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RESEARCH ARTICLE :

Influence of nitrogen levels and chlormequat on nutrient status and nitrogen uptake by wheat

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SUMMARY : A field experiment was conducted during *Rabi* season of 2013-2014 at Agronomy Section Nagpur. The experiment was laid out in split plot design with three treatments of nitrogen levels under main plot *viz.*, N_1 - 100 kg N ha^{-1}, N_2 - 125 kg N ha^{-1}, N_3 - 150 kg N ha^{-1} and four chlormequat levels as sub plot treatments *viz.*, C_0 – Control *i.e.* (no inoculation, no foliar application), C_1- Seed inoculation of chlormequat @ 1000 ppm, C_2 - Foliar application of chlormequat @ 1000 ppm at maximum tillering stage and C_3 - Seed inoculation of chlormequat @ 1000 ppm + foliar application of chlormequat @1000 ppm at maximum tillering stage, forming 12 treatment combinations replicated three times. Nitrogen uptake by crop was increased significantly with increase in levels of nitrogen. Total uptake of nitrogen was significantly more with application of 150 kg N ha^{-1}. After harvest available nitrogen content in soil was maximum with application of 150 kg N ha^{-1} and Seed inoculation of chlormequat @ 1000 ppm + foliar application of chlormequat @1000 ppm at maximum tillering stage recorded significantly more uptake of nitrogen.

KEY WORDS :
Wheat, Chlormequat, Nitrogen uptake, Nutrient status

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BACKGROUND AND OBJECTIVES

Wheat is one of the most important staple food crops of India grown in diverse agro-climatic conditions from 11°N- 35°N latitude and 72°E- 92°E longitudes. It is most widely cultivated as stable food crop of the world.

Indian soils are deficient in nitrogen. Deficiency of this major element is a limiting factor in crop production in this country. It is, therefore, required to be added in appropriate quantity to the soil at a time when it could be best utilized by the crop plant for their optimum responses for increasing yield of wheat.

Singh *et al.* (2008) conducted an experiment at Bichpuri, Agra and reported that the uptake of N, P and K by wheat grain and straw was increased due to increasing level of nitrogen 60, 90 and 120 kg N ha^{-1}. Addition of these inputs showed positive changes in available N content of the soil.

Chlormequat has been reported to posses growth retarding effect on wheat. Typical effect on growth and yield include reduction in plant height and leaf number accompanied by increasing nitrogen content of plant and

increase in yield due to foliar application.The application of chlormequat can be a substitute to fulfil the nutrient management of cereals crop. The research work on these aspect of application of growth retardant *i.e.* chloremequat chloride identified by the name of cations it contains on wheat.

RESOURCES AND METHODS

The field experiment was conducted in field No.15 at Agronomy farm, college of Agriculture, Nagpur during *Rabi* season of 2013-2014. The topography of experimental site was fairly uniform and leveled. The soil analyzed in experimental site have loamy clayey in texture, medium in nitrogen content (206.98 kg ha^{-1}), low in phosphorus (16.15 kg ha^{-1}) and rich in potash (350.00 kg ha^{-1}) and soil reaction was slightly alkaline (ph7.7) in nature.

The experiment was replicated thrice in split plot design with 3 levels of nitrogen, *i.e.* 100, 125 and 150 kg ha^{-1} and four levels of chlormequat, *i.e.* Control (no inoculation, no foliar application) (C_0), Seed inoculation of chlormequat @ 1000 ppm (C_1), Foliar application of chlormequat @ 1000 ppm at maximum (C_2) tillering stage and seed inoculation of chlormequat @ 1000 ppm + foliar application of chlormequat @1000 ppm at maximum tillering stage (C_3). After seed bed preparation, sowing was done by drilling.

The gross plot size was 4.5 m x 4.8 m and net plot size was 3.6 m x 4.2 m. The composite soil sample (30 cm depth) from representative spots of the experimental area was collected before sowing and was analyzed N, P and K. The available soil nitrogen,phosphorousand potassium was estimated by the method proposed by Subbiah and Asija (1956), Olen's method (Jackson, 1967) and Flame photometer (Jackson, 1967), respectively.

OBSERVATIONS AND ANALYSIS

The results obtained from the present study as well as discussions have been summarized under following heads:

Nitrogen uptake by plant :

The data presented in Table 1 indicate that the mean nitrogen uptake was 54.05 kg ha^{-1}.

Effect of nitrogen :

Nitrogen uptake by plant was significantly influenced due to application of nitrogen. Application of 150 kg N ha^{-1} recorded maximum nitrogen uptake (55.65 kg ha^{-1}) which was significantly superior over application of 100 and 125 kg N ha^{-1}.

Similar results of increase in nitrogen uptake ha^{-1}due

Table 1 : Mean nitrogen uptake by plant and mean available nutrients as influenced by various treatments

Treatments	Nitrogen uptake (kg ha^{-1})	Available nitrogen (kg ha^{-1})	Available phosphorus (kg ha^{-1})	Available potash (kg ha^{-1})
Initial soil status		206.98	16.15	350.00
Effect of nitrogen				
N_1	52.73	211.12	17.29	391.38
N_2	53.76	212.58	18.25	395.42
N_3	55.65	213.85	20.55	398.51
S.E. $\pm$	0.38	0.22	0.30	0.32
C.D. (P=0.05)	1.14	0.64	0.89	0.96
Effect of Chlormequat				
C_0 (control)	52.79	214.11	18.44	394.79
C_1	53.24	213.25	18.60	394.96
C_2	54.11	212.03	18.70	395.15
C_3	56.05	210.67	19.05	395.51
S.E. $\pm$	0.41	0.16	0.20	0.39
C.D. (P=0.05)	1.21	0.48	NS	NS
Effect of Interaction				
S.E. $\pm$	0.71	0.28	0.34	0.68
C.D. (P=0.05)	NS	NS	NS	NS
G.M	54.05	212.52	18.70	395.10

NS=Non-significant

to application of nitrogen were reported by Saren and Jana (2001), Singh *et al*. (2007) and Singh *et al*. (2008).

Effect of chlormequat :

Nitrogen uptake by plant was significantly influenced due to chlormequat. Seed inoculation of chlormequat @ 1000 ppm + foliar application of chlormequat @1000 ppm at maximum tillering stage (C_3) recorded maximum nitrogen uptake (56.05 kg N ha^{-1}) which was significantly superior over rest of treatments.

Similar result of increase in nitrogen uptake ha^{-1}due to application of chlormequat was reported by Naylor and Stephen (1993).

Effect of interaction :

The interaction effect of nitrogen levels and chlormequat on nitrogen uptake was found to be non-significant.

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