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Application of various mulching treatments with pitcher irrigation for yield of tomato (*Lycopersicom esculentum*) in red and laterite soil

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Abstract: Mulch along with pitcher irrigation technique enhances water use efficiency by checking evaporation and thereby conserves soil moisture, which in turn enhances microbial activities as a result of increased organic matter through decomposition of these residues. It results in improved soil aggregation and suitability. It also protects the soil and reduces crust formation, controls soil erosion and increases the water holding capacity. Pitcher irrigation, a traditional system of irrigation is an alternative to drip method which is the latest advancement and effective innovation of localized methods of irrigation and found suitable where water scarcity becomes a major stress for crop production. In order to assess the effectiveness of vegetable crop production by pitcher pot irrigation with mulch in different season and conserving water towards increasing of crop productivity in Red & Lateritic Zones of West Bengal. The experiment was conducted with five treatments combinations viz. T_1 - Pitcher irrigation + live mulch (black gram),T_2 - Pitcher irrigation + coco coir mulch,T_3 – Pitcher pot irrigation + jute fibre mulch,T_4 - Pitcher pot irrigation + babui grass mulch and T_5 – Pitcher pot irrigation + no mulch (i.e. control). The result found that application of mulch with pitcher irrigation increased yield of tomato.

Keywords: Mulch, Pitcher irrigation, Tomato cultivation, Soil conservation, Soil health

Introduction:

Mulch along with pitcher irrigation further enhances water use efficiency by checking evaporation and thereby conserves soil moisture, which in turn enhances microbial activities as a result of increased organic matter through decomposition of these residues *(Adhikary and Pal 2020)*. It results in improved soil aggregation and suitability *(Pal et al., 2020)*. It also protects the soil and reduces crust formation. It is controls soil erosion and increases the water holding capacity, reduces salinity in the soil and regulates soil temperature. Weed control is an added advantage of mulch, and thereby reducing labour costs for weeding. There is a possibility of biomass production and nutrient cycling through live mulch of in situ grown annual legumes along with vegetables and field crops (*Pain et al., 2013, Pal et al., 2020 and Adhikari et al., 2016)*. Live mulch through intercropped sun hemp (*Crotalaria juncea*) dhaincha (*Sesbania aculeata*) and cowpea (*Vigna unguiculata*) with main crop has been found beneficial for erosion control and checking weed growth as well as enhanced moisture and nutrient conservation. The choice of an appropriate crop and time of its cutting or up rooting for mulch is very important for successfully crop production.

The important merits of using pitchers for irrigation are the result of their water saving capacity. To compare pitcher irrigation to flood or sprinkler irrigation one must correct for the fact that the scales are radically different. Pitcher irrigation is used on small-scale, while flood and sprinkler systems are used for more extensive irrigation *(Adhikary and Pal 2019 and Thingujam et al., 2017)*. Taking this into on account, pitcher irrigation is still more efficient. Pitcher irrigation uses water more efficiently than other systems since it delivers water directly to plant root zones, instead of to broader areas of the field. With pitcher irrigation, deep percolation losses are negligible since water

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is released from smaller areas, and the rate of water loss can be controlled site to site by the amount of water put in each pitcher *(Adhikary el al, 2020)*. The surrounding soil is almost always at field capacity (approximately 80 per cent of soil pores filled with water) as long as the pot is not allowed to dry up completely due to evapo-transpiration. As per the water requirements in a pitcher irrigated field can be even less than those of a drip irrigated system (of the same scale) due to the very low hydraulic conductivity of the pitchers, as well as reduced evaporation losses *(Batchelor et al., 1996).*

Red and Lateritic zone in West Bengal, occupying under rainfed situation and is characterize by undulating tract (slope 1 to 5%) of high ridges and low valley. Average annual rainfall although found to be normal but are distributed during the month of June to September (82%) due to influence of the south west monsoon and leaving a prolong dry spells even or after the rainy seasons, creating unfavourable soil moisture for growing crops during the period. Being the rain shadow, this zone is very prone to drought winter and summer seasons as well as kharif seasons which ultimately effect the crop production. Soil of this region are mainly formed by alfisols with some exceptions are characterized by sandy texture, high porosity, low soil depth, acidic in nature, low water holding capacity, low organic matter and low infiltration. Besides the water crisis in the long spell, the soils of the regions are also suffered by low availability of nutrients, organic matter content and susceptibility of soil erosion.

