

**Original Research Article**

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## **Effect of Integrated Nutrient Management on Growth and Yield Parameters of Pomegranate cv. Bhagwa under Central Dry Zone of Karnataka**

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A field experiment was conducted in the farmer's field at Somerhalli village, Hiriyurtaluk of Chitradurga district on pomegranate cv. Bhagwa during 2015-16 titled as Studies on integrated nutrient management in relation to growth and yield characters in Mrigbahar season. The experiment was laid out in randomized block design with 9 treatment combinations, comprising of inorganic, organic and biofertilizers with 3 replications. Results revealed that application of 100% recommended dose of fertilizers (RDF) along with vermicompost + poultry manure + *Azospirillum* + PSB + KSBT<sub>9</sub> has recorded the maximum fresh weight of leaf (0.28 and 0.38 g), dry weight of leaf (0.17 and 0.27 g), leaf area (9.91 and 12.89 cm<sup>2</sup>), shoot length (35.22 and 43.33 cm) at 30 and 60 days after first Biofertilizer application respectively, and also recorded the maximum weight of fruit (292.61g), number of fruits per tree (61.22), yield per tree (17.93kg), yield per hectare (16.46 t/ha).

### **Introduction**

Pomegranate (*Punica granatum* L.) belongs to family Lythraceae, regarded as 'Fruit of Paradise', an ancient favorite fruit of tropical and sub-tropical regions of the world. The fruit rind, seeds and pulp comprises of rich medicinal properties. Present global pomegranate consumption ranks 18<sup>th</sup> place annually and expected to move onto 10<sup>th</sup> place within the decade in view of its innumerable nutraceutical importance. The fruit contains

nearly about 153 phytochemicals like ellagic acid, catechin and procyandins, fatty acids and triglycerides, sterols and terpenoids, flavonols etc. The fruit juice contains tannins, anthocyanin, polyphenols and antioxidants A, E and C which plays major role in maintenance of heart blood vessels, and proper blood circulation. Among the various factors which contribute towards the growth, yield and quality of pomegranate, nutrition is the most important and it has direct effect on production and quality. Integrated nutrient

management includes, use of inorganic and organic sources of nutrients to ensure balanced nutrient proportions by enhancing nutrient response efficiency and maximizing crop productivity of desired quality. In view of this present experiment titled as “Studies on integrated nutrient management on growth and yield of pomegranate (cv. Bhagwa) under central dry zone of Karnataka” has been designed.

### Materials and Methods

The investigation conducted during 2015-16 in the farmer's field of Somerhalli village, Hiriyurtaluk of Chitradurga district, titled as “Studies on integrated nutrient management on growth and yield of pomegranate (cv. Bhagwa) under central dry zone of Karnataka”. Uniformly aged 135 plants spaced at 10ftx10 ft were selected during Mrigbahar (June-July) of 2015. There were nine treatments along with control and each treatment was replicated thrice in a Complete Randomized Block Design. The recommended dose of fertilizers for pomegranate 400:200:200 g NPK per tree with FYM 5 tonnes per acre (12.5 tonnes per hectare 5.4 kg/ plant) was applied during the course of experimentation. Biofertilizers and organic manures were procured from KVKBabbur farm, Hiriyur. The bioferilizers like *Azospirillum*, PSB, and KSB were applied at the rate of 5 kg/ acre, (12.5 kg/ hectare, 13.61 g/ plant), poultry manure at the rate of 3.3 kg/ tree and vermicompost at 2 kg/ tree. The recommended dose of NPK was applied in the form of urea, diammonium phosphate and muriate of potash, respectively. The growth parameters like leaf fresh and dry weight (g), leaf area ( $\text{cm}^2$ ), shoot length (cm) at 30 and 60 days recorded after first biofertilizer application and the yield parameters like weight of fruit (g), number of fruits per plant, yield (kg/ plant), Yield per hectare (t) was recorded.

### Results and Discussion

The growth parameters were significantly influenced by application of biofertilizers Maximum fresh weight of leaf (0.28 g and 0.38 g), dry weight of leaf (0.18 g and 0.27 g), shoot length (35.22cm and 45.19 cm) at 30 and 60 days after biofertilizer application was recorded with (Table 1). The improvement in growth might be due to the application of biofertilizers that results in increased length of shoots, supply of all nutrients so ultimately increases the vegetative growth of the plant. These observations are in conformity with those of Khan *et al.*, (2009) in citrus and Khalid *et al.*, (2013) in strawberry. The maximum leaf area ( $9.91 \text{ cm}^2$  and  $12.89 \text{ cm}^2$ ) recorded at 30 and 60 days after first biofertilizer application (Table 1). This might be due to supply of optimum levels of nitrogen, phosphorus and potassium. The addition of biofertilizers like *Azospirillum*, PSB and KSB resulted in higher uptake and accumulation of nutrients in leaf tissues which inturn ensure photosynthetic efficiency causing greater synthesis, translocation and accumulation of carbohydrates. These results were similar with the earlier findings of Sheikh and Rao (2005) in pomegranate and Athaniet *et al.*, (2005) in guava.

