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INFLUENCE OF PLANT GROWTH REGULATORS AND ORGANIC SUBSTANCES ON FLOWERING DYNAMICS AND FRUIT QUALITY ATTRIBUTES OF BER (*ZIZIPHUS MAURITIANA LAMK*.) CV. APPLE BER

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ABSTRACT
This experiment was conducted to assess the influence of foliar application of different plant growth regulators and organic substances on flowering , fruit set, fruit retention, fruit drop, yield and quality parameter of ber (*Ziziphus mauritiana L*amk).cv. Apple Ber. Total 16 Treatments viz.Urea(1,2,3%),GA3(10,25,40ppm),NAA(10,30,50ppm),2,4-D(5,10,15 ppm), Humicacid (1,1.5,2%)with 3 replication were applied in RBD design. The result revealed that minimum days taken for Initiation of flowering (5.90 days), minimum days taken for 50% flowering (14.92 days) and minimum days taken for 100% flowering (23.63 days) ,maximum initial fruit set (3711), fruit retention (24.92%) and minimum fruit drop (75.07%) were recorded with NAA 50 ppm. Highest fruit yield (37.62kg/ Plant) produced with 40 ppm GA3 over control (8.35 kg/Plant). The quantitative character of fruits i.e. maximum volume (49.57cc), length (4.78cm), diameter (4.74mm), fruit weight (50.99g), pulp weight (46.45g) found with 40ppm GA3. The minimum stone weight (2.75g) observed with Urea @ 1% .The qualitative character i.e. TSS (12.9 0Brix), ascorbic acid (87.46 mg/100g), reducing sugar (4.82 %), non- reducing sugar(7.313 %), Total sugar (12.13%) observed maximum and minimum acidity (0.43%) with the application of GA3 @40 ppm.

KEYWORDS: Apple Ber,Plant, Growth Regulators, Organic Substances, Flowering and Fuit Quality Parameters

INTRODUCTION

The ber cultivation is popularly in arid and semi-arid region in India because of its low maintenance cost, wide adaptability, high yield, good return, scope for value addition and suitability under waste land (Martinuzz,2006). In India it is gaining momentum in subtropical and tropical regions i.e. Maharashtra, West Bengal, Andhra Pradesh, Madhya Pradesh and Chhattisgarh due to precocity in bearing, fruit size, yield potential and crispy texture. The ber plant is quick growing, bearing early at the age of 2-3 years of planting and good spreading habit. Flowering occurs in autumn (Aug-Sept.) and fruit mature in winter (Nov-Dec.) It is a cross-pollinating crop and often propagated through seeds resulting variability in quantitative and qualitative characteristics of fruit. As the ber is a hardy fruit plant can be grown in inferior or waste land with less input requirement. It can thrive well in wide range of agro- climatic conditions and soils. Ber can be grown in dry and hot climate and also be grown in slightly alkaline or waterlogged soils. The ber plant responds well to intercultural operations like training, pruning, manuring and fertigationAmong various ber cultivars Apple ber is gaining popularity among farmers of many parts of India. Unlike local and hybrid cultivars, the specialty of the Apple ber is the bigger size of fruit, weight of each fruit is 50-100 g. It starts bearing fruits after 6 month of planting and gives fruit twice in a year having total bearing age of 20 years. This tree gives 25-30 kg fruits on first year and from second year onward gives 40-50 kg of fruits.

In 2025, Chhattisgarh recorded a production level of 58.98 tons, reflecting a decline from 69.43 tons reported in 2024 (Anon., 2025). The ber plant is well known for its profuse flowering and fruiting but prone to fruit drop which hinders the ber production. During their long period of stay on the tree fruit face the vagaries of the climatic conditions changing during the months of September to January. Therefore it is very essential to control the fruit drop to obtain profitable yield. There are several factors causing fruit drop but biochemical and physiological behaviour of plant plays a vital role. In view of this optimum level of plant growth regulators and nutrients should be applied at proper time is practical solution to overcome the problem of fruit drop and ensure good setting and retention of fruits on thetree.

The higher fruit set and retention in fruit on the tree is induced by the application of plant hormones resulting in good growth rate of fruit and contributing in final size of the fruits. An imbalance of auxins, cytokinine and gibberellins may leads to the formation of abscission at the stem point and eventually cause fruit drop. Flower requires an endogenous

hormonal stimulation to set fruit, especially sufficient amount of auxin and gibberelline.NAA is synthetic auxin hormone, inhibits the physiological breakdown of calcium and magnesium pectate at the middle lamella of the cell wall thereby preventing abscission of fruit. It also strengthens the petiole which ultimately reduces the fruit drop. The exogenous application of GA3 increases the size of fruit by increasing rate of cell division and cell enlargement. GA3 induces higher activity of α and β-amylase which degrade starch and mobilize carbohydrate reserve in the plants. GA3 affects the activity of enzyme invertase cause hydrolysis of sucrose and yielding glucose and fructose thereby increasing TSS content. GA3 also contribute to high vitamin C content. It enhances the activity of auxin thereby reducing the fruit drop. Similarly the application of 2, 4-D reduces the fruit drop by contributing to the high level of auxin in plant and lowering the ethylene concentration. Among many nutrients nitrogen plays a major role in vegetative growth and better flowering, fruiting and fruit retention. Urea is the cheapest source of nitrogen, as it is water soluble, less corrosive and high nitrogen content makes it useful in foliar feeding. It stimulates the function of several enzymes therefore its spray helps in reduction of fruit drop and improving quality of fruits. Humic acid and seed weed extract are well known bio-stimulants which enhances the plant growth , plant enzymes and increases production. Its pramote thickens the cell wall of the fruits and increases shelf life of the fruits.

