

Effect of levels of nitrogen and phosphorus in conjunction with varying plant densities on some important bulb characters and yield of garlic (*Allium sativum* Linn.)

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ABSTRACT

Garlic (*Allium sativum* Linn.) having the 88100 ha cultivation area in India, is an important spice and condiment crop (Anon, 2002). Besides its culinary uses it is well known all over the world for therapeutic effectiveness. Recently, in the era of the World Trade Organization and new policy of economic liberalization in the country, it has now become an immensely attractive crop for international trade. Notwithstanding all this, its productivity, which has already been very low, has further gone down from 4.37 t/ha to 3.67 t/ha over the period of 1984-91. Although efforts have been made to boost up its productivity through various agronomic manipulations (Rao and Purewal, 1957; Anon, 1978, 1987 and 1992), the effects of plant density and N and P₂O₅ fertilization and that too, in respect of alluvial plain of eastern U.P. has been scantily tested. It is with this view, the present experiment were conducted and the results of which have been presented herewith.

Key words : Spice, Condiment, Culinary, Clove, Plant density therapeutic, Garlic.

INTRODUCTION

Garlic (*Allium sativum* Linn.) a member of the family Amaryllidaceae, has long been cultivated in India as an important spices and/condiment. Although a hardy perennial bulbous plant, it is grown as an annual crop. The edible part, which is composed of several bulblets or segments called "Clove". The number of cloves normally vary from 6 to 50 but some times single clove bulb also found. The therapeutic value of garlic has attracted the attention of one and all since vedic era and every Indian home can prescribed garlic based effective treatment for many common ailments. Because of its medicinal properties. The various uses and properties of garlic has created its big demand for it within and outside of the country. In 1992-93 India exported 7700 tones garlic worth Rs. 71.69 millions, putting it among high foreign exchange earner. Since large quantities of dry matter and carbohydrates are synthesized by bulb crops, application of nitrogen, phosphorus is very important for getting high economic yields. Garlic responds well to nitrogen, phosphorus and spacing be achieved without adversely affecting the productivity in long run. Apart from essential elements, appropriate plant density is also an important factor effecting the yield. (Maurya and Bhuyan, 1982) . By manipulating optimum nitrogen and phosphorus levels in conjunction with suitable plant density, maximum economic yield per unit area and time can.

MATERIALS AND METHODS

The experiment was conducted at KAPG, P.G. College, Allahabad (U.P.) during 1986-87 and 1987-88. The design of the experiment was split plot with three levels of each of N and P₂O₅ i.e. 0, 120, 160 Kg N and 0, 80, 120 Kg P₂O₅/ha as Urea and S.S.P. respectively in the main plots and three plant spacing (15x10 cm, 10 x 10 cm. And 5 x 10 cm.) in the sub-plots. A local white skin cultivar of garlic was used during both the years of experimentation. The experiment was replicated thrice. The important yield contributing characters, viz., bulb diameter, No. of cloves,/bulbs, fresh and dry weight of bulbs and the yield, which was computed to q/ha, were recorded at 150 DAP at harvest. Response curve was fitted to ascertain the most economic levels of treatment. The data obtained were subjected to statistical analysis by usual method of analysis of variance.

RESULTS AND DISCUSSION

While none of the treatments had any effect on number of cloves/bulb, all treatments significantly affected other characters and the yield (Table-1).

Effect of N levels

The minimum diameters of 2.26 and 2.24 cm and under without nitrogen treatments significantly increased to 3.48 and 3.31 cm in

respective two years under the highest level of nitrogen. The mid level of 120 kg/ha was also significantly superior to without nitrogen but inferior to highest levels in both the years. Identical trends were witnessed in the case of fresh and dry weight also. The lightest bulbs 12.44 and 11.84 g fresh weight and 5.96 and 5.83 g dry weight produced under without nitrogen treatment which went on increasing up to highest level.

Effects of P₂O₅ levels

Similar to the effects of N, the bulb diameter was significantly affected with each increasing level of P₂O₅. It increased from 2.75 and 2.58 cm in respective two years to 2.83 and 2.80 under 80 Kg P₂O₅/ha which further spot up to 2.93 and 2.91 under the highest dose of 120 Kg/ha. The similar trend was in respect of fresh and dry weights as well which significantly increased with each increasing level.

Spacing effects

The effect of spacing on diameter was not as pronounced as in the case of fertilizers. The spacing effect in the second year turned out to be non-significant. In the first year too, the effects between lowest density and mid density (15x10cm and 10x10 cm) and mid density and highest density (10x10 cm and 5 x 10 cm) turned out to be non-significant, but L.S.D. between minimum and maximum spacing (15 x 10 cm and 5x10cm) was enough to make the effect significant. So far as the fresh and dry weights are concerned, these significantly reduced with the increase in the plant density. The fresh weight in the two respective years (21.62 and 20.66 g/bulb) at 15x10 cm. Spacing reduced to almost 50 per cent i.e. to 10.79 and 10.19 g under 5x10 cm spacing. The reduction in the case of dry weight was still more pronounced which reduced from 10.52 and 10.35 g to 4.41 to 4.24 under the influence of highest plant density in both the respective years.

Effects on yield :

Nitrogen levels

Like three character parameters, bulb yield also went to increasing with each incremental level of nitrogen in both the years and the increase was found to be significant. The minimum yield of 118.60 and 111.74 g/ha under control increased to 168.12 and 159.50 g/ha respectively under 120 Kg N/ha. This further increased to 207.62 and 179.33 g/ha with highest level of 160 Kg N/ha.

Phosphorus levels

Each incremental dose of P₂O₅ also positively and significantly affected bulb yield in both the years. In this case also, lowest yields of

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