Study the effect of foliar spray of different chemicals on flowering and fruiting in Mango (*Mangifera indica* L.) *cv*. Dashehari

Abstract: The current study entitled **"Study the effect of foliar spray of different chemicals on flowering and fruiting in Mango (*Mangifera indica* L.) *cv*. Dashehari"** was conducted during the year 2022-23 at Horticulture Farm, Bharregaon under Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, (C.G.), during the period from first fortnight of October 2022 and November 2022. The experiment was laid out in randomized block design and replicated thrice with a total of 11 treatment where urea at 1.5%, 2% and 2.5%, KNO_3 at 1.5%, 2% and 2.5%, Ethephon at 250 mg, SOP at 0.5%, 1% and 1.5% and control (spray in water).The present experiment revealed that the treatment T_6 (KNO_3 @ 2.5 %) exhibited better performance in relation to vegetative and growth parameters like minimum vegetative shoots per terminal (0.62), maximum of flowering shoots per terminal (0.98), minimum vegetative shoots (7.64%), maximum flowering shoots (91.55%) and minimum days for full bloom (19.11 days), maximum panicle length (44.39 cm) yield parameters like. highest average weight of fruits (265.11g), average length of fruits (11.18 cm), maximum average diameter of fruits (7.43 cm), number of fruits per panicle (13.80 cm), Higher number of fruits per tree (294.50) and maximum fruit yield per tree (78.76 kg/tree) and quality parameters like. maximum total soluble solids (19.89 ^{0}Brix), minimum acidity (0.16%), total sugar (13.61 %), reducing sugar (10.41%) and non-reducing sugar (3.12%).Hence the treatment T_6 (KNO_3 @ 2.5%) may be recommended for foliar spray for improvement of vegetative growth, fruiting, quality and yield parameters of mango *cv*. Dashehari.

Keywords: Mango, Foliar Spray, Flowering, Fruiting,KNO_3.

1.Introduction:

Mango (*Mangifera indica* L.) belongs to the family Anacardiaceae, is universally accepted as the finest tropical fruit of the world and has been called, in the Orient, "King of Fruits." Mango is rightly known as the 'National Fruit of India, Pakistan, and Philippines It was originated from Indo-Burma region and has grown in almost all parts of the world. Mango inflorescence is primarily terminal, but auxiliary and multiple panicles may also arise from auxiliary buds quite frequently. The flowers are closely clustered toward the apices of each branch or main axis and are either male or hermaphrodite. The total number of flowers in a panicle may vary from 1,000 to 6,000 depending on the variety (Mukherjee, 1953).Change to [1]

The temperature between 24 °C and 27 °C is ideal for its cultivation. It can be grown best in regions with a rainfall between 25 and 250 cm. Regions with bright sunny days and moderate humidity during flowering are ideal for mango growing.

The fruit has been cultivated in the Indian subcontinent for well over 4,000 years and has been the favorite of the kings and commoners because of its nutritive value, taste, attractive fragrance, and health-promoting qualities. Due to its wide adaptability, richness in variety, delicious taste, pleasant flavor, attractive appearance and high nutritive value, it enjoys unique popularity all over the world. It has more nutritional value, because it is a rich source of vitamins (vitamin A-4800 I.U.) and minerals, as well as carbohydrates. The calorific value per 100 g is 50–60 on average. The ripe fruit of mango is fattening, diuretic, and laxative. Beside table purposes, mango fruit can be used for the preparation of pickles, preserves, jam, amchur (mango powder), mango leather and mango fool (mango + milk + sugars) (Singh, 1992). [2]

The fruit is widely grown in countries such as Burma, China, Japan the U.S.A. and India. It is grown to a limited extent as a cultivated crop in selected areas in almost all the states of India. The major mango growing states are Uttar Pradesh, Andhra Pradesh, Bihar, Karnataka, Tamil Nadu, Kerala, Maharashtra, Orissa, West Bengal, and Gujarat. In India, mango production is 20336 thousand MT from an area of 2339 thousand ha (Annonymus, 2022).[ ]

Chhattisgarh mango distribution is in Raipur, Balaudabajar, Mahasamund, Durg, Balod, Bametara, Rajnandgaon, Kabirdham, Jagdalpur, Kanker, Dantewada, Mungeli, Janjgir-champa, Korba, Raigarh, Jashpur and Surajpur In (C.G.) mango production is 459.141 MT. from an area of 76.126 ha (Annonymous, 2022).

