Influence of fertigation levels and drip irrigation levels on yield and quality of *rabi* chilli under mulch and no mulched conditions

ABSTRACT

The field investigation was carried out to evaluate the influence of fertigation levels, mulch and drip irrigation levels on yield and yield quality at WTC fields, PJTSAU, Rajendranagar, Telangana during 2020-21 and 2021-22. Thestudy was consisted of 12 treatment combinations *viz.*.75 %, 100 % (300-60-120 kg ha^{-1} N-P_2O_5-K_2O& 125% RDF, drip irrigation levels (0.8 Epan& 1.0 Epan) imposed under factorial combination of mulch (M_1) and no mulch (M_0)conditions.An investigation was undertaken during *rabi* season.Among the fertigation levels, 100 % RDF (31.15 t ha^{-1}, 195.04 mg 100 g^{-1}, 10.33 % & 0.94 %, respectively) recorded the higher fresh fruit yield, ascorbic acid content, oleoresin content and capsaicin content in pooled data. With regards to mulch, the M_1 has recorded the maximum values for fresh fruit yield (37.56 t ha^{-1}), ascorbic acid content (224.43), oleoresin content (11.11 %) and capsaicin content (0.74 %) in pooled data.

Key Words: Fertigation levels, irrigation levels, mulch, ascorbic acid, oleoresin content and capsaicin content

Introduction

Vegetable and fruit production is one of the emerging businesses in India in off and on season.InTelangana, agriculture contributes a large sector of the state's economyand uses around 55.51 lakh ha with 27 different crops.Though vegetable production is limited duewater, labour availability and price fluctuations around the year. Inadequate soil moisture and high soil temperature with low organic carbon content are the major factors for declining the yield and quality of vegetable production (Yogaraju*et al.*, 2019).

Chilli (*Capsicum annuum* L.) commonly known as hot pepper belongs to family Solanaceae and is cultivated as an annual crop worldwide.It is an important spice as well as vegetable crop, where both ripe and unripe fruits are used for culinary, salad, anti-cancer agent and processing purposes. Its extract is used in pharmaceutical industry for colouring the drugs. It is an excellent source of vitamin A and C. Beneficial effects of chilli sometimes referred as capsule of vitamin C due to high amounts of vitamin C (Davindersingh, 2016).

India contributes about 36.57% to the total world chilli production and occupies an area of 411.0 thousand hectares in the country with a production of 4363.0 thousand million tonnes and productivity of 10.6 MT ha^{-1}. In Telangana, it occupies an area of 10.9 thousand hectares with a production of 15.78 thousand tonnes (Indiastat-2021-22). India is the largest producer, consumer and exporter of chilli, which contribute to 25 per cent of total world's production. It responds well to split application of nutrients through fertigation in terms of increased growth and yield. Pungency and colour are two important characters liked by consumers. Nitrogen is an essential component of nucleic acid and has been suggested to improve the development of vegetative structures. Potassium is well known for its role in improving quality. In foreign export and imports, quality is the important factor to be considered which can be achieved only through optimum nutrient application (Biwalkar*et al.*, 2015).

Mulching is pertinent method to modify the hydrothermal regime of crop and enhance the efficiency of nutrients which resulting in more yield over open field condition (Shailendra *et al.*,2021). The consumption of water varies with method of application and frequency of application. To achieve more yield through drip, irrigation scheduling is a viable option since it can minimize the water losses of runoff and deep percolation (Supekar*et al.*, 2021).

Materials and methods

The present experiment was carried out at Water Technology Center, College Farm, College of Agriculture, Rajendranagar, Hyderabad. The field experiment was laid out in randomisedcomplete block design, wherein three fertigation levels viz., F_{75} (225-45-90 kg ha^{-1} N, P_2O_5-K_2O), F_{100}(300-60-120 kg ha^{-1} N, P_2O_5-K_2O) & F_{125} (375-75-150 kg ha^{-1} N, P_2O_5-K_2O) and two drip irrigation levels ($I_{0.8}$& $I_{1.0}$) imposed under factorial combination of with mulch (M_1) and no mulch (M_0). Thus, the experiment consisted of total 12 treatment combinations which were replicated thrice. Silver-black mulch (30 µ) sheet was laid on the field as per the treatments. Robust seeds of chilli hybrid (sonali) used as test crop and seedlings were ~~transplated~~transplanted in paired row method at spacing 45 / 30 cm x 40 cm. Equal amount of irrigation was given up to 10 DAS to get better establishment after that irrigation was scheduled at 2 days interval based on daily evaporation data (0.8

