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Effect of soil application of fertilizers and spraying of micro-nutrients on physical parameters of pomegranate cv. Bhagwa

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Abstract
The objective of this study was to determine the effect of soil application of fertilizers and spraying of micronutrients on physical parameters of pomegranate cv. Bhagwa. The selected trees were applied with different split doses of fertilizers and foliar sprayed with different concentrations of micronutrient mixture in the crop of *Ambe bahar* during the year 2018. The treatments comprised of four levels of fertilizers split (S) *viz*., S_1= No split, S_2= Two splits, S_3= Three splits and S_4= Four splits and two different levels of multi-micronutrient mixture (Grade-IV) (M) *viz*., M_1= Foliar spray at 0.5% and M_2= Foliar spray at 1.0%. Among the different treatments, application of fertilizers in four splits and foliar application of micronutrient mixture (grade-IV) @ 1.0% found superior in various fruit physical parameters.

Keywords: Pomegranate, Bhagwa, soil application, micronutrients, physical parameters

Introduction
Pomegranate (*Punica granatum* L.) is an important commercial fruit plant belonging to the family Punicaceae. The plant is winter hardy and thrives well under rainfed condition. Pomegranate fruits are mainly used for table purpose. A well known post harvest product 'Anar-rub' is also prepared from pomegranate. Several products such as candy, tuti-fruity, squash, powder and ready to serve beverage can also be prepared and marketed in domestic as well as international markets. Its juice is considered to be useful for several problems such as leprosy, high cholesterol levels and heart disorders. Pomegranate is emerging as one of the important fruit crops owing to its hardiness and ability to withstand adverse soil and climatic conditions. Balanced nutrition is very important for better yield and quality of fruits. So, it is paramount important to determine the number of splits for fertilizer application in pomegranate. Dividing the total fertilizer requirement of plant into two or more treatments can help growers to enhance the nutrient use efficiency, produce optimum yield and mitigate the losses of nutrient. Micro nutrients are essential for plant growth and play the vital role in balanced nutrition. They play an essential role in improving growth, yield and quality of many crops. Foliar application of micronutrients during crop growth was successfully used for correcting their deficits and improving the mineral status of plants as well as increasing the crop yield and quality (Kolota and Osinska, 2001) [1].

Materials and Methods
Experimental location
The present investigation was carried out on a farmer's field which is located in Junagadh during *Ambe bahar* season of 2018.

Experimental material
In the present investigation, four year old plants of pomegranate cv. Bhagwa, uniform in vigour and productivity, were selected as experimental material to find out the effect of soil application of fertilizers and spraying of micro-nutrients on physical parameters of pomegranate fruits.

Experimental details
Fifty plants of pomegranate cv. Bhagwa of uniform age and vigour were selected for the present studies in four year old orchard. Selected plants were supplied with different splits of fertilizers and foliar spray of multi-micronutrient mixture. Total 10 treatments of Factor A: Split application of fertilizers with four different levels: S_1:- No split (whole dose in March),

S_2:- Two splits (1st split in March and 2nd split in April), S_3:- Three splits (1st split in March, 2nd split in April and 3rd split in May) and S_4:- Four splits (1st split in March, 2nd split in April, 3rd split in May and 4th split in June) and Factor B: Foliar application of multi-micronutrient mixture (grade-IV) with two different concentrations: M_1 (0.5% grade-IV micronutrient) and M_2 (1.0% grade-IV micronutrient). Micronutrient grade-IV contains Zn (6%), Fe (4%), Mn (1%), Cu (0.5%) and B (0.5%). First spray was given 15 days before full bloom and 2nd spray was given at 30 days after 1stspray. Nitrogen and potash were applied at the rate of 500 g and 125 g per plant, respectively. Data was statistically analyzed by factorial RBD with three replications.

