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Effect of Gibberellic acid and Naphthalene acetic acid on the physical parameters and yield of Phalsa (Grewia subinaequalis).

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ABSTRACT

The present study entitled "Effect of Gibberellic acid and Naphthalene acetic acid on the fruit quality and yield of phalsa (Grewia subinaequalis)" was conducted in the Department of Agriculture, D.A.V College, Abohar. The healthy plants were selected and sprayed with GA_3 (60 ppm) and NAA (50 ppm) before flowering and after fifteen days of flowering. The mature fruits were harvested at proper time and their physical characters and yield were studied. Various physical characters such as fruit size (length and width), fruit weight, fruit volume and specific gravity and yield were evaluated. It was concluded that fruit samples showed significantly increase in its physical characters and yield attributes of phalsa with the application of GA_3 60 ppm.

Keywords: *GA_3, NAA, Phalsa, Physical characters, Yield*

I. INTRODUCTION

The phalsa (*Grewia subinequalis*) is a subtropical fruit belongs to family Tiliaceae and order Malvales. Phalsa is a quick growing very hardy shrub which thrives well in arid and semi–arid region as well as in salt affected wasteland condition (Meena *et al*, [1]). Ripe fruits of phalsa are deep reddish – brown in colour, sour to sweet in taste with a desirable and pleasant flavor. It is a rich source of vitamins (A and C) and minerals (Phosphorus, Calcium and Iron), contains 50–60 % juice, 2–2.5 % acids (Linolic and Arachidic acids), 81.13 % moisture, 1.58 % protein, 1.82 % fat, 1.77 % crude fibre and 10.27 % sugar. The significant content of Na, K and Ca makes the juice palatable and nutritious (Alam and Kumar, [2]). The Phalsa fruit is known for its cooling effect and has beneficial gastric properties. The Phalsa fruit is beneficial for heart, blood and liver disorders and also for asthma patients. The leaves are known for its antibiotic action. Through Phalsa wood is strong and elastic so it is used for making shoulder poles, bowls, spear handles, baskets and shingles. The shoot can be utilized for making baskets or as a support for vegetable crops. As soon as the Phalsa fruits are harvested, they should be sent to market immediately for sale for its perishable nature. Sometimes growers do not get satisfactory market price for the production. So it would be desirable to delay or hasten the maturity of fruits. To serve the above purpose growth promoters or growth retardants are used, which promotes or delay maturity of fruits. Plant growth regulators are chemicals that effect flowering, ageing, root growth, prevention and promotion of stem elongation, color enhancement of phalsa fruits. Very small concentration of these substances produces major growth changes. They are widely used for increasing fruit set, controlling fruit drop, enhancing quality and

uniform maturity. The plant growth regulators have proved to be effective in increasing fruit set and yield in phalsa as well as quality of fruits. GA_3 is an acid promoting growth and elongation of cells. It affects decomposition of plants and helps plants to grow. It stimulates the cell of germinating seeds. It regulates plant growth but only in low concentration it is useful, if high concentration is used its affects can be opposite. It is usually used in concentration between 0.01 to 10 mg/L. NAA helps to induce flowering, to prevent shedding of buds, Flowers and unripe fruits. It also enlarges fruit size and increase the yield. It also improves the quality of fruits. NAA is widely used in horticulture for various purposes and play many important roles in flowering, fruit setting and tissue culture, increase in fruit set or prevent fruit drop in Mango and Citrus, blossom thinning in Peach and Guava and fruit thinning in Apple and Pear (Singh *et al*, [3]).

II. MATERIAL AND METHODS

The present investigation on the effect of GA_3 and NAA on the physical parameters and yield of phalsa was carried out at the Mirok Farm, Village Khalanda Ram during 2017. On the selected trees GA_3 (60 ppm) and NAA (50 ppm) were sprayed. The plants were sprayed before flowering on March 12, 2017 and after 15 days of flowering on April 14, 2017. The fruits were harvested at the time of maturity and the physical parameters were studied in the laboratory of Department of Agriculture, D.A.V. College, Abohar.

The physical parameters i.e. fruit size, fruit weight, fruit volume, specific gravity were taken into consideration. Ten fruits were randomly selected from each sample. Average length and width of samples were measured using vernier's calliper and was expressed in centimeters, fruit weight was evaluated with the help of weighing balance and expressed in grams, fruit volume was determined by using water displacement method and expressed in millilitres and specific gravity was calculated by dividing weight with volume of fruit and was represented as g/ml. After 4 pickings of the fruit, the average yield of all the treatments was determined.

III. RESULTS AND DISCUSSION

3.1 Fruit size

3.1.1 Fruit length

The data (Fig. 4.1) revealed that fruit length improved effectively with the use of gibberellins. Maximum fruit length (1.261 cm) was recorded in fruits obtained from trees treated with GA_3 (60 ppm). Whereas minimum fruit length (0.907 cm) was observed in control. These results are in accordance with findings of Meena *et al* [1] on phalsa and Digrase *et al* [4] on pomegranate.

