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EFFECT OF BIOSTIMULANTS ON PHYSICAL AND QUALITY PARAMETERS OF BER (*ZIZYPHUS MAURITIANA* LAMK.) CV. APPLE BER

Abhay Bisen[1*], Pallavi Deshlahre[2], Ravishankar Lanjhiyana[3]and Shishir Prakash Sharma[4]

[1*]Associate Professor (Fruit Science), Pt. Shiv Kumar Shashtri College of Agriculture and Research Station, Rajnandgaon, IGKV, Chhattisgarh, India-491441
[2]Research Scholar, Department of Fruit Science, IGKV, Raipur ,Chhattisgarh, India
[3]Associate Professor (Horticulture), Sant Kabir College of Agriculture and Research Station,Kawardha,Distt. Kabirdham, IGKV, Chhattisgarh, India
[4]Assistant Professor (Fruit Science), Pt. Shiv Kumar Shashtri College of Agriculture and Research Station, Rajnandgaon, IGKV, Chhattisgarh, India
***Corresponding Author**: Abhay Bisen, Email:abhay_horti@yahoo.co.in

ABSTRACT
Ber (*Ziziphus mauritiana* Lamk.) is an important arid and semi-arid fruit crop valued for its nutritional and economic significance. The productivity and fruit quality of ber can be improved through the application of biostimulants, which enhance plant physiological processes and nutrient utilization. Therefore, a field experiment was conducted during 2025–26 at the Dryland Horticultural Farm, SKS College of Agriculture and Research Station, Rajnandgaon, Chhattisgarh to assess the influence of different biostimulants on fruit characteristics, yield and quality of ber cv. Apple Ber. The experiment was laid out in a Randomized Block Design (RBD) comprising thirteen treatments with three replications, involving Panchagavya, Jeevamrit, Amrit Pani, moringa leaf extract, seaweed extract and humic acid applied at different concentrations. Among the treatments, foliar application of Panchagavya @ 3% (T_1) recorded superior performance for most of the growth, yield and quality parameters. The treatment T_1 recorded the highest fruit weight (56.55 g), pulp weight (51.97 g) and fruit yield (55.60 kg plant^{-1} and 22.24 t ha^{-1}). It also resulted in the highest ascorbic acid content (89.65 mg 100 g^{-1}), total sugar (12.75%), reducing sugar (4.85%) and non-reducing sugar (7.90%). Fruit length (4.77 cm) and fruit diameter (4.62 cm) were also numerically highest under Panchagavya @ 3%; however, the differences among treatments for these parameters were statistically non-significant. Similarly, TSS, acidity, stone weight and specific gravity did not differ significantly among the treatments. Panchagavya @ 5% (T_2) ranked next to Panchagavya @ 3% and showed comparatively better performance for several of the studied attributes. The superior response to Panchagavya @ 3% may be attributed to its beneficial effect on nutrient availability, physiological processes and assimilate accumulation, which ultimately enhanced fruit development, pulp formation and biochemical quality. Based on the present investigation, foliar application of Panchagavya @ 3% can be considered a promising biostimulant treatment for improving yield and quality attributes of Apple Ber under the agro-climatic conditions of Rajnandgaon, Chhattisgarh. Further multi-season and multi-location studies are suggested to validate its consistency and economic feasibility under different ber-growing environments.

KEYWORDS: Apple Ber, Biostimulants, Panchagavya, , Yield, Fruit quality,.Physical parameters

INTRODUCTION
Ber (*Ziziphus mauritiana* Lamk.) is an important fruit crop of the arid, semi-arid and rainfed regions of India owing to its hardy nature, wide environmental adaptability and relatively low input requirement. It belongs to the family Rhamnaceae and is well known for its ability to withstand adverse climatic conditions, including high temperature, moisture stress and comparatively poor soil conditions. The crop produces nutritious fruits containing appreciable amounts of sugars, vitamin C, minerals and other bioactive compounds, which contribute to its nutritional and commercial importance. Ber also possesses an early bearing habit and has the potential to provide remunerative returns to growers, particularly in marginal and resource-constrained production systems. In India, ber is cultivated in several states, including Chhattisgarh, where the prevailing agro-climatic conditions offer considerable scope for its expansion and sustainable production. However, productivity and fruit quality are influenced by cultivar, environmental conditions, nutritional status and orchard management practices.Among the improved types of ber, Apple Ber has gained considerable attention because of its comparatively large, attractive, crispy and good-quality fruits with desirable consumer appeal. The cultivar has considerable potential for commercial cultivation; however, achieving higher productivity requires efficient management of flowering, fruit set, fruit retention and fruit development. In fruit crops, profuse flowering does not always translate into higher yield because a considerable

