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Elemental changes during seedling growth under cold stress in boro rice (*Oryza sativa* L.)

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SUMMARY
An experiment was conducted with six rice genotype to study the element concentration in the rice seedlings grown under low temperature stress. Results showed that with the increase in duration of chilling and seedling age, nitrogen decrease by 12.50-70.75 per cent, phosphorus by 6.89-80.64 per cent, potassium by 11.76-66.50 per cent, calcium by 11.54-76.19 per cent, magnesium by 11.11-83.34 per cent and sodium by 7.14-48.39 per cent in shoot at 70 DAS (days after sowing) stage of various rice genotypes in respect of 40 DAS seedling. A similar trend of decrease in mineral levels was observed in roots. The root nitrogen level decreased by 12; 87-64.15 per cent, phosphorus by 12.25-78.57 per cent, potassium by 16.06-62.19 per cent, calcium by 11.11-81.25 per cent, magnesium by 15.38-78.57 per cent and sodium by 17.65-48.57 per cent. Cold tolerant genotypes (Gautam, Richharia & Dhanlaxmi) had significantly higher values than those of susceptible genotypes (Turanta, Heera & Jaya) both in roots and shoots.

Key words : Boro rice, Cold, Element.

The success of boro rice in low land areas taking advantages of the residual water in field after harvest of Kharif paddy, longer moisture, retentivity of the soil and surface water stored in the near by ditches have encouraged the farmers in eastern states to increase the boro rice area to supplement poor kharif harvest. Temperature is one of the vital factors in nutrient absorption. Beyond a certain limit of temperature, nutrient absorption gets inhibited and stops because of denaturation of enzymes involved directly or indirectly in the process. Therefore, the present study was planned to determine the impact of low temperature stress on the uptake of macro elements during seedling growth.

MATERIALS AND METHODS

Experiment was conducted in 2001-2002 at Rajendra Agril. University, Pusa campus with six rice genotypes viz V_1- Gautam, V_2- Richharia, V_3-Dhanlaxmi, from cold tolerant group and V_4- Turanta, V_5- Jaya and V_6-Heera from cold susceptible group. The maximum and minimum temperature during the experiment period ranged between 27.74-11.6°C in 2000-01 and 23.53 to 11.88°C in 2001-2002. Sowing was done on 8th Nov. and the data was recorded at three period of fifteen days interval i.e. T_1- 40 days after sowing (DAS), T_2- 55 DAS, T_3- 70 DAS. Analysis of the dried plant sample was done for the estimation of nitrogen, sodium, potassium, calcium, magnesium and phosphorus. The plant samples of root and shoot were finely ground using an electric grinder fitted with stainless steel blade. The nitrogen content was determined by automatic N analyser, phosphorus by vanadomolybdate yellow colour method, sodium and potassium by flame photometer and calcium and magnisium by versenate filtration method (Jackson, 1973).

RESULTS AND DISCUSSION

Result showed that the average value of nitrogen content of T_1 and T_3 seedlings, depicted a consistent decrease from 25.40-14.80 mg/g dry weight and periodic decrease of nitrogen content of shoots of various rice genotypes during T_1-T_2 showed a decrease of 28.42 per cent while the decrease during T_2-T_3 period was 18.59% (Table 1a). The variation in nitrogen content among various rice genotypes was statistically significant. Nitrogen content of roots at three-time interval, on an average depicted a consistent decrease from 26.90 mg/g dry weight to 16.82 mg/g dry weight. However, decrease during T_1-T_2 period was 25.31 per cent while that during T_2-T_3 was 16.28 per cent (Table 1b). Phosphorus content in shoot depicted a consistent decrease from 3.02 mg/g dry weight to 1.78 mg/g dry weight. The rate of decrease during T_1-T_2 period was 33.77 per cent while during T_2-T_3 period of seedling growth the decrease was relatively less being 11.00 per cent (Table 2a). Phosphorus content in seedling roots during T_2-T_3 stage depicted a consistent

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