Effect of Different Organic and Inorganic Sources of Nutrients on Growth and Yield of Rabi Onion (Allium cepa L.)

Santosh Kumar Chaudhary*, Sushil Kumar Yadav1 Dilip Kumar Mahto2, Sanjay Kumar Singh3, Beer Bahadur Singh4 and Neha Sinha5

1Department of Agronomy, 2Department of Soil Science, 3Department of Vegetable Science, 4Department of Entomology, NCOH, Noorsarai, Nalanda, India 5Research Scholar, BAU Sabour, Bhagalpur, India

*Corresponding author

Abstract

An experiment was conducted in Bihar Agricultural University, at Nalanda College of Horticulture, Noorsarai, during Rabi season 2016, to evaluate the effect of complementary and sole applications of organic and inorganic fertilizers on the growth and yield of rabi onion. The soil of the experimental plot had 7.47 pH, 0.21 EC and 0.62 % organic carbon with 262, 14.60 and 142 kg ha⁻¹ available N, P and K respectively. There were seven different organic and inorganic sources viz., T1-inorganic fertilizer (IF) 120:60:40; T2-50 %NPK through IF+50 % through FYM; T3-50 % N through FYM+50 % N through VC; T4- 1/3 of N each through FYM + VC + Neemcake; T5-50% N through FYM + PSB + Azotobactor; T6-T3+PSB + Azotobactor and T7-T3+PSB + Azotobactor have been taken for study. The experiment was conducted in randomized block design (RBD) with three replications. Results showed that plant height differed significantly due to different treatments at 30 and 60 DAT. At both the stages, 100% inorganic fertilizer (T1) recorded significantly highest plant height followed by T2 and T6. Number of leaves didn't differ significantly during early stage of crop growth but during later stage (60 DAT) it differed significantly and recorded highest in T1 followed by T2 and T6. Equatorial diameter of the bulb didn’t differ significantly and found similar in T1, T2 and T6. Bulb yield differed significantly and found highest in T1 (245.3 q ha⁻¹) which was at par with T2 (229.7 q ha⁻¹) and T6 (200.3 q ha⁻¹). Gross and net return, didn’t differ significantly but recorded maximum in T1 followed by T2 and T6. Although, B: C ration differed significantly and found highest in T1 (3.5). It may be due to low input cost and high yield. On the basis result obtained T2 as 50 %NPK through fertilizer+50 %N through FYM can be adapted as sustainable crop production being at par with 100% inorganic fertilizer sources.

Keywords
Onion, FYM, Vermicompost, Neemcake, Inorganic, Organic, Fertilizers

Introduction

Onion being important bulbous vegetable crop included in the top 15 commonly grown vegetables worldwide (Best, 2000); (Jahromi and Amirizadeh, 2015). It is globally the most marketable crop that too, round the year and can be grown under wide range of Agro-climate conditions. Irrespective of price, its demand remains almost constant in the
market as it is primarily used as seasoning for a wide variety of dishes. In India, onion is produced in three seasons *i.e.* kharif, rabi and late kharif. Of these, 64.7 percent production comes from *rabi* crop while *kharif* and late *kharif* crops contribute 15.1 and 20.08 percent, respectively (Anonymous 2016-17). Considering its domestic consumption and export, attention is needed for its quality and sustainable production. Since, intensive use of soils specifically those oriented to horticultural production, has caused the decrease of organic matter and nutrient, that has been identified as one of the most important threats to the quality of soils (Bevacqua and Mellano, 1994); (Maynard, 1995); (Kalaivanan and Hattab, 2016). Although, application of organic amendments, coming from the composting process of different kinds of wastes significantly improved the nutritional condition of the plant as well as in the performance and quality of harvested crops (Arancon et al., 2004); (Lee et al., 2004); (Giannakis et al., 2014). Organic manure and inorganic fertilizers have paramount importance in ameliorating the yield and soil sustainability. Researches on various aspects of its production technology have been carried out, but limited number of works has been done on different organic sources of nutrients in onion.