Organic substances plays a significant role in many physiological phenomena for improving the flowering and fruiting behavior and quality attributes has not been properly investigated in Chhattisgarh conditions. Hence, present experiment framed to find the suitable pre harvest treatments and their doses for improving fruit set, and yield of ber in Chhattisgarh. Therefore, the present investigation entitled effect of PGRs and Organic substances on flowering behaviour and Physico-chemical parametrers of Ber (Ziziphus mauritiana Lamk.) was undertaken to assess the performance of pre-harvest treatments effective for controlling fruit retention, fruit drop, economic and quality parameters of Apple ber.

MATERIAL AND METHODS

The experiment was carried out during 2019-20 at the Dry Land Horticulture Farm Surgi, SKS College of Agriculture & Research Station, Rajnandgaon, IGKV, Chhattisgarh. Rajnandgaon lies at 21.0 N latitude and 81.03 E longitudes at an altitude of 307 meters above the mean sea level in the western part of the Chhattisgarh plains. The experiment was conducted on 3 year old plant of ber cv. Apple ber. The foliar spray were made by using plant growth regulators like NAA, GA3, Urea and organic substances like Sea weed extract and Humic acid. First foliar application of plant growth regulators and organic substances was applied during last week of September (at flowering stage) and second foliar application was applied during last week of November (at pea stage) and third foliar spray was applied at marble stage. The selected trees were uniform in size and three year old.The experiment consists of 16 treatments namely Control – T0,Urea (1%)-T1,Urea (2%)- T2, Urea (3%)- T3,GA3(10 ppm)-T4,GA3 (25 ppm)–T5,GA3(40 ppm)–T6, NAA (10 ppm)-T7NAA (30 ppm)- T8, NAA (50 ppm)- T9, Sea weed extract (2%) – T10, Sea weed extract (4%) – T11Sea weed extract (4%) – T12, Humic acid (1%) - T13, Humic acid (1.5%) - T14and Humic acid (2%) - T15 were tested. The experiment was laid on Randomized Block Design with 16 treatments which were replicated three times and each treatment contains ten plants. The treatments were assigned randomly on each replication.

The number of flower initiation, 50% flowering and 100% flowering per shoot counted by selecting three branches of similar length and size projecting opposite direction to each other. Each of the three selected branches of all trees were tagged prior to flowering. Number of flower per shoot counted at periodic interval till the end of flowering before spraying. The average number of flowers per shoot was recorded from each treatment before spraying, by counting the total number of fruits set of the respective tagged shoots of each treatment and average number of fruit per shoot was derived.The number of fruit those were set, recorded at 15 days interval and their number counted at the time of harvest.The amount of fruit drop recorded from the fruit setting to the time of harvest. The percentage of fruit drop determined by average of the data obtained from each treatment.The fruit size in terms of length and diameter were calculated using Vernier callipers. The fruit length measured from stem end to distal end and diameter measured at the middle portion of the fruit.The fruit volume calculated by putting the fruit in a partially filled measuring cylinder with water.The displaced water in the measuring cylinder which represents the volume of the fruit. The average volume of fruits were calculated and expressed in terms of cubic centimeter. Ten fresh fruit were selected from each tree of each treatment and weight measured in gram using electronic balance. The average weight obtained to get average fruit weight. Stone of ten selected fully matured fruit is weighed by electronic balance. Pulp weight was calculated by deducting stone weight from fruit weight of each treatment. Total soluble solids content of fruit was determined with the help of a hand refractometer.sugar was estimated by method of Lane and Eynon (1923) whereas ascorbic acid and acidity were analyzed by (A.O.A.C., 1970).Data recorded on various aspects in the field and laboratory were subjected to statistical analysis of variance technique as given by Gomez and Gomez (1985). The significant differences between treatments were compared with the critical differences at 5 per cent level of significance

RESULT AND DISCUSSION

Days taken for Flowering behavior

The result revealed that the Table 1 and fig 1 application of different PGRs sand organic substances showed significant effect. The minimum days taken for Initiation of Flowering (5.90 days), minimum days taken for 50% flowering (14.92 days) and minimum days taken for 100% flowering (23.63 days) were recorded in treatment (T4) NAA @ 50 ppm while maximum (15.12 days) for days taken in initiation of flowering, days taken for 50% flowering (26.21 days) and days taken for 100% flowering (40.26 days) found at control (T0). Flowering is mediated by increased levels of endogenous auxin that may simply hasten flower emergence of a differentiated dormant bud, the earliness in blooming of flower bud

due to NAA treatment might be associated with its action in promoting the flow of metabolites towards flowering buds and thus fasten the floral development Krishna et al. (2017) .

