PHOTOPERIODIC STUDIES ON RICE

IV. Additional Data on the Test of the Interruption of Dark Period During the Growth Stage of A Short Day Rice Variety[1]

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The authors have reported previously that floral initation in the short-day rice variety Shuang-chiang (霜降) induced by daily cycles of 8L + 16D and 12L + 12D could be inhibited by the insertion of a 15-minute light interruption in the middle of dark period. The degree of inhibition was greater by the insertion of the light period in the 12-hour dark period than in the 16-hour dark period. (Yü, Yao and Wang 1962). The objective of this study was to detect changes in the degree of the inhibition of floral initiation by alternating the duration of the light interruption inserted in the dark period.

Materials and Methods

The short-day rice variety Shuang-chiang (霜降) was used throughout the experiment.

Experimental materials were seeded on April 1, 1957 and transplanted on April 10 Short-day treatments including the light interruption treatments were started on July 2, and concluded on July 31. Plants were kept under light period of 24 hours after transplanting till the start of short-day treatment. The light intensity of electric lamps used to simulates day light was the same as in the authors' previous report.

Light interruption was done in the middle of the 16-hour dark period during the short-day treatment of 8L + 16D. The light source for the interruption was the 100-watt tungsten lamp kept at a distance of 30 cm from the plants. The light intensity which the plants received was 10 f.c.. The durations of light interruption inserted in the dark period were as follows: flash, 1 minute, 3 minutes,

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9 minutes, 15 minutes. Under each duration, there were three harvesting dates, i. e. the 15th, the 22nd and the 29th day after the interruption of dark period, making a total of 15 treatments in addition to controls. Three plants were harvested for each treatment and a control and dissected for the floral buds of first tillers. The average length of the floral buds was then determined. Tests for statistical significance were made by Hartley's method.

There was little change in temperature during the treatment period. The average daily temperature was 29.4±0.28°C.

Results and Discussion

The experimental results are shown in Table 1.

Table 1. *Effects of light interruption of different duration upon the growth of floral buds*

Interuption treatment \ Average length of floral buds(cm) \ Date of determination	July 17	July 24	July 31
Flash light	0.074	1.288	12.876
1 min. light	0.054	0.376	5.880
3	0.045	0.151	2.015
9	0.030	0.078	0.502
15	0.022	0.064	0.632
Control 8L+16D	0.226	5.130	16.269
Control 24L	0.012	0.029	0.225
F value	5.314**	8.472**	74.551**
D(%)	0.069	1.490	1.677

From Table 1, we see that on the 15th day after the beginning of this experiment, the control plot of 24L had the smallest floral buds while the control plot of 8L+16D had the largest. The difference between the two was highly significant. In the light interruption treatments, the flash treatment had the largest floral bud on the 15th day and other treatments had floral buds decreasing in length with increasing duration of light interruption. But the differences among these treatments were not statistically significant at 1% level. The differences in floral bud length were not significant between each of these treatments and the 8L+16D plot.

On the 22nd day after light interruption, the differences in average floral bud length among the light interruption treatments were more evident. How-

ever when D was used as the standard for comparison, the same conclusions were reached as in the case of determinations on the 15th day. In other words, there were significant differences between each of the treatments and the 8L+16D plot, but not between each of the treatments and the 24L plot.

On the 29th day after light interruption, the differences among all treatments and controls were significant at 1% level with the exception of those among the 24L plot, and the two treatments with 15-minute and 9-minute light interruptions.

The above results indicated that by inserting a short period of light in the middle of the dark period, there was a definite inhibiting effect on the differentiation and growth of floral buds as induced by the short-day treatment. The degree of inhibition was closely related to the duration of the light interruption inserted in the dark period, and also related to the date of its determination. Prior to the 22nd day after the beginning of the treatment, a flash interruption was enough to result in floral bud length not significantly different from that of the 24L plot. On the 29th day after the beginning of the treatment, there was still no significant difference in floral bud length between either of the treatments with 9-minute and 15-minute light interruption and the 24L plot. For the light interruption treatments of 3 minutes or less durations, the inhibiting effect on the differentiation and growth of floral buds was proportional to the duration of light interruption.

From the combined results in cocklebur (Salisbury and Bonner, 1955, 1956) and rice, it may be concluded that more sensitive to short day treatment a plant is, the more affected it will be by light interruption. As far as the short day rice is concerned, the longer the duration of light interruption is, the greater will be the inhibiting effect on the floral initation.

Summary

By inserting a light period of different durations from flash to 15 minutes in the middle of the dark period during the treatment of a daily cycle of 8L+16D in the short-day rice variety Shuang-Chiang, it was found that the inhibiting effect on the differentiation and growth of floral buds increased with the increasing durations of light interruption. Unlike the Cocklebur, light interruption in the dark period did not completely inhibit floral initiation in rice.

水稻光週性的研究

IV. 在一短日性水稻品種生長期中截斷短日處理暗期測驗的補充資料

于景讓 姚潤德

作者等以短日性水稻品種霜降爲材料，作8L+16D的短日處理，在16小時暗期的正中插入時間長短不同的光期，見閃光亦有抑制花芽分化與花芽生長的作用，但插入光期是以時間愈長者，其抑制作用愈爲顯著。

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