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Effect of Different Levels of Nitrogen, Phosphorus and Potassium on Fruit Growth, Yield and Quality of Strawberry (*Fragaria x ananassa*) cv. Sweet charley

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Abstract:

The experiment was carried out in fruit Research Farm, during Mid-November to 30- March with following combination of which was T_0 (control), T_1 (N.P.K120:50:50), T_2 (N.P.K120:40:40), T_3 (N.P.K120:30:30), T_4 (N.P.K100:50:50), T_5 (N.P.K100:40:40), T_6 (N.P.K100:30:30), T_7 (N.P.K80:50:50), T_8 (N.P.K80:40:40), T_9 (N.P.K80:30:30), T_{10} (N.P.K60:60:60), T_{11} (N.P.K50:50:50), T_{12} (N.P.K40:40:40). The cultivar of strawberry was "sweet charley". The highest high plant (9.17 cm) was recorded in T_{12} and the highest No. leaves per plant (9.53) was recorded in T_{12}, number of flowers per plant (2.20) was recorded in T_{12}, yield per plant (200.00) was recorded in T_2, yield Tonnes / hac (12.00) was recorded in T_2 and the maximum total soluble solids of fruits was recorded is (9.00 °Brix) was obtained in T_5 treatment.

Key words: strawberry (*Fragaria x ananassa)*, plant height , leaves number, yield per plant, total soluble solids and " sweet charley "

Introduction

The modern cultivated strawberry (Fragaria x ananassa Duchene) is one of the most delicious and refreshing soft fruit of the world. Worldwide, it is ther most widely distributed fruit crop due to its genotypic diversity, highly heterozygous nature and broad range of environment adaptations, (Childers et al, 1995). Its plants are cherished in gardens and in commercial fields for its beautiful red soft fruit with a tantalizing aroma (Sharma and Yamdagni 1999) Strawberry is a profitable fruit crop in the shortest possible time as compared to the other fruits. The fruits are delicious and attractive, having pleasant aroma and a delicate flavour. It is also nutritious and beneficial to anemic patients. Rich in Vitamin C, strawberry also provided iron and mineral. Strawberry can reduce the risk of developing cancer 5% -50% due to the high levels of vitamin C as well as foliate and phytochemical compound such as the elegiac acid present in this fruit. Being a rich source of vitamins and mineral coupled with delicate flavours strawberry has now become an important table fruit of million of people around the lobule (Sharma and Singh 1999). Beside vitamin C, strawberry is also fairly a good source of vitamin A (60 IU/100 g of edible portion). Strawberry also has high pectin (0.55%), available in the from of calcium pectate, which serves as an excellent ingredient for jelly making Fresh fruits are the major source for the vitamin C required in the human diet. For example, depending on the age group, the daily requirement for vitamin C is about 60 – 90 mg (Johnson M.S. and Fennimore S.A. 2005). The size, the shape, the color, the firmness, the acidity, the sweetness and the overall fruit flavor make strawberry, one of the most popular spring and summer fruits (U.S. Department of Agriculture, Agricultural Research Service. (2006) It is therefore important to know when ripe vitamin C concentration is higher. Complex interplay between temperature and day length directly influence the content of vitamin C and total

acidity of strawberry fruits (Lester G.E. 2006) Mulching of soil is an old practice aimed primarily to conserve moisture in soil and reduce the intensity of emergence of weed flora, thus increasing yield and quality of fruit in cultivated plants. In addition, mulching changes temperature conditions of the soil and of the air lying immediately above soil, facilitates the movement in the field, and reduces the level of soil erosion. Applying organic mulch (straw, leaves, compost, or similar).

Material and Methods

The present investigation on growth and yield of strawberry was conducted at research farm, Department of Horticulture, SHIATS, Allahabad during the winter (Rabi) season of 2013-2014. The objective was to find put the best combination of NPK with mulching on growth and yield of strawberry for this region and the method of plant runner manner.

Treatments Detail:

T_0 - Control

T_1 - 120kg N + 50 kg P_2O_5 + 50 kg K_2O

T_2 - 120kg N + 40 kg P_2O_5 + 40 kg K_2O

T_3 - 120kg N + 30 kg P_2O_5 + 30 kg K_2O

T_4 - 100kg N + 50 kg P_2O_5 + 50 kg K_2O

T_5 - 100kg N + 40 kg P_2O_5 +40 kg K_2O

T_6 - 100kg N + 30 kg P_2O_5 + 30 kg K_2O

T_7 - 80kg N + 50 kg P_2O_5 + 50 kg K_2O

T_8 - 80kg N + 40 kg P_2O_5 +40 kg K_2O

T_9 - 80kg N + 30 kg P_2O_5 +30 kg K_2O

T_{10} - 60kg N + 60 kg P_2O_5 + 60 kg K_2O

T_{11} - 50kg N + 50 kg P_2O_5 + 50 kg K_2O

T_{12} - 40kg N + 40 kg P_2O_5 + 40 kg K_2O

A normal sized flat bed (1.0 m × 1.0 m) was prepared in the departmental nursery on 15 November 2013. After arriving seedling to second true leaves, uniform size and healthy seedlings were selected for the transplanting into the sack to planting seedling separately. after arriving to the forth true leaves transplanting was done into the main field . The fertilizer was applied @ recommended dose viz., NPK with mulching applied as a basal dose After transplanting and well mixed with the soil and adding 1.5 kg and 2.5 kg farm yard manure (FYM) per m2 according to the treatments. Remaining dose of nitrogen was applied at 15 days after first add fertilazer one three time

