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Effect of Nitrogenous Fertilizer on Growth and Yield of Garlic

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Abstract: Field experiment were conducted to assess the effect of different nitrogen levels on the growth and yield of garlic on clay loam soil. Eight nitrogen levels viz. 0, 50, 60, 70, 80, 90, 100 and 110kg nitrogen ha^{-1}, respectively were tested. Results demonstrated that increasing nitrogen level up to 100kg ha^{-1} resulted in longer leaves (64.83), greater number of leaves per plant (17.90), maximum single bulb, weight (42.60g), and bulb yield per plant (7.08kg) and Bulb yield ha^{-1} (6746.03kg) . Further more, increase in nitrogen levels had no appreciable effect on the performance of garlic.

Key words: Garlic, nitrogen, yield, bulb yield

Introduction

Garlic (*Allium sativum* L.) is an important crop grown and used as spice or condiment through out the world as well as Pakistan. It is an other foreign earning commodity for Pakistan, as a good quantity of garlic is exported every year and also it has a higher nutritive value then other bulb crops and its preparations are administered as a cure against some long lingering stomach diseases, sore eyes and earache. The per hectare yield of garlic can be increased by adopting proper package of practices like, timely planting, proper spacing, judicious application of irrigation water, besides these balance applications of nitrogen plays a vital role in the development of garlic.

Chaudhry (1979) reported that application of 125 to 150kg N ha^{-1} produced good yield of garlic. Aijaro and Gacitue (1976) applied nitrogen at 75-225kg ha^{-1} to garlic and obtained high yields. Optimum bulb size were obtained from treatments receiving nitrogen at 150kg ha^{-1}. Maurya and Bhuyan (1982) noted that the highest yield (8.2 tones) per hectare with plant spacing of 10x10 cm^2 receiving 150kg N ha^{-1}. Nelson (1983) observed high yield with the combination of nitrogen at 100, 150 or 200kg ha^{-1} and P at 25 or 35 ha^{-1}, and improved bulb size by increasing the nitrogen rate when combined with higher P rate also increased the yield. Gardenas (1986) reported that the best combination is of 60kg P_2O_5 ha^{-1} + 240kg N ha^{-1} for best yield of garlic. Further Khoso (1994), suggested that NPK combination 70-70-37kg ac^{-1} performed better yield results of garlic.

Keeping in view the importance of garlic and above facts the present project was proposed to assess the affect of different nitrogen levels on the growth and yield of garlic under Usta Muhammad conditions.

Materials and Methods

Experiments were conducted at farmer field Usta Muhammad during the year 1999-2001 to determine the effect of different levels of nitrogen on growth and yield of garlic.

The experiments were laid out in randomized complete block design. The local variety of garlic was planted having a net plot area of 3.00 x 4.00m^2, keeping 1 feet distance between row to row and 9 inches distance between plant to plant to avoid extremely crowded condition. All the recommended doses of phosphorus and potassium were applied at the time of sowing with seed bed preparation and the nitrogen was applied in to two split doses. All the agronomical operations were carried to eradicate weeds and pulverization of soil. Thinning and weeding was practiced and necessary spray against thrips was made to control insect attack. Farm yard manure at the rate of 15 tones per ha^{-1} was applied by the farmer to improve the physical condition and create retardation of available nutrients. The farm yard manure applied was not in a composite condition and was taken from an open surface of collected dungs. The main soil characteristics were pH 8.0, organic matter 0.88%, total nitrogen 0.058%, available phosphorus 9.2 ppm, available K 10.00 ppm, calcium carbonate ($CaCO_3$) 32.3, MWHC (Maximum water holding capacity) 38.7% and soil porosity 8.0% followed by Klute (1986). The details of treatments are as under:-

T_1, kg ha^{-1} (control); T_2, 50; T_3, 60; T_4, 70; T_5 80; T_6, 90; T_7, 100 and T_8 110kg N ha^{-1}. At the time of maturity randomly 10 plants per treatment were selected and tagged to record growth and yield traits. After harvesting all the data thus collected were subjected to statistically analysis of variance on the basis of two years data by following the method of Gomez and Gomez (1984).