The cultivation of crop requires balance supply of plant nutrients, but farmers applying only chemical fertilizer for fetching maximum yield. Furthermore, Obi and Ofonduro (1997) and Moyin-Jesu (2007) also reported that problems associated with continuous use of chemical fertilizers included nutrient imbalance, increased soil acidity, degradation in soil physical properties and loss of organic matter. And therefore, adequate and uniform supply of nitrogen is essential for plant growth, bulb yield and good quality (Tandon 1987). The tendency to supply all plant nutrients through chemical fertilizer should be reconsidered, because of the deleterious effect on soil productivity on a long-term basis. However, these requirements of nutrients can be met through applying organic manure or its combination with inorganic fertilizers that increase the soil organic matter which is (SOM) known to improve many soil properties such as soil structure, water holding capacity and nutrient supply (Johnston *et al.*, 2009). Since, fertility of a particular soil is determined by the presence of organic matter which rely on several factors like origin of soil, climatic conditions, type of vegetations and microbial activities. Therefore, organic matter is needed to restore in soil either by supplying nutrient through organic sources or through residue management.

Organic manures contain all the essential plant nutrients, but after application they require time to convert from unavailable to available form. That’s why the response of crops to organic manures is initially low. But due to the residual and beneficial effects on soil properties, application of organic manures is need to be encouraged. Application of both organic and inorganic fertilizers altogether can increase the yield and keep the environment sound (Hsieh *et al.*, 1995), increase the productivity of soil as well as crop quality (Tindall, 2000). There is great scope in improving the yield, quality and shelf life of onion (Gupta *et al.*, 1999) with integrated nutrient management using organic fertilizers. Keeping above aspects in view the present investigation has been carried out to study the effect of organic and inorganic fertilizers on growth, yield attributes, yield and economics in *rabi* onion.

**Materials and Methods**

This experiment was conducted at Nalanda College of Horticulture, Noorsarai, Nalanda...
during 2017, to assess the suitable source and optimum dose of organic fertilizer for \textit{Rabi} onion in onion-onion- bottle gourd cropping system. The initial soil chemical properties of the experimental field were 7.47 pH, 0.21 EC and 0.62 % organic carbon and 262, 14.60 and 142 kg ha$^{-1}$ available N, P and K, respectively.

The experiment was laid down in Randomized Block Design with three replications. There were seven nutrient treatments \textit{viz.}, $T_1$-Inorganic fertilizers (120, 60, 40 kg N, P$_2$O$_5$ and K$_2$O), $T_2$-50 % NPK through inorganic fertilizer (IF)+50 % N through FYM, $T_3$-50% N through FYM+50 % N through VC, $T_4$-1/3 each through FYM + VC + Neemcake, $T_5$-50% N through FYM + biofertilizers, $T_6$-T3+biofertilizer and $T_7$-T4+ biofertilizer, have been taken for study. There were three organic fertilizer sources \textit{viz.}, FYM, vermicompost, neem cake and biofertilizers namely azotobactor and PSB applied as per treatment. Recommended agronomic package of practices were followed excluding fertilizer treatments.

Organic fertilizers were applied a week before sowing. It was uniformly spread on the plots and incorporated into the soil manually. 35 days old seedling was planted at row and plant spacing of 15 and 10 cm respectively. Irrigation was given as per crop demand. Weeding was done manually at 25 days after transplanting. Observations such as number of leaves and plant height at different plant growth stages have taken followed by diameter of bulb and its weight per plot and yield per hectare were measured.

Harvesting of matured bulb started as they attain maturity in each experimental plot on treatment basis. After harvesting, soil samples were taken from each plot for routine laboratory analysis. Soil pH, Organic-C, N, P, and K were determined. The data collected on different aspect of experimentation, were analyzed with the help of computer applying analysis of variance technique given by Gomez and Gomez (1984).

