S**TUDIES OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH, YIELD AND QUALITY TRAITS OF ONION (*Allium cepa L.)***

**ABSTRACT**

The experiment entitled “Studies of Integrated Management on growth, yield and quality traits of onion **(*Allium cepa L.)”*** was conducted Rabi season of 2016-17 and 2017-18 at the research farm of R.B.S College Bichpuri, Agra (U.P.). The investigation comprised of all combination eight treatment of 100%RDF (T1), 100%RDF+PSB (T2), 100% RDF+FYM (T3), 100%RDF+PSB+FYM (T4), 80%RDF+PSB (T5), 80%RDF+FYM (T6), 80%RDF+PSB+FYM (T7), control 75% RDF (T8), which were replication in random block design. Treatment T4 (100%RDF+ PSB+FYM) was related as the best treatment for majority of character like height of plant, numbers of green leafs per plant, length of longest leaf, width of longest leaf, diameter of pseudo-stem, diameter of bulb, weight of bulb, bulb yield per plot, bulb yield per hectare. Seeds of onion pusa red found treated with 0.2% thiram to check the Infection of damping off and seedling per transplanted after seven weeks at 15 cm X 10 cm spacing on 1m X 1m plot accommodating 45 plants in a plot. The results revealed the among the various treatments.

**Keywords**:-Integrated nutrient management (INM), Quality, growth, Chemical fertilizers, FYM, bio- fertilizer and Onion.

**INTROTUCTION**

Onion (*Allium cepa L*.) family Alliaceae is one of the important commercial bulbous crop cultivated extensively in India and widely used as vegetables. The onion bulb is rich in minerals (calcium 27 mg, potassium 1.57 mg phosphorus 39 mg) along with carbohydrates (11. 0 gm), protein ( 1.2g) and vitamin C (11 mg), fiber ( 0.6g), moisture (86.8g) and 38 calories from the bulb, iron ( 0.7mg), thiamin (0.08 mg). flavonoids found in it have also been linked to a lower the risk of chronic disease like cancer diabetes and coronary heart disease (Hejazi *et al* 2023) and have antibacterial and antifungal effects. The chief component of pungency is allyl propyl disulphide’ of the fifteen vegetables crop listed by FAO, falls second only to tomato in terms of annual production. It is one of the few versatile vegetables crop that can be kept for a fairly long period and can safely with stand the hazards of rough handling including long distance transport. It occupies an area of 11.67 lakh hectors with production of 24.4 million tonnes and productivity 25.12 tones ha-1 (2023-2024).

Although India is the second largest producer of onion too, in the world next only to china but its productivity is very low 17.32 tons/ha as compared to china and other countries like, Egypt, Netherland and Iran etc. In India “Maharashtra” is the largest producer of onion contributing (5867.00 thousand MT). Followed by Karnataka (2466.40 thousand MT). Gujarat (1858.00). Bihar (1304.15 thousand MT). Madhya Pradesh (2826.00 thousand MT) and Andhra Pradesh ,(1525.18 thousand MT). Vegetables play an important role in human health. They supply dietary fiber and are rich sources of nutrients, important for human diet .They are particularly important source of micronutrients, pro-vitamin –A,B6,C and E as well as folic acid, iron and magnesium. The pungency in onion is due to sulphur bearing compound in very small quantity (about 0.005%) in the volatile oil allyl propyl disulphide (C6 H12 O2).the color of the outer skin of onion bulbs is due to quercetin .The quality of onion depends on shape size, color and pungency of bulbs. Highly pungent red color onion are preferred in India while less pungent, yellow or white skinned ones are demanded in European and Japanese market. The farm yard manure seems to act directly for increasing crop yield by accelerating the respiratory process though cell permeability or by hormones through growth action. It supplies nitrogen, phosphorus and sulphur in available form to the plants through biological decomposition. Indirectly, it improves the physical properties of the soil such as aggregation, aeration permeability and water holding capacity (Chandra mohan,2002). Bio-fertilizers or more appropriately called microbial inoculants are the preparation containing live or latent cells of efficient strains of microorganism .These may be biological nitrogen fixer’s. Phosphorus solubilizing mineralization or nitrogen and transformation of several elements like sulphur and iron into available forms. 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 importance consideration for the use of organic nutrients (Patel *et al.* 2005).

