# Performance of Different Organic Manures on Onion (Alium cepa L) in Srinagar Valley of Uttarakhand, India

Abstract

The present investigation entitled “Performance of Different Organic Manures on Onion (Alium cepa L) in Srinagar Valley of Uttarakhand” under usual practice was carried out at Rural Technology Demonstration Unit, the Department of Rural Technology, H.N.B. Garhwal University, Chauras Campus (Uttarakhand). The present experiment comprised of 8 treatments consist of different organic manure viz, FYM, Vermicompost, Poultry manure used singly or with the combination of two or three viz FYM @ 15 t/ha, Poultry manure @ 7.5 t/ha, Vermicompost @ 7.5 t/ha, FYM + Poultry manure @ 7.5t/ha+3.75t/ha, FYM + Vermicompost @ 7.5t/ha+3.75t/ha, Poultry manure + Vermicompost @3.75t/ha+3.75t/ha, FYM + Poultry + Vermicompost @ 7.5t/ha+3.75t/ha+3.75t/ha, Control (Without any treatment). The Experiment was carried out in RBD with three replications. Observation regarding performance of different organic manures on growth parameters including plant height and number of leaves recorded at 30,60,90 DAS and at harvest. Yield and yield attributing traits measures neck thickness, length of bulb, diameter of bulb, fresh weight of bulb, dry weight of bulb, root length and yield. The performance of treatment T7 FYM @ 7.5 t/ha+ Poultry@3.75t/ha+ Vermicompost 3.75 t/ha was found the best in maximum characters taken for study.

Keywords: Allyl-propyl disulphide, Nasik red, Poultry manure, Vermicompost

# Introduction

Vegetables are an important part of world meal. Onion (*Allium cepa L*) is one of the important members of the Alliaceae family and amongst the most important vegetables in the world. Onion is also called Common onion, Garden onion and Bulb onion. In onion production India stand Second (2nd) rank in world. Demand of onion is universal. Onions have a history that goes back 5,000 years, but their exact origin remains unclear. They are probably native to Asia, particularly areas like North West India, Baluchistan, and Afghanistan. In India, Maharashtra and Gujarat are major onion-growing regions, with the crop being an important export commodity. Onion can be eaten raw and cooked. Onion is used on daily basis in the kitchen for the preparation of almost each vegetable dish.

Red colour onion is mostly preferred in India, while yellow colour varieties preferred in Japan, Europe and America. Small sized onions are more nutritive comparison to large size. Onion odour is pungent due to an enzyme response that occurs exclusively in cases of tissue damage. The pungency of onions comes from a volatile oil called allyl-propyl disulphide. This intensity changes based on the type of onion, its maturity, how long it’s stored, and the nutrients it receives. The pungency is strongest just before the onion tops fall over in the field. The outer skin colour is due to presence of quercetin (Tamburaj and Singh, 2003).

India is a net exporter of onions, generating significant revenue from international sales. In the last three years, the country earned Rs. 3,326.99 crore in 2021-22, Rs. 4,525.91 crore in 2022-23, and Rs. 3,513.22 crore in 2023-24 from onion exports, showcasing its prominent position in the global onion market. (Ministry of Consumer Affairs, Food & Public Distribution, 2024)

Onions are known as the "Queen of Kitchen" due to their versatility in cooking. They're used in various dishes, such as salads, curries, boiled, fried, baked, and pickled preparations. Onions also have medicinal properties, acting as a stimulant, diuretic, expectorant, and antibacterial agent. Additionally, they may help prevent heart disease by reducing blood cholesterol and lipid levels (Yadav *et.al* 2024).

 Onion plants can be successfully grown in an organic fertilizer. These fertilizers improve onions’ chemical and physical characteristics (Ghuncha *et.al.*2024).

To realize the maximum yield potential of a genotype, it is necessary that the optimum environmental conditions for the growth and development of the crop are provided. The response of different agronomical practices in various onion growing areas is yet to be fully evaluated. The use of organic manure helps crop to meet micro and macro nutrient requirement. Organic manure enhances soil quality by improving its physical, chemical, and biological properties. It also helps the soil retain moisture better, leading to increased crop productivity.

