center.

TRAINING ACTIVITIES OF 1980

ANNUAL REPORT 1980

C O N T E N T

APPENDIX TABLE OF CONTENT

APPENDIX CONTENT

Training work of Suphan Buri Experiment Station and Training Center Project for Agriculture Development in Irrigated area

1 9 8 0

Introduction

Experiment Station and Training Center Project for agriculture development in Suphan Buri irrigated area under Technical Division of Department of Agriculture is situated in Suphan Buri Rice Experiment Station, Tambol Rua-yai, Amphur Muang, Changvat Suphan Buri. This project is established by cooperation between Thai and Japanese governments to support Agriculture Development Project in Thailand irrigated area. The purpose of this Center is to support techniques and to train the officials who work in Irrigated Agriculture Development Project area especial in irrigated area of Chao Phya and Mae Klong river.

There are 3 sub-projects in Irrigated Agriculture Development Project which were the cooperation between Thai and Japanese governments, those were signed on 8 th April, 1977 as follows

1. Chao Phya Pilot Project of Agricultural Land Reform Office starts to do in area 3,000 rai, donated value 38,831,000 baht.
2. Mae Klong Pilot Project of Royal Irrigation Department starts to do in area 2,400 rai for No. 1 and 3,000 rai for No. 2, donated value 21,599,000 baht.
3. Experiment Station and Training Center for Agriculture Development in Suphan Buri irrigated area was established for training and technical supporting to officials and technicians who concerned with irrigated agriculture development, donated value 2,500,000 baht and 8,000,000 baht for building construction so the total was 10,500,000 baht.

Policy and aim

1. To train technicians and officials who concerned with Irrigated Agriculture Development Project about modern agriculture for practicing in their works.
2. To develop cropping system in project area to the aims those are high efficiency of resources resorting, agriculture yield increasing, farmer income increasing, resources distributing and consistent income of farmer.

3. To develop productive system to be cooperative form by uniting in production, sale and consumer goods buying. So, we can eradicate the problems about middlemen and bargain power.
4. To disseminate modern technology to farmer in irrigated area expeditiously and efficiently by direct and indirect ways. The direct way is distributing trial farms or technical demonstration in project area so the farmer can dicide by themselves about varieties, nourishment or cropping system. The indirect way is by training technicians and officials who work in these projects.
5. To solve the problems in projects. If the problem is complicated, we can solve by multidiscipline method.

Training result in 1980

In 1980, Suphan Buri Training Center doesn't have dormitory and cafeteria so trainees must stay in hotel. By this reason, long term training course can't be done so there are 3 curricula of 2 weeks course and 4 curricula of special course (about 2-3 days) as follows

2 weeks course

	name	duration	number
1.	Cropping system in irrigated area	17-28 December 79	39
2.	Integrated farming in irrigated area	14-25 January 80	32
3.	Rice cultivation techniques in irrigated area	14-25 April 80	40
4.	" ——————————— "	12-23 May 80	33
		Total	144

	Special course	duration	number
1.	Experimental designs and result analysis by computer	5-6 February 80	15
2.	Modern agriculture in irrigated area	18-20 March 80	46
3.	Introduction to computer programing and utilization	16-17 June 80	12
4.	Advance of computer programing and utilization	23-24 July 80	9
		Total	82
		Grand total	226

Conclusion of training in 1980

Subjects selection in these curricula of training courses emphasizes in knowledge revision and new technology interpolation in order that trainees, who come from many offices, will have broad knowledge that concerning so they can improve their works.

From the evaluation test of all trainees, there are some suggestions as follows

1. Should have more practices
2. Should have more observation
3. Should stay in the same place so trainee will be closelier to each other

These needs can be solved in next year when the dormitory is finish. Except these needs, we can say that the training is acheiving.

The lecturers are the experts in those fields of knowledge who come from government offices, university, organizations and private busy such as Royal Irrigation Department, Land Consolidation Office, Agricultural Inspection and Coordination, etc..

Other activities of Center in 1980

1. Construction

In fiscal year 1980, Training Center received construction budget as follows

1. Dormitory (40 persons)	Amount	1,800,000	baht
2. 2 expert houses	Amount	400,000	baht
	Total	2,200,000	baht

The construction began since 10 May 1980 and finished in September 1980. This amount of money didn't include durable articles in dormitory.

2. Experiment

2.1 Study of co-factors in yield increasing

2.2 Study of influence of water ventilation to rice growth and yield in clay soil

3. Cooperation with other offices

3.1 Technical cooperation with Cooperative assembly of Thailand about seedling for transplanter and transplanter test

3.2 Supporting in technology, rice and crop seed to Mae Klong and Chao Phya Pilot Projects.

3.3 Supporting by training the farmer in Land reform project area

4. Seminar

In 1980, there were meeting and seminar as follows

1. Procedure result seminar of Research Coordination and Promotion of water in Agriculture utilization Sub-committee (45 members), the duration was 25-26 October 1979
2. Meeting for sensitive rice varieties selection among Experiment Station in Central region (35 members), the duration was 26-27 May 1980
3. Meeting of Agriculture officials of Modern germinated broadcasting rice cultivation project in Suphan Buri, Kanjanaburi, Nakornpathom and Samuthsakorn area (45 members), Director-general of Department of Agriculture and Department of Agricultural Extension were presidents. The meeting was on 4 June 1980.