\textbf{Results and Discussion}

\textbf{Growth and yield}

Plant height (Table 1) differed significantly at 30 and 60 DAT. It is found significantly highest in $T_1$ (27.26 cm) at 30 DAT which was at par with $T_2$ (26.17) and $T_6$ (24.59). But at 60 DAT, $T_1$ become significant over all the treatments. It may be due to instant supply of nutrient through inorganic fertilizers. Number of leaves didn’t differ significantly during early stage (30 DAT) of crop growth but at later stage (60 DAT) it became significant and recorded more in $T_1$ (5.93) followed by $T_2$ (5.53) and $T_6$ (5.20).

Highest number of leaves (13.33) had also been recorded with RDF 75% + Azotobacter 25 % (Brinjh \textit{et al.}, 2014). Equatorial diameter didn’t differ significantly (Table 1) but found highest with similar value (4.1) in $T_1$, $T_2$ and $T_6$. Bulb yield (Table 1) differed significantly due to different treatments and found highest in $T_1$ (245.3 q ha$^{-1}$) which was at par with $T_2$ (229.7 q ha$^{-1}$), $T_6$ (200.3 q ha$^{-1}$). The lowest was recorded in $T_5$ (150 q ha$^{-1}$). Jayathilake \textit{et al.}, (2003) reported that RDF (150:80:100) recorded 340 q ha$^{-1}$ bulb yield which was significantly lower to the above organic amendments combined with chemical fertilizers.

Chaudhary \textit{et al.}, (2018) reported similar finding in \textit{kharif} onion. Increase in yield may be due to the application of biofertilizer and their direct role in nitrogen fixation and the production of phytohormone like substances and increase in nutrient uptake (Govindan and Purushottam, 1984).
**Table 1** Plant height (cm) number of leaves, equatorial diameter (cm) yield and economics of *rabi* onion as influenced by the application of organic and inorganic fertilizer sources in onion-onion-bottle gourd crop sequence

| Treatments                              | Plant height | No. of leaves | Equatorial diameter (cm) | Yield (q ha\(^{-1}\)) | Gross return (Lac ha\(^{-1}\)) | Net Return (Lac ha\(^{-1}\)) | B: C Ratio |
|-----------------------------------------|--------------|---------------|---------------------------|------------------------|-------------------------------|-------------------------------|-------------|
|                                         | 30 DAP       | 60 DAP        | 30 DAP                    | 60 DAP                 |                               |                               |             |
| T\(_1\)-100% from inorganic fertilizers  | 27.26        | 41.11         | 3.20                      | 5.93                   | 4.1                           | 245.3                         | 1.96        |
|                                         |              |               |                           |                        |                               | 1.53                          |             |
| T\(_2\)-50% NPK as MF+50% N as FYM     | 26.17        | 35.45         | 3.20                      | 5.53                   | 4.1                           | 229.7                         | 1.84        |
|                                         |              |               |                           |                        |                               | 1.35                          |             |
| T\(_3\)-50% N as FYM+50% N as VC       | 22.49        | 32.33         | 2.80                      | 5.20                   | 4.0                           | 178.2                         | 1.43        |
|                                         |              |               |                           |                        |                               | 0.86                          |             |
| T\(_4\)-1/3 of N each as FYM+VC+NC     | 22.16        | 34.56         | 2.60                      | 5.00                   | 3.8                           | 169.8                         | 1.36        |
|                                         |              |               |                           |                        |                               | 0.80                          |             |
| T\(_5\)-50% N through FYM+ biofertilizer| 19.81        | 30.84         | 2.60                      | 4.67                   | 3.8                           | 150.0                         | 1.20        |
|                                         |              |               |                           |                        |                               | 0.71                          |             |
| T\(_6\)-T3+biofertilizer               | 24.59        | 34.48         | 3.07                      | 5.20                   | 4.1                           | 200.3                         | 1.60        |
|                                         |              |               |                           |                        |                               | 1.00                          |             |
| T\(_7\)-T4+biofertilizer               | 22.68        | 32.52         | 2.93                      | 5.13                   | 3.8                           | 176.0                         | 1.41        |
|                                         |              |               |                           |                        |                               | 0.82                          |             |
| SE(d)                                   | 1.71         | 2.06          | 0.29                      | 0.48                   | 0.3                           | 49.3                          | 0.39        |
|                                         |              |               |                           |                        |                               | 0.39                          |             |
| C D at 5%                               | 3.74         | 4.50          | NS                        | 1.05                   | NS                            | 77.11                         | 0.86        |

