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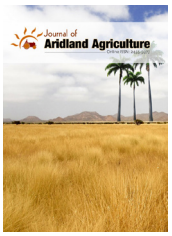
Short Communication



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Productivity improvement of onion (*Allium cepa L.*) under agro- climatic conditions of Mansehra, Pakistan

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ABSTRACT

The present study was conducted to investigate the effect of various levels of NPK fertilizers on the yield and yield contributing factors of onion.Treatments includes namely T_1(00-00-00),T_2(25-25-12.5),T_3(50-50-25),T_4(75-75-37.5)and T_5(100-100-50) NPK kg/ha. All P and K fertilizer was applied as basal dose while Nitrogen was applied in split doses. The variety used in the study was Swat-1. Data revealed that at harvest maximum plant height of 53.8cm, No. of leaves/ plant (7), No. of roots/plant (95), No. of bulb/plot (221), fresh weight/bulb (127.7g), bulb size (6.4 cm), and yield of 24.92 tons/ha were recorded in treatment T_5 provided 100-100-50 NPK kg/ha followed by plant height of 52.2cm, No. of leaves/plant (6), No. of roots/plant (83), No. of bulb/plot(156), fresh weight/bulb 118g, bulb size 5.7cm, and 23.87 tons/ha yield in treatment receiving 75-57-37.5NPK kg/ha. The minimum plant height of 46.3 cm, No. of leaves/plant (5), No. of roots/plant (55), No. of bulb/plot (114), fresh weight/bulb (103.5 g) bulb size (5.05cm) and yield of 17.80 tons/ha was recorded in control plot (without NPK). Results indicates that NPK @100-100-50 kg/ha proved to be the optimal dose of fertilizer to get maximum yield of onion.

KEYWORDS: Swat-1, NPK fertilizers, onion (*Allium Cepa L.*), growth and yield

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INTRODUCTION

Onion (*Allium Cepa*. L), as integral part of food in kitchen is occupying an important role in our daily vegetable use. Onion besides being used as food is also used as medicine for the treatment of various diseases in different parts of the world [1]. In South Asia and particularly in Pakistan onion is used as important and essential ingredient of large number of food recipes. In Pakistan, Onion is being cultivated in many areas including Khyber Pakhtun khawa province [2]. There are many districts, in which the onion production is contribution a significant percentage. There some factors which hindering the production of onion in Pakistan like poor nutritional, management practices and post-harvest losses.

Optimum fertilizers application for onion is an inevitable factor for good yield and quality. Previous studies showed the fertilizer effects on onion crop [3-5]. Dosages of potassium application in comparison with nitrogen and phosphorus was explained earlier [6] and the average NPK levels in onion crop [7]. Results of Tahir *et al* [8] revealed that nitrogen application significantly affected most of the parameters. Plots treated with Nitrogen 120 kg ha^{-1} produced maximum bulb diameter (6.82 cm), bulb neck diameter (1.09 cm), bulb fresh weight (141.37 g), bulb dry weight (15.61g) and marketable yield (12.81 ton ha^{-1}) with reducing bolting (24.72%). Abdissa *et al.* [9] studied the effect of nitrogen on different parameters of onion and found that nitrogen application reduced bolting percentage in onion and also extended days to physiological maturity. Ghaffoor *et al.* [7] reported that bulb survival percentage in onion was maximum when nitrogen was applied at 150 kg ha^{-1}. Jilani *et al.* [10] obtained 95.22% bulb survival at 120 kg ha^{-1} and suggested this level as best for growth and yield of onion.

The present research work was conducted to determine the best combination or the balanced fertilization ratio of NPK for onion Cv. Swat-1.

MATERIAL AND METHODS

This study was conducted at PARC National Tea and High Value Crops Research Institute, Shinkiari (Mansehra) Pakistan during 2017 to determine the effect of different levels of nitrogen, phosphorus and potassium on yield and other parameters of onion. Variety Swat-1 was used in the trial. The transplantation of Swat-1 Cv was done on January, 13, 2017. The experiment was laid out in randomized complete blocks design (RCBD) with three replicates.

Different five combinations of NPK fertilizer treatments of experimental site were T_1 (0-0-0), T_2 (25-25-12.5), T_3 (50- 50- 25), T_4 (75-75-37.5), T_5 (100-100-50), NPK kg/ha. The doses of phosphorus fertilizer as Single Supper Phosphate (21 % P_2O_5) and potassium fertilizer as Sulfate of Potash (50 % K_2O) were added during soil preparation. However, nitrogen fertilizer as Urea (46%N) was divided into three equal parts and applied at 30, 60 and 90 days after transplanting process. All other recommended cultural practices including irrigation, weeding was applied uniformly.

Morphological parameters like plant height (cm), number of leaves per plant, Number of roots/plant, bulb size, fresh weight/ bulb(gm) were recorded together with Bulb yield.

Statistical Analysis was done with Least significant difference (LSD) test at 5% probability was used to compare the difference amongst treatment means [11].