4. On 9 June 1980, there was training of Modern germinated seed demonstration pilot to 50 agriculture officials, Suphan Buri technicians and farmer.

5. Visitation

In fiscal year 1980, there were 990 visitors (41 groups) those were foreign experts, students and farmer. This number didn't include the farmer who came for seed buying and technology service.

Subjects schedules of training courses in fiscal year 1980

1. Curriculum "Cropping system in irrigated area"

(2 weeks)

No.	Subject name	Hour
1.	Open ceremony and orientation	2
2.	Special lecture "Role of Market Organization for agriculturist to Agriculture Development in Thailand"	1½
3.	Principle in Cropping system and Multi-cropping	3
4.	Soil and nourishment	3
5.	Chemistry and soil fertility	3
6.	Agro-climatology	3
7.	Irrigation system in paddy field	3
8.	Water and utilization in agriculture	3
9.	Weeds and its control	3
10.	Vegetables in cropping system	3
11.	Rice cultivation techniques	3
12.	Cultivation of soybean, mung bean and ground nut	3
13.	Cultivation of corn and sorghum	3
14.	Seed technology, utilization of Rhyzobium in bean family plant	3
15.	Agricultural statistic	3
16.	Principle in experimental designs for study of cropping system in paddy field	3
17.	Insects, pests and its control	3
18.	Diseases and its control	3
19.	Farm management and economic analysis	3
20.	Agricultural machinery	4½
21.	Visual education and observation	12
22.	Certificates distribution and close ceremony	1½
	Total	72½

2. Curriculum "Integrated farming in irrigated area"

(2 weeks)

1.	Open ceremony and orientation	2
2.	Special lecture "Land consolidation for agriculture development in irrigated area"	1½
3.	Integrated farming	3

No.	Subject name	Hour
4.	Rice cultivation techniques and maintenance	3
5.	Cultivation of soy bean, mung bean and ground nut in irrigated area	3
6.	Vegetable cultivation	1½
7.	Orchard cultivation	1½
8.	Observation	6
9.	Diseases and its control (No harm for pets and fish)	3
10.	Insects and its control (No harm for pets and fish)	3
11.	Pests and its control (No harm for pets and fish)	3
12.	Fish raising in Integrated farming	3
13.	Pig raising and nourishment	3
14.	Poultry raising and nourishment	3
15.	Mushroom cultivation and demonstration	6
16.	Preservation and food science	3
17.	Observation	6
18.	Economic stove for agriculture	1½
19.	Bio-gas well making	1½
20.	Agricultural equipment	3
21.	Farm management and economic analysis	3
22.	Training evaluation	1½
23.	Visual education and observation	1½
24.	Certificates distribution and close ceremony	1½
	Total	68

3. Curriculum "Rice cultivation techniques in irrigated area"
(2 weeks)

1.	Open ceremony and orientation	1
2.	Land consolidation for agriculture	2
3.	Climatology and Agro-ecology	3
4.	Rice cultivation techniques in irrigated area	3
5.	Biology of yield and yield components	1½
6.	Fertilizer	1½
7.	Agricultural irrigation and water management	3
8.	Study and observation at Sri-pra-jan agricultural cooperative and farmer farm	6
9.	Chemistry and soil fertility	3
10.	Weeds in paddy field and its control	3

No.	Subject name	Hour
11.	Diseases and its control	3
12.	Practice in rice diseases, insects and pests control and study of weeds in paddy field	3
13.	Rice pests and its control in paddy field and storage	3
14.	Rice insects and its control in paddy field and storage	3
15.	Cropping system in paddy field	1½
16.	Straw mushroom cultivation and demonstration	4½
17.	Integrated farming	3
18.	Agricultural machinery and wind wheel utilizing	3
19.	Evaluation and analysis of rice yield	3
20.	Rice knowledge	3
21.	Training evaluation	1
22.	Special lecture "Psychology in farmer approach"	4
23.	Visual education and observation	12
24.	Certificates distribution and close ceremony	1
	Total	75

4. Curriculum "Modern agriculture"

(3 days)

1.	Open ceremony and orientation	1
2.	Roles of farmer group to agricultural development	2
3.	Cultivation methods and rice varieties	3
4.	Rice cultivation techniques for high yield and problems discussion	3
5.	Mushroom cultivation	3
6.	Integrated farming	3
7.	Visual education and observation	3
8.	Certificates distribution and close ceremony	1
	Total	22

5. Curriculum "Experimental designs and computer result analysis"

(2 days)

1.	Experimental designs	6
2.	Computer utilization training	6
	Total	12

6. Curriculum "Computer programing and utilizing"

(2 days)

No.	Subject name	Hour
1.	Computer knowledge	3
2.	Computer working	3
3.	Introduction to computer programing	3
4.	Computer programing and utilizing training	3
	Total	12

7. Curriculum "Advance of computer programing and utilizing"

(2 days)

1.	Principle of computer program in agriculture	6
2.	Training in computer programing, data in-put and result analysis	6
	Total	12

