Effect of organic and in-organic mulch on growth, yield and quality of strawberry cv. winter dawn.

ABSTRACT: -

The present investigation to find out the effect of organic and inorganic mulch on growth, yield and quality of strawberry cv. winter dawn was carried out at Horticulture Demonstration Farm, Department of Horticulture, SGT University, Gurugram (Haryana), India during the year 2022-23. The experiment was laid out in Randomized Block Design (RBD) with seven treatments replicated thrice. Treatment T_6i.e. mulching with Dry banana leaf was found to be best in terms of plant height (20.46 cm), number of leaves (22.66), number of crown (5.02), number of runners (16.30), length of runners (17.90 cm), number of flowers (49.40), yield/plant (170.30 g), yield per hectare (45.68 ton), plant fresh weight (135.67 g), plant dry weight (49.56 g), berry size (44.58 mm), berry volume (36.95 cc) and berry weight (23.15 g), TSS (11.67 ^{0}Brix) and Titrable acidity (0.24 %), Leaf nutrient status N (22.86%), P (3.10%), K (85.00%).

Keywords: - Strawberry, Organic mulch, inorganic mulch, production, yield, quality

INTRODUCTION

Commercially grown strawberry (*Fragaria x ananassa* Duch.) is a monoecious octoploid (2n=56), and belongs to the family Rosaceae (Bowling 2000). Botanically, it is an aggregate fruit with seeds on the surface (Darnell, 2003). The presence of ellagic acid prevents cancer and heart diseases (Nazir *et al*., 2012), and a cornucopia of Anthocyanin makes it rich in antioxidants (Sun *et al*., 2002).

Organic and inorganic mulches serve distinct purposes in strawberry cultivation. Organic mulches, such as banana leaves, straw, wood chips, compost are popular for their ability to enhance soil health and protect strawberry plants. They excel at moisture retention, reducing weed competition, and regulating soil temperature, all of which are crucial for successful strawberry growth. Organic mulches also contribute organic matter as they break down, enriching the soil over time. Moreover, they offer protection to the berries by keeping them clean and free from soil splashes, which can lead to fungal issues (Ali *et.al.* 2007).

On the other hand, inorganic mulches, like plastic or landscape fabric, are chosen for their exceptional weed control and moisture preservation capabilities. They create a physical barrier that prevents weed growth and conserves soil moisture efficiently. While they lack the soil-enriching qualities of organic mulches, they are long-lasting and particularly effective in commercial strawberry farming where weed suppression is critical (Ghosh *et.al.* 2015). In summary, the choice between organic and inorganic mulches in strawberry cultivation depends on specific goals and preferences, with organic mulches emphasizing soil health and inorganic mulches focusing on weed control and moisture conservation.

MATERIAL AND METHODS:-

The research trial was conducted during the year 2022-2023 at Horticulture Demonstration Farm, Shree Guru Gobind Singh Tricentenary (SGT) University in Bhudera, Gurugram, Haryana.Using Randomized Block Design (RBD) layout, the experiment was conducted with 7 treatment replicated thrice with different organic and inorganic mulches *viz* T_0 **(**Control**),** T_1 **(**Wheat Straw**),** T_2 **(**Neem Leaf**),** T_3 **(**Polythene**),** T_4 **(**Paddy Straw**),** T_5 **(**Wooden Shaving**),** T_6 **(**Dry Banana Leaf**).**

Data for vegetative, reproductive and quality parameters was recorded following the standard methods. Number of leaves, number of crown and number of runners were counted manually and averaged together individually for each parameters. Plant height was assessed with the help of wooden scale. Yield and plant fresh and dry weight parameters were measured using electronic weighing balance. Berry size was measured through vernier calipers and volume by water displacement methods. Hand refractometer was used to calculate TSS and expressed in ^{o} Brix. For estimation of acidity titration methods was used. For Leaf nutrient analysis micro-kheldahl method (*Jackson, 1973*) was used to estimate total nitrogen, Vandomolybdophosphoric yellow colour method (*Muhr et al., 1963*) was used to determine Phosphorus content and the potassium content was determined by flame photometer (*Chapman and Pratt, 1961*).

