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Prajapati PJ
PG In-Service Student and Scientist (Agronomy), Krishi Vigyan Kendra, JAU, Amreli, Gujarat, India

Vekariya PD
Associate Research Scientist (Agronomy), Main Dry Farming Research Station, JAU, Targhadia, Rajkot, Gujarat, India

Corresponding Author:
Prajapati PJ
PG In-Service Student and Scientist (Agronomy), Krishi Vigyan Kendra, JAU, Amreli, Gujarat, India

Effect of organics on growth and yield of drip irrigated onion (*Allium cepa* L.) under organic condition

Prajapati PJ and Vekariya PD

Abstract
An experiment was conducted on medium black clayey soil at organic plot, Krishi Vigyan Kendra, Junagadh Agricultural University, Amreli (Gujarat) during *rabi* season year of 2018-19 and 2019-20 to evaluate some organic manures and cow-based bio-enhancers for organic cultivation of drip irrigated onion (var. GJRO-11). Ten treatments comprising *Panchagavya* as foliar spray @ 3% at 30, 45 and 60 DAT + FYM @ 5 t ha^{-1}, *Jivamrut* as drenching @ 5% at 15, 30 and 45 DAT + FYM @ 5 t ha^{-1}, Cow urine as foliar spray @ 3% at 15, 30 and 45 DAT + FYM @ 5 t ha^{-1}, Seaweed extract as foliar spray @ 3.5% at 30, 45 and 60 DAT + FYM @ 5 t ha^{-1}, Banana sap as foliar spray @ 1% at 30, 45 and 60 DAT + FYM @ 5 t ha^{-1}, Vermiwash as foliar spray @ 2% at 45 and 60 DAT + FYM @ 5 t ha^{-1}, Enrich vermi compost @ 2 t ha^{-1} + FYM @ 5 t ha^{-1}, Vermi compost @ 2 t ha^{-1} + FYM @ 5 t ha^{-1}, FYM @ 20 t ha^{-1} and Control (Absolute) in randomized block design with three replications. The experiment results basis on two year pooled mean revealed that application of FYM 20 t ha^{-1} followed by *Panchagavya* as foliar spray @ 3% at 30, 45 and 60 DAT + FYM @ 5 t ha^{-1}, *Jivamrut* as drenching @ 5% at 15, 30 and 45 DAT + FYM @ 5 t ha$^{-1,}$ enrich vermi compost @ 2 t ha^{-1} + FYM @ 5 t ha^{-1}, vermi compost @ 2 t ha^{-1} + FYM @ 5 t ha^{-1} were found superior in respect of the plant height (cm), number of leaves plant^{-1}, leaf length (cm), neck thickness (mm), no. of scale per bulb, polar diameter (mm), equatorial diameter (mm), bulb weight (g) and bulb yield (t ha^{-1}).

Keywords: Organic farming, onion, bio enhancers, organic manures

Introduction
Onion (*Allium cepa* L.) is one of the important bulbous vegetable crops of India. It is most important condiments and vegetable crops grown throughout the world for its pungency and nutritive value. In the global vegetable scenario, onion ranks second in area and third in production. Onion is extremely important vegetable crop not only for internal consumption but also as highest foreign exchange earner among the fruits and vegetables. The export of onion during 2017-18 was 1588985.71 MT with a value of Rs 308882.23 Lacs (Anon., 2018) [2]. India is the leading exporter of onion. The total area under onion in India is about 12.85 lakh hectares with production of 232.62 lakh tonnes and productivity of 18.1 tonnes ha^{-1} in the year 2017-18. India is the world leader in production of onion, which is mostly grown in the states of Maharashtra, Madhya Pradesh, Karnataka, Bihar, Rajasthan, Gujarat, Andhra Pradesh, Haryana, West Bengal and Uttar Pradesh (Anon., 2020).

Global awareness of health and environmental issues has increased in recent years and the demand for organically grown food products is increasing worldwide. Before the Green Revolution, farming was mostly done through natural and traditional farming methods. As a result of the Green Revolution, the use of chemical fertilizers and pesticides has been encouraged. Indiscriminate use of chemical fertilizers and pesticides has caused many harmful effects on soil, water and environment due to their pollution and reduction in soil productivity. Also, agricultural lands are continuously shrinking and pose a major threat to the global environment and land resources. These threats are biodiversity erosion and desertification and climate change marching towards environmental, soil, air, water and food pollution. Hence, there is now a major concern to maintain soil health and protect the environment by popularizing eco-friendly and cost-effective organic fertilizers.

Organic farming system is not new in India and has been followed since ancient times. The main purpose of organic farming is to cultivate the soil and raise the crops in such a way, that the soil is alive and healthy by using organic waste (crop, animal, farm waste and aquatic waste) and others. Organic material with beneficial microbes (bio-fertilizer) to release nutrients to crops to increase sustainable production in an environmentally friendly, pollution-free environment.