Epan& 1.0 Epan) recorded from USWB class 'A' pan evaporimeter in agro-meteorological station, ARI Farm, Rajendranagar, Hyderabad.The fertigation was carried out through ventury system on every 4th day at 38 splits as per the treatments.Chilli fresh fruit yield was recorded at different pickings and sum of all the pickings considered as total fresh fruit yield plot and expressed in t ha^{-1}. Quality parameters were analysed immediately after harvesting of fresh fruits during both the years. The ascorbic acid content, oleoresin content and capsaicin content was estimated as per the procedure given by Sadasivam, S and Manickam, A. (2005).

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Results and Discussion

Yield

The total fresh fruit yield of chilli was found to be significantly influenced by mulch and fertigation levels (Table 1). Among the fertigation levels, F_{100} resulted in significantly the highest total fresh fruit yield (30.98 t ha^{-1}) followed by F_{125} (28.85 t ha^{-1}) and the lowest was registered in F_{75} (24.13 t ha^{-1}) during I year. Likewise, the F_{100}recorded the highest total fresh fruit yield of chilli (31.32 & 31.15 t ha^{-1}) and was on par with F_{125} (30.38 & 29.62 t ha^{-1}) & significantly over F_{75} (24.58 & 24.36 t ha^{-1}). Drip fertigation with 100 % RDF positively influenced the total fresh fruit yield of chilli which was due to positive affect on yield attributing characters ultimately higher fruit yield. Right amount of NPK during flowering stage that favourably increased the number of flowers $plant^{-1}$ obviously led to increased fruit setting.Another possible reason was the timely availability of nutrients led to increased growth, higher uptake of nutrients, better photo assimilation and better translocation of assimilates from source to sink which in turn increased total fresh fruit yield (Subramani, 2008). Ayare *et al.* (2012) described about fertigation which was concentrated near the root zone and resulting in production of more dry matter by more efficient utilization of applied nutrients ultimately yield of the crop.

With mulching, during I year, it has recorded 1.83, 2.09 & 1.96 times higher fresh fruit yield over non-mulching (19.77, 18.62 & 19.19 t ha^{-1}) during I, II year and in pooled data. it might be due to mulch provides the congenial conditions to the plant like water availability & it's retention for long time and constant availability of nutrients throughout the crop period which might have improved the growth and yield. Similar results were observed by Kumara *et al.* (2015). Another reason might be pest and disease attack was relatively less under mulch and healthier plants were observed in mulch which resulted higher yield over no mulch Iftikhar Ahmad *et al.* (2011).

The irrigation levels did not shows any significant difference during both the years. Among the interactions, the combination of fertigation levels, mulch and drip irrigation levels found to be significant (Table 1). It was noticed that during 2020-21 (I year), F_{100} + $I_{0.8}$+ M_1 has recorded the highest total fresh fruit yield of chilli (42.85 t ha^{-1}) and it was on par with F_{125}+$I_{0.8}$+ M_1 (38.13 t ha^{-1}), F_{100} + $I_{1.0}$+ M_1 (38.03 t ha^{-1}), F_{125} + $I_{1.0}$+ M_1 (34.78 t ha^{-1}) and F_{75}+$I_{1.0}$+ M_1 (34.14 t ha^{-1}) and significantly higher over all other treatments. During II year fertigation levels coupled with mulch treatments were found to be significant. The mean data revealed that F_{100} + M_1 has recorded 43.36 t ha^{-1} of total fresh fruit yield followed by F_{125} + M_1 (41.28 t ha^{-1}) and which was significantly higher over F_{75} + M_1 (32.07 t ha^{-1}), F_{125} + M_0 (19.49 t ha^{-1}), F_{100} + M_0 (19.27 t ha^{-1}) & F_{75} + M_0 (17.09 t ha^{-1}). In pooled data, none of the interactions showed any significant influence on total fresh fruit yield of chilli.