# Materials and Methods

The experiment was carried out at Rural Technology Demonstration Unit, the Department of Rural Technology, H.N.B. Garhwal University, Chauras Campus (Uttarakhand), India during winter season, 2019-2020. Geographically, the nursery in rural tech. of Hemwati Nandan Bahuguna Garhwal University, Srinagar (Garhwal) is situated in Alaknanda valley which lies between valley (78° 47’ 30" E longitude and 30° 13’ 0" N latitude, right in the heart of Garhwal region at an elevation 540 m above MSL, in the lesser Himalayan region. This valley is about 6 km long and 3 to 4 km wide and divisible into two halves by the holy river Alaknanda which flows from north-east to south-west direction. It is 132 km away from Haridwar on the Haridwar-Badarinath Dham highway. The present experiment comprised of 8 treatments consist of different organic manure viz, FYM, Vermicompost, Poultry manure used singly or with the combination of two or three viz FYM @ 15 t/ha, Poultry manure @ 7.5 t/ha, Vermicompost @ 7.5 t/ha, FYM + Poultry manure @ 7.5t/ha+3.75t/ha, FYM + Vermicompost @ 7.5t/ha+3.75t/ha, Poultry manure + Vermicompost @3.75t/ha+3.75t/ha, FYM + Poultry + Vermicompost @ 7.5t/ha+3.75t/ha+3.75t/ha, Control (Without any treatment). The Experiment was laid out in RBD with three replications. The 6-week-old seedling of onion cv. Nasik Red were transplanted, on the time of transplantation they attain the height of 12-15cm. Fifteen (15)

days prior to the date of transplanting of seedlings, the experimental field was deep ploughed & harrowed followed by planking and levelling. Stone and pebbles were removed from the field and then it was divided into 24 beds of equal size. The soil was well worked one day before seedling transplanting. During the experimentation, the following observations with regards to the growth, yield and quality parameters were recorded. Ten plants under each treatment were randomly selected and tagged for recording the observations.

# Result and Discussion Growth parameters

The experimental results and data presented in Table 4 showed significant differences among the treatments for plant height at 30 days after transplanting. The maximum plant height 30 days after transplant was recorded in treatment T5 (FYM @ 7.5 t/ha+ Vermicompost@3.75t/ha) showed maximum (17.907cm) plant height followed by treatment T6 (poultry@3.75t/ha+ Vermicompost@3.75t/ha) with 16.427cm plant height as compare to treatment T0 (control) which show minimum (10.613 cm) plant height. The maximum plant height 90 days after transplant was recorded in the treatment T4 (FYM @ 7.5 t/ha+ Poultry@3.75t/ha) whereas minimum in T0 (control). Among all the treatments, the treatment T5 (FYM @ 7.5 t/ha+ Vermicompost@3.75t/ha) showed maximum (68.287cm) plant height, followed by treatment T4 (FYM @ 7.5 t/ha+ Poultry@3.75t/ha) with 64.057cm, as compare to (control) treatment T0 which show minimum (51.563cm) plant height at harvest.

The maximum number of leaves (4.407) was recorded in T1 (FYM @ 15 t/ha) and treatment T0 (control) showed the minimum (2.127) number of leaves per plant after 30 days after transplanting. The maximum number of leaves 90 days after transplant was recorded in T4 (FYM @ 7.5 t/ha+ Poultry@3.75t/ha followed by treatment T1 (F YM @ 15 t/ha) with

8.130 and treatment T0 (control) showed the minimum (5.440) number of leaves per plant after 90 days after transplanting. Tt the time of harvest the maximum number of leaves (9.677) was found in treatment T7 (FYM @ 7.5 t/ha+ Poultry@3.75t/ha+ Vermicompost@3.75t/ha) followed by treatment T4 (FYM @ 7.5 t/ha+ Poultry@3.75t/ha) with 8.990. The treatment T3 (Vermicompost@7.5t/ha t) showed the minimum (7.190) number of leaves after harvesting.

# Yield parameters

The maximum neck diameter was recorded in treatment T3 (vermicompost) followed by in treatment T6 (poultry + vermicompost) and T1 (farm yard manure) Therefore, it was found that vermicompost plays an active role in vegetative growth of onion plant. These results are in accordance with the investigation of Vani et. al., (2019). The Length of bulb (cm) of onion was found in maximum in T7 (farm yard manure+ vermicompost + poultry) followed by in a treatment T7 (poultry + vermicompost), while the minimum length of bulb was found in T0 (Control). This might have accumulated more carbohydrates, resulting in to increased diameter of the bulb, which is the storage organ. These results were in agreement with those reported by Mia et al., (2004). The maximum bulb diameter was recorded in treatment T7 (farm yard manure + vermicompost+ poultry). The maximum fresh weight of bulb was found under the treatment T7 (farm yard manure+ vermicompost+ poultry) followed by treatment T4 (farm

yard manure+ poultry) and T2 (poultry) in which an increase in fresh weight of bulb recorded. As the plant leaves and roots system improved, the bulb development progressed. These results are in accordance with those of Mia et. al., (2004). The maximum dry weight of bulb was found in treatments T7 (farm yard manure+ vermicompost+ poultry). The treatment T0 (Control) showed poorest performance among all the treatments. These findings are in accordance with those of Mia et. al., (2004). The maximum root length was found under the treatment T7 (farm yard manure+ vermicompost+ poultry). Mekonnen et. al., (2017) also reported the similar results with respect to root length in onion. The highest bulb yield per hectare recorded under the treatment T7 (farm yard manure+ vermicompost + poultry) being statistically higher than the other treatments, and followed by in treatment T4 (farm yard manure+ poultry) recorded respectively.