3.1.2 Fruit width

The data related to fruit width as influenced by GA_3 and NAA in phalsa are presented in Fig. 4.2 which showed that fruit width influenced significantly by the application of growth regulators. Maximum fruit width (1.24 cm) was measured under GA_3 (60 ppm). Minimum fruit width (1.04 cm) was recorded in control.

Fruit size significantly increased due to application of gibberellin this might be due to the fact that gibberellins indirectly affect the level of auxin that ultimately caused cell elongation by enlargement of vacuoles and loosening of cell wall after increasing its palatability. The present analysis is in accordance with Wahdan *et al* [5] on mango, Alam and Kumar *et al* [2] on phalsa.

3.2 Fruit weight

The data regarding fruit weight as affected by GA_3 and NAA are presented in Fig. 4.3. From the data, it has been observed that GA_3 60 ppm treated plants gave fruits with maximum weight (0.71 g). This increase in fruit weight because of gibberellins might be due to increase in the cell division and translocation of food material. Minimum fruit weight (0.41 g) was recorded under the control. Results of these findings were confirmed by Meena *et al* [1] on phalsa and Rokaya *et al* [6] on mandarin fruit.

3.3 Fruit volume

The data of fruit volume as influenced by GA_3 and NAA are presented in Fig. 4.4. The given data represented that plants treated with GA_3 @ 60 ppm yielded fruits with maximum fruit volume (12 ml). The increase in fruit volume is directly correlated with the increase in weight and size of fruit. Minimum fruit volume (5 ml) was observed under control. The present study is in conformity with the findings of Chandra *et al* [7] on aonla and Mandal *et al* [8] on Amrapali mango.

3.4 Specific gravity

The data regarding specific gravity as influenced by various concentrations of NAA and GA_3 are presented in Fig. 4.5 which represented that GA_3 (60 ppm) treated plants gave fruits with minimum specific gravity (0.059 g/ml). Control showed maximum specific gravity (0.082 g/ml). These findings are in accordance with the findings of Saima *et al* [9] on strawberry and Chandra *et al* [7].

3.5 Yield

The data regarding yield as influenced by NAA and GA_3 are presented in Fig. 4.6. This showed that yield was influenced significantly by application of growth regulators. The plants treated with GA_3 60 ppm registered maximum yield (3.50 kg/plant). This might be due to increased fruit set, greater berry size and weight under GA_3 treated plants. However, the plants under control gave minimum fruit yield (2.00 kg/ plant). The results are in accordance with the findings of Singh *et al* [3] on phalsa. The results are also in collaboration with the findings of Vishal *et al* [10] on strawberry.