Potassium nitrate (KNO_3), also known as saltpeter or nitric acid, is considered a special fertilizer. It is a colorless, transparent crystal or white powder with 14% nitrogen (N) and 46% potassium (K). KNO_3 is one of the chemical-inducing substances that has shown some potential for inducing flowering in mango by increasing the activity of nitrate reductive and stimulating the production of ethylene (Beevers and Hageman, 1969). The use of KNO_3 has been employed in various countries, like Mexico, The United States (Hawaii) and Malaysia, for off-season flowering and quality improvement (Afiqah *et al*. 2014).

Urea is the richest source of nitrogen among the common dry fertilizers. Urea is the most important nitrogenous fertilizer. There are two main reasons for urea fertilizer to be the king of fertilizers. Firstly, it has a high nitrogen content of about 46%. Secondly, it is a white, crystalline organic chemical compound. It is neutral and can adapt to almost all of the land. In the case of mango, pre-flowering foliar sprays of urea have been found to increase the number of fruits retained per panicle. Pre-flowering urea spray application was reported to be effective (Singh *et al*. 2005).

Ethephon is a plant growth regulator used to promote fruit ripening, abscission and flower induction. Ethephon is an ethylene releasing compound. Endogenous ethylene plays an integral role in the flower induction process (Chadha and Pal, 1986). The group's soluble SOP can also contribute to high-quality mango production and the efficiency of standard fertilization. A complementary application of SOP in soluble form has been shown to have a significant effect on mango yield and fruit quality.

In the case of flowering in mango, the most important thing is that the trees should be able to produce new vegetative growth in the ‘on’ year, which should also be mature to be ready to enter the reproduction phase and give flowering in the following season. Moreover, early flowering results in advanced fruit maturity and provides opportunities to have the commercial advantages of early marketing in season.

The flowering, fruit set and fruit yield of mango are the most critical events and they are dependent upon many biotic and abiotic factors. Amongst them foliar sprays of growth regulators and growth retardants play very important role in regulating them in mango. These equally true for mango qualitative and quantitative production as well.

2.Material and method:

The current study entitled **“Study the effect of foliar spray of different chemicals on flowering and fruiting in Mango (*Mangifera indica* L.) *cv*. Dashehari”** was conducted during the year 2022-23 at Horticulture Farm, Bharregaon under Pt. K.L.S. College of Horticulture and Research Station, Rajnandgaon, (C.G.), during the period from first fortnight of October 2022 and November 2022. The experiment was laid out in randomized block design and replicated

thrice with a total of 11 treatment where urea at 1.5%, 2% and 2.5%, KNO_3 at 1.5%, 2% and 2.5%, Ethephon at 250 mg, SOP at 0.5%, 1% and 1.5% and control (spray in water).

Preparation of solution.

1. Urea

The required quantity of Urea was weighed, dissolved in water and then the final volume was made for 1.5%, 2% and 2.5% Urea solution, 100 g Urea dissolved in 10 liter up

2. Potassium nitrate (KNO_3)

For preparation of KNO_3 @ 1.5%, 2% and 2.5% solution, 100 g KNO_3 dissolved in 10 liters of water.

3. Ethephon

The required quantity of Ethephon was measured, dissolved in water and then the final volume was made up. For @ 250 mg^{-1} solution 2g Ethephon dissolved in 10 liters of water.

