Original Research Article

STUDIES ON USE OF NPK AND ORGANIC MANURES ON GROWTH , YIELD AND QUALITY OF LETTUCE (*Lactuca sativa*) cv. Grand Rapid.

ABSTRACT

The experiment was conducted in the Departmental field of Horticulture Deparment, Naini Agricultural Institute, Sam Higginbottom, University of Agriculture, Technology and Sciences, Prayagraj (U.P) during 2020 – 2021, by adapting randomized block design consisting of 7 treatments and three replications with different combination of NPK and Organic manures. Based on the present investigation, it is concluded that the treatment T5 (50% RDF + 25% FYM + 25% Poultry manure) was found to be superior all-over other treatments with respect to Plant height at 45 DAS (21CM), Number of leaves plant^{-1} at 45 DAP (21.1), Leaf length at 45 DAS (19.90cm), Leaf width at 45 DAS (16.2cm), Leaf area at 45 DAS (232.5cm), Leaf area index at 45 DAS (20.4cm^2), Leaf weight (107.6g), Leaf yield plot^{-1} (10.5kg), Leaf yield ha^{-1} (23.4t), Vitamin-C (3.5) content and TSS (3.4°Brix) of Lettuce under the agro-climatic condition of prayagraj. Among the treatments, Highest Gross return, Net return, and Benefit Cost ratio (1:3.8) was obtained under the treatment T5 (50% RDF+ 25% FYM + 25% Poultry manure).

Keywords: Lettuce, NPK, Organic Manure, Growth, Yield and Quality.

INTRODUCTION

Lettuce is a cool season annual leafy vegetable. Lettuce is more popular among salad vegetable crops. This crop is a member of Asteraceae family and native to Mediterranean region. The word (lactuca) is derived from the Latin word “lac” or “milk”. Among all the lettuce varieties, Romaine lettuce variety is famous for its nutrition values. Lettuce is mainly used in food items like wraps, sandwiches apart from using as leafy vegetable. The plant can vary in its size, shape, Leaf type and generally Leaves of the plant form a dense head or loose rosette, crispy texture and slightly bitter in taste with milky juice as fresh condition. Lettuce varieties are mostly eaten fresh, and served as salads, although it is also seen in other kinds of food, such as soups, sandwiches and wraps; it can also be grilled. All types of lettuce are good for health. As a vegetable, it provides fibre, vitamins, minerals and phytochemicals for very few calories. Lettuce is a rich source of folate, such as vitamin B, need to make and repair DNA cells, and vitamin K, nutrient essential for healthy bones. It grows in various types of soil, but it gives good results when grown in sandy loam and silt loam soil. Its Ideal soil pH should be about 6 to 6.8. Waterlogged condition is not good for its growth and lettuces are harvested prior to flowering.

Lettuce has been used as a medicine for dierent ailments including stomach problems, inflammation, pain and urinary tract infections from ancient times due to the presence of secondary metabolites such as terpenoids, flavonoids and phenols Nowadays, consumption of organic vegetables, including lettuce, is surging because of the fast-growing human population, rapid urbanization and increased health concerns. This vegetable requires a high rate of nitrogen for growth and development.Lettuce (Lactuca sativa L.), an annual leafy herb is one of the most popular salad crops which mainly grows in temperate regions and in some cases in the tropic and sub-tropic regions of the world. The best temperature for cultivation of lettuce is 18-25°C and the night temperature is 10-15°C (Ryder, 1998; Lindquist, 1960). The nutritive value of lettuce is very high which contains vitamin A and C, minerals (calcium, phosphorus and iron), protein, carbohydrate, fat, etc. (Gopalan and Balaraman, 1966). Lettuce is also known as anodyne, sedative, diuretic and expectorant (Kallo, 1986). It is a newly introduced crop in Bangladesh and getting popularity day by day though its production package is not much known to the Bangladeshi farmers. The supply of nutrient and production technology plays a vital role in the production and quality of lettuce. Being a succulent vegetable, fertilizer application in appropriate time with

appropriate dose and sufficient irrigation by using proper method is also the prerequisite for the cultivation of lettuce. Deficiency of soil nutrient is now considered as one of the major constraints to successful upland crop production in Bangladesh (Islam and Noor, 1982). As organic farming eliminates agrichemicals and reduces other external inputs to improve the environment as well as farm economics, organic farming can play a vital role in the maximum profitable production of lettuce with sustaining soil fertility than the use of nutrient deficiency in the soils (Uddin et al., 1995). The experiment was undertaken to observe the growth and yield of lettuce under different combinations of NPK along with organic manures application, to find out the suitable organic manure for higher production, and to investigate the proper dose for the maximum production of lettuce.