The water requirement of crop varies in mulch and non-mulching condition, optimum soil moisture condition near the root zone has reduced the moisture losses and proliferate the dry matter partitioning and helped in the diversion of photosynthesis to the reproductive parts ultimately resulted in higher yield (Rajanee *et al.,* 2017). Maida *et al.* (2020) observed that 0.8 IW/CPE treatment has recorded the maximum fruit length, maximum fruit diameter, maximum average weight of fruit.Chilli is sensitive to fluctuation in temperature and moisture. Mulch protected the crop from higher temperatures and modifies the hydrothermal properties of soil which resulted better plant growth and yield (SitiAishai Hassan *et al.,* 1995).Mulch in conjunction with drip irrigation and fertigation hasten the growth and yield of the crop may be due to favourable moisture maintained in the root zone, its availability to plants, avoiding leaching of soluble fertilizers, weed free environment.During second year of the study with higher levels of NPK @ 125 % lower the fresh fruit yield was noticed under no mulch condition (Anup Niranjan, 2017).

Ascorbic Acid (mg 100 g^{-1})

The results revealed that highest ascorbic acid content(Table 2) was observed with F_{100}among fertigation levels,which was 2.47% higher over F_{125} (198.33 mg 100

g^{-1}). The F_{100} and F_{125} treatments are on par to each other. The lowest ascorbic acid content was noticed in F_{75} (177.00 mg 100 g^{-1}) during I year. Similarly higher ascorbic acid content was observed with F_{100}, which was 7.69 % & 14.40 % higher over F_{125} and F_{75} respectively. Significantly lower ascorbic acid content was noticed in F_{75} (180.51 mg 100 g^{-1}) during II year. In pooled data, the F_{100} has recorded the highest ascorbic acid content (204.87 mg 100 g^{-1}) and was on par to the F_{125} (195.04 mg 100 g^{-1}) and the lower value was recorded in F_{75} (178.75 mg 100 g^{-1}). Higher ascorbic acid content found with optimum level of NPK @ 100 % RDF could be due to higher NPK which influenced the carbohydrate synthesis and formation of ascorbic acid, as ascorbic acid is mainly constituted of carbohydrate compounds. These results were in line with Mounika (2016) and Shilpa (2019). Mehnaz Akram *et al.* (2017) and Janardhanrao (2020) who reported that the highest ascorbic acid content (118 mg 100 g^{-1}) with higher levels of NPK @ 100 % RDF was due to enhancement of enzyme activity for amino acids synthesis leading to higher ascorbic acid content.

With mulching of the chilli crop, the M_1 has recorded 38.04 %, 40.15 % & 39.09% higher ascorbic acid content over M_0 (162.03, 160.67 & 161.35 mg 100 g^{-1}, respectively) during I, II year and in pooled data. There was insignificant variation found between $I_{0.8}$& $I_{1.0}$ irrigation levels during both the years. The interaction effect among fertigation levels, mulch and drip irrigation levels found to be non-significant. Relatively higher content was observed in F_{100}+$I_{1.0}$+M_1 (241.35 mg 100 g^{-1}). There was positive correlation observed between yield and mean ascorbic acid content. The determination coefficient (R^2) (Figure 1) was 0.962 in pooled data which showed a linear increase in ascorbic acid content observed with total fresh yield.

Generally ascorbic acid production mainly controlled by changes in the soil temperature (Davinder Singh 2016). Mulch maintains the temperature range from 24^{o}C to 32^{o}C at different pickings hence higher ascorbic acid content recorded. Similar results were observed by Ashrafuzzaman*et al.* (2011) and Maida *et al.* (2019).