Therefore, in this study, the effect of FYM, vermicompost, enrich vermicompost, *Panchgavya*, *Jivamrut*, cow urine, seaweed extract, Banana sap, vermi wash has been tested in the onion crop based on organic farming. In fact, these manures and microbial consortia are rich sources of useful microorganisms, plant growth promoting hormones including beneficial nutrients and immune enhancers.

Materials and Methods

An experiment was conducted during two years in *Rabi* season of 2018-19 and 2019-20 at Organic plot, Krishi Vigyan Kendra, JAU, Amreli. The meteorological data it is clear that the weather parameters such as temperature, relative humidity, sunshine hours, wind velocity and evaporation were more or less congenial for growth and development of onion crop during *Rabi* season of 2018-19 and 2019-20. Soil of the experimental plot was clayey in texture, medium in organic carbon, slightly alkaline in reaction, electrical conductive normal, medium in available nitrogen, medium in available phosphorus and high in available potash during both the years of 2018-19 and 2019-20. The experiment comprising of 10 treatments and it was laid out in Randomized Block Design (RBD) with three replications. The details of the treatments were given as ten treatments comprising of some cow-based bio-enhancers and botanicals *viz*.,T_1: *Panchagavya* as foliar spray @ 3% at 30, 45 and 60 DAT + FYM @ 5 t ha^{-1}, T_2: *Jivamrut* as drenching @ 5% at 15, 30 and 45 DAT + FYM @ 5 t ha^{-1}, T_3: Cow urine as foliar spray @ 3% at 15, 30 and 45 DAT + FYM @ 5 t ha^{-1}, T_4: Seaweed extract as foliar spray @ 3.5% at 30, 45 and 60 DAT + FYM @ 5 t ha^{-1}, T_5: Banana sap as foliar spray @ 1% at 30, 45 and 60 DAT + FYM @ 5 t ha^{-1}, T_6: Vermiwash as foliar spray @ 2% at 45 and 60 DAT + FYM @ 5 t ha^{-1}, T_7: Enrich vermi compost @ 2 t ha^{-1}+ FYM @ 5 t ha^{-1}, T_8: Vermi compost @ 2 t ha^{-1} + FYM @ 5 t ha^{-1}, T_9: FYM @ 20 t ha^{-1} and T_{10}: Control (Absolute). Growth and yield observations were recorded according to standard procedure on plant height (cm), number of leaves plant^{-1}, leaf length (cm), neck thickness (mm), no. of scale per bulb, polar diameter (mm), equatorial diameter (mm), bulb weight (g) and bulb yield (t ha^{-1}).

Result and Discussion

Scrutiny of the two year pooled data plainly specified that application of different organics treatments were found to have significant positive effect on growth parameters (Table 1) *viz.*, plant height (cm), number of leaves plant^{-1}, leaf length (cm), neck thickness (mm) and yield attributing characters (Table 2) *viz.*, no. of scale per bulb, polar diameter (mm), equatorial diameter (mm), bulb weight (g) and bulb yield (t ha^{-1}) as compare to control.

Application of FYM @ 20 t ha^{-1} (T_9) recorded significantly maximum value of plant height at 30, 60 and 90 DAT and at harvest, number of leaves at 30, 60 and 90 DAT and at harvest, leaf length at 30, 60 and 90 DAT and at harvest, neck thickness at 90 DAT and at harvest and number of scales per bulb at harvest and it was remained at par with *Panchagavya* as foliar spray @ 3% at 30, 45 and 60 DAT (T_1) + FYM @ 5 t ha^{-1}, *Jivamrut* as drenching @ 5% at 15, 30 and 45 DAT (T_2) + FYM @ 5 t ha^{-1}, Enrich vermi compost @ 2 t ha^{-1} (T_7) + FYM @ 5 t ha^{-1} and Vermi compost @ 2 t ha^{-1} (T_8) + FYM @ 5 t ha^{-1}. While, the lowest value of these growth parameters were recorded in control (T_{10}). This might be due to the fact that application of FYM resulted in vigorous vegetative growth of the plant and imparted dark green colour to the foliage which favoured photosynthetic activity of the plant and greater synthesis of carbohydrate in the leaves leading to formation of amino acids, nucleo-proteins, chlorophyll, alkaloids and amides (Kaswan *et al.* 2017) [4]. These complex compounds are responsible for building up of new tissues and are associated with several metabolic processes, which in turn favoured better development of plant. These results agree with the findings of Praveenkumar *et al.* (2014) [6], Sundharaiya *et al.* (2016) [11], Mavarkar *et al.* (2016) [5], Sundharaiya *et al.* (2017) [10], Sachin *et al.* (2017) [9] in garlic and Bijjula and Somasundaram (2019) [12].

