

Original Research Article

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Influence of Integrated Nutrient Management on Various Growth Attributes and Yield of Mango (*Mangifera indica* L.) cv. Jamadar

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ABSTRACT

Keywords

Mango, Growth attributes, Yield, Jamadar, INM

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An experiment was conducted to find out the influence of integrated nutrient management on various growth attributes and yield of mango (*Mangifera indica* L.) cv. Jamadar during 2013-14 to 2016-17 at Agriculture Research Station (Fruit Crops), Junagadh Agricultural University, Mahuva. The trial was laid out in Randomized Block Design with four replication and seven treatments. Four year pooled data revealed that the highest plant height (5.33 m), maximum plant spread (E-W) (4.34 m), plant spread (N-S) (3.97 m), fruit girth (9.53 cm), fruit length (8.76 cm), fruit weight (185.50 g), fruit yield (18.40 kg/plant and 3271 kg/ha), total sugar (14.78%) and TSS (26.81%) was obtained in treatment T7 comprising full dose of RDF NPK (kg/ha) + FYM. Treatment having 50 % N from RDF + 50 % N from Castor Cake kg/pl/ Year proved as the next better treatment.

Introduction

Mango belongs to the family Anacardiaceae. Mango is known as the “King of fruits”. It is one of the most important tropical fruit of the world and the national fruit of India. India has traditionally been the world's largest producer of mangoes and having area under cultivation of 22.5 lakh hectares with production of 21.82 million tons with a productivity of 8.7 tons/ha (Anon., 2018). India ranks first in mango production in the world contributing 41 % of the total world production. Jamadar is local

variety of Bhavnagar district of Gujarat. Fruits are green, medium in size having typical smell and colour. Nutrient management is of vital importance and affects growth, yield and quality of the crop.

This is very important in horticultural crop like mango. Balanced nutrition is a pre requisite to get higher and quality yield without detracting soil health. This could be possible only through choice of various organic, inorganic and biological sources of nutrients, which are easy to apply. Plant

required balanced nutrients to complete life cycle and produce higher yield and it fulfilled when we provided recommended dose of fertilizers. Hence, choice and source of nutrients to meet the crop need at the same time maintaining / improving native soil fertility and productivity is of great importance. Keeping these views in mind, this trial was carried out for the research purpose.

Materials and Methods

A field experiment was conducted at the Agriculture Research Station (Fruit crops), Junagadh Agricultural University, Mahuva (Bhavnagar) during summer season of the year 2013-14 to 2016-17. The soil samples of Location before conducting experiment in main field were analyzed for essential nutrient, EC and pH (Jackson, 1973).

The details of value is given in Table 1, which indicate the available phosphorus and potash was high whereas available nitrogen was found lower at the location of experiment. pH value indicate the experimental soil was alkaline in nature. Analysis of irrigation water was also carried out before conducting experiment (Table-2).The experiment was carried out with seven different treatments comprised of organic manure (FYM), Poultry manure, Castor cake and recommended dose of NPK. The details of treatments are given in the table 3. According to treatments, phosphorus and potash were applied in all the treatments as per RDF in the month of June. Full dose of FYM, Poultry manure and Castor cake were also applied in the month of June. N fertilizer was applied in two splits in year i.e. June and Feb. All the fertilizer were given making ring with 10 cm deep and one meter away from main tree trunk.

The experiment was laid out in a Randomized Block Design with four replication. Number of plant per treatments was two. The gross

plot size was 15 x 7.5 m². Data obtained from study for four consecutive year were pooled and statistically analyzed as procedure given by Panse and Sukhatme (1967).

Results and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads

Plant height (m)

A perusal of the data (Table: 4) indicated that the effect different treatments on plant height was found significant. Treatment T₇ (Full dose of RDF NPK (kg/ha) + FYM) produced the maximum height (5.33 m) which was at par with T₄ (50 % N from RDF + 50 % N from FYM kg/pl/ Year). Similar result were obtained by Nehete and Jadav (2019) who reported that maximum tree height in mango cv. Amrapali was found by the application of 100% N + 85% P₂O₅ + Azatobactor + PSB.

Plant spread (E-W)

The data present in the table 4 indicate that the plant spread (E-W) was found significant. The highest plant spread (E-W)(4.34 m) was observed in treatment T₇which was at par with T₆ (50 % N from RDF + 50 % N from Castor Cake kg/pl/ Year).The results are in agreement with statement of Nehete and Jadav (2019).

Plant spread (N-S)

The results revealed that the among different treatments, plant spread (N-S)was found significant. Treatment T₇was found superior and produced the highest plant spread (N-S)(3.97 m) (Table 4).Nehete and Jadav (2019) also stated similar outcomes in mango cv. Amrapali.

Fruit girth (cm)

Aperusal of the data indicated that the effect of different treatments on fruit girth was found significant. Treatment T₇ produced the highest fruit girth (9.53 cm) which was at par with T₄, T₅ & T₆ (Table 4). This result is in line the finding of Kundu *et al.*, (2011) in mango cv. Amrapali.

Fruit length (cm)

The data obtained from the present research shown that the effect of different treatments on fruit length (cm) was found significant. Treatment T₇ produced the highest fruit length (8.76 cm) which was at par with T₃, T₄, T₅& T₆ (Table 4).