FYM; Farm yard manure, VC; Vermicompost, NC; Neemcake, IF; inorganic fertilizers

**Table 2** pH, EC, Org.-C, available N, P and K (kg ha\(^{-1}\)) as influenced by the application of different organic and inorganic fertilizer sources in *Rabi* onion after crop harvest in onion-onion-bottle gourd crop sequence

| Treatments                              | pH 1:2.5 | EC (dSm\(^{-1}\)) | OC (%) | Available N (Kg ha\(^{-1}\)) | Available P (Kg ha\(^{-1}\)) | Available K (Kg ha\(^{-1}\)) |
|-----------------------------------------|----------|-------------------|--------|-------------------------------|------------------------------|------------------------------|
| T\(_1\)-100% from inorganic fertilizers  | 7.44     | 0.19              | 0.62   | 278.1                         | 39.67                        | 160.5                        |
| T\(_2\)-50% NPK as IF+50% N as FYM     | 7.42     | 0.18              | 0.63   | 273.5                         | 39.39                        | 149.6                        |
| T\(_3\)-50% N as FYM+50% N as VC       | 7.41     | 0.17              | 0.64   | 271.3                         | 38.60                        | 146.8                        |
| T\(_4\)-1/3 of N each as FYM+VC+NC     | 7.42     | 0.17              | 0.64   | 267.1                         | 37.88                        | 142.5                        |
| T\(_5\)-50% N through FYM+ biofertilizer| 7.39     | 0.15              | 0.63   | 257.4                         | 39.17                        | 137.1                        |
| T\(_6\)-T3+biofertilizer               | 7.38     | 0.16              | 0.65   | 269.2                         | 40.62                        | 149.3                        |
| T\(_7\)-T4+biofertilizer               | 7.38     | 0.16              | 0.64   | 263.9                         | 39.11                        | 144.6                        |
| SE(d)                                   | 0.06     | 0.02              | 0.02   | 9.1                           | 1.95                         | 8.8                          |
| C D at 5%                               | 0.14     | 0.05              | 0.03   | 19.8                          | 4.26                         | 19.2                         |

FYM; Farm yard manure, VC; Vermicompost, NC; Neemcake, IF; inorganic fertilizers
Soil chemical properties

Reduction in pH was more over initial value (Table 2) in the plots receiving organic fertilizers viz., T_3, T_4, T_5, T_6, and T_7. These reductions in pH in plots receiving organic manures may be due to production of organic acids during decomposition of organic manures which neutralize the sodium salts present in the soil and increase the hydrogen ions concentration. Decrease in the soil pH by 0.3 to 0.9 unit after continuous application of chemical fertilizer along with green manure and FYM (Maurya and Ghosh, 1972; Swarup and Singh, 1989).

Maximum reduction (0.15) in the EC recorded in the treatment T_3 followed by T_6 and T_7. However, the reduction in EC was less over initial values in the plots receiving chemical fertilizers. Similar finding was also observed by Chaudhary et al., (1992); Chaudhary et al., (2018). Kumar and Yadav (1995) also reported that organic plus chemical fertilizer treatments decrease EC at faster rate than inorganic fertilizers alone.

The maximum organic carbon (0.65 %) was noticed in T_6 receiving 50 % N through FYM+50 % N through VC + PSB+ Azotobacttor while, lowest (0.62 %) was measured with the treatment T_1.

