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Effect of organic farming on yield, yield parameters and storage quality of onion (*Allium cepa* L.)

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Abstract
The present experiment was laid out in randomized complete block design with four replications with aims to determine Effect of organic farming on yield, yield parameters and storage quality of onion (*Allium cepa* L.) in Rabi season during 2016-17 at experimental farm of TCA; Dholi with five treatments (var. Agrifound Light Red) planted in December. Observations were recorded on all the five plants maintained carefully in each plot for six quantitative characters *viz*., TBY=Total bulb yield (q/ha), DB=Double bulbs (%), BB=Bolter bulbs (%), MBY=Marketable bulb yield (q/ha), cost benefit ratio (B:C ratio), total storage losses % (TSL) and dry matter yield (kg/ha) were recorded. Among the treatments, maximum total bulb yield (258.38 q/ha) by T_5-INM (recommended package of practices-Inorganic + organic source) followed by T_1-Vermicompost @ 15 t/ha and T_3-Farm Yard Manure @ 30 t/ha with (237.38 q/ha) and (222.65 q/ha) respectively, were recorded. In case of marketable bulb yield, T_5-INM (recommended package of practices-Inorganic + organic source) followed by T_1-Vermicompost @ 15 t/ha given maximum marketable bulb yield (250.02 q/ha) and (230.01 q/ha) respectively. Maximum cost benefit ratio was found by T_5-INM (recommended package of practices-Inorganic + organic source) followed by T_1-Vermicompost @ 15 t/ha with (2.61: 1) and (2.34: 1) respectively. Minimum total storage losses was recorded by T_1-Vermicompost @ 15 t/ha with (71.25 %) which was best from rest treatments during investigation. Maximum dry matter yield by T_2-Poultry manure @ 15 t/ha was significantly superior one.

Keywords: INM, Onion, total yield, marketable yield, Economics, TSL (%)

1. Introduction
Onion is considered to be the second most important vegetable crop grown in the world after tomato. It is an indispensible item in every kitchen as vegetable and condiment used to flavour many of the food stuffs. Therefore, onion is popularly referred as "Queen of Kitchen." In addition, onion is used as salad and pickle. Recently onion is being used by processing industry to greater extent for preparing dehydrated forms like powder and flakes. Onion (*Allium cepa* L. 2n=16), is an important vegetable belonging to the family Alliaceae. It is most widely grown and popular crop among the *genus* Alliums. Onion is an important vegetable crop grown worldwide for its fleshy bulbs which are used for specific flavour and culinary properties, reference to onion can be found in the religious books like Bible and Koran. In India onion is grown since ancient time and it is known to have been cultivated
Since 600 BC. It has established well in India under tropical and short days. The nutritive value of the onion vary with varieties and generally 100g of edible bulb portion contain moisture (86.8 g), carbohydrates (11.0 g), protien (1.2 g), fiber (0.6 g) and mineral like calcium (180 mg), phosphorus (50 mg) and iron (0.7 mg); nicotinic acid (0.4 mg) and trace of thiamine, altogether accounting for an average nutritive value of 2.06. Although the nutritive value of onion is low it is greatly valued for its inevitable and extensive usage as a vegetable to a medicine. It is well established fact that Post harvest factors *viz.* curing, grading, packaging and transportation are however main factors affecting the quality of onion Gertsson *et al.* (2002) [4]. The productivity (22.97 t/ha) of onion in Bihar is higher than national average productivity (16.13 t/has). Bihar is the largest producer of onion in the eastern India. There are many essential nutrients which are required to promote the growth and the development of plants. Among them nitrogen, phosphorus and potash are important nutrients which are utilized in large amount by plant are called major nutrients. Organic farming is good method for providing all essential plant nutrients for longer time without extra expenses, viz.; FYM, Vermi-compost, Poultry manure and Neem cake also applicable under INM. Despite the release of number of varieties the productivity remains static. Keeping in view the importance

of the crop and low productivity Directorate of Onion and Garlic, Rajgurunagar, Pune, Maharashtra taken up to see the Effect of organic farming on yield, yield parameters and storage quality of onion (*Allium cepa* L.).