The yield contributing characters like no. of scale per bulb, polar diameter, equatorial diameter, bulb weight and bulb yield recorded significantly higher under organics treatment FYM @ 20 t ha^{-1} (T_9). This was followed by *Panchagavya* as foliar spray @ 3% at 30, 45 and 60 DAT (T_1) + FYM @ 5 t ha^{-1}, *Jivamrut* as drenching @ 5% at 15, 30 and 45 DAT (T_2) FYM @ 5 t ha^{-1}, Enrich vermi compost @ 2 t ha^{-1} (T_7) + FYM @ 5 t ha^{-1} and Vermi compost @ 2 t ha^{-1} (T_8)+FYM @ 5 t ha^{-1}. While, the minimum values of yield attributing characters were observed in the control.

In general, the significant improvement in yield attributes of onion with the farmyard manure could be ascribed to overall improvement in vigour and crop growth as already explained in preceding growth parameters. Adequate amounts of major and minor nutrients supplied by FYM play an important role in promoting rapid fresh weight and dry weight in onion of bulb in terms of number of scales per bulb, polar and equatorial diameter of bulb, bulb weight and bulb yield. These parameters were recorded significantly higher with application of 20 tonnes FYM per hectare. FYM promotes net photosynthesis and strongly aids in the transfer of photosynthesis to the storage organ of the bulb resulting in increased bulb growth in diameter and weight. Bulb yield is a primary function of the cumulative effect of all these parameters. The beneficial effects of farmyard manure on yield attributes were probably due to enhanced supply of macro as well as micronutrients during entire growing season. It may be attributed to higher production of food and subsequent greater division into sinks. Greater availability and supply of nutrients to plants favours flower and fruit formation, ultimately increasing bulb yield. The FYM might enhance the efficiency of uptake of native and soil nutrients. The reason for increased bulb yield with the application of farmyard manure could be attributed to solubilisation effect of plant nutrients by the addition of FYM leading to increased uptake of nutrients especially NPK as reported by Raina and Jaggi (2008) [7]. The improvement in bulb weight and yield of onion in response to farmyard manure application is possibly attributed to improved soil physical conditions and slow release availability of nutrients. The present findings are in accordance with those earlier reported by Praveenkumar *et al.* (2014) [6], Sundharaiya *et al.* (2016) [11], Mavarkar *et al.* (2016) [5], Sundharaiya *et al.* (2017) [10], Kaswan *et al.* (2017) [4], Ram *et al.* (2017) [8] in garlic, Sachin *et al.* (2017) [9] in garlic and Bijjula and Somasundaram (2019) [12].

Table 1: Effect of organics on growth parameters of onion under organic condition (Pooled data over 2 years)

Treatment	Plant height (cm)				Number of leaves plant^{-1}				Leaf length (cm)				Neck thickness (mm)	
	30 DAT	60 DAT	90 DAT	At Harvest	30 DAT	60 DAT	90 DAT	At Harvest	30 DAT	60 DAT	90 DAT	At Harvest	90 DAT	At Harvest
T_1	27.2	40.2	58.6	53.6	5.2	8.3	15.0	12.0	27.0	42.0	58.6	50.6	14.0	14.5
T_2	26.7	39.7	58.3	53.3	4.6	8.2	14.9	11.9	26.9	41.9	58.3	50.3	14.1	14.6
T_3	22.1	35.1	49.5	44.5	3.2	5.9	12.5	9.8	24.0	38.8	49.5	41.5	11.5	12.3
T_4	23.3	35.8	52.3	47.3	3.3	6.4	12.9	10.4	23.7	39.1	52.3	44.3	11.6	12.1
T_5	23.3	35.8	53.1	48.1	2.9	5.9	12.5	10.0	24.3	39.5	53.1	45.1	12.0	12.5
T_6	23.1	35.7	52.8	47.8	3.5	6.6	13.0	10.3	24.1	40.0	52.8	44.8	11.6	12.3
T_7	26.5	39.5	57.7	53.0	4.5	7.6	14.1	11.7	26.7	42.1	57.7	50.0	13.7	14.6
T_8	26.3	39.3	59.1	54.1	4.5	7.3	14.2	12.0	26.8	42.6	59.1	51.1	13.5	14.4
T_9	28.3	41.4	60.7	55.7	5.7	8.8	15.4	12.7	27.7	44.9	60.7	52.7	14.8	15.7
T_{10}	20.2	29.1	44.1	36.9	2.7	5.7	11.7	9.2	22.2	35.6	44.1	33.9	10.7	11.0
S. Em. ±	0.80	1.07	1.5	1.2	0.18	0.3	0.4	0.36	0.8	1.1	1.5	1.2	0.50	0.5
C.D. (P=0.05)	2.3	3.08	4.3	3.4	0.5	0.8	1.3	1.03	2.2	3.3	4.3	3.4	1.44	1.4