The improvement in organic matter content of soil in the treatment receiving organic manure is attributed to direct incorporation of the organic matter in the soil. Soil organic carbon reported by (Swarup and Yaduvanshi 2000), significantly reduced in inorganic fertilizer treatments as compared to the treatments involving fertilizer with organic sources. These results corroborated with the finding of Numbiar and Abrol (1989), Bhandari et al., (1992), More (1994) and Chaudhary et al., (2018).

Change in available nitrogen, phosphorus and potassium

Almost all the essential nutrients needed for crop production are found in organic manure. Of these, nitrogen is being a most common nutrient added to soil for increasing yield of the crops. Although, when it is supplied through organic sources, it undergoes through many transformations in soil as it is used, reused, and made available by soil microbes. Result showed that maximum available N (278.1 kg ha^{-1}) was found in T_1 receiving inorganic fertilizers (Table 2) followed by T_2 and T_3 (273.5 and 271.3 kg ha^{-1}) respectively. Among organic treatments, maximum buildup of nitrogen is observed in T_6-50 % N through FYM+50 % N through VC (269.2 kg ha^{-1}). It may be due to application of FYM and vermicomposts as these are rich in organic matter which increased N content in treatments. Similar finding were also observed by Bhandari et al., (1992); Kumar and Yadav (1995) and Sharma and Ghosh (2000). Highest available P was observed in all those treatment where biofertilizers were applied along with organic manure such as FYM, Vermicompost and Neem cake. The available P didn’t differ significantly but maximum buildup was observed in T_6-receiving 50 % N as FYM+50 % N as VC +biofertilizer (40.62 kg ha^{-1}). However, the lowest was observed in T_4 (37.88 kg ha^{-1}). Increased availability of phosphorus in soil under treatments may be by increased solubility due to production of organic acids. Similar P availability had been observed in kharif onion (Chaudhary et al., 2018), cabbage (Chaudhary et al., 2018) and in okra (Chaudhary et al., 2017). Available K differed significantly and found highest in T_1-Inorganic fertilizer alone (160.5 kg ha^{-1}) followed by T_2-50% NPK as inorganic fertilizer + 50 % N as FYM (149.6 kg ha^{-1}) and T_6 (149.3 kg ha^{-1}), while lowest (137.1 kg ha^{-1}) was observed in T_5-50% N as FYM+
biofertilizers. Increase in available potassium in T1 and T2 may be attributed to direct addition of potassium to the available pool of the soil. The beneficial effects of FYM, Vermicompost and Neem cake on available K in T6 may be ascribed to the reduction of fixation and release of K due to the interaction of organic matter with clay, besides the direct K addition to the available K pool of the soil. Increase in available potassium due to green manure and FYM had been reported by many workers Bharadwaj and Omanwar (1994), Tolanur and Badanur (2003).

**Economics**

The economics as influenced by different treatments (Table 1) differed significantly and recorded maximum gross returns, (Rs. 1.96 lac), net return (1.53 lac) and B: C ration (3.5) in T1 receiving 100% inorganic fertilizers followed by T2 and T6. Highest net return in T1 and T2 is due to less cost of cultivation and more bulb production. However, among organics T6 found best with 1.0 lac net return.

On the basis result obtained it is concluded that T2 as 50 %NPK through inorganic fertilizers + 50 % N through FYM can be adapted as sustainable onion production, as it performed bulb yield statistically at par with 100% inorganic fertilizer This is one year trial and need few more years research on organics.

**References**

Anonymous, 2016-17. Monthly Report Onion, January, 2018 Horticulture Statistics Division Department of Agriculture Cooperation and Farmers Welfare, Ministry of Agriculture and Farmer Welfare Govt. of India, New Delhi.

Arancon NQ, Edwards CA, Berman P, Welch C, Metzger JD. 2004. Influences of vermicomposts on field strawberries: 1. Effects on growth and yields. *Bioresour Technol* 93:145–153. doi:10.1016/j.biortech.2003.10.014

Best K. 2008. Red onion cultivars trial. Horticultural Nova Scotia, Kentville agricultural centre, Nova Scotia, Canada.

