

Effect of Integrated Nutrient Management (INM) on Growth and Yield Attributes of *Kharif* Onion (*Allium cepa* L.)

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ABSTRACT

The present investigation entitled “Effect of Integrated nutrient management on growth and yield attributes of *kharif* onion (*Allium cepa* L.)” was conducted with the objective to understand the better utilization of nutrients for yield and growth at Horticulture farm, S.K.N college of Agriculture, Jobner during *kharif* season in 2013 which consisted of sixteen treatment combinations with four levels of both organic manures and inorganic fertilizers. The application of FYM @ 5 t/ha + vermicompost @ 2.5 t/ha + Bio-fertilizers as organic source and NPK +S + Zn (100:50:100:20:10 kg/ ha) as the inorganic source were found significantly superior over other treatments comparable with bulb yield ($q\ ha^{-1}$) and net returns from *kharif* onion (N-53).

Key words: *Kharif* onion, Organic And Inorganic Fertilizers, Bio-fertilizers, Growth, Yield Parameters.

INTRODUCTION

Onion is one of the most important cash crops grown for vegetable as green and spices as mature bulb. It adds flavor to various vegetable preparations and hence it is called ‘Queen of kitchen’. Onion is also used in preparation soups, sauces, curries, pickle and flavoring and seasoning foods. Onion bulbs have various medicinal properties. It increases the appetite and suppressed the formation of gases. It’s used as the best remedy against sunstroke during summer. It is also helpful in fever, dyspepsia, catarrh and chronic bronchitis.

The pungency in onion is due to allyl propyl disulphide in the volatile oil and the skin colour is due to the presence of ‘quercetin’. Production of *kharif* onion is very important to have continuous supply of onion round the year. Farmers also gain good returns from *kharif* season crop. Use of inorganic fertilizers and organic manures play a vital role in various physiological activities of plant like NPK are essential nutrients for integral part of chlorophyll, nucleic acid, increased vigour and disease resistant to plant.

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Organic manures like FYM, vermicompost have been advocated as good organic manure for use in vegetables. Bose *et al*¹, suggested that the use of FYM stimulates the production of polysaccharides and other compound that favor aggregation of fine soil particles, thereby promoting good structure, improved tilth, aeration, moisture movement and retention. Vermicompost contain nutrients in the readily available form to the plants such as nitrates, exchangeable phosphorous, soluble potassium, calcium & magnesium³. Bio-fertilizers are the inoculation of micro organism, which are capable of mobilizing nutritive elements from non-usable form to usable form through biological process. Phosphate solubilising bacteria (PSB) when inoculated, secrete acetic substances and solubilizing the insoluble soil phosphorous. Tilak and Annapurna⁷, suggested that the inoculation with PSB bio fertilizer increased the yield of crop by 10 to 30 per cent. Sulphur is essential constituent of certain amino acids namely cysteine & methionine and is involved in synthesis of protein and pungency in onion. Zinc is also important for oxidation and auxin synthesis and for absorption of water. Onion is a heavy feeder of mineral elements. A crop of 35t/ha removes approximately 120 kg of N, 50 kg of P₂O₅ and 160 of K₂O per ha. Hence, the greater its ability to utilize nutrients for crop production, the greater is the yield potential. So that the present experiments entitled Integrated Nutrient Management in Onion was carried out to study the different organic and inorganic treatment combinations.

MATERIALS AND METHODS

The experiment was laid out at the Horticulture farm, SKN college of Agriculture, Jobner under the SKRAU, Bikaner (Rajasthan). Jobner (Jaipur) during "kharif" season of 2013. Jobner is situated at 26.05° north latitude, 75.20° east longitudes and an altitude of 427 meters above mean sea level, in Jaipur district of Rajasthan. This region falls under agro climatic zone-IIIa (Semi-Arid Eastern Plain) of the state. During summer, the temperature may go as high as 48°C while in winter, it may fall as low as -1.0 °C. Before start of the experiment, the represented soil

samples were taken randomly in a depth of 0-15 cm from experimental field and result of soil analysis showed soil texturally classified as loamy sand and slightly alkaline in reaction.

Onion seeds of N-53 were sown on nursery beds by broadcasting method on raised beds. The healthy and uniform shape and sizes of onion bulb lets were selected and treated with carbendazim @ 2 g/ kg of onion bulb lets then transplanted in prepared field. The required area was then marked with plots size of 2.4 × 3 m² were also prepared and planted at spacing of 30 × 15 cm². The experiment was laid out in Randomized Block Design with three replications. The experiment was comprised of 16 treatment combinations of four levels of inorganic fertilizers and four levels of organic manures. The application of different integrated nutrient management treatments were applied during *kharif* season in 2013. The symbol of treatment were F₀= control, F₁=NPK, F₂=NPK+S, F₃=NPK+S+Zn, M₀=control, M₁=FYM (10t/ha), M₂= FYM (10t/ha) + vermicompost (2.5 t/ha), M₃= FYM (10t/ha) + vermicompost (2.5t/ha) + mixed culture (Azospirillum+ PSB). The observation like plant height (cm), neck thickness (cm), diameter of bulb (cm), average weight of bulb (g), bulb yield (kg / plot), total bulb yield (t /ha) were recorded from July to December, 2013. Harvesting was done manually by hand digger. The data were analysis using analysis of variance (ANOVA) under RBD stated by Fisher (1950).