MATERIALS AND METHODS

This investigation "Studies on Use of NPK and Organic Manure on Growth, Yield and Quality of Lettuce (Lactuca sativa) cv. Grand Rapid." Was carried out at the Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj during the year 2021. All the facilities necessary for cultivation, including labour were made available in the department.

RESULT AND DISCUSSION

The investigation entitled "Studies on Use of NPK and Organic Manure on Growth, Yield and Quality of Lettuce (Lactuca sativa) cv. Grand Rapid". Were carried out at Departmental Field of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.). in the year 2020-2021. The results of the investigation, regarding the Lettuce on growth, yield and quality have been presented in table . The result of the experiment has been presented under the following heading.

GROWTH PARAMETERS

- The maximum Plant Height at 15 days (13.9 cm) was recorded in treatment T5 and minimum in the treatment T0 (5.7 cm). The maximum plant height at 30 days (17.9 cm) was recorded in treatment T5 and minimum in T0 (10.1 cm).The maximum plant height at 45 days (21.0 cm) was recorded in treatment T5 and minimum in T0 (13.1 cm)
- The maximum Number of Leaves at 15 days (10.9) was recorded in treatment T5 and minimum Number of leaves in T0 (8.0).The maximum Number of leaves at 30 days (15.9)

was recorded in treatment T5 and minimum in T0 (13.2).The maximum Number of leaves at 45 days (21.1) was recorded in treatment T5 and minimum in T0 (18.4)

- The maximum Leaf Length at 15 days (8.62cm) was recorded in treatment T5 and minimum Leaf Length in T0 (6.07 cm). The maximum Leaf Length at 30 days (12.60 cm) was recorded in treatment T5 and minimum in T0 (11.22 cm). The maximum Leaf Length at 45 days (19.90cm) was recorded in treatment T5 and minimum in T0 (13.94 cm)
- The maximum Leaf Width at 15 days (8.7 cm) was recorded in treatment T5 and minimum in T0 (4.7 cm).The maximum leaf width at 30 days (12.0 cm) was recorded in treatment T5 and minimum in T0 (8.0 cm). The maximum leaf width at 45 days (16.2 cm) was recorded in treatment T5 and minimum in T0 (12.2 cm)
- The maximum Leaf Area at 15 days (130.4 cm^2) was recorded in treatment and minimum recorded in the treatment T0 (89.8 cm^2). The maximum Leaf Area at 30 days (220 cm^2) was recorded in treatment T5 and minimum in T0 (112.8 cm^2). The maximum Leaf Area at 45 days (232.5 cm^2) was recorded in treatment T5 and minimum in T0 (125.3cm^2).
- The maximum Leaf Area index at 15 days (5.1 cm^2) was recorded in treatment T5 and minimum Leaf Area index in T0 (3.0cm^2).The maximum Leaf Area index at 30 days (8.3cm^2) was recorded in treatment T5 and minimum in the treatment T0 (62cm^2). The maximum Leaf Area index at 45 days (20.4cm^2) was recorded in treatment T5 and minimum Leaf Area index in T0 (18.2cm^2).

YIELD AND QUALITY PARAMETERS

- The maximum Leaf Weight (102.9 g) was record in treatment T5 followed by T6 (93.8 g) and minimum leaf weight was record in treatment T0 (50.9 g)
- The maximum Leaf Yield / plot (10.2 kg) was record in treatment T5 followed by T6 (8.4 kg) and minimum leaf yield / plot was record in treatment T0 (3.7 kg)
- The maximum Leaf Yield (t /ha) (22.4 t) was record in treatment T5 followed by T6 (18.7 t) and minimum leaf yield (t/ha) was record in treatment T0 (8.1 t)
- The maximum TSS Content (3.4˚Brix) was record in treatment T5 followed by T6 (3.2˚Brix) and minimum TSS content was record in treatment T0 (1.8˚Brix)

- The maximum Vitamin-C Content (3.5) was record in treatment T5 followed by T6 (3.2) and minimum vitamin-c content was record in treatment T0 (1.9)

CONCLUSION

Based on the present investigation, it is concluded that the treatment **T5** (50% RDF + 25% FYM + 25% Poultry manure) was found to be superior all-over other treatments with respect to Plant height, Number of leaves, Leaf length, Leaf width, Leaf area, Leaf area index, Leaf weight, Leaf yield plot^{-1}, Leaf yield tonnes ha^{-1}, Vitamin C content and TSS of Lettuce under the agro-climatic condition of prayagraj. The result of the experiment indicate that the highest growth, yield and quality of lettuce was obtained and Studies revealed that the treatment T5 was the best for maximizing the production of lettuce which was also economically profitable.

Table.1

- Effect of different combinations of NPK and Organic manure on Plant height,No. of leaves, Leaf length.