Suphan Buri Training Center

Fiscal year 1980

Trainees agency and organization

No.	Agency	2 weeks course				Special course				Total
		1	2	3	4	1	2	3	4	
1.	Royal Irrigation Department	10	4	5	4	2	-	1	-	26
2.	Agricultural Land Reform Office	6	4	-	3	5	-	2	-	20
3.	Department of Agriculture	4	11	6	9	8	-	9	9	56
4.	Department of Agricultural Extension	15	-	11	5	-	-	-	-	31
5.	Department of Agricultural Cooperative Promotion	-	3	4	4	-	-	-	-	11
6.	Department of Community Development	-	2	2	-	-	-	-	-	4
7.	Department of Public Welfare	-	2	2	2	-	-	-	-	6
8.	National Security Command	-	2	1	2	-	-	-	-	5
9.	Office of Accelerated Rural Development	-	2	2	1	-	-	-	-	5
10.	Office of Agricultural Economics	2	1	2	2	-	-	-	-	7
11.	Petchburi Demonstration Farm Pilot Project	-	-	2	1	-	-	-	-	3
12.	Thai-IRRI Joint Research Project	-	-	3	-	-	-	-	-	3
13.	Department of Fisheries	-	1	-	-	-	-	-	-	1
14.	Chiengmai University	2	-	-	-	-	-	-	-	2
15.	Farmer Organization	-	-	-	-	-	46	-	-	46
	Total	39	32	40	33	15	46	12	9	226

Suphan Buri Training Center

Fiscal 1980

Schedule of education degree and position of trainees

Education degree	2 weeks course				Special course				Total
	1	2	3	4	1	2	3	4	
Expert	-	-	-	-	5	-	-	-	
Doctor degree	-	-	-	-	-	-	1	-	
Master degree	2	1	-	1	-	-	2	2	
Bacholor degree	25	24	9	29	10	-	9	7	
Agricultural Vocational School Certificate (5 years)	8	4	27	-	-	-	-	-	
Agricultural Vocational School Certificate (3 years)	4	3	4	3	-	-	-	-	
Farmer leader	-	-	-	-	-	46	-	-	
Total	39	32	40	33	15	46	12	9	226
Position									
Expert	-	-	-	-	5	-	-	-	
PC 6	-	2	-	-	1	-	2	1	
PC 5	6	6	2	3	4	-	4	5	
PC 4	10	10	5	11	5	-	3	2	
PC 3	20	10	19	17	-	-	3	1	
PC 2	2	3	13	2	-	-	-	-	
PC 1	1	1	1	-	-	-	-	-	
Farmer leader	-	-	-	-	-	46	-	-	
Total	39	32	40	33	15	46	12	9	226

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Department of Agriculture order

At 543/1979

Item Appointment of Suphan Buri Training Center Project working group

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By Japanese government aiding, Department of Agriculture has established Suphan Buri Irrigated Agriculture Development Training Center for training technicians and Promotion officers who concern in economic crops and technology to disseminate to farmer. For good effect from training center establishment, working group of Suphan Buri Training Center Project that is under Department of Agriculture are appointed as follows

1.	Dr. Vinit Jaengsri	The Director of the Technical Division as chairman
2.	Mr. Kluenn Thongsaeng	Technician 7, Technical Division
3.	Mr. Sansern Piriyathamrong	Technician 6, Horticulture Division
4.	Mr. Rapeepan Pasabutt	Agricultural Engineer 6, Agricultural Engineering Division
5.	Mr. Paisarn Supanksen	Entomologist 6, Entomology and Zoology Division
6.	Mr. Boonlert Graiprayong	Chief of Suphan Buri Rice Experiment Station, Rice Division
7.	Mr. Prakong Jitasombat	Scientist 7, Chemistry Division
8.	Mr. Somkid Disthaporn	Pestologist 6, Plant Pathology and Microbiology Division
9.	Miss Sagha Duangratt	Statistician 7, Planning Division
10.	Mr. Vijit Kajornmalee	Chief of U-thong Field Crops Experiment Station, Field Crops Division
11.	Mr. Vichien Sasiprapa	Agricultural technician 6, Technical Division, the secretary

Duty of working group

1. Arranging curricula in training
2. Procuring lecturers
3. Planning research and training direction follow to the policy and direction those are set by the Ministry of Agriculture and Cooperative.

These persons are in duty since now.

This order is on 30 March 1979

(sign) Phaderm Titatharn

(Mr. Phaderm Titatharn)

Vice-director-general
acting for Director-general
of Department of Agriculture

Right copy

(sign) Vichien Sasiprapa

(Mr. Vichien Sasiprapa)

Agricultural technician 6
Technical Division
Department of Agriculture

(Copy)

Ministry of Agriculture and Cooperative order

At 251/1980

Item Appointment of Suphan Buri Experiment Station and Training Center Project coordinate sub committee

Suphan Buri Experiment Station and Training Center is a sub-project of Irrigated Agriculture Development Project.

This sub-project is aid by Japanese government in technology and necessary to cooperate with government officers and concerned offices for considering training curricula and other coordinating.