proportion of flowers and young fruits may be lost through poor fruit set and fruit drop (Gangadhar *et a*l., 2019). Consequently, improving reproductive efficiency and maintaining adequate nutrient availability during flowering and fruit development are important for realizing the yield potential of Apple Ber. Appropriate nutrient and biostimulant management can play a significant role in supporting these physiological processes and improving fruit yield and quality.In recent years, increasing emphasis on sustainable and environmentally friendly horticultural production has encouraged the use of organic nutrient sources and plant biostimulants. Biostimulants are substances or formulations that can enhance plant physiological processes, nutrient-use efficiency, growth, productivity and quality when applied in appropriate quantities. Unlike conventional fertilizers, their beneficial effects may arise through several mechanisms, including improved nutrient availability, stimulation of physiological activity, enhancement of root development and modulation of plant metabolic processes. Organic liquid formulations such as Panchagavya, Jeevamrit and Amrit Pani have traditionally been used in natural and organic farming systems and contain various organic compounds and microbial populations that may contribute to improved plant growth and productivity (Bisen *et al.* 2026).

Panchagavya is a traditional organic formulation prepared from cow-derived products and is considered a potential source of nutrients, beneficial microorganisms and biologically active compounds. Its application has been associated with improved vegetative growth, flowering, fruit development and yield in several horticultural crops. Jeevamrit is another microbial-rich organic formulation that may enhance nutrient cycling and microbial activity in the rhizosphere, thereby improving nutrient availability to plants. Similarly, Amrit Pani is an organic liquid input used in natural farming systems and may contribute to improved plant growth and physiological performance. The effectiveness of these formulations, however, may vary depending on crop, cultivar, environmental conditions, method of application and concentration used.

Plant-based biostimulants such as Moringa leaf extract have also received attention because of their naturally occurring growth-promoting constituents. Moringa leaves contain nutrients, antioxidants, vitamins, minerals and plant growth-promoting compounds that may stimulate physiological activities and improve crop performance (Meena *et al.,*2025). Seaweed extracts are another important category of biostimulants containing minerals, polysaccharides, amino acids and other bioactive compounds. Their application has been reported to influence plant growth, nutrient uptake, stress tolerance and developmental processes (Khan *et al*., 2009). Humic acid and other humic substances can improve soil properties, root development, nutrient uptake and plant physiological activity, thereby contributing to improved growth and productivity (Nardi *et al.,* 2002). These organic and biological inputs therefore have potential for improving the productive performance and quality of fruit crops while supporting more sustainable production practices.Despite the increasing interest in organic biostimulants, information on the comparative effectiveness of different organic formulations and their concentrations in Apple Ber remains limited, particularly under the agro-climatic conditions of Chhattisgarh. The response of ber to biostimulants may also vary with concentration and environmental conditions; therefore, identification of an appropriate treatment and concentration is essential for obtaining consistent improvements in fruit yield and quality. Evaluation of different biostimulants under local growing conditions can provide useful information for developing suitable nutrient-management strategies for Apple Ber cultivation.Considering the nutritional and commercial importance of Apple Ber and the need for sustainable approaches to improve fruit production, the present investigation was undertaken to evaluate the effect of different organic biostimulants and their concentrations on flowering, fruiting, physical characteristics, yield and quality attributes of ber (*Ziziphus mauritiana* Lamk.) cv. Apple Ber under the agro-climatic conditions of Rajnandgaon, Chhattisgarh. The study was aimed particularly at identifying an effective biostimulanttreatment and concentration capable of improving fruit development, productivity and biochemical quality of Apple Ber.