Initial Fruit set

The physical characteristics of the fruits are an expression of fruiting activity of the plant which was significantly influenced by the all the plant growth promoting substance applied over the control. The range of fruit set i.e. 2924 to 3711 was found under present investigation. The poorest fruit set found to be 2924 under the treatment (T0). The table 1 and fig. 2 clearly depicts that the maximum number of fruit set (3711) found under the treatment of NAA 50 ppm (T9). Thus treatment of plant with 50ppm NAA resulted in 7.2 % more fruit set as compared to control. Thus the increase in fruit setting is due to acceleration of metabolic activities of the plant by increasing meristematic growth which leads to increase in vegetative growth, increase in photosynthesis and ultimately enhance higher flowering and fruit setting. These results are in close similarity with the findings of Gangadhar et al., (2019) in ber and Uma Shankar et al., (2002) in guava.

Fruit retention

The application of different growth promoting substances greatly influenced the fruit retention of ber. It is clearly apparent from the table 1 and fig. 2 that the maximum fruit retention (24.92%) was observed under the treatment of plant with 50ppm NAA (T9). The minimum fruit set (8.34%) recorded under control (T0). All the concentration of NAA and GA3 greatly hasten the fruit set percentage over control. Thus the enhancement of fruit set by treatment of NAA is due to physiological process of inhibiting the abscission layer formation resulting in less fruit drop. Auxin also plays a vital role in cell division, cell elongation, photosynthesis, RNA synthesis and membrane permeability resulting in high water and nutrient uptake which lead to low fruit drop and high fruit retention. These finding is line with reports of Chaudhury et al., (2006), Bal and Randhawa (1982) inber.

Fruit drop

It is clear from the observation recorded that the increasing concentration of the NAA reduces quantum of fruit drop. The minimum fruit drop (75.07%) was recorded with the treatment 50 ppm NAA (T9) and the maximum fruit drop (91.66%) was noted under control as shown in table 1 and depicted in fig. 2. The reduction in fruit drop is due to increase in auxin level which prevent the abscission by inhibiting the enzymatic activity of pectinase, polygalactauronase and cellulasase. These results are in agreement with the findings of Singh et al., (2001) and Yadav (2002). Sarshwatiet al., (2003) in mandarin.

Fruit size

All the physical characters of fruits significantly influenced by the treatment of various growth promoting substances as compared to control (Table 2). It is clearly shown in table 4.2 that GA3 40 ppm (T6) gives maximum impact on all physical parameters of fruits like length (4.78cm), width (4.74cm) and volume (49.55cc). The minimum length (4.39cm), width (3.44cm) and volume (30.97cc) obtained under control (T0).It may be due to involvement of growth promoting substances specially GA3 in cell division, expansion and increase in the intercellular space of mesocarpic cell and increase in water absorption and translocation of metabolites and sugars to the expanded cell. These results in close similarity with the results of Painkaraet al., (2012) in mango cv. Langra, Shukla et al., (2011) inAonla.

Fruit weight

All the growth promoting substance appreciably improved the fruit weight over the control. The maximum fruit weight (50.99g) is recorded with the treatment (T6), pre harvest spray of GA3 40ppm. It may be due to the involvement of GA3 in the cell division higher synthesis of metabolites and translocation of food materials to the developing fruits cause increase in fruit weight. The minimum fruit weight (31.89gm) recorded with control (T0). These results in close similarity with the results of Painkaraet al., (2012) in mango cv. Langra, Shukla et al., (2011) in aonla. The results are presented in table 2.

Pulp weight

The pulp weight increase appreciably with all the growth promoting substances over control. The treatment (T6), spray of GA3 40ppm resulted in maximum increase in pulp weight (46.45gm) whereas the minimum pulp weight (28.42gm) obtained with control (T0) as shown in table 2. It may be due to involvement of GA3 in cell division, expansion and increase in the intercellular space of mesocarpic cell and increase in water absorption and translocation of metabolites and sugars to the expanded cell. This result is in close conformity with the results of Painkaraet al., (2012) in mango cv. Langra.

Stone weight

All the growth promoting substances significantly influenced the stone weight over control. The minimum stone weight (2.75gm) recorded with treatment (T2), spray of urea 2% .However increase in stone weight obtained with increasing concentration of urea. The table 2 clearly shows that the maximum stone weight (4.53gm) obtained with the treatment (T6), spray of GA3 40ppm. But the maximum stone weight (3.46gm) with respect to control obtained with the control (T0).

Yield

The ultimate object of all experiment is to increase the yield per plant. The fresh yield of fruit is significantly influenced by all the growth promoting substances but maximum yield (37.62Kg/plant) obtained with the treatment (T6),spray of GA3 40ppm and second highest yield (35.94Kg/plant)obtained with treatment (T9) , spray with NAA 50ppm. As regard the minimum fruit yield (8.35Kg/plant) obtained with control (T0) as in table (4.3). Both the growth hormone NAA and GA3 progressively increase the yield on increasing its concentration. These results are in close conformity with the finding of Bhowik and Banik (2011), Painkaraet al., (2012) in mango and Ghosh et al , (2013) in ber.