So, for the efficiency works of Suphan Buri Experiment Station and Training Center Project, appointing Experiment Station and Training Center Project coordinate sub committee as follows

1.	Dr. Vinit Jaengsri	Suphan Buri Experiment Station and Training Center Project Manager	as	President of sub committee
2.	Mr. Gasem Jarintho	Chief of Training Office, Department of Agricultural Extension	as	Sub committee member
3.	Dr. Thiravee Supanich	Land Reform Officer 6, Agricultural Land Reform Office	as	Sub committee member
4.	Mr. Udom Rakjanya	Irrigation Management and Maintenance Director, Royal Irrigation Department	as	Sub committee member
5.	Mrs. Vannee Rattanavaraha	Cooperative technician 6, Department of Agricultural Cooperative Promotion	as	Sub committee member
6.	Mr. Kluenn Thongsaeng	Agricultural technician 7, Department of Agriculture	as	Sub committee member
7.	Mr. Sommai Suragul	Agricultural Inspection and Coordination Director	as	Sub committee member
8.	Mr. Prasert Gaewnum	Director of Office of Community Development area 7, Department of Community Development	as	Sub committee member
9.	Mr. Pongpiya Piyasiranon	Agricultural technician 5, Land Development Department	as	Sub committee member
10.	Mr. Vichien Sasiprapa	Agricultural technician 6, Project Manager assistant of Suphan Buri Experiment Station and Training Center	as	Sub committee member and secretary

The sub committee have duties in considering training curricula; duration of training and selecting trainees for the efficiency and accomplishment of works of Suphan Buri Experiment Station and Training Center Project

This order is on 10 June 1980

Right copy

(sign) Vichien Sasiprapa

(Mr. Vichien Sasiprapa)

Agricultural technician 6
Technical Division
Department of Agriculture

Thalerng Thamrongnavasavad

(Mr. Thalerng Thamrongnavasavad)

The permanent undersecretary of
The Ministry of Agriculture and Cooperative

(Copy)

Ministry of Agriculture and Cooperative order
At 167/1980
Item Adjust of Irrigated Agriculture Development Project direction staff

Follow to the Ministry of Agriculture and Cooperative order at 284/1978 on 24 th August 1978 that was about the adjustment of Irrigated Agriculture Development Project direction staff.

Now, some of the staff have been ohanged their positions. So, for the appropriateness, adjusting the direction staff of Irrigated Agriculture Development Project as follows

1.	Ml. Pilan Malagul	Inspector of the Ministry of Agriculture and Cooperative	as	Project Director
2.	Mr. Roongrueng Julchart	Engineer 7, Royal Irrigation Department	as	Mae Klong Pilot Project Manager
3.	Mr. Chalermtep Rattana-	Agricultural technician 6, Royal Irrigation Department	as	Project Manager assistant of Mae Klong Pilot Project
4.	Dr. Vinit Jaengsri	Technical Division Director, Department of Agriculture	as	Project Manager of Suphan Buri Experiment Station and Training Center
5.	Mr. Vichien Sasiprapa	Agricultural technioian 6, Department of Agriculture	as	Project Manager assistant of Suphan Buri Experiment Station and Training Center
6.	Mr. Sutin Mulpruk	Civil Engineer 6, Land Reform Management Division, Agricultural Land Reform Office	as	Chao Phya Pilot Project Manager
7.	Mr. Surapol Petchlom	Land Reform Officer 6, Ayudthya Land Reform Office, Agricultural Land Reform Office	as	Project Manager assistant of Chao Phya Pilot Project
8.	Deputy of Department of Agricultural Extension		as	Agricultural Extension officer
9.	Deputy of Office of Agricultural Economics		as	Agricultural Economics officer
10.	Mr. Paitoon Palayasut	Chief of Central Land Consolidation Office	as	Project Coordinator
11.	Mr. Pornnarong Siriyotin	Civil Engineer 4, Central Land Consolidation Office	as	Project Coordinator assistant

These officers have responsible on these projects and set working staffs as fitting

This order is on 23 th April 1980

Right copy

(sign) Vichien Sasiprapa
(Mr. Vichien Sasiprapa)
Agricultural technician 6
Technical Division
Department of Agriculture

Thalerng Thamrongnavasavad
(Mr. Thalerng Thamrongnavasavad)
The permanent undersecretary of
The Ministry of Agriculture and Cooperative

List of durable articles and construction donated from Japanese Government

Suphan Buri Experiment Station and Training Center Project

1978

Construction	Number	Price (¥)
1. The main building is reingorced concrete	1	120,000,000 ¥
2. The size of downstair is 13 metre wide and 45 metre long. Upstair is 13 metre wide and 30 metre long with water , electric, gas and waste water control system including decoration and some furniture		
Consist of		
- Laboratory	14 sets	
- Office desk with armchair	27 sets	
- Typewriter table with armchair	1 set	
- Teak cabinet	27	
- Desk	24	
- Armchair	48	
- Air condition (split type)	3	
- Book shelf	10	
- Small conference table with 12 armchairs	1 set	

List of durable articles and construction donated from Japanese Government

Suphan Buri Experiment Station and Training Center Project

1979

		Number	Price (¥)
Agriculture Machinery			
1.	Power tiller with spare part	1	659,600
2.	2 rows transplanter	1	253,000
3.	4 rows transplanter	1	495,300
4.	Mist blower sprayer	1	51,700
5.	Seed thresher	1	240,000
Laboratory Equipment			
1.	Moisture Meter	1	80,000
2.	Granometer	7	84,000
3.	Hydrometer	1	500
4.	Reaping area determinator	1	30,000
5.	Germinator	2	20,000
6.	Drying oven	2	880,000
7.	Balance	5	160,000
8.	Microscope	1 set	247,000
Stationery			
1.	Computer	1	465,500
2.	Copy machine	1	508,250
3.	English typewriter	1	114,000
4.	Duplicator	1	235,000
5.	Air condition	2	237,400
6.	Steel cabinet	1	34,200
Audio visual aids			
1.	Amplifier with attachment	1	124,100
2.	Amplifier (carried type)	1	23,500
3.	Camera with attachment	1	232,750
Vehicle			
1.	Air conditioned bus (45 seats)	1	6,765,000
		Total	11,940,800
		CIF	13,225,800

