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Impact of different organic ferilizer on quality of onion (*Allium cepa* L.) under North Gujarat condition

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Abstract
The present investigation entitled, "Impact of Different Organic Manures on Quality of Onion (*Allium cepa* L.) Under North Gujarat Condition" was carried out during *rabi* season of 2014-2015 at Horticulture Instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar. The treatment response was observed for the quality parameters *viz*., diameter of bulb, neck thickness after curing and TSS. The highest bulb diameter (7.42 cm) was found with the treatment T_2, minimum neck thickness (0.85 cm) was recorded with the treatment T_6 and highest TSS (12.86 ^{o}Brix) was recorded with the treatment T_{11}.

Keywords: Organic fertilizer, quality, onion, *Allium cepa* L., North Gujarat

Introduction
Onion (*Allium cepa* L.) is one of the most important commercial vegetable crops grown extensively throughout the country. India is the second largest producer of onion in the world, next to China, with 70% of the total production comes as winter crop and remaining 30% as kharif onion as off season crop, accounting for 11.40 per cent of the area and 10.40 per cent of the world production and 16 per cent of productivity.
In India, onion is being grown in an area of 3.64 million hectares with production of 68.45 million tonnes and the average productivity is 18.82 tonnes per hectare. Maharashtra is the leading onion growing state of India (Anonymous, 2013).
The continuous chemical fertilizer use deteriorated crop while organic manures improved these properties (Watson *et al*., 2002) [8]. The farmers can in turn obtained good remuneration from the organically produced vegetables due to their heavy demands in national and international markets (Singh, 2005) [7]. Nutrient management is one of the most important considerations under organic production system. The increasing cost of chemical fertilizers and their harmful effects on the soil health is also an important consideration for the use of organic nutrients (Patel *et al*., 2005) [7]. In recent times, consumers are demanding higher quality and safer food and highly interested in organic products. At present, very scanty work has been made on organic farming of onion which is grown on large scale. Keeping this in view, an investigation was undertaken to effect of different organic manures on growth and yield of onion.

Materials and Methods
The experiment was conducted at Horticulture Instructional Farm, Department of Horticulture, Chimanbhai Patel College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat during the *rabi* season of the year 2014-15. Healthy uniform seedlings having about 15-20 cm height were used and transplanting was done at last week of December with spacing of 15 cm × 10 cm in.
The details of the treatments and treatment wise application of organic manures and inorganic fertilizers (kg/ha) are given in Table 1 and Table 2. All the treatments were laid out in randomized block design with three replications under drip irrigation.
Impact of organic manures i.e. FYM, Vermicompost and Poultry Manure along with nitrogen on growth, yield and qualitative character of onion (Cultivar Agrifound Light Red). The soil of the experimental field was loamy sand texture with pH 7.8, EC 0.16 dSm^{-1}, Available N 215 kg/ha, Available P_2O_5 37.11 kg/ha and Available K_2O 185 kg/ha. The recommended amount of nitrogen (100 kg N/ha) was applied in four splits i.e. one fourth was applied as basal and the remaining dose of N was applied 30,45 and 60 days after planting.

Plant height was measured at 45 and 90 days after transplanting by using scale method and average of ten tagged plants was worked out. Number of leaves per plant was measured at45 and 90 DAT. Bulb diameter and neck thickness was measured by using verniear caliper. Bulb weight and bulb yield was measured at harvesting stage and yield was calculated as marketable and unmarketable basis. The bulbs were harvested on maturity when 50-70 % percent neck fall stage. The number of bolters were counted from each treatment and worked out in per cent.

Table 1: Details of the treatments used for present investigation

Sr. No.	Tr. No.	Treatments detail
1	T_1	100% NPK as per recommendation (100:50:50) + FYM 20 t/ha
2	T_2	125 kg/ha N + 50kg P and K + FYM 20 t/ha
3	T_3	50% (50kg) recommended dose of N through FYM and 50% (50 kg) recommended dose of N through chemical fertilizer.
4	T_4	50 % (50 kg) recommended dose of N through vermicompost and 50% (50 kg) recommended dose of N through chemical fertilizer.
5	T_5	50% (50 kg) recommended dose of N through poultry manure and 50% (50 kg) recommended dose of N through chemical fertilizer.
6	T_6	100% (100 kg) recommended dose of N through FYM.
7	T_7	100% (100 kg) recommended dose of N through vermicompost.
8	T_8	100% (100 kg) recommended dose of N through poultry manure.
9	T_9	125 kg/ha N through FYM
10	T_{10}	125 kg/ha N through vermin-compost
11	T_{11}	125 kg/ha N through poultry manure

Table 2: Treatment wise application of organic manures and inorganic fertilizers (kg/ha)

Treatment No.	Required quantity (kg/ha)					
	FYM	Vermi compost	Poultry manure	Urea	SSP	MOP
T_1	20,000			217.39	312.5	83.33
T_2	20,000			271.74	312.5	83.33
T_3	9613			108.79	312.5	83.33
T_4		2933		108.79	312.5	83.33
T_5			2177	108.79	312.5	83.33
T_6	19228				312.5	83.33
T_7		5866			312.5	83.33
T_8			4222		312.5	83.33
T_9	24022				312.5	83.33
T_{10}		7333			312.5	83.33
T11			5422		312.5	83.33

Result and Discussion

The results obtain from the present investigation on the impact of different organic manures on quality of onion (*Allium cepa* L.) Under north Gujarat condition during *rabi* 2014-15 are discussed given below.

Quality parameters

Quality parameters like diameter of bulb, neck thickness after curing and Total Soluble Solids were recorded under the quality parameters.