Oleoresin content (%)

Oleoresin is essential oil that gives sharp pungent aroma and the data related to oleoresin content of fresh chilli is presented in Table 3. With respect to the fertigation levels, during I year, F_{100} recorded the higher oleoresin content (11.36 %)

followed by F_{125} (10.50 %) and the lowest oleoresin content was registered in F_{75} (10.02%). During II year, F_{100} recorded higher oleoresin content (9.30 %) followed by F_{75} (8.51 %) whereas the minimum oleoresin content was recorded in lower level of NPK (F_{125} -8.20 %) treatment. In the pooled data, higher content was recorded in F_{100} and which was 1.08, 1.13 & 1.10 times higher over F_{125} (9.35 %). The lowest content was found in F_{75} (9.26 %) though it was on par with F_{125}. There was significant variation found between mulch and non-mulch treatments. The mulch (M_1) treatment was observed 33.58 %, 38.16% & 35.62% higher content when compared to the no mulch treatment (9.10, 7.28 & 8.19 %, respectively) during I, II year and in pooled data. With respect to irrigation levels, their interaction with fertigation levels and mulch has not shown significant influence on oleoresin content.

The data on correlation between yield and mean oleoresin content (Figure 1) revealed that there was significant positive correlation observed for oleoresin (0.896) in I, II year and in pooled data respectively.

The highest oleoresin content observed with F_{100} treatment, it might be attributed due to greater synthesis and translocation of photosynthates in fruits on account of increased uptake of nutrients. These results were in corroborative to Shilpa (2019), Mounika (2016). Under mulch it could be due to optimum soil moisture which hastens the physiological growth that ultimately increased the production of secondary metabolites (Davinder Singh, 2016).

Capsaicin content (%)

Market demand of chilli depends on the pungency of the fruit, capsaicin major is the alkaloid responsible for pungency in chilli. It is mainly controlled by genetic characters of the plant but external environment and management practices also plays significant role in synthesis of capsaicin and data related capsaicin content of fresh of chilli fruit is presented in Table 3. The capsaicin content was significantly influenced by fertigation levels and mulch during both the years. With respect to the fertigation levels, during 2020-21 (I year), F_{125} recorded higher capsaicin content (0.90 %) and was on par with F_{100} (0.86 %). the lowest capsaicin content (0.73 %) was registered in F_{75} treatment. The F_{100} has recorded higher capsaicin content (1.02 & 0.94 %) followed by F_{125} (0.93 & 0.91 %) whereas minimum capsaicin content was recorded with F_{75} (0.85 & 0.79 %) during II year and in pooled data respectively. Higher levels of NPK improved the fruit quality, Capsaicin content increased with increase in the NPK fertigation levels which might be due to external application of nitrogen that is essential for the synthesis of capsicinoids as nitrogen controls the activity of phenylalaineammonialyase enzyme and capsaicin synthase enzyme which were responsible for production as well as longitivity of capsaicin content in the chilli. Similar results were observed by Mounika (2016) and Shilpa (2019).

Data related to mulch indicated that the variation between the mulch and no mulch treatments was significant. During I year, the maximum capsaicin content was observed in M_0 (0.99 %, 1.05 % & 1.02 %, respectively) over M_1 (0.67 %, 0.81% & 0.74 %, respectively) during I, II year and in pooled data. Data pertaining to the irrigation levels, there was no significant variation found between the $I_{0.8}$ & $I_{1.0}$ during both the years. The interaction effect among the fertigation levels, mulch and drip irrigation levels found to be significant during II year but not in I year and in pooled data. During II year, the highest content was noticed in F_{100}+$I_{1.0}$+M_0 (1.33 %) which was on par with F_{100}+$I_{0.8}$+M_0 (1.06 %), F_{125}+$I_{1.0}$+M_0 (1.06 %), F_{75}+$I_{0.8}$+M_0 (1.00 %), F_{75}+$I_{1.0}$+M_0 (0.95 %), F_{125}+$I_{1.0}$+M_1 (0.95 %), F_{125}+$I_{0.8}$+M_0 (0.93 %) and F_{100}+$I_{0.8}$+M_1 (0.90 %). The lowest content was resulted in F_{75}+$I_{1.0}$+M_1 (0.70 %). In pooled data, relatively higher capsaicin content was observed in F_{100}+$I_{1.0}$+M_0 (1.22 %) closely followed by F_{100}+$I_{0.8}$+M_0 (1.03 %).Capsaicin content and fruit yield are highly negatively correlated. The determination coefficient (R^2) (Figure 1) showed as non-significant (P=0.01) in pooled data (0.4222).

