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Original Research Article

Impact of Nutrient Management and Chlormequat Application on Protein Quality of Maize

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Keywords

Maize, nutrient management, chlormequat, protein quality and yield

A B S T R A C T

The field experiment was conducted during *kharif* season of 2013-2014 on field No.10 of Agronomy farm, College of Agriculture, Nagpur. The experiment was laid out in Split plot design with twelve treatment combinations comprising three levels of nutrient management viz., N_1-100% RDF (120:60:30 NPK kg ha^{-1}), N_2-125% RDF (150:75:37.5 NPK kg ha^{-1}) and N_3-150% RDF (180:90:45 NPK kg ha^{-1}) and four foliar applications of chlormequat viz., C_0 (No application), C_1 (500 ppm), C_2 (750 ppm) and C_3 (1000 ppm) concentrations. Nutrient management treatment of 150% RDF and foliar application of chlormequat 1000 ppm significantly increased protein content (%) and protein yield (q ha^{-1}) of maize.

Introduction

Maize (*Zea mays* L.) is one of the most versatile emerging crop having wider adaptability under varied agro- climatic conditions. Globally, maize is known as "Queen of cereals" because it has the highest genetic yield potential among the cereals. Primary centre of origin of maize is considered to be the central America and Mexico. Its introduction in India probably occurred in the beginning of the 17th century during the early days of the east India company (Singh, 1999).

The several inputs are essential for crop production. The importance of fertilizers is perhaps next only to water, Maize responds well to fertilizers. Widespread deficiency of N, P, K and micronutrients like zinc, iron and copper, shows the need to apply them for getting optimum yield of maize. A crop producing 11.87 per cent maize protien yield is estimated to consume 168 kg N, 205 kg P, 135 kg K and 30 kg Zn (Kamalakumari and Singaram, 1996).

For a better crop production suitable amount of growth is essential and a shift on either side may be harmful. Growth retardants like chlormequat chloride have been used in cereals to protien qualities of maize. (Nafziger *et al.*, 1986).

Sultan Ahmad *et al.*, (1990) in a field trial studied the effect of chlormequat applied by two modes on two varieties of maize (*Zea mays* L.) viz. Akbar and Sultan. Application

of chlormequat was found to increase protien content in both the varieties. The two varieties exhibited similar response. Foliar spray proved to be more useful than seed soaking method.

Generally maize is cultivated with traditional package of practice and inadequate use of inputs. Particularly the inadequate use of nutrients is an important factor limiting the full expression of maize protien qualities potential. Intensive crop cultivation requires use of chemical fertilizer however, fertilizers are not only in short supply but also expensive. Therefore, current trend is to explore the effectiveness of chemical fertilizers. Accordingly to test the performance the protien qualities potential of maize crop with nutrient management and chlormequat application individually and combination of both.

Materials and Methods

The field experiment was conducted in field No.15 at Agronomy farm, college of Agriculture, Nagpur during *kharif* 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 (250.60 kg ha^{-1}), low in phosphorus (19.32 kg ha^{-1}) and rich in potash (409.42 kg ha^{-1}) and soil reaction was slightly alkaline (pH 7.70) in nature. The experiment was laid out in Split plot design with twelve treatment combinations comprising three levels of nutrient management viz., N_1-100% RDF (120:60:30 NPK kg ha^{-1}), N_2-125% RDF (150:75:37.5 NPK kg ha^{-1}) and N_3-150% RDF (180:90:45 NPK kg ha^{-1}) and four foliar applications of chlormequat viz., C_0 (No application), C_1 (500 ppm), C_2 (750 ppm) and C_3 (1000 ppm) concentrations. The gross plot size was 4.2 m x 5.4 m and net plot size was 3.0 m x 4.2 m. The determination of protein content in maize in which the dried sample of maize kernel from cob were powdered separated and about 20 g of representive sample from each powdered material was stored in brown paper envelop. Estimation of nitrogen, was determined by modified micro-kjeldahl method as suggested by Subhaiah and Asija, (1956) same was converted in to crude protein by multiplying 'N' percentage with factor 6.25 then converted in q ha^{-1}.

Protein content in grain = N% x 6.25

Although quality of crop product such as protein content and appearance is genetically controlled, the nutrition of plants can have considerable impact of on the expression of quality. It is therefore, essential to judiciously take care of the nutrient supply at grain formation stage. Protein content of the grain is one of the considerable factors for grain quality determination also.