List of durable articles and construction donated from Japanese Government

Suphan Buri Experiment Station and Training center Project

1979

Agricultural Machinery	Number	Price (¥)
1. Straw twisting machine	1	130,350
2. Vinyl sheet (2.7 x 50.0 m)	1	25,000
3. Cheese cloth	1	18,000
Laboratory Equipment		
1. Tension meter	2	24,000
2. Fine autonomic balance	1	350,000
3. Semi autonomic balance	1	51,000
4. Hydrometer	1	21,000
5. pH meter	1	56,000
6. Eh meter	1	40,000
7. E.C. meter	1	27,000
8. Shaker	1	95,000
9. Centrifygal machine	1	100,000
10. Distilled & pure water making machine	1	390,000
11. Leaf area measurement	1	400,000
12. Binocular microscrope with attachment	2	360,000
13. Pressure sterilizer	1	270,000
Stationery		
Electric fan (12 inches)	10	124,000
Air condition (split type)	1	174,000
Refrigerator (10.5 cu)	2	340,000
Calculator	1	18,000
Pocket calculator	20	132,400
Copy machine (wet type)	1	142,500
Audio visual aids		
Color video camera	1	195,000
Color video record	1	190,000
Color video accessory	1set	190,000
Color television set (20 inches)	1	130,000
16mm projector	1	240,000
Over-head projector	1	70,000

Vehicle	Number	Price (¥)
1. Station Wagon	1	1,610,000
2. Station Wagon Attachment	1 set	161,000
	Total	6,074,250
	CIF	6,721,821

List of durable articles and construction donated from Japanese Government

Suphan Buri Experiment Station and Training Center Project

1980

	Agricultural Machinery	Number	Price(¥)
1.	8 rows transplanter (riding type)	1	1,468,600
2.	Mist blower sprayer	2	111,300
3.	Binder	1	343,500
4.	Paddy interculture	1	68,700
	Laboratory equipment		
1.	Grain moisture meter	1	90,200
2.	Tube shaker	1	30,750
3.	Soil crusher	1	166,600
4.	Semi micro Kjedhl	2 sets	98,400
5.	Auto burette set	2 sets	114,800
6.	Experimental winnower	1	272,200
7.	Rice huller	1	262,200
8.	Rice mill	1	413,000
9.	Hand rice mill	1	4,100
10.	Grain rigidity tester	1	90,200
11.	Straw fracture tester	1	15,400
12.	Rice shattering habit tester	1	225,500
13.	Grain sample divider	1	118,300
14.	Grain micrometer	1	4,400
15.	Hand level	1	4,600
16.	Sugar refraction	1	14,350
17.	Soil sterilization injector	1	17,400
18.	Soil seive shaker	1	273,700
19.	Furnance	1	205,000
20.	Vacum pump	1	71,750
21	Media Pipetting	1 set	200,000
22.	Magnetic stirrer	1 set	74,800
23.	Hot plate	2	162,000
24.	Insect net	2	24,600
25.	Water bath	2	265,500
26.	Stalk balance (200 gm)	1	24,600
27.	Paddy leaf color charts	1 set	3,100
28.	Standard leaf color charts	1 book	14,900
29.	Leaf punch	1	36,900
30.	Water culture solution tester	1 set	31,800

		Number	Price(¥)
31.	Soil tester	1 set	32,300
32.	Crossing net	1 set	45,100
33.	Ice box	2	48,200
34.	Handy cart	1	64,600
35.	Incubator	1	1,010,000
36.	Colony counter	1 set	102,000
37.	Electric sterilizer	1 set	89,250
38.	Frame photometer	1 set	995,505
39.	Insect iron net	1 set	252,000
40.	Electro-auto pump	2	75,600
	Stationery		
1.	Porcelain board	2	131,900
2.	Paper trimmer	1	195,000
3.	Off set printer with binder and parts	1 set	2,544,790
4.	Ricoh printer E 120 spare parts	1 set	30,400
5.	Air condition (split type)	1	294,000
	Publicity equipment		
1.	Microphone	6	24,000
2.	Transceiver	4	122,000
3.	Cassette recorder	1	16,200
4.	Mini cassette recorder	1	27,000
5.	Microphone terminal	1	43,000
6.	Camera's attachment	1 set	121,300
7.	Color film	3	461,500
8.	Screen	1	174,300
	Vehicle		
1.	Mini truck (600 cc)	1	840,000
2.	Motorcycle (90 cc)	2	262,500
		FOB	13,325,995
		CIF	14,053,498

List of durable articles bought in Thailand

Suphan Buri Experiment Station and Training Center Project

Technical Division : Department of Agriculture

1978 - 1980

		Number	Price (Baht)
1.	Bicycle	1	1,105
2.	Electric fan (16 inches)	1	1,400
3.	Air condition (split type)	1	27,000
4.	Hover electric polisher	1	5,500
5.	Sofa set	1 set	3,100
6.	Tank (400 gallon) with stand	2	3,700
7.	Electric type-writer (both English and Thai languages)	1	30,200
8.	Megaphone - apex	1 set	1,600
9.	Electric water pump (2 inches)	1	3,000
		Total	76,605