No mulch treatment recorded higher capsaicin content due to water stress condition which boosted the activity of antioxidant enzyme in chilli leaves and fruits and leads to the production of high capsaicin content. Another reason might be due to limited moisture content under no mulch condition along with with optimum NPK enhances activity of capsaicin synthase enzyme and ultimately increased the production of capsaicin (Subramani 2008).

Conclusion:

From the current study, it can be concluded that application of 100 % RDF along with $I_{0.8}$ + mulch resulted in higher yield and quality of chilli further increment in the nutrients and waterreduced the spiciness of the chilli besides reduction in the yield. So that 100 % RDF along with $I_{0.8}$ + mulch might be recommended for green chilli growers for achieving higher quality.

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Table 1. Effect of fertigation and irrigation levels under mulch and non-mulch conditions on total fruit yield (t ha^{-1}) of chilli during 2020-21 (I year), 2021-21 (II year) and in pooled data during *rabi* season.

Table 2. Effect of fertigation and irrigation levels under mulch and non-mulch conditions on ascorbic acid content (mg 100 g^{-1}) of chilli during 2020-21 (I year) and 2021-21 (II year) during *rabi* season.

Treatments	**No mulch** $I_{0.8}$	**No mulch** $I_{1.0}$	**Mean**	**Mulch** $I_{0.8}$	**Mulch** $I_{1.0}$	**Mean**	**Overall Mean**
2020-21 (I Year)- Total fruit yield (t ha^{-1})							
F_{75}	15.63	17.44	**16.53**	29.34	34.14	**31.74**	**24.13**
F_{100}	17.15	25.89	**21.52**	42.85	38.03	**40.44**	**30.98**
F_{125}	19.31	23.18	**21.24**	38.13	34.78	**36.46**	**28.85**
Mean	**17.36**	**22.17**	**19.77**	**36.77**	**35.65**	**36.21**	
Mean of I $_{0.8}$			**27.07**	**Mean of I $_{1.0}$**		**28.91**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	1.81	5.31	I X M			2.56	NS
Irrigation (I)	1.81	NS	F x M			3.14	NS
Fertigation (F)	0.64	1.88	F x I			3.14	NS
			F x M x I			4.44	13.01
2021-22 (II Year)- Total fruit yield (t ha^{-1})							
F_{75}	17.37	16.81	**17.09**	32.25	31.88	**32.07**	**24.58**
F_{100}	18.27	20.27	**19.27**	42.57	44.14	**43.36**	**31.32**
F_{125}	15.94	23.05	**19.49**	43.09	39.46	**41.28**	**30.38**
Mean	**17.19**	**20.04**	**18.62**	**39.30**	**38.50**	**38.90**	
Mean of I $_{0.8}$			**28.25**	**Mean of I $_{1.0}$**		**29.27**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	2.03	5.94	I X M			2.87	NS
Irrigation (I)	2.03	NS	F x M			3.51	10.30
Fertigation (F)	0.72	2.10	F x I			3.51	NS
			F x M x I			4.96	NS
Mean of two years (pooled data)- Total fruit yield (t ha^{-1})							
F_{75}	16.50	17.12	**16.81**	30.79	33.01	**31.90**	**24.36**
F_{100}	17.71	23.08	**20.40**	42.71	41.09	**41.90**	**31.15**
F_{125}	17.62	23.11	**20.37**	40.61	37.12	**38.87**	**29.62**
Mean	**17.28**	**21.11**	**19.19**	**38.04**	**37.07**	**37.56**	
Mean of I $_{0.8}$			**27.66**	**Mean of I $_{1.0}$**		**29.09**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	3.00	8.80	I X M			4.25	NS
Irrigation (I)	3.00	NS	F x M			5.20	NS
Fertigation (F)	1.06	3.11	F x I			5.20	NS
			F x M x I			7.35	NS

F_{75}= 225-45-90 g N-P2O5-K2O ha-1;F100= 300-60-120 g N-P2O5-K2O ha-1;F125= 375-75-150 g N-P2O5-K2O ha-1