2. Material and Methods

The present experiment was conducted in Randomized complete block design with four replications at Tirhut College of Agriculture, Dholi campus of Dr. RPCAU, Pusa, Samastipur, Bihar. Five treatments viz; T_1-Vermicompost @ 15 t/ha, T_2-Poultry manure @ 15 t/ha, T_3-Farm Yard Manure @ 30 t/ha, T_4-Neem cake @ 5 t/ha, T_5-INM (recommended package of practices-Inorganic + organic source) were studies on onion crops Var. Agrifound Light Red (ALR), during *Rabi* season, December, 2016-17. The plot size 240 m/treatment and spacing (15cm x10cm) were maintained and other recommended agronomical practices were done during the period of studies. FYM @ 15t/ha and N:P:K:S:: 110:40:40:30 (kg/ha) were applied in all treatments from T_1 to T_5, uniformly. One third of N and full dose of P, K, S and micro-nutrients should be applied as basal dose. Remaining two third of nitrogen should be applied in two equal splits after 30 and 45 days after transplanting (DAP). Organic should be applied one month before transplanting. Use trichoderma @ 5 kg/ha. In organic treatment, only organic plant protection measures should be followed for control of pest and diseases (Neem oil, karanj oil etc.). Physical condition of experimental field was represented in table-1. Observations were recorded on all the five plants maintained carefully in each plot for six quantitative characters *viz*., TBY=Total bulb yield (q/ha), DB=Double bulbs (%), BB=Bolter bulbs (%), MBY=Marketable bulb yield (q/ha), cost benefit ratio (B:C ratio), total storage losses % (TSL) and dry matter yield (kg/ha) were recorded.

3. Results and Discussion

Among the treatments, maximum total bulb yield (258.38 q/ha) by T_5-INM (recommended package of practices-Inorganic + organic source) followed by T_1-Vermicompost @ 15 t/ha and T_3-Farm Yard Manure @ 30 t/ha with (237.38 q/ha) and (222.65 q/ha) respectively, were recorded. In case of marketable bulb yield, T_5-INM (recommended package of practices-Inorganic + organic source) followed by T_1-Vermicompost @ 15 t/ha given maximum marketable bulb yield (250.02 q/ha) and (230.01 q/ha) respectively. Maximum cost benefit ratio was found by T_5-INM (recommended package of practices-Inorganic + organic source) followed by T_1-Vermicompost @ 15 t/ha with (2.61: 1) and (2.34: 1) respectively. Minimum total storage losses was recorded by T_1-Vermicompost @ 15 t/ha with (71.25 %) which was best from rest treatments during investigation (Table-2). Maximum dry matter yield by T_2-Poultry manure @ 15 t/ha was significantly superior one. Similar result was found by Shinde *et al.* (2016) [5], Chavan *et al.* (2016) [1] and Thangasamy *et al.* (2016) [7]. It is concluded that Out of five treatments T_5-INM (recommended package of practices-Inorganic + organic source) was best from other treatments and it may be use for commercial cultivation of onion.

4. Conclusion

It is concluded that Out of five treatments T_5-INM (recommended package of practices-Inorganic + organic source) was best from other treatments and it may be use for commercial cultivation of onion by using organic manures along with inorganic fertilizers.

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Table 1: Soil Properties of Experimental field before transplanting the onion during 2016-17

Soil properties	Before planting
Soil texture	Sandy loam
Soil pH	8.31
Electrical Conductivity (dSm^{-1})	0.34
Soil Organic Carbon (mg g^{-1})	4.81
Available Nitrogen (kg ha^{-1})	221
Available Phosphorus (kg ha^{-1})	16.98
Available potassium (kg ha^{-1})	129.13
Available Sulphur (kg ha^{-1})	18.11
Available Fe (mg/kg)	7.87
Available Mn (mg/kg)	3.27
Available Zn (mg/kg)	0.44
Available Cu (mg/kg)	1.24
Available B (mg/kg)	0.67

Table 2 Effect of organic farming on yield and yield parameters of onion during 2016-17

Treatment	TBY (q/ha)	Doubles (%)	Bolters (%)	MBY (q/ha)	B:C ratio	TSL (%)	Dry matter yield (kg/ha)		
							Leaves	Bulbs	Total
T_1	237.38	2.01	1.98	230.01	2.34:1	71.25	1.31	22.64	23.95
T_2	204.65	1.99	2.13	194.06	1.39:1	67.62	2.03	34.10	36.13
T_3	222.65	2.04	1.97	214.06	2.01:1	80.32	1.58	31.20	32.78
T_4	204.50	2.09	2.14	198.53	1.79:1	78.89	0.97	28.10	29.07
T_5	258.38	2.11	1.98	250.02	2.61:1	82.27	1.33	23.41	24.74
SEm (±)	3.82	0.32	0.33	6.89	-	1.20	3.56	1.36	-
CD (5 %)	14.44	0.95	0.98	22.47	-	3.51	4.66	4.07	-
CV %	4.50	8.16	6.55	5.49	-	10.86	16.43	13.22	-

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