Total Soluble Solid

The Total Soluble Solid (TSS) increased appreciably with the application of all growth promoting substances over control. The maximum impact obtained with GA3 and NAA. It is noticed in observation that there is steady increase in TSS with NAA whereas abrupt increase in TSS with increasing concentration of GA3. The maximum TSS (12.90Brix) obtained with treatment (T6), spray of GA3 40ppm. The minimum TSS (11.070Brix) obtained with control (T0) as shown in table 3. This improvement in the TSS of fruit is due to increased mobilization of metabolites and glucose to the developing fruits. These results are in line with the finding of Ram et al., (2005) and Gill and Bal (2013) in ber.

Titrable acidity

Application of growth promoting substances shows direct impact on the acidity % of fruits. From the table 3and fig 3it is concluded that minimum acidity (0.43%) found with treatment (T6), spray of GA3 40ppm whereas maximum acidity (0.51%) recorded with control (T0). It appears that acids under the influence of growth promoting substances might have easily and rapidly been converted into sugars and their derivatives by reactions involving reverse glycolytic pathways or might have been used in respiration or both. Same trend in the results has been also observed by Kher et al., (2005) in guava and Kaur et al., (2002) in Kinnow.

Ascorbic acid

The vitamin C content of fruits appreciably increased with the application of growth promoting substances. The maximum (87.46mg/100gm) vitamin C content found with treatment (T6), spray of GA3 40 ppm. The minimum ascorbic acid content (81.95mg/gm) recorded under control (T0), table 4.4. The enhancement of ascorbic acid is due to increase in metabolic activity involving enzymes and ion under the influence of growth regulators which lead to synthesisof Glucose -6- phosphate in developing fruits throughout the growth and it is the precursor of ascorbic acid (Bhati and Yadav 2003).

Total sugar

The examination of finding of this parameter showed that effect of all growth promoting substances significantly influenced the total sugar content of fruits over control. The maximum (12.13%) total sugar was recorded under the treatment (T6), spray of GA3 40ppm concentration. In this regard, the minimum (8.33%) sugar obtained under control (T0) as depicted in table 3fig 3. This increase in fruit sugar might be due to increase in photosynthetic activity which leads to formation of more carbohydrates and transportation of these carbohydrates to the developing fruits. Under the influences of the growth promoting substances sugars are quickly converted to its derivatives through several Glycolatic Pathway. The results are in close conformity with finding of Bhati and Yadav (2002), Kassem et al., (2011), Ghosh et al., (2013) in ber."

Reducing sugar

The data presented in the table 3 it is clearly revealed that the application of different growth promoting substances significantly influenced the reducing sugar content in fruits over control. The maximum (4.82%) reducing sugar content in fruits obtained with treatment (T6), spray of GA3 40ppm whereas minimum (2.76%) reducing sugar found under control (T0). The increase in content of reducing sugars is due to the effect of GA3 which delays ripening process of fruit. This long period stay on trees provides fruits to accumulate more carbohydrate. These results are in line with the findings of Bhati and Yadav (2002) and Katiyar et al., (2010) in ber and Kher et al., (2005) in guava.

Non- Reducing sugar

The finding of the studied elaborated significant variation among the growth promoting substances in respect of non-reducing sugars content in the fruits and the treatment were found to significantly influence over control. The maximum(7.31%) non-reducing sugars was found under treatmen t(T6),spray of GA3 40ppm. However, the minimum (5.56%) non- reducing sugars was recorded under control (T0) as the data represented in table 3. The increase in non-reducing sugars content of fruits increases with increasing concentration of the GA3.The increase in non-reducing sugars in fruits is because of degradation of polysaccharides into simple sugars by metabolic activity and conversion of organic acids into sugars, and loss of moisture. The results are in agreement with the results of Kumar et al., (2010) in mango.

Total sugar

The examination of finding of this parameter showed that effect of all growth promoting substances significantly influenced the total sugar content of fruits over control. The maximum (12.13%) total sugar was recorded under the treatment (T6), spray of GA3 40ppm concentration. In this regard, the minimum (8.33%) sugar obtained under control (T0) as depicted in table 3.This increase in fruit sugar might be due to increase in photosynthetic activity which leads to formation of more carbohydrates and transportation of these carbohydrates to the developing fruits. Under the influences of the growth promoting substances sugars are quickly converted to its derivatives through several Glycolatic Pathway.

The results are in close conformity with finding of Bhati and Yadav (2002), Kassem et al., (2011), Ghosh et al., (2013) in ber.

CONCLUSION

The results of the present experiment conducted on 3 years old berplants cv. Apple ber showed that the treatment T9 (NAA 50ppm) was found most appropriate dose of NAA for obtaining maximum fruit set , retention and minimum fruit drop. The Treatment T6 (GA3 40ppm) has given maximum yield, physical (fruit weight, pulp weight and stone weight) and bio-chemical parameters (TSS, Titrable acidity, Ascorbic acid and Sugars) of fruits. Hence spray of these plant growth promoting substances may be useful for maximum production and quality fruits. It could be concluded that the results of this experiment will be useful with particular reference for maximum yield and quality of the fruits both beneficial for farmers and consumers.