Bevacqua RF, Mellano VJ. 1994. Cumulative effects of sludge compost on crop yields and soil properties. *Commun Soil Sci Plant Anal* 25:395–406. doi:10.1080/00103629409369046

Bhandari A L, Sood A, Sharma K N and Rana D S. 1992. Integrated nutrient management in a rice-wheat system. Journal of Indian Society of Soil Science. 40 (4):742-747.

Bhardwaj V. and Omanvar PK. 1994. Long-term effect of continuous cropping and fertilization on crop yields and soil properties II. Effect on EC, pH, organic matter and available nutrients of soil. *Journal of Indian Society of Soil Science*. 42: 387-392

Brinj S, Kumar S, Kumar D and Kumar M. 2014. Effect of integrated nutrient management on growth, yield and quality in onion cv. Pusa madhvi. *Plant Archives* 14 (1): 557-559

Chaudhary M.R., Rafique M.S, Younos T, Diplas P. and Mostaghimi S. 1992. Efficiency of biological and chemical reclaimants in the reclamation of saline sodic soil. Land reclamation advance in research and technology, *Proceeding of the International Symposium*. 14-15 Dec. 1992, Nashville, Tennessee, 327-336.

Chaudhary S.K, Yadav S.K, Mahto DK, Sharma RP, and Kumar G. 2018. Response of Different Organic and Inorganic Sources of Nutrients on Growth and Yield of Kharif Onion (*Allium cepa* L.). *Current Journal of
Int.J.Curr.Microbiol.App.Sci (2020) 9(10): 2851-2858

Chaudhary SK, Sharma RP, Yadav SK, Azmi NY and Singh MK. 2017. Effect of Organic and Inorganic Fertilization on Growth, Yield Attributes and Yield of Okra (Abelmoschus esculentus L. Moench) in Bihar. TECHNOFAME- A Journal of Multidisciplinary Advance Research 6 (1): 123-126

Chaudhary SK, Yadav SK, Mahto DK, Sharma RP, and Kumar M. 2018. Response of Growth, Yield Attributes and Yield of Cabbage (Brassica oleracea var. capitata) to Different Organic and Inorganic Sources of Nutrients in Magadha Plain of Bihar. Int.J.Curr.Microbiol.App.Sci. Special Issue-7: 4748-4756

Giannakis GV, Kourgialas NN, Paranychianakis NV, Nikolaidis NP, Kalogerakis N. 2014. Effects of municipal solid waste compost on soil properties and vegetables growth. Compost Sci Util 22(3):116–131. doi:10.1080/1065657X.2014.899938

Gomez KA. and Gomez AA. 1984 Statistical Procedures in Agricultural Research, New York, Chichester, etc.: Wiley (1984), 2nd edition, paperback, pp. 680

Govindan M and Purushottam D. 1984. Production of phytohormones by the nitrogen fixing bacteria Azospirillum. Agricultural Research Journal, Kerala 22(2): 133-138

Gupta RP, Sharma VP, Singh DK. and Srivastava KJ. 1999. Effect of organic manures and inorganic fertilizers on growth, yield and quality of onion variety agrifound dark red. National Horticultural Research and Development Foundation News Letter 19(2/3):7-11

Hsieh CF, Fang HC, Nan K and Hsu KN. 1995. Effect of continuous use of organic manures on the growth and yield of vegetable soybean' and cabbage. Bulletin of Taichung District. Agric. Improvement Sta., Japan, 46:1-10

Jahromi AA and Amirizadeh RS. 2015. Production potential of onion (Allium cepa L.) as influenced by different transplant ages. Indian Journal of Fundamental and Applied Life Sciences, 5(2):118-121

Jayathilake PKS, Reddy IP, Sriharin D, Reddy KR and Neeraja G. 2003. Integrated Nutrient Management in Onion (Allium cepa L.). Tropical Agricultural Research 15:1-9

Johnston AE, Poulton PR. and Coleman K. 2009. Soil organic matter: its importance in sustainable agriculture and carbon dioxide fluxes. Advances in agronomy 101: 1-57.