RESULTS AND DISCUSSION

Plant Height (cm)

Data recorded on plant height at harvest presented in Table-1 indicated that maximum plant height of 53.8 cm was recorded in the plot provided (100-100-50 NPK kg/ha) followed by plant of 52.2cm in plot receiving (75-75-37.5) NPK kg/ha and 51.8cm in treatment T_3 receiving (50-50-25) NPK kg/ha. Minimum plant height of 46.3cm was recorded in control plot (without NPK). Statistically all treatment was found at par in plant height. Similar results were noted by Ghaffoor *et al* [7].

No. of Leaves/Plant

Data regarding on No. of leaves/plant is presented in Table-1. Data showed that maximum No. of leaves/plant of (7) was recorded in the plot receiving (100-100-50 NPK kg/ha) followed by No. of leaves/plant (6) in plot provided (75-75-37.5) NPK kg/ha. Minimum No. of leaves/plant of 5 were recorded in control plot (without fertilizer). No significant differences were observed among the treatment. Our results are in line with previous reports [7].

No. of Roots/Plant

Data pertaining to No. of roots/plant is presented in Table-1. Data revealed that maximum No. of roots/plant of (95) was recorded in the plot receiving (100-100-50 NPK kg/ha) followed by No. of roots/plant (83) in plot provided (75-75-37.5) NPK kg/ ha and 66 root/plant in plot fertilized with 50-50-25 NPK kg/ha. Minimum No. of roots/plant of 55 were recorded in treatment T_1 (without fertilizer).

No. of Bulb/Plot

Data on No. of bulb/plot presented in Table-1 revealed that maximum No. of bulb/plot(221) was recorded in the plot receiving (100-100-50 NPK kg/ha) followed by 183 No. of bulb/ plot in plot provided ((25-25-12.5)) NPK kg/ha and 182 No. of bulb/plot in plot fertilized with 50-50-25 NPK kg/ha. Minimum No. of bulb/plot of 156 were recorded in treatment T_1 (without fertilizer).

Bulb Size (cm)

Data recorded on Bulb size (cm) at harvest presented in Table-1 showed that maximum Bulb size of 6.1 cm was recorded in the treatment receiving (100-100-50 NPK kg/ha) followed by Bulb size of (5.7cm) in plot provided (75-75-37.5) NPK kg/ha and 6 cm in treatment T_3 receiving (50-50-25) NPK kg/ha. Minimum Bulb size of 5.05 cm was recorded in control plot (without NPK).

Fresh Weight/Bulb (gm)

Fresh weight/bulb of ten selected bulbs were recorded at harvesting and are depicted in Table-1. Data revealed that maximum fresh weight of 127.7 gm/bulb was obtained in the plot provided (100-100-50 NPK kg/ha) followed by fresh weight 118 gm/bulb in plot receiving (75-75-37.5) NPK kg/ ha. Control plot (without NPK fertilizer) resulted minimum fresh weight of 103.5gm/bulb. Similar results were reported by Tahir *et al* [1] that nitrogen application @ 120 kg ha^{-1} produced maximum bulb fresh weight (141.37 g), bulb dry weight (15.61g), bulb diameter (6.82 cm), bulb neck diameter (1.09 cm), and marketable yield (12.81 ton ha^{-1}) with reducing bolting (24.72%).

Bulb Yield Tons/Ha.

Bulb yield was obtained by harvesting whole plot and yield per plot was converted in to ton/ha. Data indicated that maximum bulb yield of 24.91tons/ha was recorded in the plot provided

Table1: Effect of NPK fertilizer on growth and yield of onion during 2016-17

Treatment NPK kg/ha	Plant height (cm)	No. of leaves/plant	No. of roots/plant	No. of bulb/plot	Bulb size (cm)	Fresh weight/ bulb (gm).	Bulb yield tons/ha.
T_1 (0-0-0)	46.3 a	5 a	55 c	114 c	5.05 c	103.5 c	17.8 c
T_2 (25-25-12.5)	47.8 a	5 a	65 b	183 ab	5.35 c	106.7 ab	23.04 b
T_3 (50-50-25)	51.8 a	5 a	66 b	182 ab	6.0 b	108.8 bc	23.52 ab
T_4 (75-75-37.5)	52.2 a	6 a	83 a	156 bc	5.7b	118 ab	23.87 ab
T_5 (100-100-50)	53.8 a	7 a	95 a	221 a	6.4 a	127.7 a	24.91 a
LSD 0.05%	9.13	3.10	10.89	62.79	0.33	10.54	1.82
CV%	6.53	20.70	5.41	13.21	2.09	3.36	2.9

Source: PARC National Tea & High Value Crops Research Institute Shinkiari, Mansehra.

(100-100-50 NPK kg/ha) followed by bulb yield of 23.87 tons/ha in plot receiving (75-75-37.5) NPK kg/h and 23.52 tons/ha in plot provided 50-50-25NPK kg/ha. However, T_3 and T_4 were statistically at par. Minimum Bulb yield of 17.8 tons/ha resulted in Control plot (without NPK fertilizer). Significant differences in yield were recorded due to fertilizer application over control. These results are in accordance with previous reports [3-5,12]. Source: PARC National Tea & High Value Crops Research Institute Shinkiari, Mansehra.

CONCLUSION

On the basis of present study it can be concluded that fertilizer treatment T_5 (100-100-50 NPK kg ha $^{-1}$) showed the best results for most of the parameters and it is best substitute for chemical fertilizer to get maximum yield of onion under Mansehra conditions.

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