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Table 1: Effect of PGRs and Organic substances on flowering and fruiting parameters of Ber

Treatments	Days taken for Initiation of flowering	Days taken for 50% flowering	Days taken for 100% flowering	Average no. of fruit set	Fruit retention (%)	Fruit drop (%)
Control (Water spray)	15.12	26.21	40.26	2924	8.34	91.66
Urea (1%)	10.25	19.52	31.21	3276	17.02	82.97
Urea (2%)	9.86	18.86	30.23	3296	19.07	80.93
Urea (3%)	9.12	17.81	29.63	3347	19.92	80.07
GA3(10 ppm)	8.87.	17.23	28.01	3456	22.89	77.11
GA3 (25ppm)	7.85	16.96	27.89	3503	23.04	76.96
GA3(40ppm)	7.29	16.53	26.71	3550	23.38	76.61
NAA (10 ppm)	6.23	15.91	24.89	3570	23.60	76.39
NAA(30ppm)	6.12	15.56	24.01	3699	24.06	75.94
NAA(50ppm)	5.90	14.92	23.63	3711	24.92	75.07
2,4-D (5ppm)	10.45	21.45	33.25	3381	20.5	79.5
2,4-D (10ppm)	10.23	20.23	32.52	3406	20.86	79.13
2,4-D (15ppm)	10.01	20.89	31.58	3434	21.40	78.60
Humicacid (1 %)	8.26	17.56	28.56	3102	8.91	91.08
Humic acid (1.5%)	8.12	16.23	27.52	3153	10.55	89.45
Humicacid (2 %)	8.01	15.90	26.23	3270	10.70	89.27
S.E.(d) +	0.42	0.53	0.85	2.63	0.85	0.85
C.D. at 5%	1.27	1.62	2.61	5.93	1.74	1.74

Table 2: Effect of PGRs and Organic substances on physical and economic parameters of Ber

Treatments	Fruit length(cm)	Fruit volume (cc)	Fruit diameter (cm)	Fruit weight (g)	Pulp weight (g)	Stone weight (g)	Yield (Kg/plant)
Control (Waterspray)	4.39	30.97	3.44	31.89	28.42	3.46	8.35
Urea (1%)	4.51	38.75	4.02	36.65	33.9	2.75	19.64
Urea (2%)	4.54	40	4.08	36.66	33.47	3.19	22.03
Urea (3%)	4.56	40.21	4.26	36.76	33.34	3.42	23.08
GA3(10 ppm)	4.73	45.43	4.68	46.79	42.73	4.05	33.77
GA3 (25ppm)	4.73	46.06	4.69	47.44	43.31	4.13	34.48
GA3(40ppm)	4.78	49.57	4.74	50.99	46.45	4.53	37.62
NAA (10 ppm)	4.60	41.82	4.36	43.07	39.24	3.82	29.6
NAA(30ppm)	4.62	41.91	4.41	43.17	39.29	3.88	32.80

NAA(50ppm)	4.69	44.35	4.51	45.68	41.75	3.93	35.94
2,4-D (5ppm)	4.56	31.15	3.52	32.08	28.40	3.68	20.72
2,4-D (10ppm)	4.56	34.17	3.63	33.86	30.13	3.72	22.27
2,4-D (15ppm)	4.57	34.24	3.75	33.93	30.15	3.77	22.89
Humicacid (1 %)	4.44	35.32	3.79	36.37	32.58	3.79	10.18
Humic acid (1.5%)	4.48	35.81	3.89	36.87	33.09	3.79	12.22
Humicacid (2 %)	4.48	38.23	3.91	38.71	34.88	3.82	13.08
S.E.(d) +	0.139	0.455	0.73	0.38	0.74	0.66	0.95
C.D. at 5%	N/A	0.934	N/A	0.77	1.52	N/A	1.96

Table 3: Effect of PGRs and Organic substances on quality attributes of Ber

Treatments	**TSS (0Brix)**	**Acidity (%)**	**Ascorbic acid (mg/100g)**	**Total Sugar (%)**	**Reducing sugar (%)**	**Non- reducing Sugar (%)**
Control (Waterspray)	11.07	0.51	81.95	8.33	2.76	5.56
Urea (1%)	11.6	0.48	82.74	9.18	3.43	5.74
Urea (2%)	11.71	0.48	82.89	9.61	3.67	5.95
Urea (3%)	11.73	0.47	83.07	9.72	3.70	6.02
GA3(10 ppm)	11.76	0.45	85.41	11.4	4.36	7.03
GA3 (25ppm)	12.6	0.44	86.07	11.70	4.57	7.12
GA3(40ppm)	12.9	0.43	87.46	12.13	4.82	7.31
NAA (10 ppm)	12.06	0.45	84.93	10.92	4.13	6.70
NAA(30ppm)	12.36	0.45	85.07	10.95	4.15	6.79
NAA(50ppm)	12.5	0.44	85.41	11.15	4.17	6.97
2,4-D (5ppm)	11.14	0.45	83.75	10.15	3.81	6.33
2,4-D (10ppm)	11.28	0.46	83.96	10.17	3.83	6.33
2,4-D (15ppm)	11.48	0.46	84.12	10.19	3.93	6.55
Humicacid (1 %)	11.76	0.47	84.29	10.62	3.97	6.64
Humic acid (1.5%)	11.85	0.46	84.63	10.68	4.01	6.67
Humicacid (2 %)	11.93	0.46	84.67	10.41	4.15	6.67
S.E.(d) +	0.26	0.02	0.61	0.12	0.18	0.14
C.D. at 5%	0.53	N/A	1.26	0.26	0.37	0.29