Results and Discussion

Plant height

The data presented in table 1 clearly showed that the NPK with mulching played significant role in affecting plant height. The maximum plant high was recorded statistically significant NPK 40:40:40 with mulching was recorded (9.17 cm) which was superior over control (5.97 m). There was significant difference at 5% level with other treatments also. The minimum plant height was T0 control (5.9 cm). Similar result found by Umar, Pandey and Mishra, Kirk D. Larson and A. Abou El-Yazied

Number of leaves

The data presented in table 1 clearly showed micronutrient played significant role in affecting leaves number. The maximum leaves number was recorded statistically significant in NPK with mulching which was recorded (9.53) superior over control which was recorded (5.87). The results are supported by Jagadeesha V. et al (2008).

Number of flowers per plant.

The data presented in table 1 clearly showed micronutrient played significant role in affecting the number of flower per plant.

A peak flowering stage were observed at 110DAT, where T12 - NPK 40:40:40 recorded more flowers per plant 2.20 followed by T4 NPK 100:50:50 (1.97) being statistically and the minimum number of flowers per plant (0.83) was recorded in T0 (control). These results are closely related to the reports given Reckruhm and Dlubosch (1988).

Yield per plant (g)

It showed a remarkable difference with different treatments. The maximum yield per plant 200.00 g/plant was found with was recorded with T2with mulching NPK 120:40:40 and minimum minimum yield per plant 50.00 g/Plant were noticed in T0 (control).

The increase in yield per plant may be due to the fact that between different level of NPK findings These results are in close conformity with the findings of many research workers, Dar et al. (2010).

Yield Tonnes / hac

Data on the fruit yield as influenced by different NPK level are presented in table 1. It is evident from the table that maximum yield tone per ha. (12.00) tone was recorded with T2 - NPK 120:40:40, followed by (10.80) tone / ha with T1- NPK120:50:50. The minimum yield tone / ha was noticed in T0 control (3.00 tone/ha). Similar result found by Moraes et al (1979) and Parmar H. N. et al. (2013)

Total soluble solids of fruits (°Brix)

The present data shown in table 1 that the treatment showed significant effect in T.S.S. of fruits. The maximum T.S.S. of fruit (9.00 °Brix) was observed with treatment T5. The

minimum T.S.S. of fruit (6.70 °Brix) was observed under treatment T0 - control, which are significantly lower than all other treatments. The results of nitrogen application were reported by M. Khayyat. et al. (2007) .

Conclusion

Based on the result of experiment it was aimed to identify suitable treatment for strawberry with respect to growth and economic of strawberry during November to May .it may be concluded that the treatment T12 NPK 40:40:40 was recorded the best among treatment combinations on growth, yield and quality. The treatment T12 was obtained The highest High plant (9.17 m) and the highest No.of leaves per plant (9.53) with T12, and The highest No of flower was 2.20 in T 12, yield per plant was 200 gm in T2. Yield tonnes / ha was 12 on T2 and the maximum total soluble solids of fruit (9.00) with T5.

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Table 1: Effect of different levels of N P K on plant height, no of leaves, no of flowers, yield per plant, yield tonnes / ha and T.S.S of strawberry

Treatments		Plant height	No of leaves	No of flowers	Yield per Plant (g)	Yield Tonnes / hac	T.S.S
T_0	Control	5.97	5.87	0.83	50.00	3.00	6.70
T_1	NPK 120:50:50	7.17	7.20	1.53	180.00	10.80	8.90
T_2	NPK 120:40:40	6.97	7.40	1.50	200.00	12.00	7.80
T_3	NPK 120:30:30	7.53	6.60	1.30	120.00	6.00	2.00
T_4	NPK 100:50:50	6.93	7.63	1.97	110.00	6.60	5.60
T_5	NPK 100:40:40	6.87	9.27	1.73	150.00	9.00	9.00
T_6	NPK 100:30:30	7.63	6.43	1.30	75.00	3.75	7.80
T_7	NPK 80:50:50	7.10	6.93	1.53	115.00	6.90	6.70
T_8	NPK 80:40:40	8.17	8.30	1.63	90.00	4.50	7.00
T_9	NPK 80:30:30	7.30	7.20	1.53	125.00	6.25	6.00
T_{10}	NPK 60:60:60	8.43	8.43	1.63	115.00	5.75	8.90
T_{11}	NPK50:50:50	8.40	7.20	1.53	130.00	6.50	7.00
T_{12}	NPK40:40:40	9.17	9.53	2.20	100.00	6.00	8.90
F- test		S	S	S	S	S	S
SEd (±)		0.743	0.951	0.306	0.714	0.430	0.127
C.D (P = 0.05)		1.534	1.963	0.633	1.473	0.888	0.262