List of Trainees

At Suphan Buri Training Center

Fiscal year 1979

1 st class

Curricoulum "Rice cultivation techniques in irrigated area"

Duration : 16-27 July 1979

1. Royal Irrigation Department

1. Mr. Direg Thong-ararm
2. Mr. Sawai Vongvuthsaroch
3. Mr. Theerapong Pongsawang
4. Mr. Prayong Varin
5. Mr. Pragob Thamvongchai
6. Mr. Samuane Grataithong
7. Mr. Manoch Nylniyom
8. Mr. Vichan Janpen
9. Mr. Suravuth Kampaengset
10. Mr. Pongsak Lavanamand

2. Department of Agricultural Extension

11. Mrs. Suganya Jongjaipag
12. Mr. Narongrit Onchoi
13. Mr. Vutthisag Polpinit
14. Mr. Samroj Prukpr song
15. Mr. Viratt Peanvittaya
16. Mr. Paiboon Choo-aied
17. Mr. Chamnarn Chanpradub
18. Mr. Ahree Sripijit
19. Mr. Thongchai Suthinaragorn
20. Mr. Gamon Gasemsook
21. Mr. Cherdsook Pavanavichien
22. Miss Ruengsoontorn Khuhaganog
23. Mr. Gamolsag Geesavayuth
24. Mr. Gittisag Poo-prasert
25. Mr. Chartchai Chumsai na ayuttaya

3. Agricultural Land Reform Office

26. Miss Gannigar Kamboonratt
27. Miss Alisa Hommali
28. Miss Pannee Poo-ritatt
29. Mr. Booncherd Rod-aiem
30. Mr. Chalerm Damnernpol
31. Mr. Manit Thongsriponge

4. Department of Agrioulture

32. Miss Sasithorn Sovan
33. Mr. Ohpas Jantasook
34. Mrs. Angkana Luangsiroratt
35. Mrs. Rattanaporn Sooktep
36. Mr. Patt Viboonjarernpol
37. Mr. Pornsag Jiemvijit
38. Miss Nittaya Harnsag
39. Mr. Boonyang Saengputta
40. Mr. Apichai Gusumand

2 nd class

Curricoulum "Cropping system in paddy field of irrigated area"

Duration : 17-28 December 1979

1. Chiengmai University

1. Mr. Jaturonge Puangmanee
2. Mr. Jamlong Pothajarern

2. Office of Agricultural Economics

3. Mr. Peerasag Potcharanan
4. Mr. Somsag Yo-thee

3. Agricultural Land Reform Office

5. Mr. Thana Tha-normsagyudth
6. Mr. Jaggri Rammana
7. Mr. Narongsag Sripamorn
8. Mr. Vichai Lickananon
9. Mr. Vitthaya Chaisuvan
10. Mr. Prasit Bangchuad

4. Department of Agricultural Cooperative Promotion

11. Mr. Jagchai Sagsri
12. Mr. Surachart Somvatthanasag
13. Mr. Sayan Putthasri
14. Mr. Sommai Tuladecharag
15. Mr. Jamnonge Chaichote
16. Mr. Cherdsook Pavanavichien
17. Miss Tuanejai Boonpuano
18. Mr. Prateep Jandamronge
19. Mr. Viroj Phuangphooloi
20. Mr. Pairatt Wangdee
21. Mr. Ruangsag Saenpen
22. Miss Vilai Tarerngijpan
23. Mr. Thongchai Soothi-naragorn
24. Mr. Songeserm Varamit
25. Mr. Pisin Padungchevit

5. Royal Irrigation Department

26. Mr. Ohsott Chanvetch
27. Mr. Pramote Detchyapirom
28. Mr. Manas Ruangchai
29. Mr. Samran Poo-hoi
30. Mr. Thavee Thongkharw
31. Mr. Prasonge Indontree
32. Mr. Sopon Luangemaneevetch
33. Mr. Pin Sri-ampai
34. Mr. Suvith Chua-damronggul
35. Mr. Sutep Aimratt

6. Department of Agriculture

36. Mr. Ohpas Jantasook
37. Mr. Pornlert Yoo-vatthana
38. Mr. Damronge Ponge-manavuth

3 rd class

Curriculum "Integrated farming in irrigated area"

Duration : 14-25 January 1980

1. Royal Irrigation Department

1. Mr. Soodjai Khanthichote
2. Mr. Apichai Vatthanayommaporn
3. Mr. Siroj Prakoonhangsit
4. Mr. Boontham Yongesalai

2. Agricultural Land Reform Office

5. Miss Pannee Poo-ritatt
6. Mr. Veerapan Sriboonleu
7. Mr. Supachai Visetsin
8. Mr. Suthee Boonkonge

3. National Security Command

9. Col. U-grit Janthavarin
10. Lt.Col. Gatha Rodsuthi

4. Office of Accelerated Rural Development

11. Mr. Ahthit Boontho
12. Mr. Chotechai Roongrojchaiporn

5. Department of Agricultural Cooperative Promotion

13. Mr. Gampolsag Moon-a-mart
14. Mr. Sayarmchai Phagthed
15. Mr. Gitti Chotegiet

6. Department of Fisheries

16. Mr. Giettisag Kositchaivatt

7. Department of Public Welfare

17. Mr. Chatchavaln Setthabutr
18. Mr. Prasote Pho-thivatthutham

8. Department of Community Development

19. Mr. Yudthapoom Sookpinij
20. Mr. Sura Thongphoo-noi

9. Office of Agricultural Economics

21. Mr. Peerasag Potcharanan

10. Department of Agriculture

22. Mr. Prasit Boonchoo-duang
23. Miss Lavan Aiemsupan
24. Mr. Sirichai Somboonponge
25. Mr. Monthon Punyarit
26. Mr. Banlu Ruangesook
27. Mr. Samak Yingyong
28. Mr. Ohpas Jantasook
29. Mr. Direg Gl mprathoom
30. Miss Gannigar Na-glang
31. Mrs. Supanee Jonge-dee
32. Mr. Apiratt Kharwsavee