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IV. OBSERVATIONS AND TABLES

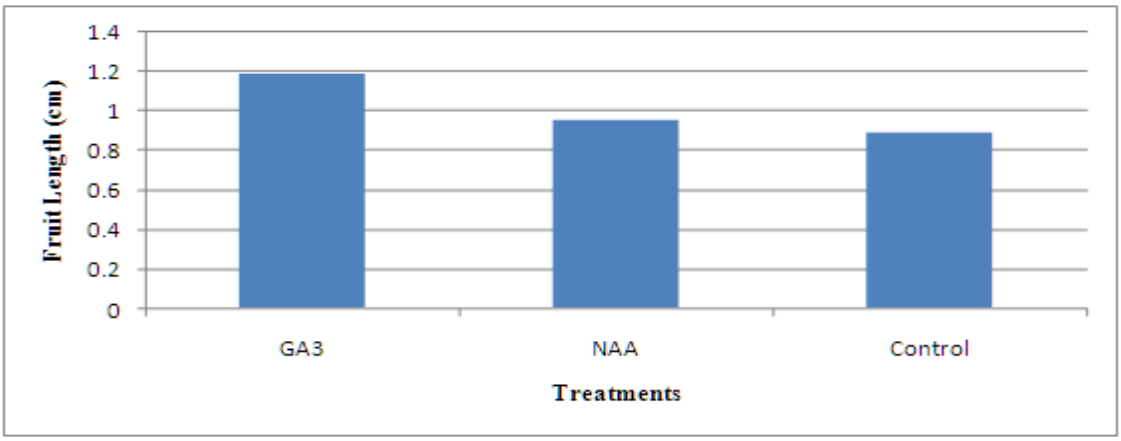

Fig. 4.1 Effect of Gibberellic acid and Naphthalene acetic acid on fruit length

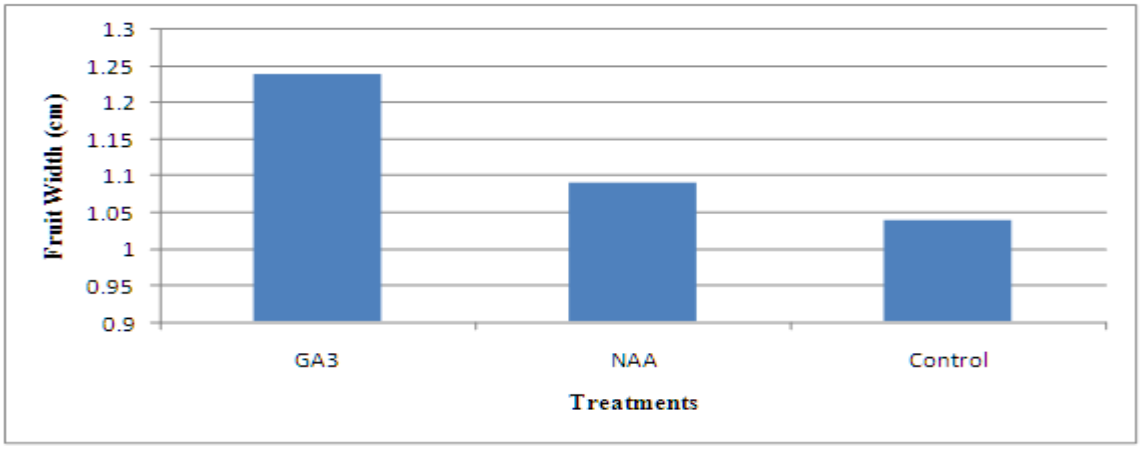

Fig. 4.2 Effect of Gibberellic acid and Naphthalene acetic acid on fruit width

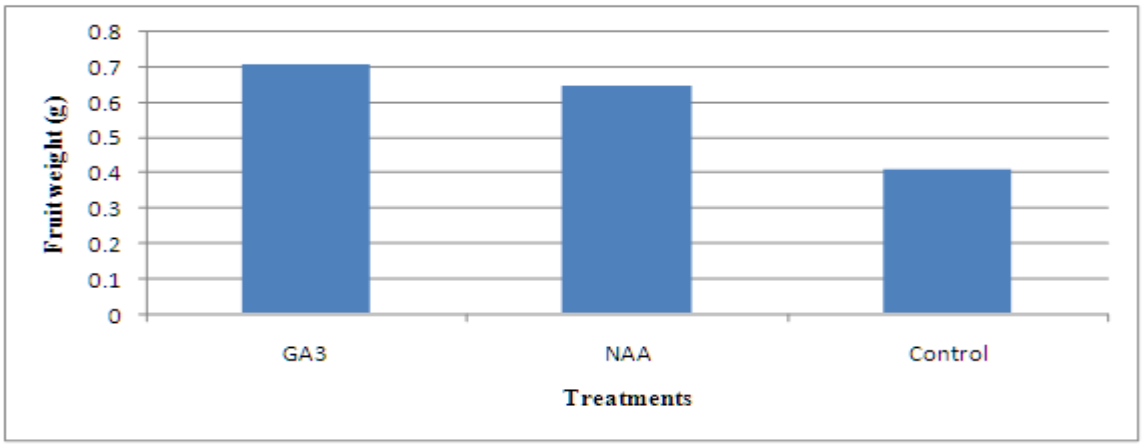

Fig. 4.3 Effect of Gibberellic acid and Naphthalene acetic acid on fruit weight

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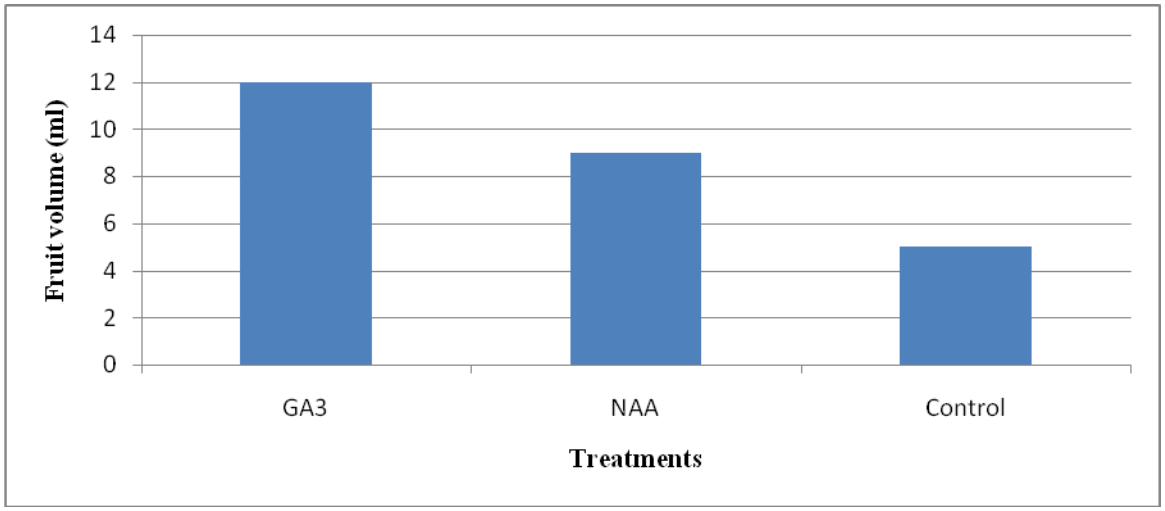

