The Pharma Innovation Journal 2021; 10(11): 1406-1409

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(11): 1406-1409

www.thepharmajournal.com
Received: 10-08-2021
Accepted: 20-10-2021

Nivedita Nidhi
M.Sc. Scholar, Department of Horticulture, NAI, SHUATS, Prayagraj, Uttar Pradesh, India

VM Prasad
Professor, Department of Horticulture, NAI, SHUATS, Prayagraj, Uttar Pradesh, India

Vijay Bahadur
Associate Professor, Department of Horticulture, NAI, SHUATS, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Nivedita Nidhi
M.Sc. Scholar, Department of Horticulture, NAI, SHUATS, Prayagraj, Uttar Pradesh, India

Effect of different mulching materials on growth and yield of Guava (*Psidium guajava* L.)

Nivedita Nidhi, VM Prasad and Vijay Bahadur

Abstract
The present investigation entitled "Effect of different mulching materials on growth and yield of Guava (*Psidium guajava* L.)" was undertaken at the Experimental Central Orchard of Department of Horticulture, Naini, Agriculture Institute, SHUATS, Prayagraj, during the year 2020-2021 with the Following findings in Randomized Block Design (RBD) having different six mulching materials with 3 plant. From the present investigation it is concluded that the mulching materials of T_0 without mulch (based on the moisture), T_1 grass, T_2 paddy,T_3 sugarcane trash, T_4 white plastic and T_5 black plastic with the different mulching materials is best suited and beneficial for the plant growth, flowering, fruit yield and quality of guava fruit. Application of T_5 black plastic was found best in respect of vegetative growth, flowering fruit yield and quality parameters of guava (*Psidium guajava* L.) cv. Allahabad Safeda.

Keywords: Mulching, plant growth, yield, fruit quality and Guava (*Psidium guajava* L.)

Introduction
Guava (*Psidium guajava* L.), the apple of the tropics, which belongs to the family Myrtaceae, is an evergreen tree is one of the major fruit crops of India and is extensively grown in wide area of tropical, sub-tropical and some parts of arid regions of India because of its low cost of cultivation, more tolerant to drought and semiarid conditions as well as salinity problems. It has wide adaptability to varying soil and climatic conditions. It has been cultivated in India since 17th century and has originated in tropical America perhaps from Mexico to Peru and introduced in India by Portuguese. In India it has been introduced in early 17th century and gradually become a commercial crop all over the country particularly in Maharashtra, Uttar Pradesh, Karnataka, Bihar, Orissa, Punjab, Uttarakhand, Gujarat, Madhya Pradesh and West Bengal. Guavas produced in Allahabad region of Uttar Pradesh are best in the world. In India it occupies an area of 0.26 million ha. with annual production of 3.66 million tones. The total cultivated area of guava in India is 276 thousand hectares with an annual production of 4236 thousand MT (NHB 19). Guava is hardy fruit plant which can be grown in poor alkaline or poorly drained soils. The rainy season crop is rough, insipid, poor in quality and less nutritive, whereas winter season crop is superior in quality having long storage life and fetches more price in the market. Being perishable nature of ripe fruit, it is essential to improve the quality of guava fruits which may be helpful in prolongation of shelf life of fruits. Guava is a rich and chief source of ascorbic acid (Vitamin-C) and pectin content and fair amount of calcium, phosphorus and vitamin. Guava is not only a delicious and nutritious table fruit but may also be utilized to make products like jam, jelly, Nectar, Cheese and Squash. Leaves are used for curing diarrhea and also for tanning. The usual practice of using mulches is to spread the material evenly over the soil surface between the rows and around the plants. The thickness of the mulches varies depending on the kind of the mulching materials used mainly. All these materials used as mulch (except polythene paper) have some value in supplying organic matter to the soil. Mulching plays an important role in soil moisture conservation, improving soil structure, regulates soil temperature and reduces weed growth water loss is reduced under plastic mulch. The soil under plastic mulch remains loose, friable and well-aerated.

Materials and Methods
The experiment was laid out under Randomized Block Design with 6 different mulching materials with the spacing of 5×5 in 36 plants.

This experiment was laid out in Randomized Block Design consisted six different mulching materials including T_0 Without mulch (based on the moisture), T_1 grass, T_2 paddy,T_3 sugarcane trash, T_4 white plastic and T_5 black Plastic. The observations on growth, flowering, fruit yield and quality of guava plants were recorded as per standard procedures. The treatment combinations listed in table 1.