Diameter of bulb (cm)

Influences of integrated nutrient management on diameter of bulb summarized in Table 3 and graphically illustrated in Fig. 1. The influences of integrated nutrient management on diameter of bulb was found significant. Maximum diameter of bulb (7.42 cm) was obtained under treatment T_2 (125 kg/ha N and 50kg P and K + FYM 20 t/ha) and it was statistically at par with treatment T_1, T_{11} and T_5. Whereas, the minimum diameter of bulb (5.80 cm) was recorded with treatment T_6 (100% (100 kg) recommended dose of N through FYM). The increase in diameter of bulb might be due to increased efficient translocation of photosynthats to bulbs thereby increase in dry matter accumulation of bulbs hence increase diameter of bulb. These results were in conformity with the closely reported by Gupta and Sharma (2000) [1] in onion and Nasreen *et al.* (2009) [2] in garlic.

Neck thickness after curing (cm)

Neck thickness after curing as influenced by effect of integrated nutrient management are presented in Table 3 and graphically depicted in Fig. 1.

Variation observed in data on neck thickness after curing was found significant. Minimum neck thickness after curing (0.85 cm) was found in treatment T_6 (100% (100 kg) recommended dose of N through FYM) and it was statistically at par with treatment T_7 and T_8.Whereas, the maximum neck thickness after curing (1.13 cm) was found in treatment T_2 (125 kg/ha N and 50 kg P and K + FYM 20 t/ha). The minimum neck thickness was found due to treatment effect only. Minimum neck thickness indicates the quality and storage life of bulb. The results are in conformity with findings of Teran *et al.* (1994) [3], Gupta and Sharma (2000) [1] and Banjare *et al.* (2015) [4] in onion.

Table 3: Impact of different organic manures on quality and quality parameters of onion

Sr. No.	Tr. No.	Diameter of bulb (cm)	Neck thickness after curing(cm)	TSS (º Brix)	Benefit Cost Ratio
1	T_1	6.82	1.02	12.28	5.33
2	T_2	7.42	1.13	11.75	5.98
3	T_3	5.98	0.99	12.37	5.38
4	T_4	6.06	1.01	10.77	5.11
5	T_5	6.54	1.04	12.74	5.80
6	T_6	5.80	0.85	12.06	4.39
7	T_7	5.88	0.86	11.17	4.09
8	T_8	6.26	0.94	12.69	4.69
9	T_9	6.21	1.03	11.77	4.41
10	T_{10}	6.24	1.02	12.52	4.19
11	T_{11}	6.77	1.01	12.86	4.91
12	S.Em. ±	0.32	0.05	0.41	
13	C.D. (P = 0.05)	0.93	0.13	1.20	
14	C.V. %	8.60	7.95	5.83	

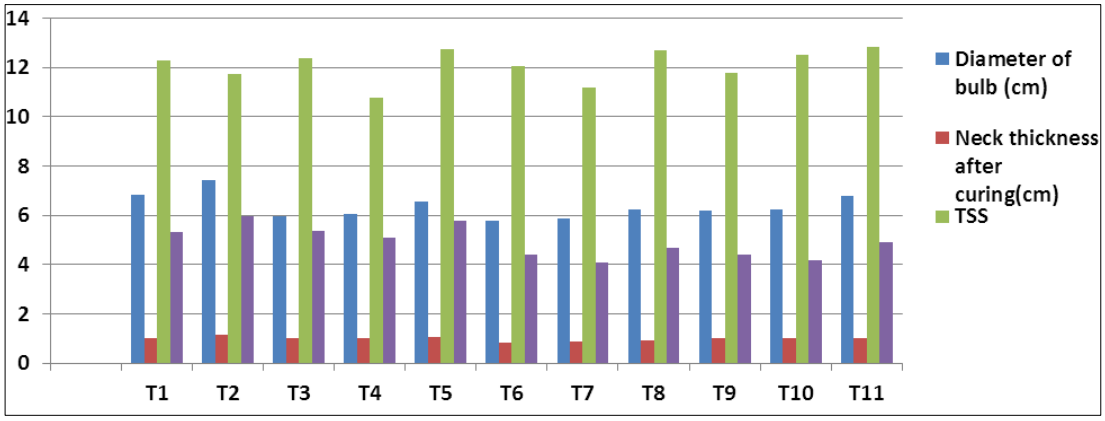

Fig 1: Impact of different organic manures on quality and quality parameters of onion

Total Soluble Solids (ºBrix)

Data presented in Table 3 and graphically presented in Fig 1 show that TSS was significantly influenced by treatments containing various integrated nutrient management. Maximum Total Soluble Solids (12.86 º Brix) was found in treatment T_{11} (125 kg/ha N through poultry manure) and it was statistically at par with treatment T_9, T_2, T_6, T_1, T_3, T_{10}, T_8 and T_5. Whereas, the minimum Total Soluble Solids (10.77 ºBrix) was found in treatment T_4 (50 % (50kg) recommended dose of N through vermicompost and 50% (50kg) recommended dose of N through chemical fertilizer).

Organic manures are capable of supplying adequate macro and micro plant nutrient which play important role in quality improvement through desirable enzymatic changes taking place during growth. Response of poultry manures in improving soil nutrition is well established fact and combined use of inorganic fertilizer and combine use of inorganic fertilizer with poultry manures also improve the quality of onion. These findings are confirming the results by earlier works like Verma *et al.* (1996) [5] in garlic and Jamir *et al.* (2013) [6] in onion.

Conclusion

Application of organic fertilizers was found to be useful. For quality maximization, poultry manure along recommended dose of P and K appeared to be the best in respect of quality management by enriching the soil with organic matter and turning vegetable cultivation towards organic farming.

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