nique Text Book

SUMMARIZED RESULTS OF FIELD TRIALS ON RICE CULTIVATION

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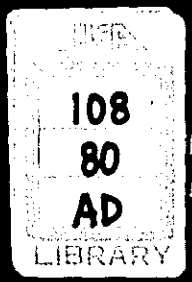

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I. SUMMARY OF FIELD TRIAL (1971/1972 WET SEASON – 1972/1973 WET SEASON) IN CIHEA

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The facts clarified up to now about the recommended short stem varieties in West Java by our trials of rice plant through 3 seasons, 1971/1972 wet season, 1972 dry season and 1972/1973 wet season, at Cihea, are as follows.

1. **Theme: Specific characters of short stem varieties**

The research regarding this theme have been done in short culm varieties from 2 points of plant growing phase and morphological characteristic phase of rice plant.

A. Tracing from plant growing phase

Stating the conclusion first, the former growth of rice plant during from early stage to medium stage after transplanting is, in general, vigorous except in some partial locations and is rather apt to become overgrowth.

On the contrary, the later growth from primordia stage to heading stage or to ripened is liable to rapidly decline in most cases.

Namely it will be said that these facts as above show a tendency of "AKIOCHI" on plant growth phase in a broad sense.

Needless to say, climatic condition, soil condition, varietal characteristic and other cultural condition, etc., will be considered the main factors for "AKIOCHI" of rice plant in West Java, but in any case, we should take in mind this phenomenon as an

important point on rice cultivation.

And here, analysis on some trials under the different cultural conditions have been done from two aspects of plant growth phase and varietal characteristic.

Some main point of the analysis results are as follows.

i) Rooting and setting of rice plant after transplanting are generally quick, and tillering in early and medium stage of plant growth is vigorous.

ii) Leaf emerging cycle (it means the necessary days for increasing one new leaf on a main culm) in the former plant growth period is much shorter than that in case of Japonica varieties in Japan, but on the countrary, the cycle in the latter plant growth period gets longer little by little in usual.

This is the facts as this show that the latter growth of rice plant in West Java is generally apt to decline and to have assort of "AKIOCHI" of rice plant as described already.

iii) Many tillers a hill are easily able to be obtained but valid tillers ratio is, in usual, liable to go down because of the less lower effective tillers compared with the upper ineffective ones.

It is well known that the more the rice plant is overgrown in the medium growth period, the more it is apt to be undergrown in the latter growth period in usual, especially in high temperature region.

iv) Even if some varieties of rice plant are planted under the quite same cultural conditions, the varietal difference in plant growth

are mostly seen on every growing stage.

For instance, each leaf emerging cycle in the former plant growth period is generally little longer in PB5 than in Pelita I/1, moreover the variability of each growth characteristic under the different external condition is more sensiable in PB5 than in Pelita I/1 (Table 1, 2).

B. Analysis from plant morphological characteristic phase

The variability of plant morphological characteristic under any different environmental condition is useful to judge the situation of plant type on rice cultivation.

On this sence, we would like to report the analytic results of plant morphological characters in short stem varieties in West Java.

Strong and weak point in short stem varieties are as follows.

i) First, it should be noticed that the neck node emerging ability of each panicle from sheath of top leaf is very weak.

The phenomenon as this is widely seen on traditional rice cultivation in West Java and is remarkable character of rice plant type here. This is a minus (-) factor for rice plant type (Table 4).

ii) The lower leaf (4th L) is, in usual too long and the upper leaves (1st L and 3rd L) are shorter.

iii) The lower internode (4N, 5N and 6N) are short in proportion to short culm but are variable unexpectedly under the different external conditions. On the contrary, the upper internode (1N and 2N) are usually very short.

These both are plus (+) and minus (-) factor

for rice plant.

iv) A panicle length is long on an average and number of spikelets per panicle are many. Especially, it is a weak point that every panicle has many 2nd rachis branches for number of 1st rachis branches.

From this, the ripened grains ratio is apt to get low, and average weight of 1000 complete grains become light unexpectedly.