Table Treatment Combinations

Treatment symbols	Treatments
T_0	Without mulch (based on the moisture)
T_1	Grass
T_2	Paddy
T_3	Sugarcane trash
T_4	White plastic
T_5	Black Plastic

Note: Recommended doses common in all treatments i.e N:P:K ratio is 300:150:150.

Results and Discussion

Effect of different mulching materials on Growth parameters of Guava (*Psidium guajava* L.)

The data on growth parameter at after harvest of guava in each treatment is presented in table (2). The data shown that different types of mulching *viz*., grass, paddy, sugarcane trash, white plastic and black plastic have significant effect mulching on plant growth parameters after harvest as compared to without mulch (based on the moisture). Treatment T_5 black plastic gave the maximum plant height (m) at and after harvest (6.56), number of primary branches per plant (6.93) and plant spread (East – West and North - South) (5.92&5.73). Where as the minimum plant height after harvest (3.82), number of primary branches per plant (4.18) and plant spread (East – West and North - South) (4.12&3.85) was found in treatments T_0 without mulch (based on the moisture). All the mulching were significantly superior in their plant height (m) over T_0 without mulch (based on the moisture).

Effect of different mulching materials on Flowering and fruiting parameters of Guava (*Psidium guajava* L.)

The data on flowering and fruit yield of guava in each treatment is presented in table (3). The data shown that different types of mulching *viz*., grass, paddy, sugarcane trash, white plastic and black plastic have significant effect mulching on flowering and fruit parameters as compared to without mulch (based on the moisture). Treatment T_5 black plastic gave the minimum days required for flowering (34.49), days required from flower to fruit set (29.74) and days required from fruit set to maturity (132.12) which was followed by T_4white plastic, T_3sugarcane trash, T_2paddy and T_1 grass. Where as the maximum days required for flowering (46.87), days required from flower to fruit set (39.72) and days required from fruit set to maturity (146.22) was found in treatments T_0 without mulch (based on the moisture). All the mulching were significantly superior in their days required for flowering over T_0 without mulch (based on the moisture). The data shown that different types of mulching *viz*., grass, paddy, sugarcane trash, white plastic and black plastic have significant effect mulching on number of flower per plant as compared to without mulch (based on the moisture). Treatment T_5 black plastic gave the maximum number of flower per plant (192.54) number of fruit per plant (186.46), fruit weight (g) (122.20), fruit yield per tree (kg) (22.79), fruit polar diameter (cm) (8.59) and fruit radial diameter (cm) (8.83) which was followed by T_4white plastic, T_3sugarcane trash, T_2paddy and T_1 grass. Where as the minimum Number of flower per plant (136.40), number of fruit per plant (118.77), fruit weight (g) (88.80), fruit yield per tree (kg) (10.55), Fruit polar diameter (cm) (6.20) and Fruit radial diameter (cm) (7.20) was found in treatments T_0 without mulch (based on the moisture). All the mulching were significantly superior in their number of flower per plant over T_0 without mulch (based on the moisture).

Effect of different mulching materials on Quality parameters of Guava (*Psidium guajava* L.)

The data on fruit quality of guava in each treatment is presented in table (4). The data shown that different types of mulching *viz*., grass, paddy, sugarcane trash, white plastic and black plastic have significant effect mulching on fruit quality as compared to without mulch (based on the moisture). Treatment T_5 black plastic gave the maximum total soluble solid (^{0}Brix) (10.20), ascorbic acid (mg / 100 g) (203.76), specific graviity (g/cm^3) (0.93), reducing sugar (4.83) and total sugar (7.00) which was followed by T_4white plastic, T_3sugarcane trash, T_2paddy and T_1 grass. Where as the minimum total soluble solid (^{0}Brix) (8.35), ascorbic acid (mg / 100 g) (165.70), specific graviity (g/cm^3) (0.44), reducing sugar (2.62) and total sugar (6.22) was found in treatments T_0 without mulch (based on the moisture). All the mulching were significantly superior in their total soluble solid (^{0}Brix) vover T_0 without mulch (based on the moisture). The data shown that different types of mulching *viz*., grass, paddy, sugarcane trash, white plastic and black plastic have significantly effective mulching on non-reducing sugar and acidity as compared to without mulch (based on the moisture). TreatmentT_5 black plastic gave the minimum non-reducing sugar (2.17) and acidity (0.41) which was followed by T_4white plastic, T_3sugarcane trash, T_2paddy and T_1 grass. Where as the maximum non-reducing sugar (3.60) and acidity (0.621) was found in treatments T_0 without mulch (based on the moisture). All the mulching were significantly superior in their non-reducing sugar over T_0 without mulch (based on the moisture).