Tomato, originated in South America is one of the most widely cultivated vegetable crops in the world. It is an important cash crop for medium scale commercial farmers, because to rich source of vitamin, mineral, amino acid and sugars it contributes to a healthy well balanced diet. A ripe tomato contains as much as 93 to 94 present water. In India it is grown about 879.632 ha area with 18226.635 mt production with 20.72 t/ha productivity (National Horticulture Board, 2012-13). The major tomato producing states of the country are Bihar, Karnataka, Uttar Pradesh, Orissa, Andhra Pradesh, Maharashtra, Madhya Pradesh and West Bengal. Tomato is used in the preparation of soup, salad, pickles, ketchup, puree, and sauces and also consumed as a vegetable in many other ways.

Materials and Method:

The present study was carried out at the farmer's field in the Amlasuli village, Garbeta II, Paschim Medinipur, West Bengal under Red and Lateritic Zone. The area lies with at 22^0.51'07.06" North Latitude and 87^0 10'52.58'' East Longitude in the extended range of Chhotonagpur plateau of Jharkhand and Rajmahal hill of Orissa. It is bounded by the districts of Bankura in the north, Howrah in the east, Purba Medinipur in the south East and South West separated by the states of Orissa and Jharkhand.

The area is having slightly undulating topography and the general elevation ranges from 150 to 400 m above mean sea level with a general slopes of 0.5 to 3% from west to east. The relief of the region is variable with sloping uplands in high situations having high runoff, nearly flat or concave low lands in lower situation having very slow runoff and flat or sloping lands in the medium position between valley bottom and ridges having slow to very slow runoff. The external and internal drainage of the most soils in the higher situation are excessive but drainage congestions are problem in the lands of medium and lower situations.

The selected area falls under hot humid subtropical climate and is situated under rain shadow area. The mean annual rainfall of this zone is 1247 mm received in 75 rainy days, of which the highest rainfall generally occurs in the month of August. Based on the rainfall pattern the months between June to October have been categorized as wet months (> 100mm rainfall) and the rest of the year as

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dry months. The major portion of the annual rainfall is usually received in the South-West monsoon season of about 1108 mm in 58 rainy days during four wet months (June to September). Monsoon in this area usually break in the first week of June and continues up to September. The mean rainfall during winter and summer months are measured with 109 mm and 89 mm in about 8 and 9 rainy days receptivity. Temperature start rising rapidly in this district from the beginning of March. The maximum temperature rises to about 42^0 C in the month of May with the onset of south-west monsoon by about first week of June, the day temperature drops appreciably. December is the coldest month in the district with a mean daily minimum temperature of 12^0 C - 13^0 C. The relative humidity becomes very high in the month of July, August and September with the average of 84.0, 85.2 and 84.2% respectively. Sky is clouded in June to September during the south west monsoon seasons. Cloudiness decreases in October and sky is clear or lightly clouded during the rest of the year. The weekly distribution of the meteorological parameter for the selected area during crop growing season is presented in Table-1. Treatments details also describe on Table No -2.

The study area occupied under the Red and Lateritic agro climatic zones of West Bengal and is represented by the alfisols as major order in soil classification. One pitcher pot placed between four plants and each pitcher pot having capacity of 10 litres water. All mulch materials @ 5 ton /ha were spread on the soil after transplanting of vegetables seedling. The experiment was continued for two years (i.e. 2011 and 2012).

