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Response of onion seed production to integrated nutrient management

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ABSTRACT

A field experiment entitled "Integrated nutrient management in onion (*Allium cepa* L.) seed production" with variety Phule Samarth was conducted at Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, during the *Rabi* season 2005-06. It revealed that yield attributes *viz.,* number of flower stalk, number of seeds per umbel and per bulb, weight of seeds per umbel and per bulb, seed yield per hectare were significantly increased with the application 150% RDF+FYM+BF, where as application of 50% RDF +FYM+BF resulted in lowest values of yield attributes. It is concluded that application of 150:75:75 kg/ha N, P_2O_5 and K_2O in conjugation with FYM @ 20 t/ha along with biofertilizer was found promising for obtaining higher seed yield and yield contributing characters of onion cv. PHULE SAMARTH.

Key words : Organic, Inorganic, Biofertilizer, Seed yield, Onion

Onion (*Allium capa* L.) a native of palestine is one of the most important vegetable cash crop grown for vegetable in green stage and also for mature bulb. It is indispensable item in every kitchen as it adds flavour to various vegetable preparation, hence it is called " Queen of Kitchen". Onion is being extensively cultivated all over the world especially in India, Pakistan, China, Netherlands, Bangladesh and Australia. India is the second largest producer of onion in the world with in area of 5.93 lakh ha and production of 75.15 lakh mt next to China (Anonymous, 2005).Maharashtra is the largest producer of onion in the country. In Maharastra the onion growing area is concentrated mainly in Nasik, Pune, Jalgaon, Dhule, Ahmadnagar, Solapur and Satara districts. Nasik district is a major producer of onion and contributes 34 per cent of the state area

Under ambient condition, however, immature or unfilled seed has poor germination and viability. Environmental condition as well as management practices during crop growth stages are found to influence the seed quality. The yield of such a valued crop is low on account of non- availability of genetically pure, genuine seed. With the use of poor seed the investment to major inputs like fertilizer, irrigation, plant protection, etc will not pay rich dividends. Considering the importance of seed and non-availability of genetically pure, true to type seed is highly essential to have standardized technology for onion seed production under Indian condition. Onion seed production is undertaken only during *Rabi* season, while higher temperature of more than 35^0C especially during flowering have detrimental effects and cause significant reduction in seed yield and also lowered seed viability (Wagh, 1986).

Nutrition is one of the most important factor which governs the onion seed production. The nutrients needed by the onion seed crop are supplied through organic manures and inorganic fertilizers. In past, the use of organic manures has been reported to improve physical, chemical and biological properties of soil. However, due to low nutrients, these organic manures alone may not be able to meet the nutritional requirement of high yielding cultivars and hence there is need for supplementing the use of chemical fertilizers.

MATERIALS AND METHODS

The present field investigation was carried out during *Rabi* season 2005-2006 in Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri (M.S.). The experiment was conducted in soil with moderate fertility and good drainage. The experimental soil was moderately alkaline (pH 8.5), with low soluble salts (non-saline) and clay loam in texture. The soil was low in available nitrogen and phosphorus and moderately high in potassium. The experiment was laid out in a Randimized Block Design with 3 replications. There were 7 treatments having combinations of different organic, inorganic and bio fertilizer treatments. The bulb of cv. PHULE SAMARTH were planted at a spacing of 60x30 cm during *Rabi* season of 2005-06. RDF For onion bulb production is 20t/ha FYM +100:50:50 N, P_2O_5, K_2O kg/ha.Biofertilizers : *Azospirillum* 12.5 kg/ha, Phosphate solubilizing bacteria (PSB) 12.5 kg/ha, vesicular arbuscular mycorrhiza (VAM) 16 kg/ha.

Mixture of bio-fertilizer *i.e.* VAM (16 kg/ha), *Azospirillum* (12.5 kg/ha) and PSB (12.5 kg/ha) was applied at the base of seed bulb along with FYM.The statistical analysis of the experimental data was carried

Treatment details with their symbols

Sr. No.	Symbol	Treatment details	Quantity applied
1.	T_1	50% RDF + FYM + BF	50:25:25 NPK kg/ha+20 t/ha FYM+BF
2.	T_2	75%RDF+FYM+ BF	75:37:5:37:5NPK kg/ha+20 t/ha FYM+BF
3.	T_3	100% RDF + FYM +BF	100:50:50NPK kg/ha+20 t/ha FYM+BF
4.	T_4	125% RDF + FYM +BF	125:62:5:62:5NPKkg/ha +20t/ha FYM+BF
5.	T_5	150% RDF + FYM +BF	150 : 75: 75NPK kg/ha +20 t / ha FYM+BF
6.	T_6 (Check)	100% RDF +FYM	100:50:50NPK kg/ha + 20 t/ha FYM
7.	T_7 (Check)	100% RDF)	100:50:50NPK kg/ha

FYM 20 t/ha was common for all the treatment except check *i.e.* T_7

out as per the procedure given by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

