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Effect of Different Nitrogen Level on Growth Performance of Onion under Poplar Based Agroforestry System

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ABSTRACT: The experiment was laid out in Randomized Block Design (Factorial) with three replication and 12 treatments with and without combination of three different levels of nitrogen fertilizer. The results revealed that vegetative growth characters such as plant height found superior in 120 kg N/h fertilizer level. The yield contributing characters such as bulb diameter, bulb weight, and yield t/h of bulb were recorded verity 120 kg N/h fertilizer level.

KEYWORDS: Nitrogen; Onion; Vegetable

I. INTRODUCTION

Agroforestry provides a different land use option, compared with traditional arable and forestry systems. It makes use of the complementarity between trees and crops, so that the available resources can be more effectively exploited. It is a practice that respects the environment and has an obvious landscape benefit. Efficient, modern versions of agroforestry have been developed, that are adapted to the constraints imposed by mechanisation. The agroforestry plot remains productive for the farmer and generates continuous revenue, which is not the case when arable land is exclusively reforested. Agroforestry allows for the diversification of farm activity and makes better use of environmental resources.

Although the wood from *Populus* is known as poplar wood, a common high-quality hardwood "poplar" with a greenish colour is actually from an unrelated genus *Liriodendron*. *Populus* wood is a lighter, more porous material. Its flexibility and close grain make it suitable for a number of applications, similar to those for willow. The Greeks and Etruscans made shields of poplar, and Pliny also recommended poplar for this purpose. Poplar continued to be used for shield construction through the Middle Ages and was renowned for a durability similar to that of oak, but at a substantial reduction in weight.

The onion (*Allium cepa* L.), also known as the bulb onion or common onion, is a vegetable that is the most widely cultivated species of the genus *Allium*. The onion plant has a fan of hollow, bluish-green leaves and its bulb at the base of the plant begins to swell when a certain day-length is reached. The bulbs are composed of shortened, compressed, underground stems surrounded by fleshy modified scale (leaves) that envelop a central bud at the tip of the stem. In the autumn (or in spring, in the case of overwintering onions), the foliage dies down and the outer layers of the bulb become dry and brittle. Onions are cultivated and used around the world. As a food item, they are usually served cooked, as a vegetable or part of a prepared savoury dish, but can also be eaten raw or used to make pickles or chutneys. They are pungent when chopped and contain certain chemical substances which irritate the eyes.

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II. MATERIALS AND METHODS

The experiment was carried out at the Forestry research Nursery area of a School of Forestry & Environment, Sam Higginbottom Institute of Agriculture, Technology and sciences, (Deemed to be University), Allahabad (U.P). The experiment was laid out in randomized block design with 12 treatments and 3 replication. The different treatment were allocated in each replication. The plot size of 2 m² was kept for all the treatments. The detail of experimental treatments is given as under:

Varieties (Main Plots)	N-Levels (Sub Plots)
V1 Nasik Red	T1 Control (No nitrogen)
V2 Pusa Red	T2 40 Kg ha ⁻¹
V3 Pusa Madhavi	T3 80 Kg ha ⁻¹
	T4 120 Kg ha ⁻¹

V - Variety, N - Nitrogen.

Seeds of the onion were placed in lines 10 cm apart. The seeds were slightly covered with soil and irrigated with the help of sprinkler. Nursery was kept weed free manually. Seed germination started a week after sowing. The first irrigation was given at the time of sowing and other irrigation was given after an interval of 15 days or according to the need of the crop. Seedlings of the same size were transplanted with row to row distance of 30 cm and plant to plant distance of 10 cm. All the required cultural practices were kept constant such as irrigation, weeding, pest and disease control etc in all experimental plots.

Data were recorded by selecting plants randomly from each treatment plot and average was calculated for the statistical analysis. The parameters under study were plant height, leaf size and number of leaves

III. RESULTS AND DISCUSSION

Plant height (cm). The results showed that various nitrogen levels had highly significant effect on the number of bulbs per plot. the maximum Plant height (42.84 cm) was recorded at 120kg N ha⁻¹ and the minimum plant height (36.34 cm) was recorded at control level of nitrogen at 30 DAS. The maximum Plant height (45.23 cm) was recorded at 120kg N ha⁻¹ and the minimum Plant height (38.38 cm) was recorded at control level of nitrogen at 60 DAS. The maximum Plant height (48.05 cm) was recorded at 120kg N ha⁻¹ and the minimum Plant height (41.40 cm) was recorded at control level of nitrogen at 90 DAS. The maximum Plant height (50.59 cm) was recorded at 120kg N ha⁻¹ and the minimum Plant height (44.15 cm) was recorded at control level of nitrogen at 120 DAS.