Observations recorded

The volume of five selected fruits was measured with the help of volumetric beaker filled with water. The displaced volume of water after immersing of fruit in beaker was measured and expressed in ml. Besides, other physical parameters of fruits like; fruit length, fruit diameter, total aril weight per fruit, number of arils per fruit, juice per fruit, rind: aril ratio, rind thickness and fruit cracking percentage were noted after harvesting of fruits. The number of fruits cracked was counted at the time of harvest. The per cent incidence of fruit cracking was calculated as below.

$$\text{Fruit cracking (\%)} = \frac{\text{Number of fruit infested}}{\text{Total number of fruit borne on individual plant}} \times 100$$

Results and discussion

It is evident from the statistical analysis of the data that the different levels of split fertilizer application and micronutrient mixture grade-IV had significant effect on the physical parameters of pomegranate *viz*., fruit volume, fruit diameter, fruit length, total aril weight per fruit, number of arils per fruit, juice per fruit, rind: aril ratio, rind thickness and fruit cracking percentage.

It was observed that the maximum fruit volume (238.10 ml), maximum fruit length and fruit diameter (8.55 cm and 7.51 cm, respectively), weight of hundred arils (35.89 g), highest total aril weight (179.76 g), number of arils (500.87), highest juice content per fruit (151.30 ml), the lowest values of rind: aril ratio (0.47) and rind thickness (3.20 mm) were noted in treatment S_4. Fruit cracking percentage was not found significant for any number of splits of fertilizer application. The results can be attributed to the way that the increased rate of photosynthesis which could have further led to the better partitioning of assimilates. It might be due to higher fertilizer use efficiency and higher nutrient uptake. Similar results are obtained by Haneef *et al*. (2014) [3] in pomegranate; Suresh (2014) [9] in aonla; Bhandari (2017) [1] in citrus, Gupta (2017) [2] in litchi; Sarkar and Rahim (2012) [7] in mango; Jadhav (2013) [4] in papaya).

Similarly, maximum fruit volume (217.42 ml), maximum fruit length and fruit diameter (8.23 cm and 7.15 cm, respectively), weight of hundred arils (35.51 g), highest total aril weight (161.95 g), number of arils (454.47), highest juice content per fruit (133.31 ml) and minimum fruit cracking percentage (5.09%) were noted in treatment M_2. Any concentration of micronutrient grade-IV was not found significant for rind: aril ratio and rind thickness. Zinc is credited with definite role in hydrolysis of complex polysaccharides into simple sugars, synthesis of metabolites and rapid translocation of photosynthetic products and minerals from other parts of the plant to developing fruits leading to increase in fruit size, weight and volume (Rawat *et al*., 2010) [6]. Further, higher fruit diameter and length may be due to combined application of micronutrients helps to stimulate the plant metabolism. Zinc helps in regulating the cell wall permeability thereby allowing more mobilization of water in fruits that attributes to the greater fruit length and weight (Wali *et al*., 2005) [10]. Moreover, iron tends to increase chlorophyll content in leaves which accumulate higher amount of photosynthates and ultimately better physical parameters of fruit. Increase in number of arils per fruit due to application of different micronutrient may be due to increase in fruit weight and fruit diameter as shown by the result of this experiment. Fruit cracking was observed the lowest (5.09%) with treatment M_2. It might be due to micronutrient grade-IV contains boron in very low concentration, which helps in translocation of sugars and synthesize the cell wall material (Sheikh and Manjula, 2012) [8]. Interaction effect of both factors did not reach to the level of significance for any of the physical parameters of the fruit.

Table 1: Effect of soil application of fertilizers and spraying of micro-nutrients on physical parameters of pomegranate cv. Bhagwa

Treatments	Fruit volume (ml)	Fruit length (cm)	Fruit diameter (cm)	Hundred arils' weight (g)	Total aril weight (g)
Split application of fertilizers					
S_1	183.67	7.28	6.22	33.43	131.45
S_2	202.27	7.97	6.75	34.97	148.19
S_3	206.28	8.28	7.04	35.58	158.59
S_4	238.10	8.55	7.51	35.89	179.76
S.Em±	7.11	0.20	0.21	0.40	4.44
C.D. at 5%	21.33	0.59	0.62	1.20	13.32
Foliar sprays of multi-micronutrient mixture					
M_1	197.73	7.81	6.61	34.42	147.04
M_2	217.42	8.23	7.15	35.51	161.95
S.Em±	5.03	0.14	0.15	0.28	3.14
C.D. at 5%	15.08	0.42	0.44	0.85	9.42
Interaction (S × M)					
S.Em±	10.06	0.28	0.29	0.57	6.28
C.D. at 5%	NS	NS	NS	NS	NS
Control vs rest					
Control	161.67	6.10	5.25	31.70	103.73
Rest	207.58	8.02	6.88	34.96	154.50
SE(d)	7.54	0.21	0.22	0.42	4.71
C.D. at 5%	22.62	0.63	0.65	1.27	14.13
C.V. %	8.61	6.22	7.52	2.83	7.31

