For first capsule bearing node, the mid parental effect was significant in only four crosses. Additivity was significant in four cases, while it was positive only in Si 1003 x Si 1125. Dominance effect was significant in three combinations. In all the cases, dominance was greater than additivity. In TSS 4 x Si 1125 alone, additive x additive effect was significant. Additive x dominance was significant in CO 1 x TSS 4 and CO 1 x Si 1125. Dominance x dominance effect was negatively significant in TSS 4 x Si 1125. In the cross Si 1484 x Si 1003, none of the genetic parameters were significant, perhaps due to complex interactions or linkage effects. Duplicate epistasis plays a role for inheritance of this trait.

For number of capsules per plant, the effect m was significant in nine cases. Additivity was significant in nine crosses. Additivity alone was observed in CO 1 x Si 1003 and Si 1003 x Si 1125. Five crosses registered significant (h) effects. Considering epistasis, additive x additive effect was positively significant in TSS 4 x Si 1484 and negatively significant in two other crosses. Effect (j) was significant in six combinations and (1) effect in four crosses. Duplicate epistasis was observed for inheritance of this character also. Higher magnitude of dominance with epistatic interactions was reported by Dixit (1976).

Considering capsule bearing nodes to total nodes per plant m effect was significant in most of the cases. Additive effect was positively significant in seven crosses. Dominance was significant in four crosses. Additive x additive effect was signficant in seven crosses and of them it was positive in three crosses. In four combinations, additive x dominance was significant. The cross CO 1 x Si 1003 recorded complementary epistasis while others registered duplicate epistasis. Additive x additive effect was preponderant as compared to other epistatic effects.

For volume of capsules m effect was significant in eight combinations. Additivity was significant in four crosses, and it was positive in CO 1 x Si 1125, TSS 4 x Si 1003 and Si 1484 x Si 1003. In four crosses, significant dominance effects were observed. The (i) effect was positively significant in three crosses while additive x dominace was negatively signficnant in four crosses and positively significant in TSS 4 x Si 1125. Dominance x dominance effect was signficnant in four combinations. The (i) and (j) type effects were predominant over dominance x dominance epistatic effects. Complementary epistasis was observed in CO.1 x Si 1125 and TSS 4 x Si 1003, while in eight other crosses duplicate epistasis was observed. The results revealed that major proportion of dominance, sizeable amounts of additivity along with epistasis were important for the inheritance of these capsule characters.

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EFFECT OF DIFFERENT TEMPERATURE REGIMES AND LOW LIGHT STRESS DURING RIPENING ON YIELD OF RICE

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ABSTRACT

Effect of high (37°/27°), medium (29°/21°) and low (23°/20°C, day/night) temperature regimes and low light stress (40 and 60% shading) from flowering to harvest on grain yield and its components were studied using rice cv. IR 44. The control plants gave the highest yield. High temperature reduced the percentage of filled spikelets, 1000 grain weight and consequently the grain yield. Low temperature decreased the number of filled spikelets but there was slight increase in 1000 grain weight. The medium temperature regime caused significant reduction in 1000-grain weight only. The percentage of filled spikelets and the grain yield per plant were signficantly reduced under shaded treatments.

Table 1. Effect of different temperature regimes from flowering to harvest on grain yield and its components of IR 44.

Treatment	Plant height (cm)	Panicles/plant (no.)	Spikelets/panicle (no.)	spikelet fertility (%)	1000-grain weight (g)	Grain yield/plant (g)
37°/27°C	87	20	96	36 c*	23.8 b	18.9 c
29°/21°C	85	22	88	79 a.b	24.4 b	33.5 b
23°/20°C	85	22	85	74 b	25.7 a	30.8 b
Control	88	24	82	86 a	25.3 a	38.0 a

* In a column, means followed by a common letter are not significantly different at 5% level.

Temperature and solar radiation are the major climatic factors affecting the growth and grain yield of rice. These effects depend on intensity and the stage at which they are imposed. Low rice yields in the tropics during wet season have been attributed to low amount of solar radiation during monsoon period. Furthermore, grain yield has been reported to be associated with daily average temperature and sunshine hours (Murakami, 1973). Since the effects of temperature and light intensity were more pronounced during reproductive phase than those of vegetative phase, therefore, the present study attempts to investigate the influence of different temperature regimes and low light intensity on grain yield and its components.

MATERIALS AND METHODS

The present investigations were conducted in 1984 in glass house at the International Rice Reasearch Institute, Philippines, using the rice cultivar IR 44. Eleven-day-old seedlings raised in iron trays were transplanted in 3.8 litre pots. Each pot contained one seedling and 3 kg clay soil, 4 g of ammonium sulphate (21%N), 2 g of solophs (18% P_2O_5) and 2 g of muriate of potash (60% K_2O).