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2020-21 (I Year)- ascorbic acid content (mg 100 g^{-1})							
Treatments	**No mulch**		**Mean**	**Mulch**		**Mean**	**Overall Mean**
	$I_{0.8}$	**$I_{1.0}$**		**$I_{0.8}$**	**$I_{1.0}$**		
F_{75}	146.86	150.48	**148.67**	204.28	206.36	**205.32**	**177.00**
F_{100}	158.12	179.92	**169.02**	239.40	235.51	**237.46**	**203.24**
F_{125}	165.87	170.95	**168.41**	236.25	220.24	**228.24**	**198.33**
Mean	**156.95**	**167.11**	**162.03**	**226.64**	**220.70**	**223.67**	
Mean of I $_{0.8}$			**191.80**	**Mean of I $_{1.0}$**		**193.91**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	12.09	35.45	I X M			17.10	NS
Irrigation (I)	12.09	NS	F x M			20.94	NS
Fertigation (F)	4.27	12.54	F x I			20.94	NS
			F x M x I			29.61	NS
2021-22 (II Year)- ascorbic acid content (mg 100 g^{-1})							
F_{75}	158.40	154.77	**156.58**	199.59	209.29	**204.44**	**180.51**
F_{100}	166.01	176.38	**171.20**	236.44	247.20	**241.82**	**206.51**
F_{125}	133.86	174.61	**154.24**	228.12	230.45	**229.28**	**191.76**
Mean	**152.76**	**168.59**	**160.67**	**221.39**	**228.98**	**225.18**	
Mean of I $_{0.8}$			**187.07**	**Mean of I $_{1.0}$**		**198.78**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	11.22	32.92	I X M			15.87	NS
Irrigation (I)	11.22	NS	F x M			19.44	NS
Fertigation (F)	3.97	11.64	F x I			19.44	NS
			F x M x I			27.49	NS
Mean of two years (pooled data)- ascorbic acid content (mg 100 g^{-1})							
F_{75}	152.63	152.62	**152.63**	201.94	207.83	**204.88**	**178.75**
F_{100}	162.07	178.15	**170.11**	237.92	241.35	**239.64**	**204.87**
F_{125}	149.86	172.78	**161.32**	232.19	225.34	**228.76**	**195.04**
Mean	**154.85**	**167.85**	**161.35**	**224.01**	**224.84**	**224.43**	
Mean of I $_{0.8}$			**189.43**	**Mean of I $_{1.0}$**		**196.35**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	11.38	33.38	I X M			16.10	NS
Irrigation (I)	11.38	NS	F x M			19.71	NS
Fertigation (F)	4.02	11.80	F x I			19.71	NS
			F x M x I			27.88	NS
F_{75}= 225-45-90 g N-P_2O_5-K_2O ha^{-1};F_{100}= 300-60-120 g N-P_2O_5-K_2O ha^{-1};F_{125}= 375-75-150 g N-P_2O_5-K_2O ha^{-1}							

Table 3. Effect of fertigation and irrigation levels under mulch and non-mulch conditions on oleoresin content (%) of chilli during 2020-21 (I year) and 2021-21 (II year)during *rabi* season.

2020-21 (I Year)- oleoresin content (%)							
Treatments	**No mulch**		**Mean**	**Mulch**		**Mean**	**Overall Mean**
	$I_{0.8}$	**$I_{1.0}$**		**$I_{0.8}$**	**$I_{1.0}$**		
F_{75}	8.53	9.13	**8.83**	11.08	11.33	**11.21**	**10.02**
F_{100}	9.70	9.69	**9.69**	13.85	12.22	**13.03**	**11.36**
F_{125}	9.05	8.50	**8.77**	12.90	11.56	**12.23**	**10.50**
Mean	**9.09**	**9.11**	**9.10**	**12.61**	**11.70**	**12.16**	
Mean of $I_{0.8}$			**10.85**	**Mean of $I_{1.0}$**		**10.40**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	0.59	1.73	I X M			0.84	NS
Irrigation (I)	0.59	NS	F x M			1.02	NS
Fertigation (F)	0.21	0.61	F x I			1.02	NS
			F x M x I			1.45	NS
2021-22 (II Year)- oleoresin content (%)							
F_{75}	7.08	7.67	**7.38**	9.21	10.06	**9.63**	**8.51**
F_{100}	7.53	7.58	**7.56**	10.75	11.34	**11.05**	**9.30**
F_{125}	6.49	7.32	**6.91**	10.07	8.92	**9.50**	**8.20**
Mean	**7.04**	**7.52**	**7.28**	**10.01**	**10.11**	**10.06**	
Mean of $I_{0.8}$			**8.52**	**Mean of $I_{1.0}$**		**8.82**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	0.49	1.44	I X M			0.69	NS
Irrigation (I)	0.49	NS	F x M			0.85	NS
Fertigation (F)	0.17	0.51	F x I			0.85	NS
			F x M x I			1.20	NS
Mean of two years (pooled data)- oleoresin content (%)							
F_{75}	7.81	8.40	**8.10**	10.15	10.69	**10.42**	**9.26**
F_{100}	8.62	8.63	**8.63**	12.30	11.78	**12.04**	**10.33**
F_{125}	7.77	7.91	**7.84**	11.49	10.24	**10.86**	**9.35**
Mean	**8.06**	**8.32**	**8.19**	**11.31**	**10.90**	**11.11**	
Mean of $I_{0.8}$			**9.69**	**Mean of $I_{1.0}$**		**9.61**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	0.51	1.50	I X M			0.72	NS
Irrigation (I)	0.51	NS	F x M			0.88	NS
Fertigation (F)	0.18	0.53	F x I			0.88	NS
			F x M x I			1.25	NS