Table 1 : Plant height and number of leaves measured at 30 and 90 days after treatment application

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Treatment** | | **Plant height (cm) 30 days ATP** | | **Plant height (cm) 90 days ATP** | | **Plant height at harvesting** | | **Number of leaves 30 days ATP** | | **Number of leaves 90 days ATP** | | **Number of leaves at harvest** | |
| T1 FYM @ 15 t/ha | | 12.333 | | 45.103 | | 61.390 | | 4.407 | | 8.130 | | 8.957 | |
| T2 [Poultry@7.5t/ha](mailto:Poultry@7.5t/ha) | | 14.993 | | 48.640 | | 57.747 | | 3.683 | | 7.423 | | 8.330 | |
| T3 [Vermicompost@7.5t/ha](mailto:Vermicompost@7.5t/ha) | | 13.263 | | 43.820 | | 54.463 | | 2.867 | | 6.623 | | 7.190 | |
| T4 FYM @ 7.5 t/ha+  [Poultry@3.75t/ha](mailto:Poultry@3.75t/ha) | | 16.040 | | 52.127 | | 64.057 | | 3.318 | | 8.347 | | 8.990 | |
| T5 FYM @ 7.5 t/ha+ [Vermicompost@3.75t/ha](mailto:Vermicompost@3.75t/ha) | | 17.907 | | 47.313 | | 68.287 | | 2.393 | | 6.817 | | 7.627 | |
| T6 poultry@3.75t/ha+  [Vermicompost@3.75t/ha](mailto:Vermicompost@3.75t/ha) | | 16.427 | | 46.257 | | 62.200 | | 2.660 | | 6.567 | | 7.370 | |
| T7 FYM @ 7.5 t/ha+  Poultry@3.75t/ha+ [Vermicompost@3.75t/ha](mailto:Vermicompost@3.75t/ha) | | 15.747s | | 43.230 | | 60.533 | | 3.133 | | 6.773 | | 9.677 | |
| T0 control | | 10.613 | | 42.720 | | 51.563 | | 2.127 | | 5.440 | | 7.380 | |
| C.D. at 5% level | | 0.443 | | 1.567 | | 0.367 | | 0.344 | | 0.851 | | 0.395 | |
| SEm± | | 0.145 | | 0.512 | | 0.12 | | 0.112 | | 0.278 | | 0.129 | |
| **Treatment** | **Neck thickness**  **(cm)** | | **Length of bulb (cm)** | | **Diameter of bulb(cm)** | | **Fresh weight of**  **bulb (gm)** | | **Dry weight of**  **bulb(g)** | | **Root length**  **(cm)** | | **Yield (q/ha.)** |
| T1 FYM @ 15 t/ha | 1.617 | | 3.411 | | 4.548 | | 115.853 | | 10.860 | | 7.753 | | 336 |
| T2 Poultry@7.5t/ha | 1.407 | | 3.413 | | 4.581 | | 135.825 | | 10.383 | | 8.160 | | 395 |
| T3  Vermicompost@7.5t/ha | 1.79 | | 3.466 | | 3.313 | | 101.687 | | 9.610 | | 6.680 | | 295 |
| T4 FYM @ 7.5 t/ha+  Poultry@3.75t/ha | 1.43 | | 3.385 | | 4.703 | | 145.927 | | 12.457 | | 8.887 | | 425 |
| T5 FYM @ 7.5 t/ha+  Vermicompost@3.75t/ha | 1.257 | | 3.561 | | 3.692 | | 124.824 | | 10.143 | | 6.723 | | 363 |
| T6 poultry@3.75t/ha+ Vermicompost@3.75t/ha | 1.767 | | 4.023 | | 4.703 | | 129.087 | | 7.827 | | 6.620 | | 376 |
| T7 FYM @ 7.5 t/ha+  Poultry@3.75t/ha+ Vermicompost@3.75t/ha | 1.52 | | 4.677 | | 5.383 | | 153.143 | | 13.493 | | 8.977 | | 445 |
| T0 control | 1.317 | | 2.864 | | 3.629 | | 90.507 | | 10.080 | | 5.187 | | 263 |
| C.D. at 5% level | 0.213 | | 0.231 | | 0.313 | | 1.223 | | 0.428 | | 0.596 | | 3.581 |
| SEm± | 0.07 | | 0.076 | | 0.102 | | 0.399 | | 0.14 | | 0.196 | | 1.169 |

# Table 2 : Measurement of neck thickness, bulb length, bulb diameter, fresh and dry weight of bulb, root length, and yield (q/ha) under different treatments