RESULTS AND DISCUSSION:-

Growth attributes:-

Data recorded for the vegetative growth attributes presented in Table 1, showed that the application of organic or inorganic mulch significantly influenced the vegetative growth parameters of strawberry plants. The maximum plant height (20.46 cm), number of leaves (22.66), number of runners 75 DAT (16.30), length of runners (17.09 cm) and number of crowns (5.02) was recorded in T_6 i.e. Dry Banana Leaf, whereas, minimum values for above-mentioned parameters were recorded in Control (T_0). Enhancement in plant growth attributes under T_6 treatment can be due to the fact the organic mulch has

suppressed the growth of weeds, which leads to the decrease in competition of nutrients for plants and also improves soil structure, enhancing its water-holding capacity and aeration to make the nutrients available for better growth of the plant. Similar finding was reported by Verma*et. al.(2017),* and Florentina *et. al. (2013).*

Yield attributes:-

Data recorded for yield parameters were also affected by various treatments (Table 1). The maximum number of flowers (49.40), number of fruits per plant (34.67), fruit yield per plant (170 g), and yield per hectare (45.68 kg/ha) was recorded in treatment T_6 (Dry Banana Leaf),whereas, minimum values for above-mentioned parameters were recorded in Control (T_0). An increase in nutrient availability helps in reproductive cell division, which is meiosis, which leads to an increase in the number of flowers, the number of fruits, and yield. These findings were also in conformity with the findings of Kher *et. al. (2010*) and *Kim et. al. (2008*) who reported maximum reproductive growth of strawberry while using organic mulch.

Quality of fruits:-

Data recorded for the vegetative growth attributes presented in Table 2 showed that all the quality parameters of fruits and nutrient uptake were significantly influenced by different treatments. Berry size (44.58 mm) and berry volume (36.95cc) and berry weight (23.15gm) were significantly higher in treatment (T_6) by the application of dry banana leaf as mulch. The increase in berry size, Berry volume, and berry weight may be due to the increased cell division in plants, resulting in enhancing the berry parameters of the fruit. Notably, these findings align with research conducted by Kumar *et al. (*2012) and Singh *et al.* (2007).

The lowest titratable acidity (0.24%) and highest TSS (11.67 °Brix), total sugar (6.01%), reducing sugars (5.93%), and non-reducing sugars (0.53 %) were recorded in treatment T_6 (Dry Banana Leaf). These findings were also in conformity with the findings of Yadav *et. al. (2018),* who reported maximum quality parameters of strawberries while using organic mulching, which created micro-climate and accumulation of photosynthates, resulting in the increased quality parameters of the strawberries.

Nutrient uptake:-

It was observed that the maximum leaf nitrogen (22.36%), phosphorus (3.10%) and potassium(85.00 %) was recorded under treatment T_6 (Dry banana leaf) and the minimum leaf nutrient was found in Control (T_0). The significant improvement in leaf nutrient status was achieved through the utilization of dry banana leaf treatment which can be primarily ascribed to its exceptional moisture retention capabilities.

This organic mulch excels in conserving soil moisture, thereby creating an advantageous microclimate that fosters the optimal growth conditions for strawberries. The veracity of these findings is further underscored by the research conducted by Kumar *et al. (2012)* and Singh *et al. (2007).*

CONCLUSION:

All the treatments appeared to significantly differfrom each other and have a significant effect on the growth yield and quality of strawberries. On the basis of experimental findings, T_6 i.e. mulching with Dry banana leaf was found best in growth parameters, flowering parameters, fruiting parameters, yield, and quality parameters. The current study tends to demonstrate the significance of using organic mulch to ensure the moisture conservation.