Results and Discussion:

Red and Laterite region present in huge area in five different districts in West Bengal. In this site soil having low fertility soil as well as low productivity and aberrant weather make soil unfertile. Irrigation is the major factor for successful contribution of quality vegetables. In this region while growing vegetables crops lack of irrigation facility and management practices during winter and summer as well as throughout the crop are major constraint for higher productivity. On this account the present experiment were conducted by growing some of the vegetable crops like tomato

The results (Table 3 & Fig 4) of pooled data on yield of tomato grown in 2011 and 2012 during *rabi* seasons showed variation with the application of pitcher pot irrigation with different type of mulch. The fruit yields of tomato were recorded as 42.69 t/ha, 39.80 t/ha, 37.08 t/ha, 30.84 t/ha and 24.77 t/ha respectively in the plots of pitcher pot irrigation + jute fibre mulch, pitcher pot irrigation + live mulch, pitcher pot irrigation + coco coir mulch, pitcher pot irrigation + babui grass mulch and pitcher pot irrigation + no mulch. Significantly highest ($P<0.05$) fruit yield was recorded in plots of pitcher pot irrigation + jute fibre mulch. Response of fruit yield over pitcher pot irrigation + no mulch due to each treatment were 17.92 t/ha (72.35%), 15.03 t/ha (60.68%), 12.31 t/ha (49.70%) and 6.06 t/ha (24.47%) respectively in pitcher pot irrigation + jute fibre mulch, pitcher pot irrigation + live mulch, pitcher pot irrigation + coco coir mulch plots and pitcher pot irrigation + babui grass mulch. The yield of tomato significantly increased ($P<0.05$) with the application of each of the different types of treatments over pitcher pot irrigation + no mulch.

The results of fruit weight (Table 3 & Fig 1) also showed similar trend of results as observed for the earlier results of number of fruits/plant. Highest values (62.63 g) were observed for the treatments of pitcher pot irrigation + jute fibre mulch followed by the treatments of pitcher pot irrigation + live mulch (60.00 g), pitcher pot irrigation + coco coir mulch (57.25 g) and pitcher pot irrigation + babui grass mulch (54.63g) and pitcher pot irrigation + no mulch (49.38 g). The effect of pooled data for 2011 and 2012 also resembles with findings (Table 5 & Fig.4). The response of fruit weight over pitcher pot irrigation + no mulch due to each treatment were 13.25 g (26.83%), 10.62 g (21.51%),

7.87 g (15.94%) and 5.25 g (10.63%) respectively in the plots received the treatments of pitcher pot irrigation + jute fibre mulch, pitcher pot irrigation + live mulch, pitcher pot irrigation + coco coir mulch and pitcher pot irrigation + babui grass mulch. Significantly highest ($P<0.05$) fruit yield was recorded in plots received in pitcher pot irrigation + jute fibre mulch.

The results of the effect of pitcher pot irrigation with various mulch on the length of fruit (Table 3 & Fig 2) of tomato crop are present (table 5). The results of length of fruit of tomato were observed as 6.75 cm, 6.25 cm, 6.13 cm, 6.00 cm and 5.38 cm respectively in pitcher pot irrigation pot+ jute fibre mulch, pitcher pot irrigation + live mulch, pitcher pot irrigation + coco coir mulch, pitcher pot irrigation + babui grass mulch and pitcher pot irrigation + no mulch of which higher values are obtained in the plots received the treatment of pitcher pot irrigation + jute fibre mulch. The pool data of the two years analysis (Fig.5) follow the similar trend of result. The results also found that response length of fruit of tomato over pitcher pot irrigation + no mulch due to each treatment were 1.37 cm (25.46%), 0.87 cm (16.17%), 0.75 cm (13.94%) and 0.62 cm (11.52%) respectively in pitcher pot irrigation + jute fibre mulch, pitcher pot irrigation + live mulch, pitcher pot irrigation + coco coir mulch and pitcher pot irrigation + babui grass mulch.