**METHODS AND MATERIALS**

The present investigation was under taken during the rabi season of year 2016-17 and 2017-18 for study the response of different combinations of bio- fertilizer , chemical and FYM (PSB + NPK + FYM) on the vegetative growth, and quality character of onion (*Allium* *cepa* L.). The Experiment was conducted at the Agricultural Research farm of Raja Balwant Singh college Bichpuri, Agra (U.P) The soil of the experimental field is gangetic alluvial with calcareous layer at the depth of about 1.0 – 1.5 meters, it was slightly alkaline in reaction pH 7.84 and well drained. Weather conditions of Agra was semi-arid sub-tropical climate with hot dry summer and hardy cold winters. Temperature falls at about 1-2℃ in winter and increased about maximum at 45-47℃. In summer. The treatments were designed as Table 1.

Table 1. The list of treatments used in this study

|  |  |  |
| --- | --- | --- |
| **S. No** |  **Treatment** |  **Notation** |
| 1 | RDF 100% | T1 |
| 2 | 100% RDF + PSB | T2 |
| 3 | 100% RDF +FYM | T3 |
| 4 | 100% RDF + PSB+FYM | T4 |
| 5 | 80% RDF + PSB | T5 |
| 6 | 80% RDF + FYM | T6 |
| 7 | 80% RDF + PSB + FYM | T7 |
| 8 | Control (75 % RDF) | T8 |

The eight treatments were replicated three times in randomized block design in 1.60m x 1.20 size plots. The Recommended dose of Nitrogen , Phosphorus and Potash were applied at the time of transplanting . The half dose of nitrogen was applied as basal and in two part after 30 day transplanting and 60 day after transplanting. Farm yard manure was applied 15 days before transplanting and the bio-fertilizer (PSB) was applied as seedling dipping treatment in PSB and water solution @2kg/ha. All the required cultural operations along with the irrigation was done as per requirement of the crop. The all growth studies recorded at first 15 DAT and all 30 DAT interval. The bulb was harvested at the mature stage.

**RESULTS AND DISCUSSION**

The pooled (2016-18) data presented in table and figure shows that maximum length of plant. The plant height increased significantly with the different treatment of organic manures, inorganic fertilizers and bio-fertilizer up to harvesting. The significantly maximum plant height was recorded in treatment T4) followed by T3 at 30,60 and 90 DAT and up to harvest. While the minimum plant height was observed under the treatment T8 ( 75% RDF) for the same. This may be due to application of integrated nutrient management, increased the photosynthetic activity, chlorophyll formation, nitrogen metabolism and auxin contents in the plants which ultimately improving the plant height. These findings was in agreement with the findings of Jayathilake *et al*.(2002), Jayathilake *et al.* (2003), Abbey and Kanton (2003), Reddy and Reddy (2005), Mahmoud et al. (2006), Patel et al. (2008a).

**Table 1. studies of Integrated Management concentrations on growth on onion (90 DAS)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Treatments** | **Plant height (cm)** | **Longest leaf** | **Diameter of pseudo-stem(cm)** | **Diameter of bulb(cm)** |
| RDF(NPK) |  42.10 | 39.99 | 1.22 | 4.19 |
| RDF+PSB |  44.11 | 41.80 | 1.4 | 4.39 |
| RDF+FYM |  46.49 | 43.08 | 1.43 | 4.48 |
| RDF+PSB+FYM |  47.14 | 43.40 | 1.46 | 4.74 |
| RDF+PSB |  44.11 | 40.75 | 1.34 | 4.33 |
| RDF+FYM |  44.29 | 40.83 | 1.37 | 4.38 |
| RDF+PSB+FYM |  45.12 | 42.6 | 1.42 | 4.39 |
| Control |  39.87 | 38.73 | 1.15 | 3.1 |
|  **S. Em±** | **1.36** | **0.53** | **0.052** | **0.155** |
|  **C.D. (P=0.05)** | **4.14** | **1.61** | **0.159** | **0.47** |
|  |  |  |  |  |

The Significantly maximum diameter of bulb was exhibited in the treatment T4 (100 % RDF+FYM+ PSB) followed by T3  and which was at par with each other. Mondal *et al*.(2004), Prabhakar *et* *al*.(2012).

Significantly maximum bulb weight of bulb was exhibited in the treatment T4 followed by T3 and which was at par with each other, whereas, the minimum weight of bulb was observed in T8 (75% RDF) Mahmoud (2006).

The yield of any crop is the final index of the experiment which indicates the success of failure of any treatment with this view the bulb yield per net plot (kg) and per hectare (4.56 kg and 299.94 q ha-1) of onion was recorded in treatment T4 followed by T3and which was at par with each other. However, lowest total bulb yield was recorded in treatment T8 (75% RDF) Patel *et al*.(2008).