The mean number of flower stalk per bulb and height of flower stalk due to various treatments are presented in Table 1. The mean number of flower stalk per bulb and height of flower stalk was 6.77 and 76.33 cm, respectively. Among the seven treatments, T_5 150% RDF + FYM +BF produced significantly highest number of flower stalk per bulb (7.66) than any other treatment which was at par with the treatment T_4 (7.20) *i.e.* 125% RDF + FYM +BF. The treatment T_4 (125% RDF + FYM +BF) was followed by the T_1 50% RDF + FYM +BF. The treatment T_1 50% RDF + FYM +BF was followed by the T_2 75% RDF + FYM + BF and T_7 100% RDF (NPK) *i.e.* NPK only which were at par with each other. The treatment T_2 75% RDF + FYM + BF and T_7 100% RDF (NPK) *i.e.* NPK only was followed by T_6 100% RDF *i.e.* (NPK + FYM). The treatment T_3 100% RDF + FYM +BF produced minimum number of flower stalk per bulb (6.20). Maximum height (80.33 cm) of flower stalk was recorded in the treatment T_5 150% RDF + FYM +BF while the treatment T_1 50% RDF + FYM +BF, T_6 100% RDF *i.e.* (NPK + FYM) and T_7 100% RDF (NPK) *i.e.* NPK. recorded minimum height (74.00cm) of flower stalk. The mean number of flower stalk per bulb and height of flower stalk did not differ significantly due to various treatment under study. However, the highest number of flower stalk and maximum height was recorded with highest dose of fertilizer in combination with organic and BF.

The mean number of seed per umbel and per bulb were 777.38 and 2998.66, respectively. The treatment T_5 150% RDF + FYM +BF exhibited significantly maximum number of seed per umbel (874) followed by T_6 100% RDF *i.e.* (NPK + FYM) and T_7 100% RDF (NPK) *i.e.* NPK. The treatment T_3 100% RDF + FYM +BF produced minimum number of seeds per umbel (718). The treatment T_5 150% RDF + FYM +BF showed significantly maximum number of seeds pre bulb *i.e.* (3121) which was at par with treatment, T_6 100% RDF *i.e.* (NPK + FYM). The treatment T_2 75% RDF+ FYM+BF produced the lowest number of seed per bulb (2923.66). Thus increased dose of fertilizer resulted in increased seed yield. This might be attributed to availability of nutrients and enhancement of physical properties of soil due to FYM. These results are in conformity with those Cuocola and Barbieri(1988) and Ilin (1992).

The mean seed weight per umbel and per bulb was 2.67 and 11.43g, respectively. The treatment T_5 150% RDF + FYM +BF produced significantly highest seed weight per umbel than any other treatment (3.27g) which was at par with the treatment T_6 100% RDF *i.e.* (NPK + FYM) and T_7 100% RDF (NPK) *i.e.* NPK only. The treatment T_3 100% RDF + FYM +BF recorded the lowest

Table 1 : Mean number of flower stalk per bulb and height of flower stalk as influenced by INM

Treatment no.	Treatments	Number of flower stalk/bulb	Height of flower stalk/bulb (cm)
T_1	50% RDF + FYM +BF	6.73	74.00
T_2	75% RDF + FYM +BF	6.60	75.66
T_3	100% RDF + FYM +BF	6.20	77.00
T_4	125% RDF + FYM +BF	7.20	79.33
T_5	150% RDF + FYM +BF	7.66	80.33
T_6 (Check)	100% RDF (NPK + FYM) (Only FYM No BF)	6.46	74.00
T_7 (Check)	100% RDF (NPK only) (No FYM and No BF)	6.60	74.00
	Mean	6.77	76.33
	S.E. ±	0.19	2.28
	C.D. (P=0.05)	0.60	N.S

NS-Non significant

Table 2 : Effect of INM on yield attributes and yield of onion seed production

Treatments no.	Treatments	Number of seed/umbel	Number of seed/bulb	Seed weight/ umbel(g)	Seed weight/ bulbl (g)	Seed yield (kg/ha)
T_1	50% RDF + FYM +BF	721.33	2991.66	2.27	10.58	311.86
T_2	75% RDF + FYM +BF	748.33	2923.66	2.33	10.96	321.66
T_3	100% RDF + FYM +BF	718.00	2948.66	2.20	10.58	360.00
T_4	125% RDF + FYM +BF	761.00	2999.66	2.69	11.34	357.66
T_5	150% RDF + FYM +BF	874.00	3121.00	3.27	12.80	384.00
T_6 (Cheak)	100% RDF (NPK + FYM) (Only FYM No BF)	815.00	3056.66	3.07	12.24	368.00
T_7 (Cheak)	100% RDF (NPK Only) (No FYM and No BF)	804.00	2989.33	2.89	11.53	338.00
	Mean	777.38	2998.66	2.67	11.43	348.74
	S.E. ±	25.97	23.39	0.14	0.35	3.10
	C. D. (P=0.05)	80.02	72.07	0.44	1.08	9.56

seed weight per umbel (2.20g).The treatment T_5 150% RDF + FYM +BF produced significantly higher seed weight per bulb than any other treatment and which was at par with treatment, T_6 100% RDF *i.e.* (NPK + FYM). $T_1$50% RDF + FYM +BF and $T_3$100% RDF + FYM +BF recorded the lowest seed weight per umbel and per bulb (2.20g and 10.58g,), respectively. The The mean seed yield per hectare was 348.74 kg. The treatment T_5 (125% RDF + FYM +BF) recorded the highest seed yield per hectare (384 kg) which was significantly higher than any other treatment under study. The treatment T_1 (50% RDF+FYM +BF) recorded the lowest seed yield per hectare (311.86 kg). Thus the higher doses of fertilizers, FYM and biofertilizers in combination produced higher yield and yield attributing characters. This might be attributed to higher levels at initial stage resulted in better vegetative growth and further the availability of nutrients and its uptake might have given higher seed yield similar results were reported by Rather *et al.* (2003) and Kumar and Sharma (2006).

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