The result of the diameter of fruit of the tomato crop as influence by various applied treatments is shows in the (Table 3 & Fig 3). The significantly highest ($P<0.05$) diameter of fruit of tomato crop were observed in pitcher pot irrigation + jute fibre mulch, pitcher pot irrigation + live mulch, pitcher pot irrigation + coco coir mulch, pitcher pot irrigation + babui grass mulch and pitcher pot irrigation + no mulch both the years. Diameter of fruit varies with the variation of treatments and values are obtained as 4.10 cm, 4.05 cm, 4.00 cm, 4.00 cm and 3.00 cm in respectively of in pitcher pot irrigation + jute fibre mulch, pitcher pot irrigation + live mulch, pitcher pot irrigation + coco coir mulch, pitcher pot irrigation + babui grass mulch and pitcher pot irrigation + no mulch.

Conclusion:

Application of pitcher pot irrigation with various mulch caused to increase tomato yield along with yield attributes than pitcher pot irrigation+ no mulch. Pitcher pot irrigation + jute fibre mulch found to be most effective in increasing number of fruits/plant, length of fruit, diameter of fruit, weight of fruit and tomato yield than the other treatments. Variations in results of yields and yield attributes of tomato due to application of various combinations of pot irrigation + various mulch may be attributed to the variations of favourable soil condition more precisely by the increasing availability of nutrients in soils.

Reference:

1. Adhikary R and Pal A (2019). Geotextile and its Importance in Agriculture: A review Study. *International Journal of Bioresource Science*. **6**(2): 61-63.

2. Adhikari N, Disha A, Mahata AP, Pal A, Adhikary R, Sardar M, Saha A, Bauri SK, Tarafdar PK and De SK (2016). Efficient use of jute agro textiles as soil conditioner to increase chilli productivity on Inceptisol of West Bengal. *Journal of Soil and Water conservation.* **15**(3): 242-245.

3. Adhikary R and Pal A (2020). Clay Pot Irrigation-A review Study. *Asian Plant research Journal*. **5**(1): 37-42.

4. Adhikary R, Pal A, Bera M., and De SK. (2020). Pitcher irrigation in salinity management for production of brinjal crop in coastal soil of West Bengal, India. Ecology. *Environment and conservation*. **26**: 179- 183.

5. Batchelor C, Lovell C and Murata M. (1997). Simple microirrigation techniques for improving irrigation efficiency on vegetable gardens. *Agricultural Water Management.* **32**(1): 37-48.

6. National Horticulture Board, 2012-13. http://nhb.gov.in/area-pro/2012-2013 (Final).xls.

7. Pine D, De SK, Tarafadar PK, Pal A, Mahata AP, Adhikary R and Bauri SK (2013). Efficient use of geotextiles as soil conditioner to increase potato productivity on inceptisol of West Bengal. *Journal of Soil and Water conservation*. **12**(2):104-107.

8. Pal A, Adhikary R, Bear M, De SK and Sardar M (2020). Application of different Geotextile in Soil to Improve the Soil health in humid and hot Sub humid region of West Bengal, India. *International Journal of current Microbiology and Applied Sciences.* **9**(6): 2812- 2818.

9. Pal A, Adhikary R, De SK and Sardar M (2020). Effect of different geotextile treatments in soil to increase the yield and yield attribute of capsicum (Capsicum annuum). *International Journal of chemical Studies*. **8**(3): 2620-2622.

10. Pal A, Adhikary R, Bera, M and Garanayak R. (2020). Pitcher irrigation: a water saving technique in arid region. *International Journal of Engineering, Science and Mathematics.* **9**(2): 50-57.
11. Thingujam U, Senjam P, Kundu D, Khanam R, Adhikary R and Pal A (2017). Pitcher Pot Irrigation- A Review Study. *International Journal of Trends in Bioscience* **10**(45):9467-9469, 2017.