Fig-1:

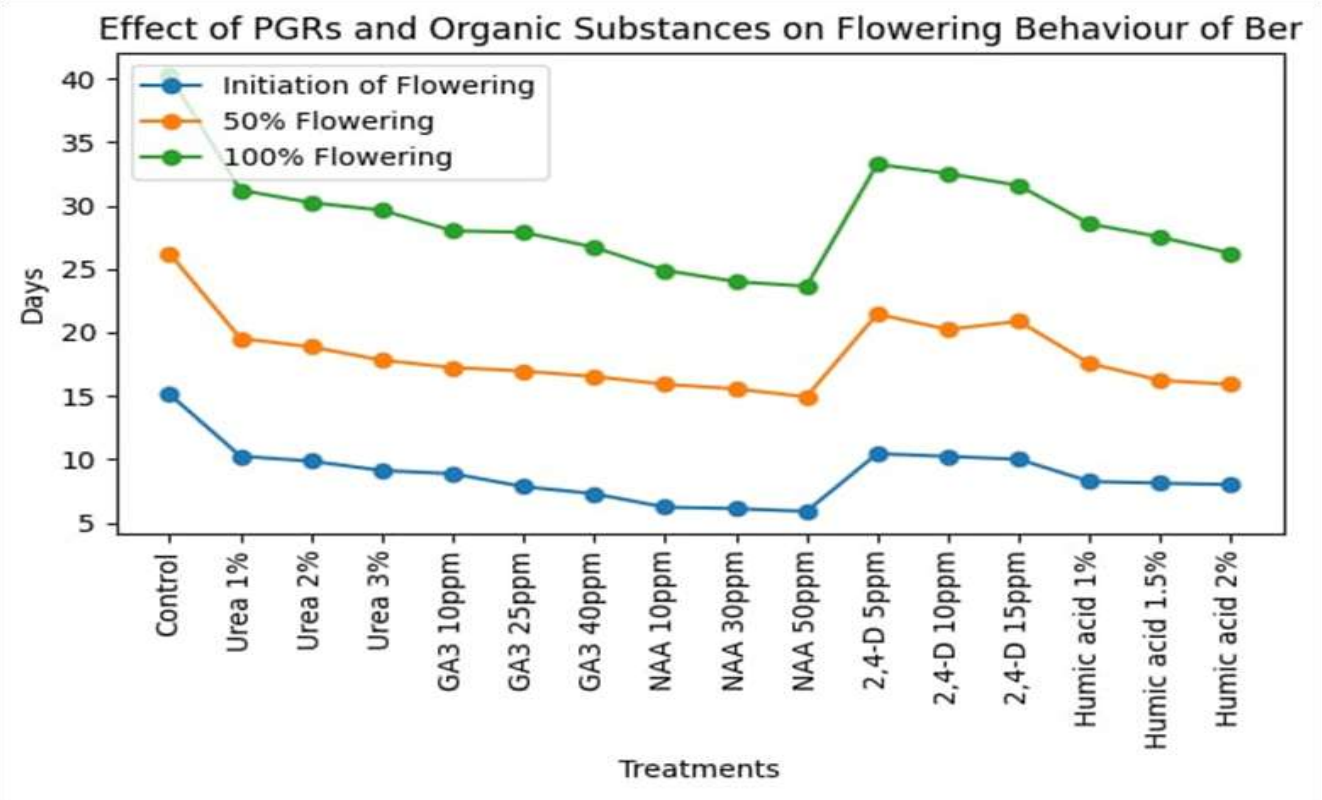

Effect of PGRs and Organic Substances on Flowering Behaviour of Ber
Initiation of Flowering
50% Flowering
100% Flowering
Days
40
35
30
25
20
15
10
5
Control
Urea 1%
Urea 2%
Urea 3%
GA3 10ppm
GA3 25ppm
GA3 40ppm
NAA 10ppm
NAA 30ppm
NAA 50ppm
2,4-D 5ppm
2,4-D 10ppm
2,4-D 15ppm
Humic acid 1%
Humic acid 1.5%
Humic acid 2%
Treatments

Fig-2 :