Treatments	Treatment combinations	Plant Height (cm)			No. of leaves			Leaf length (cm)		
		15 DAP	30 DAP	45 DAP	15 DAP	30 DAP	45 DAP	15 DAP	30 DAP	45 DAP
T0	100% RDF (100 kg N +50 kg P_2O_5 + 50 kg K_2O_5)	5.7	10.1	13.1	8.0	13.2	18.4	6.07	11.22	13.94
T1	50% RDF + 50% FYM	6.6	10.6	13.7	8.3	13.4	19.0	6.29	11.40	16.81
T2	50% RDF + 50% Vermicompost	7.2	11.2	14.2	9.0	14.0	19.9	6.49	11.61	16.91
T3	50% RDF + 50% Poultry manure	9.6	13.7	16.8	9.1	14.1	20.1	6.74	11.72	17.63
T4	50% RDF + 25% FYM + 25% Vermicompost	10.1	14.1	17.2	9.4	14.5	20.5	6.91	11.88	18.07
T5	50% RDF + 25% FYM + 25% Poultry manure	13.9	17.9	21.0	10.9	15.9	21.1	8.62	12.60	19.90
T6	50% RDF + 25% Vermicompost + 25% Poultry manure	10.6	14.7	17.7	9.9	14.7	20.7	7.04	12.04	19.64
T7	25% RDF + 25% FYM +25% Vermicompost + 25% Poultry manure	6.9	10.9	13.9	8.8	13.8	19.2	6.41	11.56	16.81
	S.Ed (±)	**0.25**	**0.19**	**0.21**	**0.25**	**0.25**	**0.39**	**0.15**	**0.19**	**0.17**

Table.2

	C.D at 5%	**0.77**	**0.58**	**0.65**	**0.77**	**0.76**	**1.17**	**0.45**	**0.58**	**0.52**
	C.V	**4.95**	**2.56**	**2.32**	**4.80**	**3.04**	**3.37**	**3.76**	**2.83**	**1.69**

– Effect of different combinations of NPK and Organic manure on Leaf width , Leaf area , Leaf area index Leaf wieght.

Treatments	**Leaf width (cm)**			**Leaf area (cm)**			**Leaf area index (cm^2)**			**Leaf Wieght (g)**
	15 DAP	30 DAP	45 DAP	15 DAP	30 DAP	45 DAP	15 DAP	30 DAP	45 DAP	
T0	4.7	8.0	12.2	89.8	112.8	125.3	3.0	6.2	18.2	87.9
T1	5.3	8.7	12.9	96.7	119.7	132.2	3.3	6.5	18.3	89.1
T2	5.8	9.2	13.4	117.5	177.5	190.0	4.0	7.2	19.0	91.3
T3	6.2	9.6	13.7	120.6	190.4	203.3	4.3	7.4	19.3	95.1
T4	6.6	9.9	14.1	124.0	207.5	220.0	4.6	7.8	19.6	97.9
T5	8.7	12.0	16.2	130.4	220.0	232.5	5.1	8.3	20.4	107.6
T6	7.4	10.7	14.9	128.6	216.5	229.0	4.9	8.0	19.9	103.9
T7	5.5	8.9	13.1	109.9	156.9	169.4	3.6	6.8	18.8	83.3
S.Ed (±)	**0.25**	**0.25**	**0.25**	**0.01**	**1.52**	**1.52**	**0.02**	**0.04**	**0.09**	**1.62**
C.D at 5%	**0.75**	**0.75**	**0.75**	**0.04**	**4.61**	**4.62**	**0.07**	**0.13**	**0.26**	**4.91**

Table.3

C.V	**6.78**	**4.42**	**3.08**	**0.02**	**1.50**	**1.40**	**0.98**	**1.05**	**0.78**	**2.97**

– Effect of different combinations of NPK and Organic manure on Leaf yield/plot , Leaf yield/ha , TSS , Vitamin c

Treatments	**Leaf yield /plot (kg)**	**Leaf Yield /ha (t)**	**TSS (^{O}Brix)**	**Vitamin c**
T0	6.3	14.1	1.8	1.9
T1	6.7	14.8	2.0	2.1
T2	7.4	16.4	2.5	2.6
T3	7.8	17.3	2.6	2.7
T4	8.3	18.5	3.0	3.1
T5	10.5	23.4	3.4	3.5
T6	9.3	20.7	3.2	3.2
T7	6.6	14.6	2.2	2.3
S.Ed (±)	**0.24**	**0.53**	**0.07**	**0.08**
C.D at 5%	**0.72**	**1.60**	**0.22**	**0.24**
C.V	**5.42**	**5.24**	**4.90**	**5.04**

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