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Table 1. Distribution of weekly rainfall, average air temperature, evaporation and wind speed during study period

Stand. Week	Rainfall (mm)		Temperature (^{0} C)		Relative humidity (%)		Evaporation (mm)	Wind speed (km/hr)
	2011	2012	Max.	Min.	Max.	Min.		
1	4.7	6.2	26.8	10.5	64.7	40.2	1.7	1.2
2	0.0	0.0	26.5	10.8	62.7	42.6	1.8	1.0
3	0.0	3.2	27.1	11.7	63.6	43.1	1.9	0.5
4	7.0	0.0	27.8	12.3	63.9	44.6	2.0	0.7
5	0.0	0.0	27.9	15.6	64.4	45.7	2.1	0.8
6	0.0	0.0	28.1	15.2	66.7	46.8	2.3	0.9
7	4.5	5.7	28.6	16.7	70.4	47.2	2.6	1.1
8	0.0	0.0	29.5	16.9	72.2	48.1	2.9	1.2
9	0.0	12.8	30.3	17.8	74.2	49.3	3.0	1.3
10	17.2	0.0	31.7	18.2	76.5	52.7	3.1	1.6
11	0.0	0.0	32.4	19.4	79.3	55.4	3.2	1.9
12	10.5	0.0	34.8	20.7	82.1	60.3	3.3	2.1
13	0.0	0.0	35.6	22.5	84.7	65.1	3.4	2.5
14	0.0	0.0	36.8	23.5	84.3	65.3	3.7	2.6
15	5.5	16.2	38.2	24.6	84.9	65.4	4.1	2.8
16	8.4	12.8	41.3	24.7	85.1	65.7	4.7	2.9
17	29.8	0.0	44.5	25.4	86.2	66.2	4.9	3.1
18	0.0	16.8	46.2	26.7	86.3	66.6	5.2	3.2
19	35.7	0.0	45.5	26.3	86.8	67.7	5.1	3.4

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Stand. Week	Rainfall (mm)		Temperature (^{0} C)		Relative humidity (%)		Evaporation (mm)	Wind speed (km/hr)
	2011	2012	Max.	Min.	Max.	Min.		
20	24.6	6.9	45.7	25.8	87.9	68.3	4.1	3.7
21	0.0	24,6	44.3	25.4	88.4	70.5	4.4	4.1
22	34.2	33.8	44.1	24.7	89.7	73.2	4.7	4.8
23	72.4	45.3	44.3	24.6	90.4	75.2	4.8	5.2
24	35.8	20.5	43.4	24.3	91.4	77.3	4.7	4.8
25	42.9	37.6	42.5	24.1	92.3	81.2	4.5	3.4
26	64.9	56.8	39.7	24.1	95.2	83.5	4.3	2.1
27	46.2	50.9	34.7	24.3	96.1	85.2	4.2	2.8
28	37.9	39.9	34.5	24.3	96.0	85.1	4.0	2.7
29	82.9	120.6	33.9	23.9	95.4	84.8	3.1	2.6
30	199.5	186.3	33.6	23.7	94.6	84.2	3.3	2.4
31	80.2	88.3	32.7	24.1	93.1	84.1	3.6	2.3
32	60.6	39.5	32.5	24.2	92.4	83.3	3.8	2.2
33	25.7	45.8	32.1	23.9	91.1	80.1	3.6	2.2
34	29.6	37.9	32.5	23.7	88.6	78.7	3.4	2.1
35	38.1	24.4	32.3	23.5	86.5	75.6	3.3	2.0
36	39.6	47.7	31.6	23.2	85.5	69.1	3.2	2.1
37	44.2	56.4	31.5	23.1	84.3	67.5	3.0	2.1
38	34.9	44.4	31.6	22.7	82.1	64.3	2.9	2.0
39	17.8	18.5	31.2	22.5	80.3	61.2	2.4	1.9
40	0.0	9.5	31.3	22.7	79.4	60.2	2.3	1.8
41	22.7	0.0	30.1	22.3	77.5	59.7	2.2	1.8
42	13.5	12.4	29.7	21.7	75.4	56.4	2.1	1.7