The black plastic mulch Soi l water content: Th e black polyethylene mulch

The black plastic maintained high soil water contents compared to the control (no mulch) and the bare soil treatments. Improvement of the water use efficiency by better utilization of soil water appears to be the best way to increase grain yield in the semiarid areas. The main methods of increasing the water use efficiency include reducing soil water evaporation, and exploiting deep soil water so as to support shoot biomass accumulation and optimize the dry matter allocation by selectively increasing the reproduction. The plastic film mulch was promoted root growth and that more roots were distributed in mid- and deep-soil, so that the plant can uptake water from the deep soil and increase the grain yield.

Nutrient availability: The decomposition of organic

The decomposition of organic

The decomposition of organic residues under plastic mulch adds organic acids to the soil resulting in low soil pH, which may incr eases the bioavailability of micronutrients (Mn, Zn, Cu, and Fe). This was also evident from the increased Fe and Zn content in soil under plastic mulch (Tisdale *et al*., 1990). The mineral

N content (NO3 and NH4+) in soil is high due to mineralization of organic N with time, thereby; it increases the availability of soil nitrogen. Breakdown of organic material release soluble nutrients like NO3, NH4+, Ca2+, Mg2+, K+ and fulvic acid to the soil intern increases the soil nutrient availability under plastic mulch.

The influence of different mulch types on crop yield might be positive or negative, related to their weed suppression effect. Many researchers proved positive effects of mulching on crop growth and the obtained yield quantities and qualities. Regardless the colour, non-Biodegradable PP and PE films mulches proved to be the most efficient in preventing of germination of seeds of the most weeds and their further growth, though they are also helpful in preventing loss of the moisture from the soil and in balancing of its temperature. Their application frequently bring about many other benefits, such as reduction of the run-offs, increase in rain water penetration, control of erosion, correction of the chemical balance of the soil and reduction of pest and disease damages. However, they also have some environmental disadvantages, related to the removal and handling of their waste.

Table 2: Effect of different mulching materials on Growth parameters of Guava (*Psidium guajava* L.)

Treatment symbols	Treatments combination	Growth parameters			
		Plant height (cm)	Number of primary branches per plant	Plant spread (m)	
				East-West	North-South
T_0	Without mulch (Based on the moisture)	3.82	4.18	4.12	3.85
T_1	Grass	4.70	5.46	4.65	4.65
T_2	Paddy	5.11	6.19	4.73	4.97
T_3	Sugarcane trash	5.53	6.36	5.19	5.27
T_4	White plastic	5.89	5.82	5.36	5.40
T_5	Black Plastic	6.56	6.93	5.92	5.73
	F-Test	S	S	S	S
	C.D at 0.5%	0.158	0.933	0.559	1.104
	S.Ed. (+)	0.071	0.419	0.251	0.496

Table 3: Effect of different mulching materials on Flowering and fruit yield parameters of Guava (*Psidium guajava* L.)

Treatment symbols	Treatments combination	Flowering and fruit yield parameters								
		Days required for flowering	Days required from flower to fruit set	Days required from fruit set to maturity	Number of flower per plant	Number of fruit per plant	Fruit weight (g)	Fruit yield per tree (kg)	Fruit polar diameter (cm)	Fruit radial diameter (cm)
T_0	Without mulch (Based on the moisture)	46.87	39.72	146.22	136.40	118.77	88.80	10.55	6.20	7.20
T_1	Grass	40.92	36.47	143.95	148.77	138.01	92.07	12.70	7.74	7.79
T_2	Paddy	40.32	34.41	140.04	162.34	149.07	100.81	15.03	7.96	8.17
T_3	Sugarcane trash	38.57	32.38	138.80	177.25	164.77	108.40	17.87	8.30	8.48
T_4	White plastic	36.14	32.07	136.16	181.43	172.41	112.81	19.44	8.42	8.57
T_5	Black Plastic	34.49	29.74	132.12	192.54	186.46	122.20	22.79	8.59	8.83
	F-Test	S	S	S	S	S	S	S	S	S
	C.D at 0.5%	1.720	3.540	5.465	5.844	8.486	6.385	1.494	0.350	0.287
	S.Ed. (+)	0.772	1.589	1.734	2.623	3.809	2.866	0.671	0.157	0.129

Table 4: Effect of different mulching materials onQuality parameters of Guava (*Psidium guajava* L.)

