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## Effect of integrated use of nutrients on growth and yield of onion (*Allium cepa* var. *aggregatum*) cv. Gnanamedu local

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#### Abstract

A field experiment was conducted to determine the response of integrated plant nutrition on growth, yield and quality of Onion at Department of Horticulture, Faculty of Agriculture, Annamalai University., During 2010 in randomized block design with eleven treatments of integrated nutrient management viz., T<sub>1</sub>- FYM 25 t ha<sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha<sup>-1</sup>). T<sub>2</sub>-FYM 25 t ha<sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. T<sub>3</sub> FYM 25 t ha<sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>. T<sub>4</sub>-FYM 25 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. T<sub>5</sub>- FYM 25 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>. T<sub>6</sub>- Vermicompost 5 t ha<sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha<sup>-1</sup>). T<sub>7</sub>-Vermicompost 5 t ha<sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>+panchagavya 3%. T<sub>8</sub>- Vermicompost 5 t ha<sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>. T<sub>9</sub>-Vermicompost 5 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. T<sub>10</sub>-Vermicompost 5 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>. T<sub>11</sub>- Control (absolute control). the treatments were imposed in onion (The results revealed that, significantly plant height, number of tillers plant<sup>-1</sup>, leaf length, bulb weight, number of bulb plant<sup>-1</sup>, individual bulb weight, yield per plot, yield per ha<sup>-1</sup> were recorded when the Onion plant treated with Vermicompost 5 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. followed by T<sub>2</sub>-FYM25 t ha<sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. Whereas, the minimum was recorded in the treatment T<sub>1</sub>- FYM 25 t ha<sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha<sup>-1</sup>).

**Keywords:** nutrients, yield of onion, Faculty of Agriculture

#### Introduction

Onion (*Allium cepa* var. *aggregatum*) cv Gnanamedu local is one of the most important bulbous vegetable and cash crop grown for vegetable. Onion has called as “Queen of Kitchen”. Selvaraj (1976) [1]. India is the second largest producer of onion in the world next to China. Onion ranks first in the export of fresh vegetables from India. It's productivity was low compared to world average productivity. This indicates that there is a great need for increasing production of onion. The yield of onion depends mainly on cultural practices like nutrition, irrigation, plant protection measures besides the congenial climatic factors. Nutrition is one of the most important factors which governs the onion production. There is need of supplementing the use of chemical fertilizers with organic manures.

Organic matter provides many additional benefits such as supply of micronutrients, preventing erosion improving drainage and good microorganisms as well as increase in Base Exchange capacity. As NPK doses and FYM application are varietal specific also, here is need to undertake the research on bulb production aspect to onion cultivation. Therefore, it is envisaged to investigate the optimum dose of NPK and FYM application for onion crop to maximize the yield under coastal region. With these considerations in mind, the present trial was conducted to study the INM on growth and yield of onion crop.

#### Materials and Methods

The present field investigation entitled, “Effect of integrated nutrient management on growth and yield of onion” was carried out during 2010-11 at Vegetable unit, Department of Horticulture, Annamalai University, The soil of the experimental field was sandy lome in texture, (pH 6.5) low in available nitrogen (141.41 kg ha<sup>-1</sup>), medium in available phosphorus (19.11 kg ha<sup>-1</sup>) and high in available potassium (450 kg ha<sup>-1</sup>). The experiment was laid out in randomized block design with nine treatments and three replications. Treatment consisted of T<sub>1</sub>- FYM 25 t ha<sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha<sup>-1</sup>). T<sub>2</sub>- FYM 25 t ha<sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. T<sub>3</sub>-FYM 25 t ha<sup>-1</sup> + 75%

RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>. T<sub>4</sub>- FYM 25 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. T<sub>5</sub>- FYM 25 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>. T<sub>6</sub>- Vermicompost 5 t ha<sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha<sup>-1</sup>) T<sub>7</sub>-Vermicompost 5 t ha<sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. T<sub>8</sub>- Vermicompost 5 t ha<sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>. T<sub>9</sub> -Vermicompost 5 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup> + panchagavya 3%. T<sub>10</sub>-Vermicompost 5 t ha<sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha<sup>-1</sup>) + sulphur @ 45 kg ha<sup>-1</sup>. T<sub>11</sub>- Control (absolute control). 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 Panse, and. Sukhatme. 1978<sup>[7]</sup>

### Results and Discussion

The significant difference in plant height at all the crop growth stages was observed due to various treatments. The treatment where highest doses NPK through inorganic and organic sources were applied produced significantly more plant height as compared to rest of the treatments at all crop growth stages. The favourable effect in increase in plant height were observed due to better availability of nutrients, better moisture utilization, better soil moisture etc. These results were in agreement with those reported by Geetha *et al.* (1999)<sup>[2]</sup>, Hemal Naik and Hosamani. (2003)<sup>[3]</sup> (Table 1).