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Stand. Week	Rainfall (mm)		Temperature (^{0} C)		Relative humidity (%)		Evaporation (mm)	Wind speed (km/hr)
	2011	2012	Max.	Min.	Max.	Min.		
43	9.7	9.0	29.5	20.2	74.3	53.2	2.0	1.6
44	0.0	4.6	29.4	18.6	73.2	51.5	1.8	1.5
45	5.4	2.5	29.2	17.5	72.4	49.6	1.9	1.6
46	7.0	6.2	29.2	16.4	71.2	47.6	1.8	1.4
47	0.0	0.6	28.9	13.7	70.4	44.3	1.7	1.2
48	0.0	0.0	28.5	12.5	69.1	42.2	1.5	1.1
49	5.3	0.0	26.5	8.9	68.4	40.5	1.4	0.9
50	0.0	3.0	26.3	8.5	67.2	40.1	1.3	0.7
51	0.0	7.8	26.1	8.1	66.1	39.6	1.2	0.5
52	5.9	5.3	26.5	8.3	65.3	38.2	1.1	0.2

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Table.2 Experimental Details

Treatment Details	T_1 - Pitcher pot irrigation + Live mulch (Black gram)
	T_2 - Pitcher pot irrigation + Coco coir mulch
	T_3- Pitcher pot irrigation + Jute fibre mulch
	T_4- Pitcher pot irrigation + Babui grass mulch
	T_5 - Pitcher pot irrigation + No mulch
Plot size	20 sq m.
Design	Randomized block design
Replication	4

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Table 3. Effect of pitcher pot irrigation and mulching on yield and yield component of tomato

Treatment	Fruit weight (g)			Length of fruit (cm)			Diameter of fruit (cm)			Yield (t/ha)		
	1st Year	2nd Year	Pooled	1st Year	2nd Year	Pooled	1st Year	2nd Year	Pooled	1st Year	2nd Year	Pooled
Pitcher + Jute fiber mulch	60.25	65.00	62.63	6.75	6.75	6.75	4.05	4.15	4.10	41.25	44.12	42.69
Pitcher + live mulch	57.75	62.25	60.00	6.25	6.25	6.25	4.10	4.00	4.05	38.35	41.24	39.80
Pitcher + Coco coir mulch	55.25	59.25	57.25	6.00	6.25	6.13	4.00	4.00	4.00	35.68	38.48	37.08
Pitcher + babui grass mulch	53.00	56.25	54.63	6.00	6.00	6.00	4.00	4.00	4.00	29.54	32.12	30.83
Pitcher + no mulch	48.50	50.25	49.38	5.50	5.25	5.38	3.00	3.00	3.00	24.50	25.03	24.77
Total	54.95	58.60	56.78	6.10	6.10	6.10	3.83	3.83	3.83	33.86	36.20	35.03

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SE (m)	**0.481**	**0.309**	**0.29**	**0.177**	**0.204**	**0.14**	**0.090**	**0.070**	**0.08**	**0.402**	**0.258**	**0.24**
LSD (0.05)	**1.482**	**0.953**	**0.83**	**0.545**	**0.630**	**0.39**	**0.284**	**0.198**	**0.24**	**1.239**	**0.796**	**0.70**
YEAR * Treatment	**SE (m)**		**0.40**			**0.19**			**0.00**			**0.34**
	LSD (0.05)		**1.18**			**NS**			**NS**			**0.99**