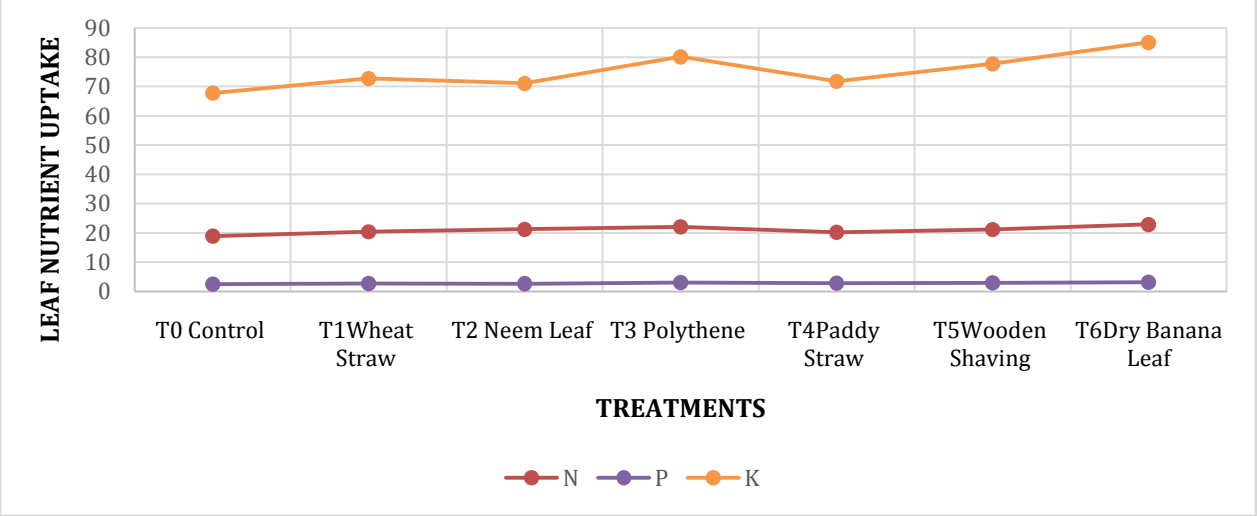

Figure 1:- Effect of different growing media on leaf nutrient uptake (NPK).

Table 1 Effect of organic and in-organic mulch on Plant Height (cm), Number of leaves, Number of crown, Number of runners, Length of runners, no. of flowers, No. of fruits/ plant, yield/plant and yield per hectare of the Strawberry cv. Winter Dawn.

Treatment	Plant Height (cm)				Number of leaves				No. of crown	Number of runner 75 DAT	length of runner 75 DAT	No. of flowers	No. of fruits/ plant	Yield/Plant (g)	Yield/ha (Tonn)
	30 DAT	60 DAT	90 DAT	120 DAT	30 DAT	60 DAT	90 DAT	120 DAT							
T_0 Control	3.56	8.92	13.11	16.70	4.62	8.92	12.90	16.80	1.12	10.40	14.83	28.62	12.22	112.00	35.00
T_1 Wheat Straw	4.62	9.98	14.17	17.76	5.34	9.98	13.82	18.10	1.68	12	15.04	30.49	17.88	120.33	37.33
T_2 Neem Leaf	5.32	10.68	14.87	18.46	5.43	10.68	15.30	18.24	2.21	13.60	15.54	32.19	19.75	144.67	39.67
T_3 Polythene	6.27	11.63	15.82	19.41	6.27	11.63	14.50	18.41	3.89	12.80	16.57	38.33	24.33	155.22	41.73
T_4 Paddy Straw	5.98	11.34	15.53	19.12	4.98	11.34	15.60	18.90	3.21	13.50	16.12	35.62	21.33	151.67	40.67
T_5 Wooden Shaving	6.81	12.34	16.53	20.06	7.10	12.34	15.95	21.30	4.62	14	16.87	40.99	29.00	162.67	43.33
T_6 Dry Banana Leaf	7.32	12.68	16.87	20.46	8.31	14.20	17.70	22.66	5.02	16.30	17.09	49.40	34.67	170.33	45.68
C.D.	0.88	1.70	1.64	1.40	0.76	1.16	1.57	2.00	0.50	1.37	1.89	1.24	0.95	1.09	0.24
SE(m)	0.29	0.55	0.53	0.45	0.25	0.38	0.51	0.65	0.16	0.45	0.61	0.49	0.11	0.43	0.74

Table 2 Effect of organic and in-organic mulch on berry size, berry volume, berry weight, TSS, Total sugar, reducing sugar, non-reducing sugar and leaf nutrient uptake status of the Strawberry cv. . Winter Dawn.

Treatment	Berry size (mm)	Berry volume (cc)	Berry weight (gm)	TSS (^{0}Brix)	Titrable acidity (%)	Total Sugar	Reducing sugar	Non reducing	Leaf nutrient status		
									N	P	K
T_0 Control	25.62	26.45	12.24	7.95	0.62	4.50	3.23	1.27	18.88	18.88	18.88
T_1Wheat Straw	32.45	28.35	16.42	8.62	0.53	5.65	4.42	1.23	20.37	20.37	20.37
T_2 Neem Leaf	35.62	31.34	17.34	9.84	0.49	5.51	4.62	0.89	21.20	21.20	21.20
T_3 Polythene	42.47	35.49	21.42	10.68	0.29	6.66	5.46	1.20	22.05	22.05	22.05
T_4Paddy Straw	38.21	32.64	18.46	9.26	0.59	5.98	5.03	0.95	20.20	20.20	20.20
T_5Wooden Shaving	40.35	33.27	19.35	10.26	0.39	5.99	5.12	0.87	21.14	21.14	21.14
T_6Dry Banana Leaf	44.58	36.95	23.15	11.67	0.24	6.96	5.64	1.32	22.86	22.86	22.86
C.D.	1.37	1.23	0.16	3.76	1.37	0.22	0.16	0.07	0.80	0.80	0.80
SE(m)	4.16	0.87	0.49	11.41	4.16	0.69	0.48	0.21	2.48	2.48	2.48

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