Fig. 4.4 Effect of Gibberellic acid and Naphthalene acetic acid on fruit volume

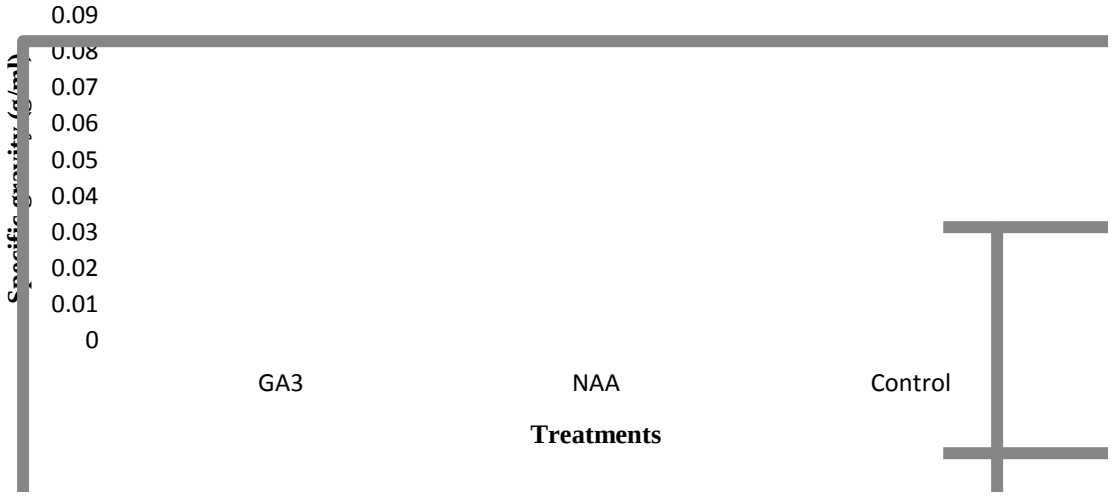

Fig. 4.5 Effect of Gibberellic acid and Naphthalene acetic acid on Specific gravity

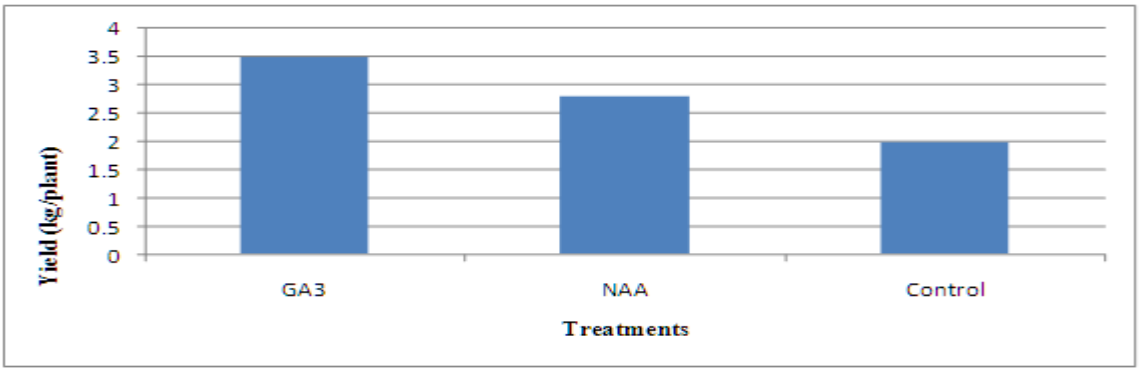

Fig. 4.6 Effect of Gibberellic acid and Naphthalene acetic acid on Yield

V. CONCLUSION

Foliar spray of GA_3 and NAA on phalsa trees significantly increased the fruit size, fruit weight, fruit volume and yield as compared to control. The fruit size and fruit weight were highest within the treatments (GA_3 @ 60 ppm and NAA @ 50 ppm) compared to control. In the comparison of GA_3 and NAA, GA_3 at 60 ppm was found effectively increased the physical characters except specific gravity. In GA_3 treatment, fruit length (1.19 cm), fruit width (1.24 cm), fruit weight (0.71 g), fruit volume (12 ml) were found maximum. An application of GA_3 also gave maximum yield (3.5 kg/plant).

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