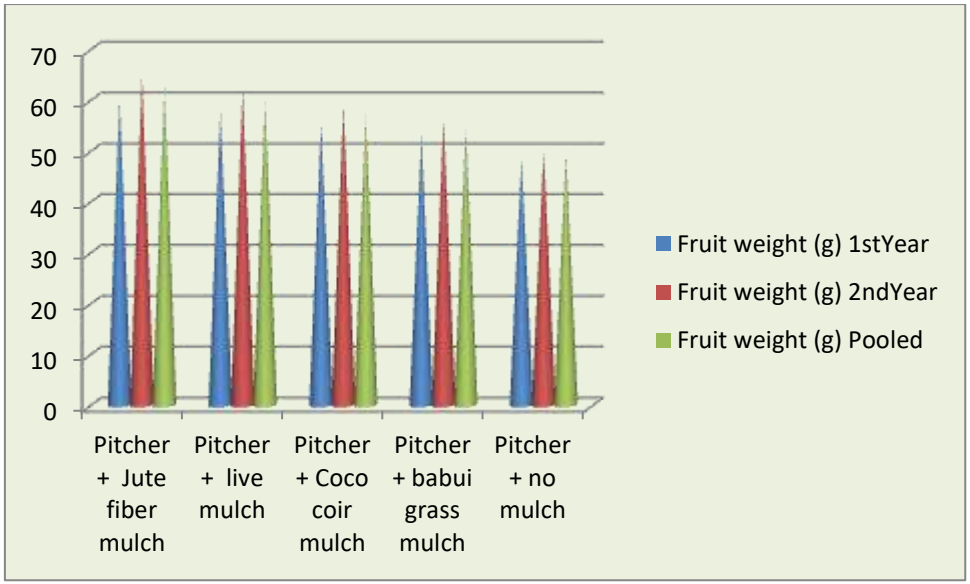

Fig 1: Fruit weight of tomato under different treatments

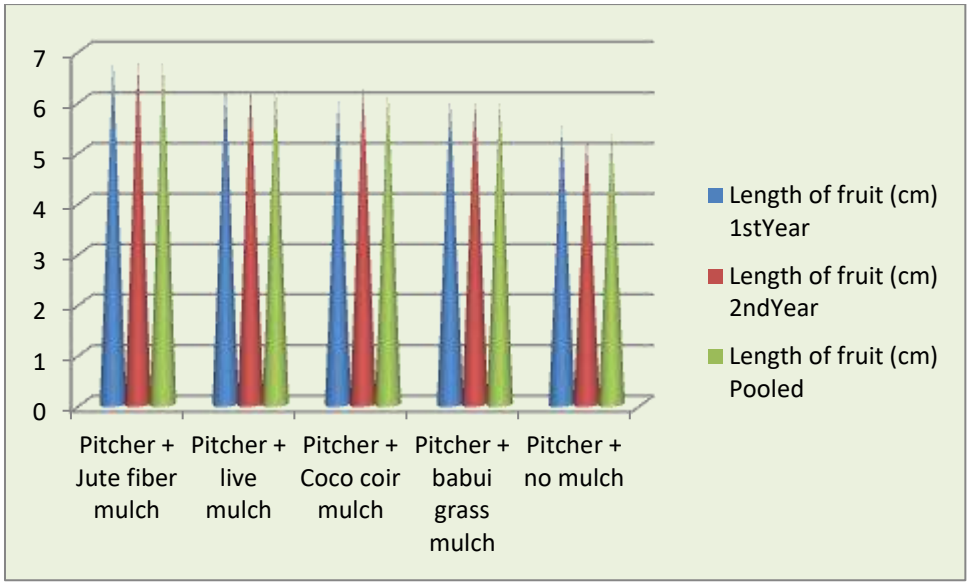

Fig 2: Length of tomato under different treatments

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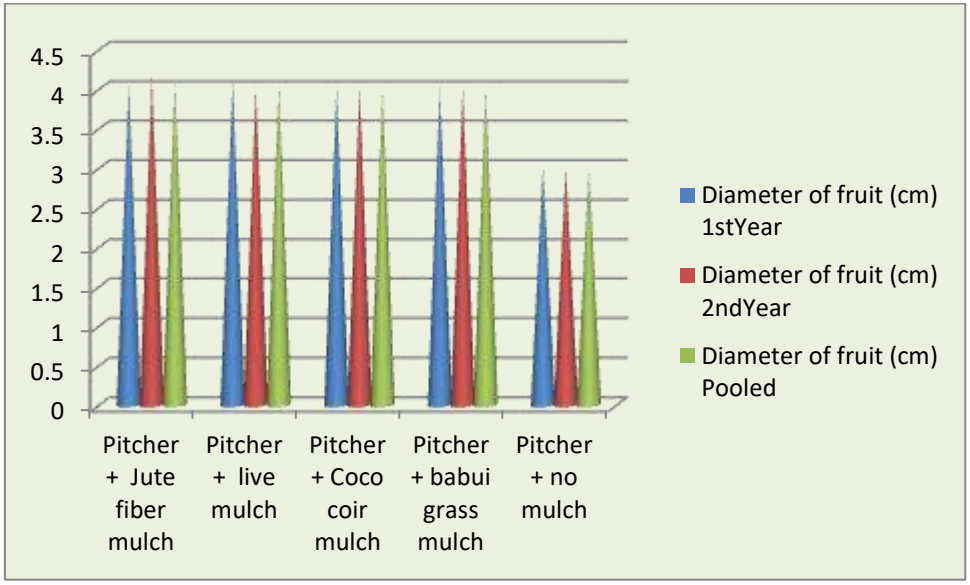

Fig 3: Diameter of tomato under different treatments