F_{75}= 225-45-90 g N-P_2O_5-K_2O ha^{-1};F_{100}= 300-60-120 g N-P_2O_5-K_2O ha^{-1};F_{125}= 375-75-150 g N-P_2O_5-K_2O ha^{-1}

Table 4. Effect of fertigation and irrigation levels under mulch and non-mulch conditions on capsaicin content (%) of chilli during 2020-21 (I year), 2021-21 (II year)and in pooled data during *rabi* season.

2020-21 (I Year)- capsaicin (%)							
Treatments	**No mulch**		**Mean**	**Mulch**		**Mean**	**Overall Mean**
	$I_{0.8}$	**$I_{1.0}$**		**$I_{0.8}$**	**$I_{1.0}$**		
F_{75}	0.87	0.82	**0.85**	0.52	0.68	**0.60**	**0.73**
F_{100}	1.01	1.12	**1.06**	0.55	0.78	**0.66**	**0.86**
F_{125}	1.03	1.08	**1.05**	0.74	0.75	**0.74**	**0.90**
Mean	**0.97**	**1.01**	**0.99**	**0.60**	**0.74**	**0.67**	
Mean of $I_{0.8}$			**0.79**	**Mean of $I_{1.0}$**		**0.87**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	0.06	0.18	I X M			0.08	NS
Irrigation (I)	0.06	NS	F x M			0.10	NS
Fertigation (F)	0.02	0.06	F x I			0.10	NS
			F x M x I			0.15	NS
2021-22 (II Year)- capsaicin (%)							
F_{75}	1.00	0.95	**0.98**	0.74	0.70	**0.72**	**0.85**
F_{100}	1.06	1.33	**1.20**	0.90	0.81	**0.85**	**1.02**
F_{125}	0.93	1.06	**0.99**	0.78	0.95	**0.87**	**0.93**
Mean	**1.00**	**1.11**	**1.05**	**0.81**	**0.82**	**0.81**	
Mean of $I_{0.8}$			**0.90**	**Mean of $I_{1.0}$**		**0.97**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	0.05	0.15	I X M			0.07	NS
Irrigation (I)	0.05	NS	F x M			0.09	NS
Fertigation (F)	0.02	0.05	F x I			0.09	NS
			F x M x I			0.12	0.44
Mean of two years (pooled data)- capsaicin (%)							
F_{75}	0.94	0.89	**0.91**	0.63	0.69	**0.66**	**0.79**
F_{100}	1.03	1.22	**1.13**	0.72	0.80	**0.76**	**0.94**
F_{125}	0.98	1.07	**1.02**	0.76	0.85	**0.80**	**0.91**
Mean	**0.98**	**1.06**	**1.02**	**0.71**	**0.78**	**0.74**	
Mean of $I_{0.8}$			**0.84**	**Mean of $I_{1.0}$**		**0.92**	
Treatments	SEm(±)	CD (P=0.05)	Interactions			SEm(±)	CD (P=0.05)
Mulch (M)	0.06	0.16	I X M			0.08	NS
Irrigation (I)	0.06	NS	F x M			0.10	NS
Fertigation (F)	0.02	0.06	F x I			0.10	NS
			F x M x I			0.14	NS