# CONCLUSION

The present investigation points towards the beneficial effects of organic manure applied as basal dose on growth and yield of onion variety Nasik Red. It can be concluded that all the growth and yield characters are influenced by the use of organic manure either used singly or in combination of two or three. The maximum plant height (68.287cm) was found under the treatment T5 (Farm yard manure + poultry) and the minimum plant height (51.563cm) were recorded with treatment T0 (control). The maximum number of leaves/plant was found under the treatment T7 (farm yard manure + vermin compost + poultry) 9.677 leaves, while the minimum number of leaves (7.190) was recorded under the treatment T3 (vermicompost). The maximum neck thickness (1.790cm) was recorded under treatment T3 (vermicompost). However, the minimum neck thickness (1.25 7cm) was observed with treatment T5 (farm yard manure + vermin compost). The maximum root lengths (8.977cm) were found under the T7 (farmyard manure + vermin compost+ poultry) were as, the lowest root length(5.187cm) was found under the treatment T0 (control). The maximum yield per hectare (321 q/ha) was recorded under treatment T7 (FYM @ 7.5 t/ha+ Poultry@3.75t/ha+ [Vermicompost @ 3.75t/ha](mailto:Vermicompost@3.75t/ha)), since the lowest yield (190q/ha) was found in T0 (control). The performance of treatment T7 (farm yard manure + vermicompost + poultry) was found the best in maximum characters taken for study. Similar conformity was given by Harpal Singh *et.al.* (2023) and Kaur *et.al.* (2023).

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc. have been used during the writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

# References

1. Balvir Kaur, A.K. Boparai and Kuldeep Singh (2023), Effect of Integrated Nutrient Sources on Agronomic Performance of Onion ( L ) and Soil Properties. Indian Journal of Ecology (2023) 50(2): 367-371.
2. Danje, A. A., Essilfie, M. E., & Asiedu, E. K. (2019), Growth and Yield Response of Two Onion (Allium cepa L.) Varieties to Organic and Inorganic Fertilizers in the Forest-Savannah Transitional Zone of Ghana. *Asian Journal of Agricultural and Horticultural Research*, *4*(4)1-14.
3. Harpal Singh and Rashmi Nigam(2023), Efficacy Of Combined Application Of Organics On Growth, Yield And Economics Of Onion. Biochem. Cell. Arch. Vol. 23, No. 1, pp. 125-127.
4. Tamburaj Singh S (2003). Onion in Textbook of Vegetables, Tuber Crops and Spices Published ICAR. New Delhi. 165-186.
5. IOSR Journal of Humanities and Social Science (IOSR-JHSS) Volume 22, Issue 9, Ver.

13 (September. 2017) PP 07-10 e-ISSN: 2279-0837, p-ISSN: 2279-0845.

[www.iosrjournals.org](http://www.iosrjournals.org/) (“Origin and History of Onions” \*Dr Indu Mehta)

1. Sanoj Kumar *et al* (2018) Response of onion (Allium cepa L.) cv. pusa red to various organic manures under subtropical condition of Garhwal Himalaya in Journal of Pharmacognosy and Phytochemistry; 7(1): 2294-2297 (E-ISSN: 2278-4136 P-ISSN:

2349-8234).

1. Naik VR *et al* (2014) Study on effect of different organics on yield and quality of organically grown onion. J Life Sci.; 9(4):1499-1503.
2. Meena AK, *et al* (2015) Effect of organic manures and bio-fertilisers on growth and quality attributes of kharif onion (Allium cepa L.) in semi-arid region. Indian Res. J Genet. & Biotech. 7(1):73-76.
3. Ngullie, R. E. N. B. O. M. O., & Biswas, P. (2017), Effect of plant and row spacing on growth and yield of onion under Mokokchung district of Nagaland. International Journal of Plant Sciences (Muzaffarnagar), 12, 28- 35.
4. Omprakash Yadav , S.S. Singh , Veerendra Kumar Patel, Vivek Kumar Singh , Suraj Mishra and Ramvikash Jaiswal (2024) Impact of Chemical Fertilizers, Organic Manure and Bio-inoculants on Sustainable Production of Onion (Allium cepa L.). Biological Forum – An International Journal 16(1): 31-36(2024).
5. Purohit, S., & Nagaich, K. N. (2015), Growth, yield and economics from organically produced onion cultivars. Annals of Plant and Soil Research, 17(4), 366- 369.
6. Parab, N., *et al* (2015), effect of coal fly ash with biofertilizers on onion yield, soil fertility and nutrient uptake under field conditions. Int. J. Environmental Sciences, 4(2), 81-93.
7. Tofiq, G. K., Halshoy, H. S., Mohammed, H. J., & Braim, S. A. (2024). Potential impact of biochar and organic fertilizer application on morphology, productivity and biochemical composition of onion plants. *Cogent Food & Agriculture*, *10*(1). https://doi.org/10.1080/23311932.2024.2432441