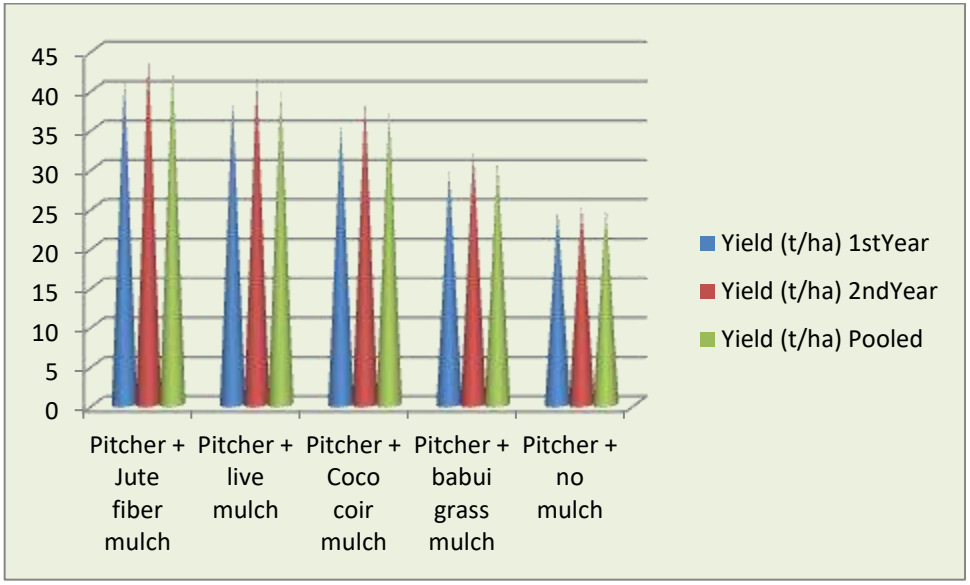

Fig 4: Yield of tomato under different treatments

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Fig 5: Clay pot arranged to put in soil

Fig 6: Clay pot put inside soil

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Fig 7: Clay pot ready to pitcher irrigation

Fig 8: Clay pot with different mulching in tomato crop