4 th class

Curriculum "Experimental designs and computer result analysis"

Duration : 5-6 February 1980

1. Agricultural Land Reform Office

1. Mr. Suppachai Visetsin
2. Miss Gannigar Kamboonratt
3. Miss Pannee Poo-rithatt
4. Mr. Ichiro Numba
5. Mr. Isamu Yamazaki

2. Royal Irrigation Department

6. Mr. Siroj Prakoonhangsit
7. Mr. Kazuto Misawa

3. Suphan Buri Experiment Station and Training Center

8. Miss Jamnonge Nardsomboon
9. Miss Sasithorn Sovan
10. Mrs. Achana Siripatt
11. Mr. Vanchai Tonsaipetch
12. Mr. Ohpas Jantasook
13. Mr. Vichien Sasiprapa
14. Mr. Susumu Inoue
15. Mr. Yasushi Watanabe

5 th class

Special curriculum "Modern agriculture in irrigated area"

Duration : 18-20 March 1980

Name	Name
1. Mr. Thavil Srisank	9. Mr. Sawang Limthong
2. Mrs. Pinthong Srisank	10. Mr. Chalerm Gerdniam
3. Mr. Samrit In-glam	11. Miss Buysri Gate-mance
4. Mr. Riab Yanggyeune	12. Mr. Bai In-sagul
5. Mr. Savonge Srisank	13. Mr. Vijin Srisank
6. Miss Samarn Nagfon	14. Mr. Savang Soonpra-cha
7. Mr. Samrarn Srajomethong	15. Mr. Od U-thaichai
8. Mr. Samrarn Sripo	16. Mr. Vichien Khunmaignarm

	Name		Name
17.	Mr. Zuan Roonnaronge	32.	Miss Banthom Palagavonge
18.	Mr. Pean Triparp	33.	Miss Thurian Khunmaignarm
19.	Mr. Somneuk Onpragnarm	34.	Mr. Thongyib Vareeratt
20.	Mr. Boonsonge Ruanegaew	35.	Mr. Mee Yimprasert
21.	Mr. Boontham Malinyln	36.	Mr. Jampee Khunmaignarm
22.	Mr. U-thai Roonnaronge	37.	Mr. Foy Triparp
23.	Mr. Prayudth Vareeratt	38.	Mr. Gnern Mingmora
24.	Mr. Manee Galavai	39.	Mr. Jampa Khunmaignarm
25.	Mr. Suthin Khunmaignarm	40.	Mr. Jamnonge Vijitbanjonge
26.	Mr. Sanan Viengkham	41.	Mr. Banthom Srimeu-dee
27.	Mr. Prathuange Chaowku-vieng	42.	Mr. Thavil Dokmaithed
28.	Mr. Boonsonge Sooksamrarn	43.	Mr. Samruay Go-patta
29.	Mr. Rien Galavai	44.	Mr. Samarn Aiemjai-dee
30.	Mr. Pua Po-paijit	45.	Mr. Ya Singto
31.	Mr. Prasit Triparp	46.	Mr. Grienggrai Siripatt

6 th class

Curriculum "Rice cultivation techniques in irrigated area"

Duration : 14-25 April 1980

1. Department of Agricultural Extension

1.	Mr. Gasetchatt Rattanasri	7.	Miss Gannigar Chomdee
2.	Mr. Thanee Thongchame	8.	Mr. Somchai Sapboriboon
3.	Mr. Yeuneyonge Peudmongekol	9.	Mr. Anan Panyagads
4.	Mr. Sagsri Lomthaisonge	10.	Mr. Sutham Cheepsamuth
5.	Mr. Samarn Vichiensan	11.	Mr. Sank Sooksavatt
6.	Mr. Suvat Poonthavee		

2. Department of Agricultural Cooperative Promotion

12.	Mr. Paichayon Gor-detch	14.	Mr. Vatchara Siri-u-dom
13.	Mr. Pravit Kiengpol	15.	Mr. Sorasag Sapsiri

3. Royal Irrigation Department

16.	Mr. Yots Sa-gnuanboon	19.	Miss Suvanna Patthayavan
17.	Mr. Amorn Sooksomsri	20.	Mr. Jaroon Gaewfuynorg
18.	Mr. Prasit Pichairuerg		

4. Department of Community Development

21.	Mr. Banjonge Masaeng	22.	Mr. Sura Thongpoo-noi

5. Department of Public Welfare

23.	Mr. Boonsonge Jarerntep	24.	Mr. Damronge Butt-rerm

6. Office of Accelerated Rural Development

25.	Mr. Kanchit Konge-somkhong	26.	Mr. La-aied Jitbampen

7. Petchburi Demonstration Farm Pilot Project

27.	Mr. Panom Vonge-gommalasai	28.	Mr. Vichien Gaewsema

8. National Security Command

29. Sergt. Vanchai Thammagij

9. Thai-IRRI Joint Research Project

30. Mr. Pathom Suppasiriratt
31. Mr. Jirapol Janrieng
32. Mr. Thongbai Pipatthitigorn

10. Department of Agriculture

33. Mr. Eggachai Srinimit
34. Mr. Ponge-sag Rattanavaraha
35. Mr. Vinyoo Vong-u-bon
36. Mr. Veerasag Sri-on
37. Mr. Udsavin No-thaya
38. Mr. Sanit Impithag