**Table 2. Studies of** **Integrated Management concentrations on growth yield and quality on onion**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Treatments** | **Fresh weight of bulb (gm)** | **Specific gravity of bulb** | **Fresh weight of bulb (Kg/plot)** | **Total bulb yield** **(q/ha)**  |
| RDF(NPK) | 75.16 |  0.919 | 9.1 | 199.23 |
| 100%RDF+PSB | 76.8 | 1.057 | 10.2 | 227.69 |
| 100%RDF+FYM | 77.4 | 1.107 | 11.2 | 245.21 |
| 100%RDF+PSB+FYM | 80.83 | 1.722 | 13.7 | 299.94 |
| 80%RDF+PSB | 75.66 | 1.042 | 10.1 | 221.12 |
| 80%RDF+FYM | 76.66 | 1.043 | 10.4 | 223.31 |
| 80%RDF+PSB+FYM | 77.1 | 1.083 | 11.1 | 243.02 |
| Control | 59.6 | 0.901 | 8.3 | 181.71 |
|  **S. Em±** | **1.46** | **0.115** | **0.259** | **17.06** |
|  **C.D. (P=0.05)** | **4.44** | **0.32** | **0.788** | **51.78** |

**CONCLUSION**

On the basis of observations and result of the present investigation, the following conclusion could be drawn, for the cultivation of onion (*Allium cepa L*.) in western Uttar Pradesh plains. Integrated nutrient management had significant effect on growth, yield attributes and yield of onion. 100 % RDF + PSB+FYM (T4) resulted in better growth and yield attributes in terms of highest plant height, maximum number of leaves plant-1, height, leaf length, leaf width, diameter of pseudo-stem, fresh weight of tops and diameter of bulb, average bulb weight and total bulb yield (299.94 q ha-1). With respect to the economics, 100 %RDF+PSB+FYM (T4) continue to maintain its superiority in term of higher net returns (Rs. 228768.0 ha- 1). Application of 100% RDF+FYM (T3) and 80% RDF + PSB+ FYM (T7) was also found next to the superior treatment i.e. T4. Thus, it may be inferred that among the integrated nutrient management 100%RDF+PSB+FYM (T4) resulted in maximum bulb yields and net profits.

**REFERENCE**

Abbey L. and Kanton RAL 2003. Fertilizer type, but not time of cessation of irrigation, affect onion development and yield in a semi-arid region. Journal of Vegetable Crop Production. **9** (2): 41-48.

Jayathilake P.K.S.**,** 2003. Integrated nutrient management in onion (*Allium cepa L*.). Tropical Agricultural Research. 15:1-9.

Mahmood MR 2006. Effect of some organic and inorganic nitrogen fertilizer on onion plants growth on a sandy calcareous soil. Assiut Journal of Agricultural Sciences. **37** (1): 147-59.

Mondal, S.S.2004**.** Integrated management of organic and inorganic sources of nutrient to improve productivity and qualitative characters of rice and onion in rice-onion cropping sequence. Environment and Ecology. **22** (1): 125-28.

Patel KM, Patel HC and Gediya KM 2008a. Effect of nitrogen, organic manures and bio-fertilizers on bulb yield and quality of onion (*Allium cepa L.)* varieties. Research on Crops. **9** (3): 636-39.

Prabhakar M, Hebbar SS and Nair AK 2012. Effect of organic farming practices on growth, yield and quality of rose onion (*Allium cepa*). Indian Journal of Agricultural Sciences. **82** (6): 500-03

Reddy, K.C and Reddy, K.M. 2015. Differential levels of Vermi-compost and nitrogen on growth and yield in onion (*Allium cepa L*.) - radish (*Raphanus sativus* L.). Cropping system. Journal Research ANGRAU, **33**(1): 11-17.

Raj Kumar, V.R. Chudasma, Jitendra Verma at all 2019. Effect of INM in onion ( *Allium cepa* L.) with respect to growth and yield under North Gujarat condition. International journal of current microbiology and applied science. **8** (4): 1618-1622.

Goue Ruchita, Sharma Roopesh and Thakur Riya 2023. Effect of INM on growth and yield of onion ( *Allium cepa* L.) under malva plated of MP. International Journal of statistics and applied mathematics. **8**(5): 742-746.

Vikash Kumar, Sandeep Kumar Rajvanshi, Deepak Kumar. 2024 Study on effect INM on growth yield and quality of onion ( *Allium cepa* L.) environment and ecology. **42** (4B) : 1906-1911.

Narendra Kumar, Ramesh Chandra Meena, Mayaram . 2024 Study on INM on onion ( *Allium cepa* L.) cv. Agrifound light red environmental and ecology. **42** (4A): 1659-1663.