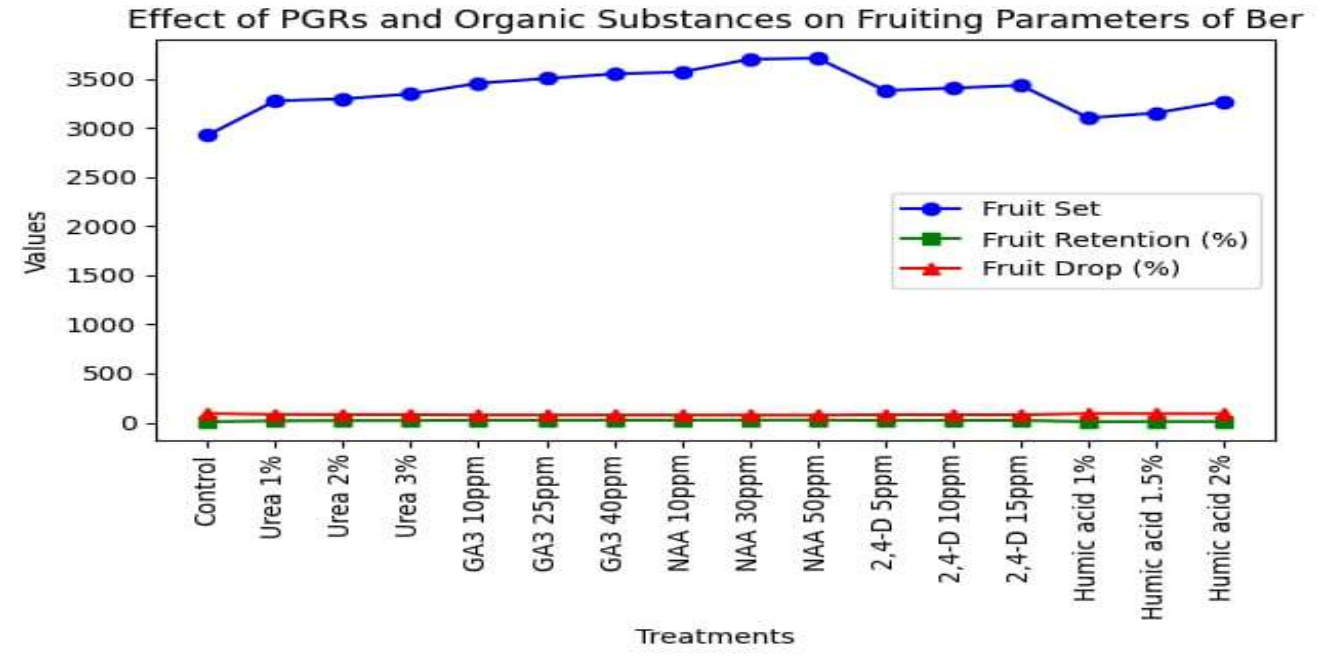

Effect of PGRs and Organic Substances on Fruiting Parameters of Ber
Fruit Set
Fruit Retention (%)
Fruit Drop (%)
Values
3500
3000
2500
2000
1500
1000
500
0
Control
Urea 1%
Urea 2%
Urea 3%
GA3 10ppm
GA3 25ppm
GA3 40ppm
NAA 10ppm
NAA 30ppm
NAA 50ppm
2,4-D 5ppm
2,4-D 10ppm
2,4-D 15ppm
Humic acid 1%
Humic acid 1.5%
Humic acid 2%
Treatments