It was substantially indicated that the integrated nutrient management through various organic and inorganic fertilizers showed better effect on number of Treatment details : Symbol Treatment details Table 1 : Mean periodical plant height (cm), number of stalks per plant, number of days to maturity as influenced by various treatments Plant height (cm) Days of the stalks per plant. These results are in conformity with the finding reported by Krishnamurthy, and Sharanappa. (2005)<sup>[4]</sup> who showed that as the level of N, P and K was increased the number of stalks also increased (Table 1).

The application of organic and inorganic fertilizers and panchagavya their integration did not effect days for maturity of onion crop significantly (Table 1). The maximum number of umbels per plant obtained in treatment (T<sub>2</sub>) 100 % RDF + 20 t FYM ha<sup>-1</sup> (6.15) which was significantly higher than any other treatment except treatment (T<sub>1</sub>) RDF as per soil test. The

nutrient availability might be coinciding with the physiological development of onion crop. This has reflected in maximum number of umbels per plant (Table 2). The application of 100 % RDF + 20 t FYM ha<sup>-1</sup> produced significantly highest weight per umbel than any other treatment (3.80 g). It was followed by treatment (T<sub>1</sub>) RDF as per soil test which was at par with treatments T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> (Table 2). The thousand weights were not affected significantly due to various treatments under study. However, maximum thousand weights were recorded in treatment (T<sub>2</sub>) 100 % RDF + 20 t FYM ha<sup>-1</sup> 92.59 g) (Table 2). The treatment (T<sub>2</sub>) 100 % RDF + 20 t FYM ha<sup>-1</sup> recorded significantly the highest yield per plant than Yield contributing characters as influenced by various treatments. General mean 4.79 1182 3.19 2.69 The treatment (T<sub>2</sub>) 100 % RDF + 20 t FYM ha<sup>-1</sup> exhibited significantly maximum number of s per umbel (1274) in all treatments but at par with treatment (T<sub>1</sub>) RDF as per soil test. This might be due to inorganic fertilizer which supply all the essential nutrients for growth and development of crop and FYM influenced soil physical environment and biological activity which reflected in terms of increased number per umbel. The similar any other treatment (23.37 g) (Table 1). The application of 100 % RDF + 20 t FM ha<sup>-1</sup> recorded the highest yield per hectare (1259 kg) which was significantly higher than any other treatment under study. The treatment T<sub>2</sub> was followed by treatment T<sub>1</sub>. The results obtained under treatment 5 t FYM ha<sup>-1</sup> Mean yield per plant (g), straw yield per hectare (kg) and yield per hectare (kg) as influenced by various treatments. General mean 15.68 1225 822 recorded the lowest yield per hectare (422 kg). Similar results were also obtained for straw yield of onion crop. The results indicated that the application of combination of inorganic fertilizers with organic manures was found highly beneficial. The increase in yield appeared due to increased growth of plants in respect of various growth parameters and yield contributing characters. The significant effects of NPK elements on onion yield were reported by Mamatha *et al.* (2008)<sup>[5]</sup>, Pal, R.K. and D.Pondey (1986)<sup>[6]</sup>, (1991) and Randhir Kumar *et al.* (2002)<sup>[8]</sup>. The application of 100 % RDF + 20 t FYM ha<sup>-1</sup> significantly increased yield as compared to rest of the treatments. It was followed by RDF as per soil test. (Tab3e -2) This indicates that adoption of integration of organic and inorganic fertilizers are beneficial for higher onion yield. The combination of organic manure and inorganic fertilizers proved advantageous as compared to use of organic manures or inorganic fertilizers alone.

**Table 1:** Effect of INM of certain Growth characters of Onion (*Allium cepa* var *aggregatum*. L) cv. Gnanamaedu local

Treatments	Plant height (cm)	Number of Leaves plant <sup>-1</sup>	Number of Tillers plant <sup>-1</sup>	Total chlorophyll content (mg g <sup>-1</sup> )	
T <sub>1</sub> - FYM 25 t ha <sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha <sup>-1</sup> ).	53.80	20.46	7.42	2.12	4291.06
T <sub>2</sub> -FYM 25 t ha <sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> + panchagavya 3%.	58.44	22.31	7.98	2.33	4768.84
T <sub>3</sub> FYM 25 t ha <sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup>	47.24	18.00	6.86	1.90	8842.18
T <sub>4</sub> -FYM 25 t ha <sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> + panchagavya 3%.	39.80	16.24	6.28	1.65	3382018
T <sub>5</sub> - FYM 25 t ha <sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup>	31.78	12.85	4.82	1.39	2519.97
T <sub>6</sub> - Vermicompost 5 t ha <sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha <sup>-1</sup> ).	57.62	21.74	7.70	2.22	4539.95
T <sub>7</sub> -Vermicompost 5 t ha <sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> +panchagavya 3%	62.44	23.52	8.36	2.44	4973.28
T <sub>8</sub> - Vermicompost 5 t ha <sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK	51.02	19.22	7.14	2.01	4057.73

ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> .					
T <sub>9</sub> -Vermicompost 5 t ha <sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> + panchagavya 3%.	43.62	16.74	8.58	1.78	3624.40
T <sub>10</sub> -Vermicompost 5 t ha <sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> .	36.56	14.52	6.00	1.52	2786.63
T <sub>11</sub> - Control (absolute control).	27.14	9.34	2.56	0.62	1168.87
SE.d	1.40	0.64	0.26	0.09	3.14
C.D=05	2.78	1.28	0.56	0.18	6.28

**Table 2:** Effect of INM of certain yield and quality characters of Onion (*Allium cepa* var *aggregatum*. L) cv. Gnanamaedu local

Treatments	Individual Bulb Weight (cm)	Number of Bulbs plant <sup>-1</sup>	Yield kg plot <sup>-1</sup>	Bulb yield t ha <sup>-1</sup>	Pyruvic acid content $\mu$ mol mg <sup>-1</sup>
T <sub>1</sub> - FYM 25 t ha <sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha <sup>-1</sup> ).	10.37	8.20	13.80	18.89	2.96
T <sub>2</sub> -FYM 25 t ha <sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> + panchagavya 3%.	11.21	8.92	14.90	22.22	3.16
T <sub>3</sub> -FYM 25 t ha <sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup>	9.42	8.44	12.52	15.79	2.62
T <sub>4</sub> -FYM 25 t ha <sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> + panchagavya 3%.	8.47	7.64	12.26	14.38	2.34
T <sub>5</sub> - FYM 25 t ha <sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup>	7.42	6.43	9.86	10.60	1.89
T <sub>6</sub> - Vermicompost 5 t ha <sup>-1</sup> + 100% RDF (60:60:30 kg NPK ha <sup>-1</sup> ).	10.80	8.54	14.36	20.49	3.02
T <sub>7</sub> -Vermicompost 5 t ha <sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> +panchagavya 3%	11.65	9.27	15.49	23.99	3.2
T <sub>8</sub> - Vermicompost 5 t ha <sup>-1</sup> + 75% RDF (45:45:22.5 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> .	9.84	8.81	13.87	19.26	2.76
T <sub>9</sub> -Vermicompost 5 t ha <sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> + panchagavya 3%.	8.96	8.08	11.91	16.08	2.49
T <sub>10</sub> -Vermicompost 5 t ha <sup>-1</sup> + 50% RDF (30:30:15 kg NPK ha <sup>-1</sup> ) + sulphur @ 45 kg ha <sup>-1</sup> .	8.01	7.24	10.65	12.88	2.20
T <sub>11</sub> - Control (absolute control).	1.18	3.64	8.21	4.99	1.32
SE.d	0.24	0.32	0.27	1.81	0.08
C.D=05	0.49	0.60	0.54	3.62	0.17

## Reference

- Selvaraj S. Onion queen of the Kitchen. Kisan world, 1976; 3(12):32-34.
- Geetha K, Srinivasa Raju A, Shanti M. Effect of farmyard manure and K nutrition and yield of onion at different stages of growth. J Res. Angrav. 1999; 27(1&2):18-13.
- Hemal Naik B, Hosamani RM. Effect of spacing and nitrogen levels on growth and yield of kharif onion. Karnataka J Agric. Sci. 2003; 16(1):98-102.
- Krishnamurthy D, Sharanappa. Effect of sole and integrated use of improved composts and NPK fertilizers on the quality, productivity and shelf life of Bangalore Rose Red Onion (*Allium cepa* L.). Mysore J Agri. Sci. 2005; 39(3):355-361.
- Mamatha HN, Yeledhalli NA, Prakash SS, Ravi MV. Effect of application of organic and inorganic source of nitrogen on yield quality and nutrient uptake by onion (*Allium cepa* L) Mysore J Agric. Sic. 2008; 42(2):530-533.
- Pal RK, Pondey D. Effect of different levels of nitrogen, phosphorus and potassium on growth and yield of garlic. Prog. Hort. 1986; 18(3-4):256-259.
- Panse VG, Sukhatme PV. Statistical methods for Agricultural workers. Indian Council of Agrl. Res. New Delhi, 3<sup>rd</sup> edn, 1978.
- Randhir Kumar, Singh SS, Rao VK. Response of garlic (*Allium sativum* L.) to various levels of nitrogen, phosphorus and potassium. Prog. Hort. 2002; 34(2):213-222.