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Effect of plant growth regulators in minimizing low temperature stress in rice

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This study was conducted to investigate rice response and consequent changes in the physiological activities and agronomic characters of rice as affected by plant growth regulators treatments.

The experiments were conducted in Andong country Kyung Pook Province in 1990 using a split plot design with three replications. The low temperature treatment was in main plot and the plant growth regulator treatments were in subplot. Plots measured 3x5m. DongJin-byeo was broadcast uniformly on a raised bed of puddled soil on April 1st. 35-day seedlings were transplanted with 2-3 seedling/hill 5 days after the field was plowed and harrowed once at 30x13.5cm hill spacing. The growth regulators, abscisic acid,benzylic acid and 2,3,5-triiodobenzoic acid, were sprayed at 15 DAT and booting stage at 10^{-4}M and 10^{-5}M respectively.

Plant growth regulators applied at 15 DAT, especially abscisic acid regardless of concentration, showed higher plant height and tiller number after 10 days low temperature treatment compared to control plant. However, the difference of plant height and tiller number could gradually diminish with processing plant growth. Chlorophyll content could be enhanced by growth regulators under low temperature condition. 10 days low temperature period decrease chlorophyll content by more than 17% in comparison with control plot. The oxiding activity of roots decreased sharply to 52.2 (mg - NA/g root/hr) after 10 days low temperature. On the other hand, abscisic acid at concentration of 10^{-4}M highly attain oxiding activity of roots. Generally, plant growth regulators applied at 15 DAT under low temperature were more reduced grain yield reduction than that of control plot which attributed to decreased yirld components. When growth regulators applied at booting stage, the tiller number did not show significantly difference, while the significant difference in culm length at harvest occured in all treatment as a result of different concentration of growth regulators. The growth regulators generally have a significant effect on yield component except panicle length. Grain yield of low temperature treatment at booting stage were significantly influenced by application of growth regulators. This was due to decreased number of spikelet and low filled spikelet percentage. However, 2,3,5-triiodobenzoic acid treatment at booting stage showed on significant differences in grain yield.

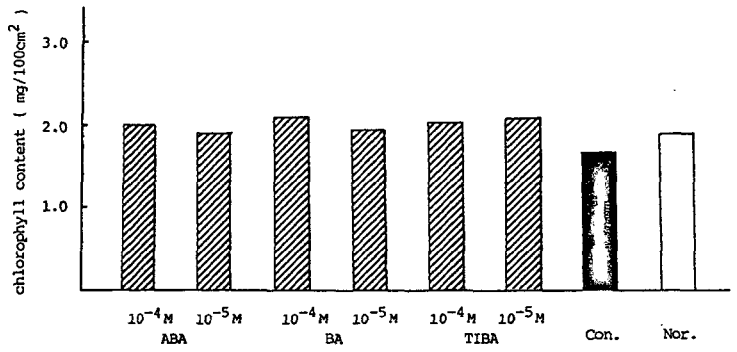

Fig. Effect of different growth regulators on chlorophyll content under low temperature.

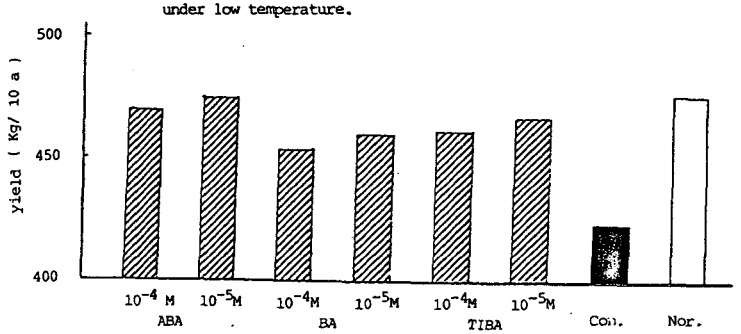

Fig. Effect of different growth regulators applied at 15 DAT on yield under low temperature.

Table. Effect of different growth regulators applied at 15 DAT on yield component under low temperature.

Treatment	Concentration	Panicle number (no/plant)	Spikelet number (no/plant)	Filled spikelet (%)	1,000 grains weight (g)
ABA	10^{-4}M	13.5 ab	87.1	89.5 a	24.1 a
ABA	10^{-5}M	13.6 ab	87.8	90.2 a	20.9 a
BA	10^{-4}M	12.9 ab	91.4	88.2 a	20.5 a
BA	10^{-5}M	12.6 ab	85.2	89.1 a	20.7 a
TIBA	10^{-4}M	13.6 ab	88.8	88.7 a	20.4 a
TIBA	10^{-5}M	14.7 a	88.1	89.3 a	20.8 a
Control		12.2 b	84.8	82.4 b	19.7 a
Normal temperature		14.6 ab	91.3	92.3 a	21.8 a

In a column, treatment means having a common letter are not significantly different at the 5% level by DMRT.

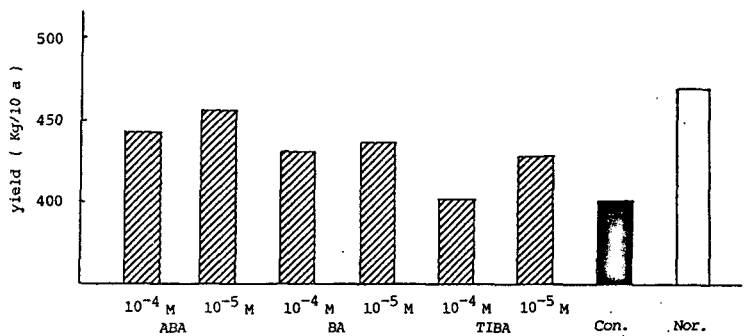

Fig. Effect of different growth regulators applied at booting stage on yield under low temperature.