Fig-3 : Effect of PGRs and Organic substances on quality attributes of Ber

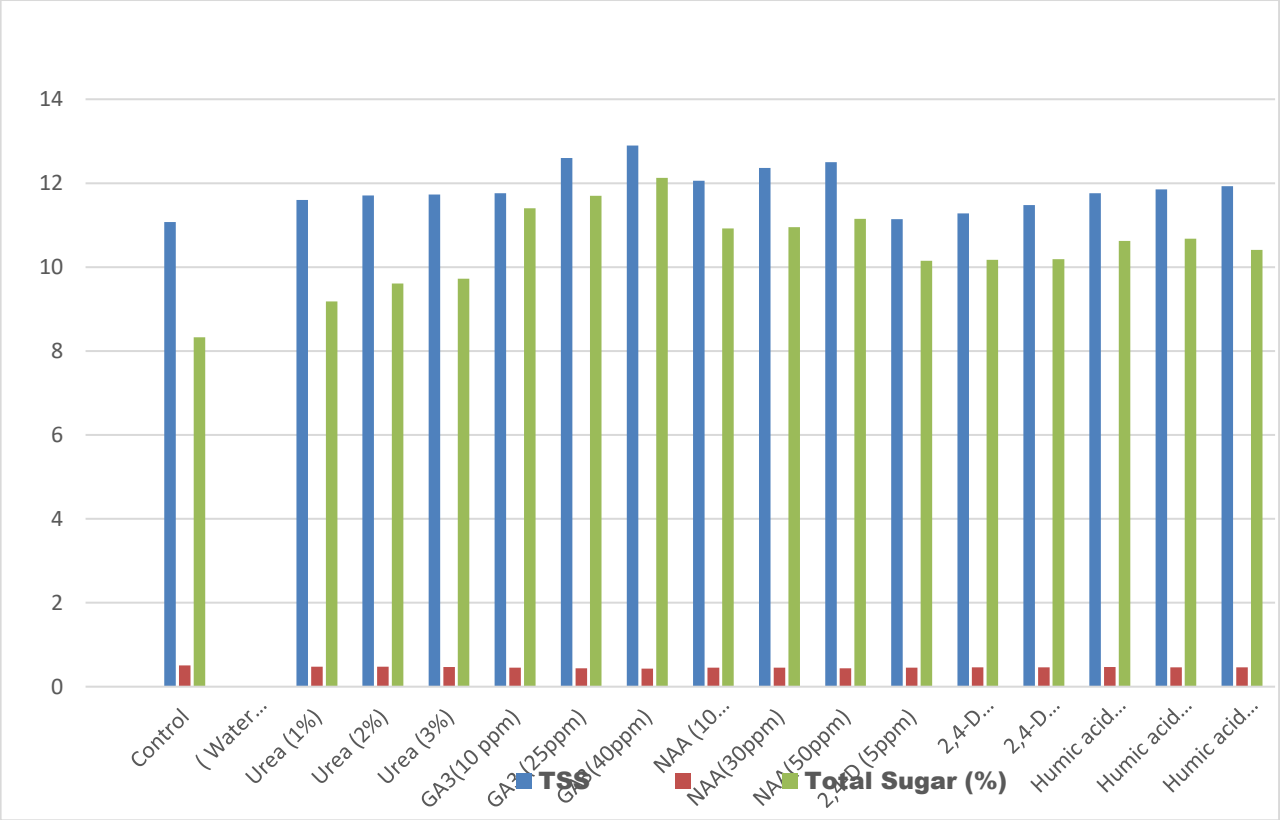
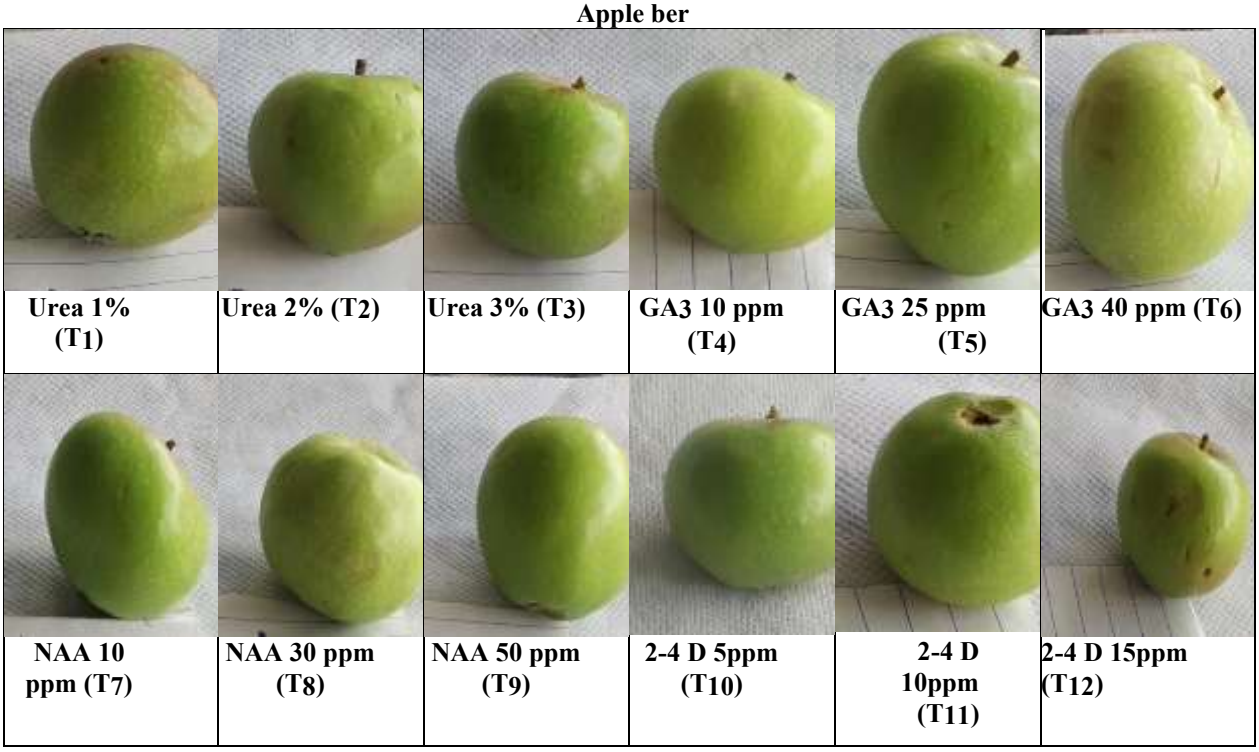


Plate 1 : Effect of different growth promoting substances on fruit size (length, diameter and volume) of ber Cv. Apple ber



					
	Humic acid 1% (T13)	**Humic acid 1.5% (T14)**	**Humic acid 2% (T15)**	**Control (T_0)**	