

c. CHANGE OF GENOTYPES OF THE HYBRID POPULATIONS IN RESPONSE TO FERTILIZER AND OTHER ENVIRONMENTAL FACTORS

Chuan-in Chao

(Cytogenetics Laboratory, National Taiwan University)

In this study, the following two hybrid combinations have been used,

- 1) Nungling No. 11×Century Patna No. 52
- 2) Taipei Black Glumes×Chianungyu No. 280

After the F_3 seeds of each of the two hybrid combination were thoroughly mixed, they were divided into 12 equal portions for planting in three different localities, namely Pintung, Taichung, and Taipei. From agricultural point of view, these three localities represent three marked regions in Taiwan. In each of the three localities two crop of rice are grown. Each of the two crops is applied with two different levels of fertilizer, one at the conventional rate (80 N, 40 P_2O_5 , 40 K_2O kg/ha) and the other at double rate (160 N, 80 P_2O_5 , 80 K_2O kg/ha). Thus, there are 12 treatments for each of the two hybrid combinations, making a total of 24 treatments in all. Seeds obtained from each of the twenty four treatments are kept separate. But seeds of each individual treatment are thoroughly mixed and a portion of which taken at random is used for planting of next crops. This will be continued until F_5 or F_6 generation. Comparisons of various agronomic characters among different treatments shall be made from a number of ecotypes of F_5 or F_6 generation of each treatment.

In the past two years, F_3 and F_4 generations were obtained in the seasons of first crop and second crop. For the purpose of making preliminary studies, 100 such F_3 plants of the first crop from Taipei region were taken at random and their height and number of tillers were measured. The results are given in Table 1.

Table 1. Mean of plant height and number of tillers of the F_3 plants grown at different levels of fertilizer

Hybrid combination	Characters	Fertilizer level	
		Double rate	Conventional rate
Nungling No. 11 × Century Patna No. 52	Number of tillers	8.70	7.26
	Height of plant in cm	95.71	97.82
Taipei Black Glume × Chianungyu No. 280	Number of tillers	9.77	8.87
	Height of plant in cm	107.41	110.74

From the above table, it can be seen that the plant height was taller in the individual plants of those populations which received conventional rate of fertilizer than those received double rate. But their number of tillers was smaller in the former than in the latter. These hold true for both hybrid combinations.

Means of plant height and of tiller number were also measure from 100 F₄ plants of the second crop from Taipei region. They are presented in Table 2.

Table 2. Mean of plant height and number of tillers of the F₄ plants grown at different levels of fertilizer

Hybrid combination	Characters	Fertilizer level	
		Double rate	Conventional rate
Nungling No. 11 × Centary Patna No. 52	Number of tillers	5.81	5.62
	Height of plant in cm	86.70	79.77
Taipei Black Glume × Chianungyu No. 280	Number of tillers	7.06	7.14
	Height of plant in cm	100.98	95.90

From the above figures it may be seen that the plant height was shorter in individual plants of those populations received conventional rate of fertilizer than those received double rate of fertilizer. No difference in tiller number between the populations received different rate of fertilizer was observed in both hybrid combinations.

The differences in plant height and tiller number among plants from populations of same generation but received different rate of fertilizer and between the F₃ and F₄ generations could be due to hereditary as well as environmental factors.

DISCUSSION

Oka: Number of samples taken from F₃ or F₄ generation and method of analysis of the results seem to be very important.

Miu: According to Dr. Chao's original design, we would not make final test until F₅ or F₆ generation from which about 50-100 random samples will be taken from each treatment for comparison of various agronomic characters under different condition.

Hsieh: Blast disease could be very serious in those populations received double rate of fertilizer. If so, other agronomic characters would be affected.

Miu: So far we have not met serious blast disease in our experimental field. If so, cerasan-lime would be used.