These phenomena as above will be sometimes a plus (+) factor and at the same time a minus (-) factor for safety yield.

v) At last, it should be marked as a common sence that the regional and individual difference of plant type are widely seen in most cases here.

2. Theme: Study for "Ideal Type" of rice plant and its example

Now, it has confirmed that some factors as described above are cited as the decisive criterion of rice plant type from the view point of plant morphological characters according to our past research results.

Here, the classification of rice plant type on the basis of some trials results in 1972 is shown as below.

As is evident from table 4, 1, 2, there is the closest relation between plant types and yield component factors.

Namely, the morphological necessary factors of plant type for high yield are as follows, in both cases of heavy weight panicle group and light weight panicle group.

i) First, lower leaf blade (4th L) is comparatively short and upper leaf blade (1st L, 3rd L) is as longer possible, conversely.

ii) Lower internode (4N, 5N and 6N) is usually short and upper internode is much longer (1N, 2N).

iii) Moreover, neck node emerging ability is strong.

iv) Small number of 2nd rachis branch for each 1st rachis branch are much better.

And so, we are to call it "Ideal Type", such rice plant type having fully combined 4 factors as described above.

Well, it is a pleasure to report the 1st discovery of a few ideal type plant in our trial in 1972 dry season at Cihea.

From table 4, we can easily confirm the existence of ideal type plant which have clearly proved the new theory regarding the plant type of rice plant. We should like to take in mind the fact as an important key point on rice cultivation in future.

3. Theme: Effect of N-priority application in latter plant growth period

Needless to say, N-application in paddy field is most important on rice cultivation. As is evident from table 5, it has been cleared that the yield is usually higher in case of N-priority application in latter plant growth-period compared with that in former one.

Further, it is shown that the basic reason of increased yield in the latter one is due to the transformation plant type from a phenomenal unhealthy type to a desirable healthy type having approached to an "Ideal Type" of rice plant according to the differential cultural condition. (Table 3).

From this trial result, it will be desirable to change the present N-dressing way to N-priority application in the latter half plant growth period (N-amount 50 % over per hectare) except for few cultural conditions (table 5).

4. Theme: Synthetic effect of some cultural Technics

The trials regarding the synthetic effect of some cultural technics have been carried out under the mutual combination with some main factors through 3 seasons.

These results is shown in Table 6.

i) First .yield are higher in case of N-priority application in the later half plant growth period. (F 40%: L 60%) compared with that in the former one.
(F 70%: L 30%) without light N-application.

ii) Especially, it should be marked that the highest yield is usually gained as the synthetic result of next 4 cultural factors. Namely: under combination with "heavy N-application", "N-proper distribution", "Closed spacing" and "Matured seedlings".

iii) But, yields are rather descreased in case of next cultural combination: "Wide spacing", "Heavy N-application" and "N-priority application in the latter growth period".

iv) The effect of closed spacing for increased yield is clear in case of N-priority application in the latter growth period regardless of seedlings quality, but not clear in the former growth period.

v) The influence of seedling quality is usually not so much large, but its effect for increased yield is clearly seen in case of heavy N-application and closed spacing. In other words, it still be said the matured seedling would effectively able to be utilized on rice cultivation under heavy N-fertilizer and closed spacing for high yield.

vi) At last, the effect of seedlings quality difference, spacing difference, and N-distribution difference, etc., are not clear under light N-application

in any case.

The trend as this proves a fact that the light N-application on rice cultivation plays a role to control the plant growth prior to another cultural factors in West - Java.

Table 1. Leaf emerging cycle

Variety	Wet Season 71/72			Dry Season 1972		
	Former period (days)	Later period (days)	Turning point (leaf age)	Former period (days)	Later period (days)	Turning point (leaf age)
PB5	6,63	10,89	12,2	6,27	10,19	12,7
Pelita I/1	6,06	12,04	12,4	6,13	10,72	13,0