F_{75}= 225-45-90 g N-P_2O_5-K_2O ha^{-1};F_{100}= 300-60-120 g N-P_2O_5-K_2O ha^{-1};F_{125}= 375-75-150 g N-P_2O_5-K_2O ha^{-1}

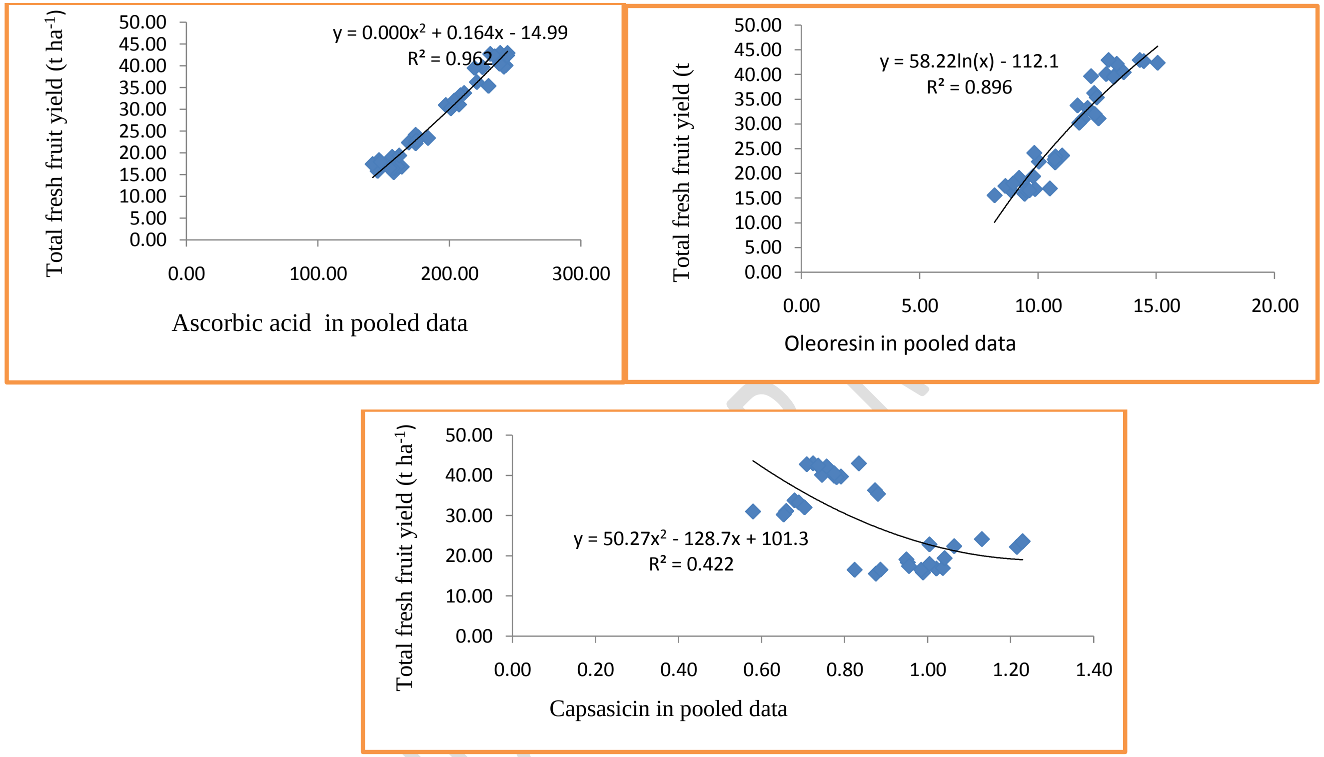

Fig 1 Regression of chilli fruit yield (t ha^{-1}) with ascorbic acid content (mg 100 g^{-1}), oleoresin content (%) and capsaicin content (%) in pooled data.

Comment [u4]: Take it under your discussion part