Treatment symbols	Treatments combination	Quality						
		Total soluble solid (^{0}Brix)	Ascorbic acid (mg / 100 g)	Specific graviity (g/cm^3)	Acidity	Non-reducing sugar	Reducing sugar	Total sugar
T_0	Without mulch (Based on the moisture)	8.35	165.70	0.44	0.61	3.60	2.62	6.22
T_1	Grass	9.18	175.89	0.75	0.57	2.49	4.39	6.88
T_2	Paddy	9.38	179.93	0.83	0.52	2.34	4.65	6.99
T_3	Sugarcane trash	9.70	181.87	0.86	0.48	2.28	4.69	6.97
T_4	White plastic	9.87	183.58	0.89	0.44	2.22	4.76	6.98
T_5	Black Plastic	10.20	203.76	0.93	0.41	2.17	4.83	7.00
	F-Test	S	S	S	S	S	S	S
	C.D at 0.5%	0.201	2.488	0.068	0.085	0.125	0.178	0.230
	S.Ed. (+)	0.090	1.117	0.030	0.038	0.056	0.080	0.103

Conclusion

It can be concluded that mulch application helps in conserving soil moisture and hence increases water use efficiency, moderating the temperature, suppressing the weed growth, improving the physical, chemical and biological properties of soil and controls the soil loss through erosion and these advantages, interacting together, enhancing the growth, yield and quality of field and fruit crops.

References

1. Abouziena HF, Hafez OM, El-Metwally IM, Sharma SD, Singh M. Comparison of weed suppression and mandarin fruit yield and quality obtained with organic mulches, synthetic mulches, cultivation and Glyphosate. Horticuture Science 2008;43(3):795-799.
2. Agrawal N, Agrawal S. Effect of drip irrigation and mulches on growth and yield of banana cv. Dwarf Cavendish. Indian Journal of Horticulture

2000;62(3):238-240.
3. Ahmed ZI, Ansar M, Iqbal M, Minhas NM. Effect of planting geometry and mulching on moisture conservation, weed control and wheat growth under rainfed conditions. Pakistan Journal of Botany 2007;39:1189-1195
4. Aulakh PS, Sur HS. Effect of mulching on soil temperature, soil moisture, weed population, growth and yield in pomegranate. Progressive Horticulture 1999;31(3-4):131-133.
5. Badaruddin M, Reynolds MP, Ageeb OAA. Wheat management in warm environments: Effects of organic and inorganic fertilizers, irrigation frequency and mulching. Agronomy Journal 1999;91:975-983.
6. Bhatt R, Khera KL. Effect of tillage and mode of straw mulch application on soil erosion in the sub-montaneous tract of Punjab, India. Soil & Tillage Re-search 2006;88:107-115.
7. Bhatt R, Khera KL. Effect of tillage and mode of straw mulch application on soil erosion in the sub-montaneous tract of Punjab, India. Soil & Tillage Re-search 2006;88:107-115.
8. Brahma R, Janawade AD, Palled YB. Effect of irrigation schedules, mulch and antitranspirant on growth, yield and economics of wheat (cv. DWD-I006). Karnataka Journal of Agricultural Science 2007b;20(1):6-9
9. Chawla AK, Singh KG, Singh A. Effect of mulch and drip irrigation on soil hydrothermal regime and potato yield (Solanum tuberosum L.). Journal of Research PAU 2009;46(1-2):68-71
10. Faber BA, Downer AJ, Menge JA. Effects of mulch on Avocado and Citrus. In Proceedings V World Avocado Congress 2003, 719-724.
11. Ghosh PK, Dayal D, Bandyopadhyay, Mohanty M. Evaluation of straw and polythene mulch for enhancing productivity of irrigated summer groundnut. Field Crops Research 2006;99:76-86
12. Habte DF, Makonnen V, Tsehafi, Imru S. Effects of farmyard manure and straw mulch on runoff, erosion, in-situ water conservation (Reservoir) and yield and yield components of wheat at the high ground of Bale, south eastern Ethiopia. African Journal of Agronomy 2014;2:137-143