4.Sulphate of potash (SOP)

For preparation of SOP @ 0.5%, 1% and 1.5% solution in 100g sop dissolved in 10 liters of water.

2.1Time and method of spray.

Foliar spray of prepared solution of chemicals was done at first fortnight of October and November as per the treatments. The spray was done by using foot sprayer. According to the treatments, the freshly prepared solutions were sprayed on the trees till they were thoroughly wet.

Harvesting of fruits.

Fully mature fruits of Dashehari mango were harvested from the treated trees and immediately brought to the laboratory and arranged as per the treatments.

Methodology adopted in recording observation

In this Study, observations were recorded on the three parameters *viz.* flowering and fruit set, quality and yield parameters.The collected data on the different parameters of study were statistically analyzed as described by Panse and Sukhatme (1985) and significance was tested by 'F' test.

Result and Discussion

Number of shoot- vegetative shoot and flowering shoot per terminal.

The data on number of vegetative shoot and flowering shoot per terminal and as influenced by different treatments of urea, KNO_3, ethephon and SOPare presented in Table1. The minimum number of vegetative shoots per terminal (0.62) were recorded in (T_6) KNO_3 @ 2.5% which was at par with treatment T_8 SOP @ 0.5% (0.69). while the maximum number of vegetative shoots per terminal T_3 urea @ 2.5% (1.34). The maximum number of flowering shoots per terminal (T_6) KNO_3 @ 2.5% (0.98) which was at par with treatment (T_5) KNO_3 @ 2% (0.91) while the minimum number of flowering shoots per terminal (0.36) were recorded in treatment (T_0) control. It might be due to the fact that mechanism of action of KNO_3 involves a biochemical process where the reduction of nitrate to ammonia takes place. Ammonia is metabolized into different amino acids, which also include methionine. Methionine is further

converted to S-adenosyl methionine (SAM), then to 1-aminocyclopropane-1-carboxylsed acid (ACC) and finally converted to ethylene. stated that KNO_3 Stimulated flowering of mango is mediated by increased levels of endogenous ethylene that may simply hasten flowering shoots. Similar result found by Patoliya*et al. (*2017) Davenport and Nunez-Elisea (1997) and (Maloba *et al*.2014).

Number of vegetative shoot (%) and flowering shoot (%).

The data on number of vegetative shoot and flowering shoot per terminal and as influenced by different treatments of urea, KNO_3, ethephon and SOP, are presented in Table 1. The minimum number of vegetative shoots (%) (T_6) KNO_3 @ 2.5% (7.64%), which was at par with treatment (T_8) SOP @ 0.5% (9.86%), while the maximum number of vegetative shoots (%) (25.16%) were observed in treatment T_3 (urea @ 2.5%). The maximum number of flowering shoots (%) (T_6) KNO_3 @ 2.5% (91.55%) which was at par with (T_5)KNO_3 @ 2 % (88.35%), While minimum number of flowering shoots (%) (57.91%) were observed in treatment T_0 (control). It might be due to the fact that mechanism of action of KNO_3 involves a biochemical process where the reduction of nitrate to ammonia takes place. Ammonia is metabolized into different amino acids, which also include methionine. Methionine is further converted to S-adenosyl methionine (SAM), then to 1-aminocyclopropane-1-carboxylsed acid (ACC) and finally converted to ethylene. stated that KNO_3 Stimulated flowering of mango is mediated by increased levels of endogenous ethylene that may simply hasten flowering shoots. Resulted higher percentage of flowering shoot and lower percentage of vegetative shoot. Similar result was found Patoliya*et al. (*2017), Davenport and Nunez-Elisea (1997) and Maloba *et al*. (2014).

Days require for full bloom.