Fruit weight (g)

Treatment T₇ (Full dose of RDF NPK (kg/ha) + FYM) recorded the maximum fruit weight (185.50 g) which was at par with T₆ (178.50 g) (Table 5). The marked effect of nitrogen on various characters of fruits was due to increase in the efficiency of metabolic processes and thus encouraged the growth of the plant and various plant parts including fruits. They also enhanced the plant growth through their beneficial effects, which resulted in higher fruit size (Singh *et al.*, 2003). The results are in conformity with the conclusion of Kalyani and Sharma (2018).

Fruit yield (kg/plant)

Significantly maximum fruit yield per plant (18.40 kg) was recorded in treatment T₇as compared to rest of the treatments. Our findings are parallel to research result of Nehete and Jadav (2019) as well as Usha *et al.*, 2019.

Fruit yield (kg/ha)

The effect of all the different treatments on fruit yield (kg/ha) was found significant. Treatment T₇ found superior as compared to other treatments (3271 kg/ha) (Table-5). The increased in fruit yield might be attributed due to increasing level of nutrient near the assimilating area of plant which enhance the rate of dry matter production and its rational partitioning to economic part improved the yield (Dalal *et al.*, 2004).

Total sugar (%)

Data from the present investigation revealed that total sugar was found significant among all treatments. The highest amount of Total Sugar (14.78 %) was found in case of treatment T₇which was at par with treatments T₆.This result is close to the finding of Kalyani and Sharma (2018) who reported that maximum total sugar were found under the treatment 80% RDF + cowdung slurry @ 10 lit/tree.

Table.1 Chemical properties of the experimental soil

Sr.no	Soil Parameters	Value
1	Available N	145.00 kg/ha
2	Available P ₂ O ₅	76.43 kg/ha
3	Available K ₂ O	922.0 kg/ha
4	EC (1:2.5) (dSm-1)	0.56
5	pH (1:2.5)	7.99
6	ESP	21.84

Table.2 Chemical properties of irrigation water

Sr.no	Parameters	Value
1	EC (1:2.5) (dSm-1)	4.88
2	pH (1:2.5)	7.78
3	SAR	9.98
4	SSP	59.62

Table.3 Treatments details in the present investigation are as under

Sr. No	Treatments	Treatment details according to age of the trees (in Year)			
		4 th	5 th	6 th	7 th
T1	Organic Manure (FYM) kg/pl/ Year	40	50	60	70
T2	Poultry Manure kg/pl/ Year	40	50	60	70
T3	Castor Cake kg/pl/ Year	8	10	12	14
T4	50 % N from RDF + 50 % N from FYM kg/pl/ Year	160(g)+20	200(g)+25	240(g)+30	280(g)+35
T5	50 % N from RDF + 50 % N Poultry Manure kg/pl/ Year	160(g)+20	200(g)+25	240(g)+30	280(g)+35
T6	50 % N from RDF + 50 % N from Castor Cake kg/pl/ Year	160(g)+4	200(g)+5	240(g)+6	280(g)+7
T7	Full dose of RDF NPK (kg/ha) + FYM	320(g)+40	400(g)+50	480(g)+60	560(g)+70

Table.4 Effects of different treatments on various attributes of mango cv. Jamadar

Treatments	Plant height (m)	Plant spread (E-W)	Plant spread (N-S)	Fruit girth (cm)	Fruitlength (cm)
T ₁	4.34	3.55	3.15	8.45	7.85
T ₂	4.27	3.63	3.25	8.64	8.02
T ₃	4.40	3.46	2.99	8.81	8.51
T ₄	5.31	3.85	3.33	9.20	8.50
T ₅	4.96	3.96	3.54	9.41	8.50
T ₆	4.79	4.07	3.58	9.20	8.65
T ₇	5.33	4.34	3.97	9.53	8.76
S.Em ₊	0.11	0.10	0.09	0.13	0.15
C.D. at 5 %	0.31	0.29	0.24	0.38	0.41
CV %	9.23	10.62	10.17	5.89	6.95

Table.5 Effects of different treatments on various attributes of mango cv. Jamadar

Treatments	Fruit Weight (g)	Fruit Yield (kg/plant)	Fruit Yield (kg/ha)	Total Sugar (%)	TSS (%)
T ₁	150.13	14.73	2619	12.17	24.38
T ₂	154.06	14.65	2605	12.88	24.66
T ₃	160.69	14.53	2582	12.96	25.81
T ₄	165.81	17.29	3074	12.92	25.38
T ₅	173.25	17.64	3137	13.48	26.44
T ₆	178.50	17.56	3121	14.25	26.81
T ₇	185.50	18.40	3271	14.78	26.75
S.Em _±	3.97	0.48	86.18	0.25	0.30
C.D. at 5 %	11.21	1.37	243.26	0.69	0.86
CV %	9.52	11.82	11.82	7.36	4.71

Total Soluble Solid (%)

Highest amount of TSS percentage (26.81 %) was recorded in treatment T₆ which was statistically at par with treatments T₅ & T₇. The results are in good agreement with the outcome of Kalyani and Sharma (2018).

From the present investigation, it can be concluded that for getting maximum yield of mango cv. Jamadar, apply full dose of recommended dose of fertilizer (kg/ha) + FYM according to age of tree (year).

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