Quality studies

Mean protein content (%) and protein yield (q ha^{-1})

The data of nitrogen content in the kernel from each plot was used to determine protein content in kernel. Nitrogen content in kernel from treatment was multiplied by the factor 6.25 to estimate the protein content in kernel of the maize.

Effect of nutrient management

Data presented in table clearly exhibited the significant influence of nutrient management on protein percentage in grain of maize. Application of 150% RDF recorded significantly higher protein percentage over treatments of 125% RDF and 100% RDF.

Table: Mean protein content (%) and protein yield (q ha^{-1}) as influenced by various treatments

Treatments	Protein	
	Content (%)	Yield q ha^{-1}
Nutrient Management (N)		
N_1 (100% RDF)	9.71	4.43
N_2 (125% RDF)	10.48	4.45
N_3 (150% RDF)	11.38	4.62
SE(m) ±	0.23	0.05
CD at 5%	0.67	0.16
Chlormequat Application (C)		
C_0 No application	9.36	4.20
C_1 Chlormequat at 500 ppm	9.88	4.35
C_2 Chlormequat at 750 ppm	10.95	4.61
C_3 Chlormequat at 1000 ppm	11.90	4.80
SE(m) ±	0.31	0.06
CD at 5%	0.91	0.10
Interaction (N x C)		
SE(m) ±	0.53	0.06
CD at 5%	NS	NS
G M	10.52	4.49

The higher protein percentage of (11.38%) was recorded in 150% RDF followed by 125% RDF (10.48%) whereas least protein percentage of (9.71%) was recorded under 100% RDF treatment of nutrient management. This increase in the protein content (%) was observed due to successive increase in the levels of nutrient management. This might have occurred due to increase in nitrogen uptake in maize plant with corresponding level of nutrient management.

Effect of nutrient management on protein yield (q ha^{-1}) was found to be significant. Application of 150% RDF recorded significantly higher protein yield (4.62 q ha^{-1}) over rest of the treatment of nutrient management. The highest protein yield was recorded under 150% RDF (4.62 q ha^{-1}) over other level of 125% RDF (4.45 q ha^{-1}) under 100% RDF (4.43 q ha^{-1}) treatment. The increase in protein content (%) ultimately reflected in more protein yield except treatment N_2 i.e. 125% RDF. The results are conformity with the findings of Gosavi *et al.*, (2009).

Effect of chlormequat application

Perusal of data in Table clearly indicates that application of chlormequat showed significant affect on the protein percentage in grain of maize. The protein percentage increased significantly with increase in the levels of chlormequat application. Foliar application of 1000 ppm chlormequat recorded higher protein percentage of (11.90%) which was significantly superior over no application of chlormequat, 500 ppm and 750 ppm of chlormequat application. Whereas, least protein percentage was found to be in the treatment of no application of chlormequat (9.36%).

Application of chlormequat showed significant effect on the protein yield (q ha^{-1}). The protein yield (q ha^{-1}) increased

significantly with increased concentration of chlormequat. Application of 1000 ppm chlormequat recorded higher protein yield (4.80 q ha^{-1}) which was significantly superior over all other treatments of chlormequat application. Increase in the protein content (%) and protein yield (q ha^{-1}) with increased concentration of chlormequat application might be due to increase in the efficiency of nitrogen use due to mode of action of chlormequat.

Interaction effects

Interaction effect of nutrient management and chlormequat application in maize was found to be non-significant in respect of protein content (%) and protein yield (q ha^{-1}).

References

Gosavi, S. P., S. C. Chavan and S. B. Bhagat, 2009. Effect of Mulches, Fertilizer and levels of FYM on yield, quality and Nutrient uptake of Rabi sweet corn (*Zea mays* saccharata). J. soils and crops 19 (1): 92-96.

Kamalakumari, K. and P. Singaram, 1996. Quality parameters of maize as influenced by application of fertilizer and manures. Madras Agriculture Journal. 83(1): 32-33.

Nafziger E. D., L.M. Wax and C. M. Brown, 1986. Response of five wheat cultivars to growth regulators and increased nitrogen. Crop Science. 26:767-770.

Singh C. D., 1999. Modern techniques of raising field crops, Oxford and IBH Publication, Co. Pvt. Ltd. 74-84.

Subbaiah, B.V. and Asija, G.L. 1956. A rapid procedure for the estimation of available nitrogen in Soil Curr. Sci., 25: 259-269.

Sultan, Ahmad, N. A. Baig and F. Baig, 1990. Response of two maize varieties to chlormequat application. Pak. J. Agric. Sci. 27(2): 180.