RESULT AND DISCUSSION

The data showed in table1 that plant height, number of leaves/ plant, total chlorophyll content of leaves (mg/g), neck thickness, diameter of bulb, average weight of bulb, bulb yield /plot, total bulb yield /ha were significantly influenced by application of different integrated nutrient management treatments. The maximum increases in plant height (59.08 cm), number of leaves/ plant (13.44), total chlorophyll content in leaves (0.071 mg/g), neck thickness of bulb (1.069 cm), diameter of bulb (4.22cm), average weight of bulb (98.80g), bulb yield /plot(15.81kg), total bulb yield / ha(219.56q) were recorded at M₃= FYM (10t/ha)+

vermicompost (2.5t/ha) + mixed culture (Azospirillum+ PSB) treatments followed by M₂ treatment and minimum increase plant height (48.17cm), number of leaves /plant(09.90), total chlorophyll content of leaves(0.061mg/g), neck thickness of bulb (0.974cm) diameter of bulb (3.00cm), average weight of bulb (76.45g), bulb yield /plot(12.23kg), total bulb yield /ha (169.89q) were recorded under control. In inorganic fertilizers, the maximum increase in plant height (57.42cm), number of leaves/ plant (12.73), total chlorophyll content in leaves (0.070 mg/g), neck thickness of bulb (1.056 cm), diameter of bulb (4.29cm), average weight of bulb (96.14g), bulb yield /plot(15.38kg), total bulb yield / ha(213.64q) were recorded under treatment F₃=NPK+S+Z_n followed by F₂ =NPK+S however, minimum increase in plant height(49.67cm), number of leaves /plant(09.91),total chlorophyll content of leaves(0.061mg/g), neck thickness of bulb (0.994cm) diameter of bulb (3.20cm), average weight of bulb (77.20g), bulb yield /plot(12.35kg), total bulb yield /ha (171.55q) were recorded under control. Similar trend in increase of plant growth characteristics under

INM using vermicompost were also observed by Meena *et al*⁵., in dill and Choudary & Chandra² in okra. Similarly Reddy and Reddy⁶ conducted a study in AP to determine the effect of vermicompost and nitrogen fertilizers on the growth and yield of onion (cv.53). The plant height, number of leaves/ plant and leaf area of onion increased significantly with increasing level of vermicompost (from 10 to 30 t/ha) and nitrogenous fertilizers (from 50 to 200 kg/ha). Among various treatment combinations, vermicompost at 30 t/ha +200 kg N per ha recorded the highest plant height and number of leaves per plant in onion but was at par with vermicompost at 30 t/ha +150 kg N/ha. Hari *et al*⁴., recorded significantly higher onion (Arka kalyan) bulb yield (202.85 q/ha) with the application of vermicompost @ 7 t/ha coupled with 75 per cent of recommended doses of nitrogenous fertilizers. Studies by Tilak and Saxena⁸ shown that application of nitrogenous fertilizers with inoculation of Azospirillum brasilense recorded maximum bulb yield (32.8 t/ha) and 'N' uptake in the plant of cv. Pusa red of onion.

Table1: Effect of Integrated nutrient management (INM) on growth and yield attributes on *kharif* onion (*Allium cepa* L.)

Treatments	Plant height (cm)	Number of leaves / plant	Total chlorophyll Content of leaves (mg/g)	Neck thickness of bulb (cm)	Diameter of bulb (cm)	Average weight of bulb (g)	Bulb yield (kg/plot)	Total bulb Yield (q/ha)
Organic manure								
M ₀ = control	48.17	09.90	0.061	0.974	3.00	76.45	12.23	169.89
M ₁ = FYM 10 t/ha	52.75	11.07	0.066	1.028	3.99	87.40	13.98	194.23
M ₂ = FYM 10 t/ha + vermicompost (2.5t/ha)	57.67	12.30	0.070	1.061	4.05	93.98	15.04	208.84
M ₃ = FYM 10t/ha + Vermicompost (2.5t/ha) + bio-fertilizers (<i>Azospirillum</i> + PSB)	59.08	13.44	0.071	1.069	4.22	98.80	15.81	219.56
S.E.	0.35	0.08	0.001	0.003	0.05	0.40	0.06	0.90
CD at 5 %	1.01	0.23	0.002	0.010	0.14	1.16	0.19	2.58
In organic fertilizers								
F ₀ = Control	49.67	09.91	0.061	0.994	3.20	77.20	12.35	171.55
F ₁ = NPK	54.58	11.90	0.067	1.032	3.76	89.11	14.26	198.02
F ₂ = NPK+S	56.00	12.16	0.069	1.051	4.02	94.19	15.07	209.31
F ₃ = NPK+S+Zn	57.42	12.73	0.070	1.056	4.29	96.14	15.38	213.64
S .E.	0.35	0.08	0.001	0.003	0.05	0.40	0.06	0.90
CD at 5 %	1.01	0.23	0.002	0.010	0.13	1.16	0.19	2.58

CONCLUSION

On the basis of results emerging out from the present investigation, It can be concluded that combined application of FYM @ 5 t/ha + V.M. 2.5t/ha + Bio-fertilizers (*Azospirillum*+ PSB) or application of NPK, S, Zn @100:50:100:20:10 kg/ha are worth recommended as both fetched comparable bulb yield and net returns in *kharif* onion which were also significantly superior to the treatments during the course of investigation.

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