MATERIAL AND METHODS

The field experiment was carried out during 2025–2026 at the Dry Land Horticulture Farm, SKS College of Agriculture and Research Station, Rajnandgaon, Chhattisgarh, India. Eight-year-old plants of ber (*Ziziphus mauritiana* Lamk.) *cv.* Apple Ber, established at a spacing of 5 × 5 m, were used for the study. A total of thirteen treatments were evaluated, comprising T_0 – control (water spray), T_1 – Panchagavya @ 3%, T_2 – Panchagavya @ 5%, T_3 – Jeevamrit @ 5%, T_4 – Jeevamrit @ 10%, T_5 – Amrit Pani @ 3%, T_6 – Amrit Pani @ 5%, T_7 – Moringa leaf extract @ 4%, T_8 – Moringa leaf extract @ 6%, T_9 – seaweed extract @ 3%, T_{10} – seaweed extract @ 5%, T_{11} – humic acid @ 1% and T_{12} – humic acid @ 2%.The treatments were arranged in a Randomized Block Design (RBD) with three replications. Each treatment was represented by ten plants, giving a total of 390 plants under the experimental study. Foliar application of the respective treatments was carried out at pre-flowering, flowering, mustard and marble stages using a hand-operated knapsack sprayer. Panchagavya, Jeevamrit, Amrit Pani, Moringa leaf extract and seaweed extract were prepared and applied at their respective concentrations, while humic acid was dissolved in water at 1 and 2% concentrations.

Observations were recorded for fruit length, fruit diameter, yield per plant, fruit weight, stone weight, pulp weight, specific gravity, TSS, acidity, ascorbic acid, total sugar, reducing sugar and non-reducing sugar. Fruit weight was

determined by randomly selecting ten mature fruits from each treatment and weighing them individually using a calibrated electronic balance, and the mean value was expressed in grams (g). Stone weight was recorded by separating the stones from the pulp of the ten selected mature fruits and weighing them individually using an electronic balance; the mean stone weight was expressed in grams (g). Pulp weight was calculated by subtracting the corresponding stone weight from the fruit weight, and the mean value was expressed in grams (g). Specific gravity of the fruit was determined as the ratio of fruit weight to fruit volume and expressed as g cc^{-1}. Total soluble solids (TSS) of the fruit juice were determined using a hand refractometer. Freshly extracted fruit juice was placed on the prism of the refractometer, and the reading was recorded in °Brix. Five observations were recorded for each treatment and the mean value was used for statistical analysis. Titratable acidity was estimated by titrating a known quantity of fruit juice against 0.1 N sodium hydroxide (NaOH) using phenolphthalein as an indicator, following the procedure described by Ranganna (2004), and the results were expressed as percentage acidity.Ascorbic acid content was estimated by the 2,6-dichlorophenol indophenol (DCPIP) visual titration method as described by Ranganna (2004), and the results were expressed as mg 100 g^{-1} of fresh fruit pulp. Reducing sugar content was estimated by the Fehling's solution titration method using methylene blue as an indicator following the procedure described by Ranganna (1995), and the results were expressed as percentage. Total sugar content was estimated after hydrolysis of the sugar extract with concentrated hydrochloric acid, followed by neutralization and titration against Fehling's solution as described by Ranganna (1995), and the results were expressed as percentage. Non-reducing sugar content was calculated by subtracting the reducing sugar content from the total sugar content and expressed as percentage.The experimental data were subjected to analysis of variance following the statistical procedure applicable to RBD. The significance of treatment effects was determined using the critical difference (CD) at the 5% level of significance.