The yield attributes were significantly influenced by application of biofertilizers (Table 2). Maximum fruit weight (292.61g) was recorded with application of 100% RDF + vermicompost + *Azospirillum* + PSB +KSB resulted fruit weight might be due to increase in cell size and intercellular space. The increase in size of fruit as a result of application of biofertilizers might be because it improved the internal physiology of developing fruit in terms of better supply of water, nutrients and other compounds vital for their proper growth and development reported by Dalal *et al.*, (2004) in Sapota, Sheikh and Rao (2005) in pomegranate.

**Table.1** Effect of integrated nutrient management on fresh and dry weight of leaf, shoot length and leaf area in pomegranate cv. Bhagwa

Treatment	Fresh weight (g)		Dry weight (g)		Shoot length (cm)		Leaf area (cm <sup>2</sup> )	
	30 <sup>th</sup> day	60 <sup>th</sup> day	30 <sup>th</sup> day	60 <sup>th</sup> day	30 <sup>th</sup> day	60 <sup>th</sup> day	30 <sup>th</sup> day	60 <sup>th</sup> day
T <sub>1</sub> -100%RDF (control)	0.18	0.27	0.07	0.17	27.07	38.28	8.20	11.48
T <sub>2</sub> -75% RDF + vermicompost	0.25	0.30	0.09	0.19	27.93	39.00	8.64	11.88
T <sub>3</sub> -75% RDF + vermicompost +Azo+PSB	0.20	0.26	0.08	0.20	30.35	39.60	8.70	11.98
T <sub>4</sub> -75% RDF + vermicompost +Azo+PSB+KSB	0.22	0.29	0.12	0.21	32.03	40.26	8.74	12.44
T <sub>5</sub> -100%RDF + poultrymanure	0.20	0.28	0.11	0.19	31.00	39.58	8.95	11.78
T <sub>6</sub> -100%RDF + poultrymanure +Azo+PSB	0.22	0.31	0.12	0.22	31.79	41.12	9.09	12.14
T <sub>7</sub> -100%RDF + poultrymanure+Azo+PSB+KSB	0.23	0.32	0.13	0.21	32.16	42.20	9.29	12.18
T <sub>8</sub> -75% RDF + vermicompost + poultrymanure+ Azo+ PSB + KSB	0.25	0.34	0.14	0.25	33.27	43.33	9.57	13.12
T <sub>9</sub> -100% RDF + vermicompost + poultrymanure+Azo+ PSB + KSB	0.28	0.38	0.17	0.27	35.22	45.19	9.91	12.89
S. Em. $\pm$	0.02	0.02	0.01	0.02	1.46	1.30	0.20	0.10
C.D. at 5%	0.05	0.06	0.04	0.05	4.36	3.91	0.59	0.29

**Table 2** Effect of integrated nutrient management on yield and yield attributes of pomegranate cv. Bhagwa

Treatment	Fruit weight (g)	Number of fruits per plant	Yield per plant (kg)	Yield per hectare (t)
<b>T<sub>1</sub>-100%RDF (control)</b>	245.85	56.06	13.82	12.68
<b>T<sub>2</sub>-75% RDF + vermicompost</b>	251.82	57.06	14.38	13.20
<b>T<sub>3</sub>-75% RDF + vermicompost +Azo+PSB</b>	253.63	57.22	14.51	13.32
<b>T<sub>4</sub>-75% RDF + vermicompost +Azo+PSB+KSB</b>	254.05	57.82	14.69	13.49
<b>T<sub>5</sub>-100%RDF + poultrymanure</b>	254.25	57.00	14.50	13.31
<b>T<sub>6</sub>-100%RDF + poultrymanure +Azo+PSB</b>	260.50	56.83	14.86	13.64
<b>T<sub>7</sub>-100%RDF + poultrymanure+Azo+PSB+KSB</b>	266.28	56.98	15.17	13.93
<b>T<sub>8</sub>-75% RDF + vermicompost + poultrymanure+Azo+ PSB + KSB</b>	290.87	60.87	17.70	16.25
<b>T<sub>9</sub>-100% RDF + vermicompost + poultrymanure+Azo+ PSB + KSB</b>	292.61	61.22	17.93	16.46
<b>S. Em.<math>\pm</math></b>	2.09	0.29	0.10	0.61
<b>C.D. at 5%</b>	0.87	6.26	0.31	1.83

The maximum fruit weight (292. 61 g), number of fruits per tree (61.00) yield per tree (17.77 kg) and yield per hectare (15.98 t) was recorded with Application of 100% RDF + vermicompost + poultry manure + *Azospirillum* + PSB + KSB (Table 2). The significant increase in fruit yield is a cumulative effect of increase in number of fruits because of reduction in fruit drop and higher fruit weight by the application of biofertilizers might have affected the physiological process resulting into higher production. These results in conformity with the findings of Dutta *et al.*, (2014) Padmavathamma and Hulamani (1998) in pomegranate, Kulapati *et al.*, (2009) in banana, Patil *et al.*, (2005) in mango.

Thus from the present study, it may be concluded that Application of 100% RDF + vermicompost + poultry manure + *Azospirillum* + PSB + KSB is superior than the other treatments with respect to improvement in growth and important attributes contributing towards the better yield in Mrigbahar pomegranate cv. Bhagwa under central dry zone of Karnataka.

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