The data on days require for full bloom as affected by different treatments of foliar spray application of chemicals are presented in Table 1. The data show that days require to full bloom significantly affected by various foliar chemical application during the year. Among them, foliar application of (T_6) KNO_3 @ 2.5%, was found early full bloom (19.11 days) which was statically at par (T_5) KNO_3 @ 2% (20.58) and maximum days require for full bloom (25.31 days) were was recorded in treatments (T_0) control. Studies found that KNO_3 may be a stimulus for flower initiation. KNO_3 does not induce flowering, but helped in sensitizing buds to the floral stimulus when KNO_3 is sprayed on the terminal bud of mango shoots because. floral stimulus was already present in the shoots at the time the buds responded to KNO_3. Similar result found at Patoliya*et al. (*2017) and Kulkarni. (1988).

Panicle length (cm).

Length of flowering shoot of panicle is presented in table 1. The results on length of panicle indicated that there were differences in panicle length due to the use of different foliar application chemicals. The longest panicle length (44.39 cm) was recorded in (T_6) (KNO_3 @ 2.5%), which was statistically at par with (T_5) KNO_3 @ 2% (41.33 cm), While the shortest panicle length (32.14 cm) was recorded in treatment (T_0) control. The reason behind it was the foliar application of KNO_3 promotes ethylene biosynthesis which encourage floral induction and the favorable effect on plant growth might be due to its bio regulatory effect chiefly through mobilization of dry matter and translocation of photosynthesis to sink (Mishra *et al*. 2011).

Table 1- Effect of different chemicals on Flowering and fruiting in mango (*Mangifera indica* L.) *cv*. Dashehari

Notation	Treatments	Number of vegetative shoot per terminal	Number of flowering shoots per terminal	Vegetative shoot (%)	Flowering shoot (%)	Days require for full bloom (days)	Panicle length (cm)
T_1	Urea @ 1.5%	1.20	0.68	19.37	75.20 (8.72)	21.14	35.80
T_2	Urea @ 2%	1.29	0.76	21.49	78.68 (8.92)	21.22	40.30
T_3	Urea @ 2.5%	1.34	0.81	25.16	83.69 (8.92)	21.93	40.98
T_4	KNO_3 @ 1.5 %	1.11	0.86	16.67	85.14 (9.28)	20.91	40.87
T_5	KNO_3 @ 2 %	1.22	0.91	17.64	88.35 (9.45)	20.58	41.33
T_6	KNO_3 @ 2.5 %	0.62	0.98	7.64	91.55 (9.61)	19.11	44.39
T_7	Ethephon @ 250 mg	0.93	0.61	14.97	72.88(8.59)	21.00	36.80
T_8	SOP @ 0.5 %	0.69	0.39	9.86	64.79 (8.10)	23.68	34.54
T_9	SOP @ 1 %	0.75	0.48	11.47	67.34 (8.26)	23.12	34.96
T_{10}	SOP @ 1.5 %	0.78	0.53	12.63	69.68 (8.40)	22.45	35.36
T_0	Control(Spray in water)	1.03	0.36	15.09	57.91 (7.67)	25.31	32.14
	SE(m)±	**0.03**	**0.02**	**0.81**	**2.41**	**0.77**	**1.25**
	C. D. at 5 %	**0.10**	**0.06**	**2.43**	**7.18**	**2.29**	**3.66**
	C.V.%	**6.33**	**5.19**	**9.06**	**5.51**	**6.12**	**5.63**

Note: - Figures in parentheses indicate square root transformed values of percentages.

Conclusion: add number correct

From the overall experiment it can be concluded that foliar application of (T_6) KNO_3 @ 2.5% treatment gave minimum vegetative shoot and maximum flowering shoot per terminal and minimum vegetative shoot (%), maximum flowering shoot (%), maximum length of panicle and minimum days for full bloom.On the basis of results obtained in present investigation, it can be summarized that foliar application of (T_6) KNO_3 @ 2.5% at first fortnight of October and November, can be utilized for enhancing flowering and fruiting in Dashehari mango.

References:add number all reference followed first reference [1] then second [2]…….

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