RESULTS AND DISCUSSION

Fruit length and fruit diameter

The data presented in Table 1 and Fig. 1 indicated that the application of different biostimulants had a non-significant effect on fruit length and fruit diameter of ber cv. Apple Ber.Fruit length varied from 4.18 to 4.77 cm among the different biostimulant treatments.The maximum fruit length of 4.77 cm was recorded with Panchagavya @ 3% (T_1).This was followed by Panchagavya @ 5% (T_2), which recorded a fruit length of 4.69 cm. The minimum fruit length of 4.18 cm was observed with Seaweed extract @ 3% (T_9).Similarly, fruit diameter ranged from 4.00 to 4.62 cm under different treatments.The maximum fruit diameter of 4.62 cm was recorded with Panchagavya @ 3% (T_1).The minimum fruit diameter of 4.00 cm was recorded with Seaweed extract @ 3% (T_9).Although numerical differences were observed among the treatments, these differences were statistically non-significant.The comparatively higher fruit size under Panchagavya @ 3% may be attributed to its beneficial effect on plant growth and nutrient availability.Panchagavya contains various nutrients, organic compounds and beneficial microorganisms that may improve nutrient uptake and plant metabolic activities.Improved nutrient absorption may enhance photosynthetic activity and the translocation of assimilates towards developing fruits.The availability of growth-promoting substances may also support cell division and cell enlargement during fruit development.Consequently, better accumulation of photosynthates in developing fruits may have contributed to the comparatively higher fruit length and diameter under T_1.However, the higher concentration of Panchagavya @ 5% did not result in a corresponding increase in fruit size.This suggests that the response of fruit growth may depend on the concentration and physiological response of the plant to the biostimulant.The comparatively lower values under Seaweed extract @ 3% may be related to differences in nutrient composition, application response or treatment efficiency under the prevailing experimental conditions. Environmental factors such as temperature, moisture availability and nutritional status of the soil may also have influenced fruit development.Since the treatment differences were non-significant, the observed numerical variation should be interpreted cautiously.Overall, Panchagavya @ 3% recorded comparatively higher fruit length and fruitdiameter, although the effect of biostimulants on these parameters was statistically non-significant under the experimental conditions. These findings along with previous studies conducted by Tripathi *et al* (2019).

Fruit weight (g)

The data presented in Table 2 and Fig.3 revealed that the application of different organic substances significantly influenced fruit weight of ber. Significant differences in fruit weight were observed among the treatments following the application of various organic substances. The maximum fruit weight (56.55 g) was recorded in T_1 (Panchagavya @ 3%), followed by T_2 (55.52 g), whereas the minimum fruit weight (31.51 g) was observed in T_0 (Control). The increase in fruit weight may be attributed to enhanced nutrient availability, photosynthetic activity and efficient translocation of assimilates towards developing fruits. Similar effects of organic nutrient management on fruit weight were reported by Panna *et al*. (2024) in ber.

Pulp weight (g)

The data presented in Table 2 and Fig. 3 indicated that the application of different organic substances significantly influenced pulp weight of ber. Significant variation in pulp weight was observed among the treatments following the application of different organic substances. The maximum pulp weight (51.97 g) was recorded in T_1 (Panchagavya @ 3%), followed by T_2 (Panchagavya @ 5%) (50.97 g) and T_4 (Jeevamrit @ 10%) (47.80 g), whereas the minimum pulp weight (28.04 g) was recorded in T_0 (Control). The higher pulp weight obtained under Panchagavya application may be attributed to improved nutrient availability, enhanced photosynthetic efficiency and increased translocation of assimilates towards developing fruits. The presence of beneficial microorganisms, amino acids, vitamins and naturally occurring growth-promoting substances in Panchagavya promotes cell division, cell enlargementand dry matter accumulation, resulting in greater pulp development and increased edible portion of fruits.The present findings are in agreement with the observations of Sau *et. al.,*(2017) in mango and Chakraborty *et al.,*(2021) in strawberry, who reported that application of liquid organic formulations and bio-stimulants enhanced fruit growth attributes through improved nutrient availability, increased photosynthetic activity and better assimilate translocation towards developing fruits. Moreover, the presence of microbial metabolites in Panchgavya may have further contributed to the enhancement of fruit quality traits (Chauhan et al. 2024).