Bulb diameter (cm). The effect of Nitrogen on maximum bulb diameter in different nitrogen level showed a significant variation. Maximum bulb diameter (4.19 cm) was recorder at 120 kg N ha⁻¹ followed by 80 kg N ha⁻¹ with 3.36 cm, respectively. The minimum bulb diameter (2.52cm) was observed at a control level of nitrogen, which was significantly different from other treatments.

Bulb Weight (gm). The effect of Nitrogen on maximum bulb weight in different nitrogen level showed a significant variation. Maximum bulb Weight (40.65gm) was recorder at 120 kg N ha⁻¹ followed by 80 kg N ha⁻¹ with 35.42 gm, respectively. The minimum bulb weight (21.93 gm) was observed at a control level of nitrogen, which was significantly different from other treatments.

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Table I. Plant height (cm), bulb weight (gm), bulb diameter (cm), yield (t/ha⁻¹) affected by different N-levels
Plant height (cm),

Levels of Variety (V)	30 DAS					Mean (V)	60 DAS				Mean (V)
	Levels of Nitrogen (N)				Control (0)		Levels of Nitrogen (N)				
	Control (0)	Nitrogen 40 kg	Nitrogen 80 kg	Nitrogen 120 kg			Nitrogen 40 kg	Nitrogen 80 kg	Nitrogen 120 kg		
V ₁	38.03	39.66	42.72	44.83	41.31	38.55	41.91	44.58	46.87	42.97	
V ₂	34.57	36.65	38.55	41.14	37.73	37.28	39.53	41.91	43.51	40.56	
V ₃	36.43	38.48	40.54	42.56	39.50	39.31	41.27	43.19	45.31	42.27	
Mean (N)	36.34	38.26	40.60	42.84		38.38	40.90	43.23	45.23		

Levels of Variety (V)	90 DAS					Mean (V)	120 DAS				Mean (V)
	Levels of Nitrogen (N)				Control (0)		Levels of Nitrogen (N)				
	Control (0)	Nitrogen 40 kg	Nitrogen 80 kg	Nitrogen 120 kg			Nitrogen 40 kg	Nitrogen 80 kg	Nitrogen 120 kg		
V ₁	42.73	45.05	47.72	49.99	46.37	45.60	47.43	50.21	52.60	48.96	
V ₂	40.47	42.29	43.59	46.00	43.09	43.11	44.60	46.17	48.28	45.54	
V ₃	41.01	43.18	45.30	48.17	44.42	43.73	45.60	47.65	50.88	46.97	
Mean (N)	41.41	43.51	45.54	48.05		44.15	45.88	48.01	50.59		

Levels of Variety (V)	Bulb diameter (cm)					Mean (V)
	Levels of Nitrogen (N)				Control (0)	
	Control (0)	Nitrogen 40 kg	Nitrogen 80 kg	Nitrogen 120 kg		
V ₁	2.69	3.17	3.58	4.69		3.53
V ₂	2.27	2.63	3.11	3.74		2.94
V ₃	2.61	2.77	3.41	4.14		3.23
Mean (N)	2.52	2.85	3.36	4.19		

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Bulb Weight (gm)					
Levels of Variety (V)	Levels of Nitrogen (N)				Mean (V)
	Control (0)	Nitrogen 40 kg	Nitrogen 80 kg	Nitrogen 120 kg	
V ₁	25.89	32.81	40.54	45.63	36.22
V ₂	17.08	25.45	30.63	35.47	27.16
V ₃	22.81	30.15	35.09	40.86	32.23
Mean (N)	21.93	29.47	35.42	40.65	

Total yield (t/ha-1)					
Levels of Variety (V)	Levels of Nitrogen (N)				Mean (V)
	Control (0)	Nitrogen 40 kg	Nitrogen 80 kg	Nitrogen 120 kg	
V ₁	3.54	4.84	6.02	7.47	5.47
V ₂	2.25	3.40	4.42	5.47	3.89
V ₃	3.15	4.25	5.30	6.40	4.78
Mean (N)	2.98	4.16	5.25	6.45	

Total yield (t ha⁻¹) The results reveal that various doses of Nitrogen had significant effect on total yield of onion. The results showed that with the increase in dose of Nitrogen up to 120 kg N ha⁻¹ the yield t ha⁻¹ was increased. The maximum yield (6.45 t/ha⁻¹) was produced in 120 kg N ha⁻¹ followed by 80 kg N ha⁻¹ with 5.25 t/ha⁻¹, respectively. While the minimum yield (2.98 t/ha⁻¹) was observed at controlled N level.

IV. CONCLUSION

It was concluded that onion 120 kg N ha⁻¹ optimum dose for obtaining maximum onion growth and yield under poplar based Agroforestry system.

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