Table 2. Varietal difference of Plant Type under differential N-distribution

N-distribution	Variety	Internode		Leaf blade		Panicle length (cm)	Neck node emerging	Complete 1000 kg
		Upper (cm)	Lower (cm)	1st L (cm)	3rd L (cm)			
F : L	PB5	48,7	11,0	24,4	34,4	22,8	−0,2	27,0
70% : 30%	Pelita I/1	52,8	12,2	24,3	40,1	24,3	+1,2	28,6
F : L	PB5	50,5	10,9	26,2	34,5	22,5	+2,1	27,9
40% : 60%	Pelita I/1	54,7	12,1	27,0	39,3	24,1	+4,3	29,8

Table 3. Relation between plant types and yield component factors

(a) 4,0 g over a panicle weight group (Heavy weight group)

Class	Internode		Leaf blade			neck node emerging (cm)	Panicle length (cm)	Panicle weight		Rachis branch 1st–2nd	Complete grain/panicle		
	upper (cm)	lower (cm)	1L (cm)	3L (cm)	4L (cm)			Total (g)	Complete %		number	%	1000 g weight
A	59,2	11,5	26,7	40,5	34,8	+3,8	25,1	4,56	91,5	9,0–3,19	142	90,1	29,7
B	57,5	11,9	25,3	39,1	35,8	+2,3	25,1	4,39	88,8	9,0–3,30	132	84,8	29,5
C	55,1	14,8	22,4	38,5	37,8	+1,7	24,8	4,35	88,5	9,0–3,42	131	84,4	29,2
D	52,9	16,0	20,8	37,8	38,9	+0,7	24,6	4,30	87,9	9,1–3,43	134	83,6	28,4

(b) 4,0 g within a panicle weight group (Light weight group)

A	59,0	9,9	27,2	38,1	33,0	+3,8	24,7	3,48	88,2	8,8–3,28	105	85,0	29,2
B	57,1	10,4	26,6	36,5	33,8	+2,6	24,9	3,42	88,0	8,8–3,40	104	83,2	28,9
C	54,9	13,9	24,0	35,9	35,9	+1,8	24,0	3,20	85,6	8,4–3,47	97	81,7	28,3
D	51,5	15,3	21,5	35,6	36,2	+0,8	23,8	3,14	85,0	8,5–3,53	96	81,1	27,8

Table 4. Example of Ideal Type Pelita I/1 Dry Season 1972

Type	Item	Plant type					
		Internode		Leaf Blade			Necnode emergomg
		upper (cm)	lower (cm)	1L	3L	4L	
I.	Ideal Type	59,6	11,2	26,0	38,9	34,1	+3,5
II.	Ideal Type	59,0	11,5	30,6	41,2	33,0	+3,5
III.	Unhealthy Type	52,0	15,4	21,6	35,8	43,2	+0,7

Type	Yield component factor							
	Panicle length	Panicle weight (g)	Complete %	Rachis branch 2nd	Perfec grain		1000 g weight (g)	Empty imperfect
					number	%		
I.	24,2	4,40	90,4	3,1	135	99,9	29,5	1–0
II.	24,8	4,90	91,8	3,2	155	99,9	29,2	4–4
III.	23,6	3,12	80,4	3,4	89	67,0	28,1	15–28

Table 5. Effect of N-priority application in later period. Pelita I/1

Nitrogen		Plant type						Yield	
Distribution	Amount	Internode		Leaf Blade		Necknode	Panicle	Yield (ton)	Complete 1000 g
		upper	lower	1st L	3rd L				
% %									
F : L	H	53,6	14,4	25,2	38,6	+1,4	23,9	8,05	28,7
70 : 30	M	50,0	11,7	23,7	33,3	+0,4	23,2	7,55	28,2
	C	51,6	11,4	22,4	34,8	+0,8	23,4	7,75	28,2
% %									
F : L	H	55,1	11,6	28,4	40,4	+2,4	24,8	8,75	29,3
40 : 60	M	54,6	10,8	25,6	37,4	+2,0	24,5	8,45	28,6
	C	54,6	10,1	25,6	36,6	+2,1	24,6	8,10	28,4

Note: H = heavy nitrogen application
M = medium, and
C = standard.
Dry season 1972.