Table 2: Effect of soil application of fertilizers and spraying of micro-nutrients on physical parameters of pomegranate cv. Bhagwa

Treatments	No. of arils	Juice/fruit (ml)	Rind: aril ratio	Rind thickness (mm)	Fruit cracking percentage (%)
Split application of fertilizers					
S_1	393.29	99.47	0.71	3.54	6.50
S_2	423.09	118.66	0.67	3.68	6.61
S_3	445.45	129.61	0.59	3.50	6.36
S_4	500.87	151.30	0.47	3.20	6.33
S.Em±	3.94	3.69	0.03	0.11	0.33
C.D. at 5%	11.82	11.05	0.08	0.33	NS
Foliar sprays of multi-micronutrient mixture					
M_1	426.88	116.21	0.63	3.49	7.80
M_2	454.47	133.31	0.59	3.47	5.09
S.Em±	2.79	2.61	0.02	0.08	0.23
C.D. at 5%	8.36	7.81	NS	NS	0.70
Interaction (S × M)					
S.Em±	5.58	5.21	0.04	0.16	0.47
C.D. at 5%	NS	NS	NS	NS	NS
Control vs rest					
Control	324.16	71.67	0.82	4.14	13.06
Rest	440.68	124.76	0.61	3.48	6.45
SE(d)	4.18	3.91	0.03	0.12	0.35
C.D. at 5%	12.54	11.72	0.09	0.35	1.05
C.V. %	2.26	7.60	10.78	7.63	11.25

References

1. Bhandari J. Effect of organic and inorganic nutrient sources on growth, yield and quality of acid lime, M. Sc. (Horti.) Thesis, RVSKVV, Gwalior, 2017.
2. Gupta K. Effect of graded level of NPK on vegetative and reproductive growth of Shahi litchi. M. Sc. (Horti.) Thesis, IGKV, Raipur, 2017.
3. Haneef M, Kaushik RA, Sarolia DK, Mordia A. Irrigation scheduling and fertigation in pomegranate cv. Bhagwa under high density planting system. Indian Journal of Horticulture. 2014; 71(1):45-48.
4. Jadhav PB. Effect of fertigation and mulching on growth, yield and quality of papaya cv. Red lady. Ph. D. Thesis, NAU, Navsari, 2013.
5. Kolota E, Osinska M. Efficiency of foliar nutrition of field vegetables grown at different nitrogen rates. Acta Horticulture. 2001; 563:87-91.
6. Rawat V, Tomar YK, Rawat JMS. Influence of foliar application of micronutrients on the fruit quality of guava cv. Lucknow-49. Journal of Hill Agriculture. 2010; 1(1):63-66.
7. Sarkar CB, Rahim MA. Effect of doses and splits of fertilizer application on harvesting time, yield and quality of mango cv. Amrapali. Bangladesh Journal of Agricultural Research. 2012; 37(2):279-293.
8. Sheikh MK, Manjula N. Effect of chemicals on control of fruit cracking in pomegranate var. Ganesh. International Symposium on the Pomegranate, Zaragoza, 2012, 133-135.
9. Suresh PM. Studies on the effect of drip fertigation levels on growth, yield and quality of aonla cv. NA 7. M. Sc.(Horti.) Thesis, TNAU, Tamil Nadu, 2014.
10. Wali VK, Kaul R, Kher R. Effect of foliar sprays of nitrogen, potassium and zinc on yield and physio-chemical composition of phalsa cv. Purple Round. Haryana Journal of Horticultural Sciences. 2005; 34(1-2):56-57.