Results and Discussion

Results depicted (Table1) that all the growth, yield components and yield ha^{-1} were highly significantly affected by nitrogen levels. Further data revealed that application of 100kg N ha^{-1} responded maximum growth, yield components and yield ha^{-1} following by higher (110kg N ha^{-1}) and lower (90kg N ha^{-1}). However, the minimum traits of growth and yield components were recorded in control following by lowest level (50kg N ha^{-1}). Application of 100kg N ha^{-1} recorded maximum bulb yield of 6746.03kg ha^{-1}, followed by 110 and 90kg N ha^{-1} given 6523.81 and 6230. 09kg ha^{-1}, respectively (Fig. 1). Where as untreated (control) recorded minimum bulb yield of 3492.06kg ha^{-1} followed by lowest levels of nitrogen 50 and 60kg N ha^{-1}, by given 4539.68 and 4888.89kg bulb yield ha^{-1} respectively.

The results are in agreement with the finding of Nelson (1983), Gardenas (1986) and Khoso (1994), Who also claimed that increasing nitrogen level up to 100kg ha^{-1}, resulted in better performance of growth and yield of garlic under Usta Muhammad conditions.

Leghari *et al.* (1997) observed that all the yield components were significantly affected by nitrogen levels except height and number of leaves per plant in onion but interaction showed significant response for single bulb weight and per hectare yield. Sheikh *et al.* (2000) reported the maximum seed yield with the combination of (N-P) at the rate of 200+150kg ha^{-1}, in turnip.

Qayyum *et al.* (1999) reported that increase the level of nitrogen up to 120kg ha^{-1} progressively increase seed yield by increasing other yield components such as plant height, pods per plant and observed highly significant response at P = 0.01 (44.8) in *Brassica napus*. Larik *et al.* (1999) showed that the flower *Zinnia elegans* showed maximum plant height at the higher rate of nitrogen and potassium. Ahmed *et al.* (2001), reported linear increase in plant height, number of branches with increase in nitrogen level after a two years experiment on sesamum genotypes.

From the results, it is obvious that nitrogen, which effect yield by affecting all the components, which are responsible for higher yield. The roles of phosphorus although not ignored for the uptake of nutrients do not play a vital role in increasing yield. The role of K is only the acceleration for uptake of N and P macro nutrient and improved plant vigor by increasing immunity against plant diseases but potassium some time may improve dry matter yield which could be dealt as yield component. The results also

Table 1: Mean growth and yield traits of garlic as affected by different leaves of nitrogen

Treatments (kg N ha^{-1})	Height (cm)	Leaves/plant	Cloves/ bulb	Weight of single bulb (g)	Bulb yield/ plant (Kg)	Bulb Yield ha^{-1} (Kg)
00	36.53g	873.00b	37.90e	31.10b	3.66e	3492.06e
50	44.46f	10.72g	40.98d	34.33g	4.76de	4539.68de
60	51.62e	11.93f	43.26c	35.10f	5.13d	4888.89d
70	55.16d	12.83e	44.80d	37.60e	5.88cd	5600.0cd
80	58.23c	14.18d	45.36b	38.30d	6.12bcd	5825.39bcd
90	60.10b	15.63c	45.60a	39.30c	6.55bc	6238.09
100	64.83a	17.90a	45.80a	42.60a	7.08a	6746.03a
110	58.13c	17.48b	45.86	41.53b	6.85b	6533.81b
S.E+	00.066	00.023	00.081	00.065	0.46	0018.470
cdi	00.141	00.049	00.173	00.139	1.004	0039.528
cdii	00.196	00.068	00.241	00.194	1.397	0055.041
cv%	02.106	02.88	03.138	02.947	5.768	0005.718

Values followed by similar letters are not significantly different at P≤0.05

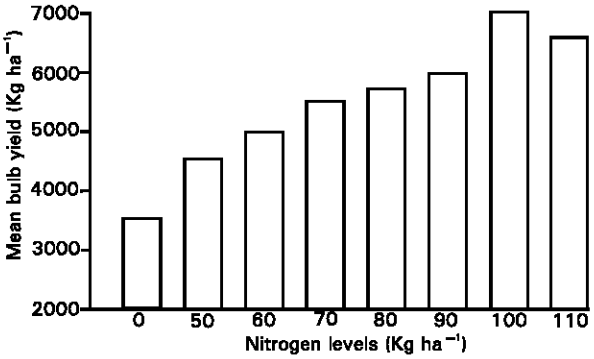

Fig. 1: Mean bulb yield (Kg ha^{-1}) as effected by different nitrogen level

revealed that the nitrogen seems effective up to some levels after ward beyond of that level could not effect yield rather helps in decreasing or stable yield. The results in garlic further proved (law of diminishing return).

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