Kalaivanan D, Hattab KO. 2016. Recycling of sugarcane industries byproducts for preparation of enriched pressmud compost and its influence on growth and yield of rice (Oryza sativa L.). Int J Recycl Org Waste Agric 5:263–272. doi:10.1007/s40093-016-0136-4

Kumar A and Yadav DS. 1995. Use of organic manures and fertilizer in rice-wheat cropping system for sustainability. Indian J. Agric. Sci. 65(10):703-707

Lee J, Park R, Kim Y, Shim J, Chae D, Rim Y, Sohn B. 2004. Effect of food waste compost on microbial population, soil enzyme activity and lettuce growth. Bioresour Technol 93:21–28. doi:10. 1016/j.biortech.2003.10.009

Maurya PR and Ghosh AB. 1972. Effect of long-term manuring and rotational cropping on fertility status of alluvial calcareous soil. Journal of Indian Society of Soil Science, 20:31-43
Maynard A. 1995. Cumulative effect of annual additions of MWC compost on the yield of field-grown tomatoes. *Compost Sci Util* 3: 55–63. doi:10.1080/1065657X.1995.1070178

More SD. 1994. Effect of farm waste and organic manure on soil properties, nutrient availability and yield of rice-wheat grown on sodic vertisol. *Journal of Indian Society of Soil Science*. 42(2):253-256

Moyin-Jesu EI. 2007. Use of plant residues for improving soil fertility, pod nutrients, root growth and pod weight of Okra (*Abelmoschus esculentum* L). *Bioresour Technol* 98:2057–2064

Nambiar KKM and Abrol I. P. 1989. Long-term fertilizer experiments in India—an overview. *Fertilizer News*, 34: 11-20

Obi ME, Ofonduro CO. 1997. The effects of soil amendments on soil physical properties of a severely degraded sandy loam soil in south Eastern Nigeria. Usman Danfodio University, Sokoto, pp 30–35

Sharma AR and Ghosh A. 2000. Effect of green manuring with *Sesbania aculeata* and nitrogen fertilizer on the performance of direct seeded flood prone low land rice, *Nutrient Cycling in Agroecosystem*, 57(2): 141-153

Swarup A and Singh KN. 1989. Effect of 12 years rice-wheat cropping sequence and fertilizer use on soil properties and crop yields in a sodic soil. *Field Crop Research*, 21:227-287.

Swarup A, Yaduvanshi NPS. 2000. Effects of integrated nutrient management on soil properties and yield of rice in alkali soils. *Journal of the Indian Society of Soil Science*. 48 (2): 279- 282

Tandon HLS. 1987. Fertilizer recommendation for horticultural crops. A guide book, Fertilizer Development and Consultation Organization, New Delhi.

Tindall M. 2000. Mineral and organic fertilizing in cabbage and their residual effect for commercial cultivation on yield and quality performance of cabbage. *Hort Brass* 6:15–20

Tolanur SI and Badanur VP. 2003. Effect of integrated use of organic manure, green manure and fertilizer nitrogen on sustaining productivity of rabi sorghum-chickpea system and fertility of a vertisol. *Journal of Indian Society of Soil Science*, 51(1):41-44.

---

**How to cite this article:**

Santosh Kumar Chaudhary, Sushil Kumar Yadav, Dilip Kumar Mahto, Sanjay Kumar Singh, Beer Bahadur Singh and Neha Sinha. 2020. Effect of Different Organic and Inorganic Sources of Nutrients on Growth and Yield of *Rabi Onion (Allium cepa* L.). *Int.J.Curr.Microbiol.App.Sci*. 9(10): 2851-2858. doi: [https://doi.org/10.20546/ijcmas.2020.910.343](https://doi.org/10.20546/ijcmas.2020.910.343)