11. Office of Agricultural Economics

39. Mr. Surin Gerdmali
40. Mr. Pichit Pradubthong

7 th class

Curriculum "Rice cultivation technique in irrigated area"

Duration : 12-23 May 1980

1. Royal Irrigation Department

1. Miss Chaveevan Boonsai
2. Mr. Pailin Nudthavorn
3. Mr. Prayoonsak Duangboots
4. Mr. Jaruthat Pollavat

2. Department of Agricultural Cooperative Promotion

5. Mrs. Lersiri Laemvilai
6. Mr. Yonge-yuth Laopoonsook
7. Mr. Cherdchai Mathuros
8. Mr. Burapa Burapasing

3. Office of Agricultural Economics

9. Mr. Paithoon Choo-muang
10. Mr. Prapassorn Ganteevonge

4. Agricultural Land Reform Office

11. Miss Gaysinee Rattanapessala
12. Mr. Gamol Bandaipetch
13. Mr. Suvit Chaow-u-thai

5. Office of Accelerated Rural Development

14. Mr. Jaggrapan Pamaranon

6. Office of Development Military

15. Second Lt. Vatchara Sitthigul
16. Second Lt. Adisak Kongekajan

7. Department of Public Welfare

17. Mr. Sayan Thatsanasonevijarn
18. Second Lt. Theera Santimaythee

8. Petchburi Demonstration Farm Pilot Project

19. Mr. Songe-grarn Chai-ya-pan

9. Department of Agriculture

20. Mr. Thiraponge Piyasiranon
21. Mr. Sombat Chinavonge
22. Miss Nantharatt Supgamnerd
23. Mr. Greepol Lymsomvonge
24. Mr. Chutivatt Vannasai
25. Mr. Suniyom Ta-prab
26. Miss Putthana Gmolrattanagul
27. Miss Vijittra Jittathai
28. Miss Nida Sainanthip

10. Department of Agricultural Extension

29. Mr. Pitcha Tewsroy
30. Mr. Thammanoon Boongrisorn
31. Mr. Chanyuth Maneeponge
32. Mr. Vorapan Poopa
33. Mr. Soothichai Yudthagasemsan

8 th class

Curriculum "Computer programing and utilizing"

Duration : 16-17 June 1980

1. Department of Agriculture

1. Mr. Pisit Sepsavatt
2. Mr. Thavatchai Na nakorn
3. Mr. Suppachai Banglieng
4. Miss Chaniga Patthamadiloge
5. Mrs. Vanna Gaewmongekol
6. Mr. Manus Paithoonjarernlarp
7. Mrs. Vatthana Panmanee
8. Miss Jamnonge Nardsomboon
9. Mr. Pairatt Duangpiboon

2. Royal Irrigation Department

10. Mr. Siroj Prakoonhangsit

3. Agricultural Land Reform Office

11. Mr. Theeravatt Vitthayasil
12. Miss Bancheune Thanyasirigul

9 th class

Curriculum "Advance of Computer programing and utilizing"

Duration : 23-24 July 1980

1. Department of Agriculture

1. Mr. Pisit Sepsavatt
2. Mr. Montien Jinda
3. Mr. Suppachai Banglieng
4. Miss Chaniga Patthamadiloge
5. Mrs. Vanna Gaewmongekol
6. Mr. Manus Paithoonjarernlarp
7. Mrs. Vatthana Panmanee
8. Miss Jamnonge Nardsomboon
9. Mr. Pairatt Duangpiboon

Epilogue

Training works of Suphan Buri Training Center in fiscal year 1980 has been accomplished by woking group and Project coordination sub-committee of Suphan Buri Experiment Station and Training Center Project in curriculum planning, lecturers and trainees selection. Project manager, Chief of Suphan Buri Rice Experiment Station and Chief of Agronimic Management Branch control the works, budget and manpower by assigning project manager assistant as the chief of training manager staff.

The staffs are as follows

1.	Mr. Vichien Sasiprapa	Agricultural technician 6	Agronomic Management Branch, Technical Division
2.	Mrs. Achana Siripatt	Economist 5	" "
3.	Miss Jamnonge Nardsomboon	Agricultural technician 5	" "
4.	Mr. Detchaown Graisoragul (Center coordinator)	Agricultural technician 5	" "
5.	Mr. Pairatt Duangpiboon	Agricultural technician 4	" "
6.	Miss Sasithorn Sovan	Scientist 5	Suphan Buri analysis laboratorial work
7.	Suphan Buri Rice Experiment Station officers		
8.	Dr. T. Sugahara	Japanese expert (JICA) of Suphan Buri Training Center	
9.	Mr. Y. Takashima	Japanese expert (JICA) of Suphan Buri Training Center	

The aim of this report is for spreading the progression of this project to the ones who concerning with agriculture development technology relaying.

Vichien Sasiprapa
Making report of 1980
September 1981