Table 2: Effect of organics on yield attributing characters of onion under organic condition (Pooled data over 2 years)

Treatment	No. of scale per bulb	Polar diameter (mm)	Equatorial diameter (mm)	Bulb weight (g)	Bulb yield (t ha^{-1})
T_1	12.0	55.0	59.4	68.8	28.22
T_2	12.1	53.9	58.2	68.5	28.20
T_3	9.5	45.9	50.8	59.7	25.10
T_4	9.6	48.7	53.1	62.5	24.94
T_5	10.0	50.0	54.4	63.4	25.02
T_6	9.6	46.2	50.6	57.4	25.65
T_7	12.1	54.6	59.0	68.2	28.22
T_8	11.9	56.0	60.4	69.6	28.93
T_9	13.2	57.6	62.0	71.2	30.27
T_{10}	8.5	42.1	46.0	47.3	21.89
S. Em. ±	0.47	1.4	1.4	1.8	0.99
C.D. (P=0.05)	1.36	3.9	3.9	5.2	2.84

Conclusion

From the result of two years pooled data in this paper mentioned that mostly all growth and yield attributing characters found best under organic manure FYM @ 20 t ha^{-1} followed by vermi compost @ 2 t ha^{-1} with FYM @ 5 t ha^{-1} and enrich vermicompost @ 2 t ha^{-1} with FYM @ 5 t ha^{-1} but if more quantity of FYM and vermicompost are not available then used *Panchagavya* and *Jivamrut* with 5 t ha^{-1} FYM for higher growth and yield in onion under organic condition.

References

1. Anonymous. Agricultural Statistics at a Glance. Directorate of Economics and Statistics, Department of Agriculture Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, 2019.
2. Anonymous. Horticultural Statistics at a Glance. Horticulture Statistics, Department of Agriculture Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, 2018.
3. Kartik Chandra Sahu, Dr. Mahendra Kumar Satapathy. Rooftop garden an organic farming to grow uncontaminated vegetable improved food quality and food security in Bhubaneswar City, India. Int. J Agric. Extension Social Dev. 2021;4(2):110-116. DOI: 10.33545/26180723.2021.v4.i2b.110
4. Kaswan PK, Yadav PK, Jakhar RK, Amit Kumawat, Harish Kumar. Effect of different varieties and FYM levels on yield and quality of onion (*Allium cepa* L.) in Arid Western Rajasthan, India. International Journal of Current Microbiology and Applied Sciences. 2017;6(6):497-503.
5. Mavarkar NS, Naik B, Naik KP, Sharanappa HG. Effect of organic source of nutrients on groundnut (*Arachis hypogaea* L.) under southern transitional zone of Karnataka. International Journal of Tropical Agriculture. 2016;34(3):567-571.
6. Praveenkumar DA, Thontadarya RN, Pujar Udachappa, U, Allolli TB. Onion growth yield and quality parameters as influenced by Panchagavya and other biofertilizers. Green Farming. 2014;5(6):998-1000.
7. Raina SK, Jaggi RC. Effect of sulphur in presence and absence of farmyard manure on onion under onion-maize cropping sequence. Indian Journal of Agriculture Sciences. 2008;78(8):659-662.
8. Ram Niwas Yadav, Bairwa HL, Gurjar MK. Response of garlic to organic manures and fertilizers. International Journal of Current Microbiology and Applied Sciences. 2017;6(10):4860-4867.
9. Sachin AJ, Bhalerao PP, Patil SJ. Effect of organic and inorganic sources of nitrogen on growth and yield of garlic (*Allium sativum* L.) var. GG-4. International Journal of Chemical Studies. 2017;5(4):559-562.
10. Sundharaiya K, Renganayaki PR, Sujatha K, Sathish G. Effect of organic manures and bio-stimulants on growth and seed yield of multiplier onion (*Allium cepa* var. *aggregatum*) cv. Co (On 5). Agriculture Update. 2017;12(8):2239-2245.
11. Sundharaiya K, Sujatha K, Renganayaki PR, Sathish G. Exploitation of organic inputs for growth and yield of multiplier onion (*Allium cepa* var. *Aggregatum*) var. Co (On 5). Journal of Progressive Agriculture. 2016;7(2):52-58.
12. Bijjula Sruthi, Somasundaram E. Influence of organic manures on yield, quality and economics of *Aggregatum* onion (*Allium cepa.* L. var. *aggregatum*). Journal of Pharmacognosy and Phytochemistry. 2019;8(3):1768-1770.