b. RESEARCH ON THE AGRONOMIC MERIT OF PHOTO-SENSITIVENESS IN RICE

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1. Comparitive studies of critical day-lengths in photosensitive rice varieties

A number of photosensitive rice varieties were grown in the second crop season of 1960 with five photoperiods, namely 12.0, 12.5, 13.0, 13.5, 14.0 hours, to investigate their critical photoperiods.

The results obtained show that 38 out of 63 varieties had their critical photoperiods between 12.0 and 12.5 hours, 12 between 12.5 and 13.0, 2 between 13.0 and 13.5, 5 between 13.5 and 14.0. The remaining 6 varieties showed no significant difference among the above-mentioned photoperiods. Previous records showed that when grown under 9-hour photoperiod, these 6 varieties had a significantly earlier heading-date than those grown under a 24-hour photoperiod. Since these varieties have been proved sensitive to photoperiod, their critical photoperiod may be between 14 and 24 hours.

The critical day-length has been found to vary with the temperature in some plant species. Experiments will be carried on in this year to investigate whether such a variation in critical daylength is also found in rice.

2. Studies on various agronomic characters in relation to growing seasons, growing periods and the amount of mineral nutrients

The varieties used in this experiment was Taitung No. 24, a photosensitive "Ponlai" rice.

Before starting the short-day treatment, all plants were grown under a long-day condition (16-hours). Thus delaying floral initiation, the vegetative growth could be continued irrespective of the seeding season. A short-day treatment of 9 hour-day was then made in each of three seeding-season groups (seeded on June 10 and there after at the intervals of 30 days) with the seedlings at the age of 30, 45, 60 and 75 days. The treatment was continued to heading.

At the advent of treatment, the flower primordia were initiated in the growing point immediately. Panicles appeared after continuing the treatment for about 40 days if the temperature and other environs were suitable.

Mixture in four different dosages of chemical fertilizers were applied in order to evaluate the effects of growing seasons, and growing periods on fertilizer response and yield. The fertilizers were used at a 15-day interval from the day of seeding to the beginning of short-day treatment, but since then was not used. Thus the longer

the days of vegetative growth was, the larger was the amount of fertilizer applied.

Results of this experiment may be summarized as follows:

1) Temperature had a significant effect on heading date. The number of days from the beginning of treatment to heading was markedly prolonged if the treatment was started later than August 24. Too late floral initiation also decreased the amount of yield.

2) Fertilizers had a little effect on the number of days of growing period. Within a certain limit of temperatures, the amount of fertilizers showed positive correlations with plant height, effective number of tillers, panicle length, panicle weight, grain number per panicle, panicle weight per plant, and straw weight. Percentage of seed setting and weight of 1000 grains showed a negative correlation with the amount of fertilizers.

3) The measurements of these agronomic characters varied with the number of days of growing period. When the duration of growing period was less 95 days, it showed positive correlations with plant height, effective number of tillers, length and weight of panicle, number of grains per panicle, and panicle weight per plant. If the duration was longer than 95 days, however, negative correlations were found, with the increase of growing period from 95 days to 105 days, dry weight of straw increased. Panicle weight per plant also showed the same tendency. Although the grain and straw yield increased with the increase of growing period, the increase in straw weight was not proportional to that in grain weight and the former often gets more than the latter. Therefore, the relation between growing period and grain straw ratio was negative.

4) It may be emphasized that growing season and growing period are important factors which modity fertilizer response and yielding.

DISSCUSSIONS

Oka: Is the purpose of this experiment genic analysis?

Yao: Not only the genic analysis, but I have studied varietal variation in photosensitiveness of rice as in my previous experiment. I used an index number to express photosensitiveness which was denoted by a formula, $a/a+b$ (where "a" represents the days of growing period needed for heading under a long-day condition, and "b" represents those under a short day condition). For instance, when $a/a+b \geq 0.5$, the plant was taken to be photosensitive. Using this standard, I observed 185 varieties collected from various districts of the world with regard to photosensitiveness. I found that photosensitiveness can be classified into three groups.

Oka: How about the definition of photosensitivity? We can't gain a clear definition of photosensitivity from the index.

Yao: The effect of temperature and photoperiodism could be estimated in some varieties which showed no heading in the first crop and headed only in the second crop. This phenomenon might be related to temperature and photoperiodism.