Experiment 1 (Temperature): Uniform plants based on tiller number were selected at flowering to reduce variability within and between treatments. The plants were divided into four lots. Three sets each of 12 plants were placed in growth cabinets (Koitotron 35A-L) of the phytotron. The temperature in the cabinets was set at 37°/27°C, 29°/21°C and 23°/20°C (day/night). The experi ment was conducted under 12 hours (6AM-6PM) photoperiod. The night temperature was set at 6 PM. The relative humidity was kept at least 70/70 percent (day/night). Irradiance inside the chambers was at least 80% of incidental solar radiations. The control plants were grown in the glass house.

Experiment 2 (Light intensity): Just after flowering two sets each of 16 plants were placed inside the cages (122 x 122 x 168 cm) and shaded with one (40% shading) and two layers (60% shading) of abaca cloth, respectively. One set was grown unshaded simultaneously in the same glass house. In both the experiments, plants were harvested 30 days after the treatments. The observations recorded were plant height, panicles per plant, spikelets per panicle, filled grains (%) and grain yield per palnt. The data were analysed as completely randomized design.

RESULTS AND DISCUSSION

Expreiment 1:. Significant differences were observed for grain yield and its components when plants were exposed to different temperature regimes from flowering to maturity (Table 1). Filled spikelets were the lowest under high temperature regimes. Control plants had significantly higher number of spikelets than those of the treatments. There were no significant differences in filled spikelets under medium temperature regime and control. The control plants and the plants under low temperature regime

Table 2. Effect of different light intensities from flowering to harvest on grain yield and its components of IR 44.

Treatment	Plant height (cm)	Panicles/plant (no.)	Spikelets/panicle (no.)	spikelet fertility (%)	1000-grain weight (g)	Grain yield/plant (g)
40% shading	89	19	79	82 b**	24.0	29.1 b
60% shading	87	21	80	70 c	23.9	27.2 b
Control	92	19	83	91 a	24.0	34.6 a

* In a column, means followed by a common letter are not significantly different at 5% level.

showed signficantly higher 1000-grain weight than those of high and medium temperature regimes. Plants under high and medium temperature regimes had similer grain weight.

The grain yield per plant in the control was significantly higher than those of the treatments. High temperature resulted in the lowest yield per plant. This low grain yield was associated with reduction in percentage of filled spikelets per panicle and 1000- grain weight. The results of the present study support the earlier contention of Yoshida *et al.* (1981) that the rice plant is most sensitive to high temperature at flowering and high temperature during anthesis increases spikelet sterility. And also, warmer nights enhances respiration losses which could further intensify the spikelet sterility (Yoshida, 1972). The reduction in 1000-grain weight under high temperature regime in the present study could be attributed to low photosynthesis at 37°C day temperature accompanied by increased respiration losses due to high temperature (27°C) during night. However, the reduction in photosynthesis at low (23°C) day temperature could not be compensated even by the simultaneous decrease in respiration losses at low (20°C) night temparature and thus might be resulting in high spikelet sterility under low temperature regime in the present study.

Experiment 2: The unshaded plants gave significantly higher grain yield than those of shaded once (Table 2). Shading at 40 and 60% did not show any significant difference in grain yield. The principal yield component to be affected by increasing shading intensity was percentage filled spikelets whereas 1000-grain weight remained unaffected. It appears that solar radiations affect grain filling and hence filled grains by controlling source activity (Ayyangar *et al*,1977).

Considering the results of the two experiments, it seems that variation in temperature has considerable effects on grain yield and the reduction could be as high as 50% when the temperature is high during flowering and it appreciably influences grain filling percentage and grain weight. However, the reduction in solar radiations up to 60% during flowering and anthesis has less pronounced effect ie, 21.4% yield reduction and affects only grain filling. It is, therefore, infered that extreme variation in temperature during flowering and ripening phases is more detrimental to rice grain yield than low light intensity.

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INFLUENCE OF SEED TREATMENTS AND FERTILIZER LEVELS ON GROWTH AND YIELD OF RAINFED REDGRAM

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ABSTRACT

A field experiment was conducted at the Agricultural college and Research Institute, Madurai during Kharif season of 1984 to study the influence of seed treatments with Rhizobium and superphosphate along with soil and foliar fertilization of N and P on redgram CV Co.4 under rainfed condition in sandy clay loam type of soil. The results revealed that basal application of 6.25 kg N and 12.5 kg P_2O_5 followed by foliar spray of three per cent diammonium phosphate recorded higher plant height number of branches, leaf area index, dry matter production and seed yield, where as the seed treatment with Rhizobium and super phosphate had influenced only on dry matter production and seed yield of redgram.