Table 6. Synthetic Effect of Several Cultural Technics

Nitrogen		Spacing	Wide	16,0/m2	Close	22,2/m2
Distribution	Amount Age	Seedling	Younger (19 days) ton	Matured (31 days) ton	Younger (19 days) ton	Matured (31 days) ton
% %	H		7,70	7,65	8,15	8,45
F : L	M		7,40	7,60	7,50	7,80
70 : 30	C		8,25	8,45	8,10	8,05
	S		7,85	7,75	7,50	7,50
% %	H		8,60	8,25	9,30	9,60
F : L	M		8,25	8,10	8,85	9,20
40 : 60	C		8,60	8,75	8,65	8,40
	S		8,05	7,55	7,20	7,60

Note: Average yield of Pelita I/1, Dry Season 1972 and Wet Season 72/73.
H = heavy nitrogen application, 135 kg N/ha
M = medium nitrogen application, 115 kg N/ha
C = normal nitrogen application, 90 kg N/ha
S = light nitrogen application, 72 kg N/ha.

II. SUMMARY OF FIELD TRIAL (1973 DRY SEASON) IN MUARA

K. Ouchi

For the purposes of solving the problems on cultivation techniques and establishing the cultivation standard in Extension Farm Project, a field trial was conducted concerning such items as top-dressing, seedling age, transplanting depth and three primary nutrients for the two kinds of varieties of Pelita I-1 and Syntha.

The summarized results are as follows.

1. With regard to top-dressing method, a method to apply more fertilizer in the 2nd half growth (to apply more than 50% of total nitrogen after the ear primordia stage) increased "the yield component factors", as well as "the yield determining factors", and brought about the higher yield in the cases of both varieties, not differing to the seedling age (Pelita I-1: 20 days and 30 days, Syntha: 20 days and 35 days).

   In the above method to apply more fertilizer in the 2nd half growth, a case to top dress nitrogen fertilizer twice at the ear primordia stage and the heading-flowering stage was noticeable in raising more the ripened grains percentage to increase the yield, as compared with that to top-dress the fertilizer twice at the ear primordia stage and the top-leaf stage.

   However, the above two cases must be further investigated.

2. Concerning the seedling age of Pelita I-1, it was easier for the 20 days seedling to procure "the yield component factors", as compared with the 30 days seedling.

   As for "the yield determining factors", the 30 days seedling was a little better.

However, the difference of growth between 20 days and 30 days seedlings was possible to be diminished if the fertilizer application methods were changed.

Practically the 20 days seedling which is easier to procure "the yield components factors" is considered relatively better.

In the case of Syntha, the difference was small in the various characters of rice plant between the 20 days and 35 days seedlings.

However, the 20 days seedling increased somewhat the number of panicle, on the other hand, the 35 days seedling was a little superior to the former in "the yield determining factors".

In the panicle number type varieties such as Pelita I-1, the 20 days seedling is easy in procuring "the yield component factors".

Contrarily, in the case of panicle weight type varieties such as Syntha which is long in the growing term, the 35 days seedling increased "the yield determining factors".

Thus, Pelita I-1 and Syntha were recognized to be more advantageous in the cases of 20 days seedling and 35 days seedling, respectively.

Since rice plants of the both varieties did not show the great differences in their growth, as long as the number of days for seedling bed differed within the range of the above mentioned periods, use of the seedlings whose ages are in the above range is considered practically suitable.

3. According to a result of the trial on transplanting depth, the number of tillers at lower node positions was more in the case of shallow transplanting (3 cm), in comparision with the deep transplanting (10 cm), not differing to the kinds of varieties.

Shallow transplanting brought about the long panicle

and many panicles type rice plant to be very beneficial in insuring "the yield component factors".

In deep transplanting, node order position to develop the tiller was upper to delay the tillering and growing, and finally to decrease the yield.

4. With regard to the three primary nutrients test, the natural supply of fertilizer elements was less in phosphorus and nitrogen, the deficient symptoms of which got visible from the beginning of growth.

The shortage of phosphorus delayed the growth and decreased "the yield determining factors".

As for nitrogen, its deficiency decreased "the yield component factors" to reduce the yield.

Although the natural supply of potassium was estimated relatively much, the effect of applying this nutrient was recognized in "the yield determining factors".

Therefore, the application of potassium is considered effective.