Stone weight (g)

The application of different organic substances did not significantly influence stone weight of ber fruits (Table 2 and Fig. 3). The maximum stone weight (4.58 g) was recorded in T_1 (Panchagavya @ 3%), whereas the minimum (3.47 g) was observed in T_0 (Control). The variation in stone weight among different treatments was statistically non-significant.The non-significant variation in stone weight suggests that seed and stone development is largely controlled by the genetic characteristics of the cultivar and is less influenced by external nutrient applications. Organic formulations primarily enhance fruit growth, pulp development and assimilate accumulation, while the stone remains comparatively stable due to its inherent structural characteristics.Similar observations have been reported by Bisen *et.al* (2026) in ber, who stated that physical characteristics such as stone weight are mainly influenced by varietal traits and showed limited variation under different management practices.

Specific gravity (g/cc)

The data presented in Table 2 and Fig. 4 indicated that the application of different organic substances had a non-significant effect on specific gravity of ber. The maximum specific gravity (0.99 g/cc) was recorded in control (T_0), whereas the minimum (0.92 g/cc) was observed in Panchagavya @ 3% (T_1). The values under other treatments ranged from 0.93 to 0.98 g/cc. Overall, specific gravity ranged from 0.92 to 0.99 g/cc.The non-significant variation suggests that organic substances had limited influence on fruit density. The variation in specific gravity may be mainly associated with fruit composition, moisture content, maturity and varietal characteristics. The present findings are in agreement with Patel *et. al.,*(2022) in strawberry, who reported negligible influence of organic biostimulants on specific gravity.

Yield (kg/plant)

The data presented in Table 1 and Fig. 2 indicated that the application of different organic substances significantly influenced yield per plant in ber (*Ziziphus mauritiana* Lamk.).The obtained data in respect of yield after application of different organic substances at different concentrations revealed that the maximum fruit yield (55.60 kg/plant) was recorded in T_1 (Panchagavya @ 3%), followed by T_2 (50.91 kg/plant) and T_4 (46.43 kg/plant), whereas the minimum yield (8.87 kg/plant) was observed in T_0 (Control). The higher yield under Panchagavya may be attributed to its favourable effect on flowering, fruit set, fruit retention and fruit development, along with improved nutrient availability and assimilate translocation. Similar findings have been reported by Gangadhar *et al*. (2019) and Ahir *et al*. (2022).

Total Soluble Solids (°Brix)

The application of different biostimulants had a non-significant effect on TSS content of ber cv. Apple Ber (Table 3 and Fig. 6). TSS ranged from 10.95 to 12.64 °Brix. The maximum TSS was recorded in Panchagavya @ 3% (T_1) (12.64 °Brix), followed by Panchagavya @ 5% (T_2) (12.62 °Brix), while the minimum was recorded in control (T_0) (10.95 °Brix). Although the differences were non-significant, Panchagavya treatments showed comparatively higher numerical values of TSS. Similar observations were reported by Sau *et al.* (2017) in mango and Patel *et al*. (2022) in strawberry.

Acidity (%)

The application of different biostimulants had a non-significant effect on acidity of ber fruits (Table 3 and Fig. 5). Acidity ranged from 0.42 to 0.52%. The lowest acidity was recorded in Panchagavya @ 3% (T_1) (0.42%), followed by Panchagavya @ 5% (T_2) (0.43%), whereas the highest was recorded in control (T_0) (0.52%). Although the differences were non-significant, the biostimulant treatments showed comparatively lower acidity than the control. Similar observations were reported by Lenka *et al.* (2019) in guava.

Ascorbic Acid (mg/100 g)

The application of different biostimulants had a significant effect on ascorbic acid content of ber fruits. The values ranged from 81.99 to 89.65 mg/100 g indicated in Table 3 and Fig. 7. The maximum ascorbic acid content was recorded in Panchagavya @ 3% (T_1) (89.65 mg/100 g), which was statistically at par with Panchagavya @ 5% (T_2) (88.46 mg/100 g), followed by Seaweed extract @ 3% (T_9) (87.12 mg/100 g), while the minimum was recorded in control (T_0) (81.99 mg/100 g). Similar enhancement in ascorbic acid content with organic nutrient application was reported by Ahir *et al.* (2022) in mango and Patel *et al*. (2022) in strawberry.

Total Sugar (%)

Significant differences in total sugar content were observed among the treatments following the application of different organic substances showed in Table 4 and Fig. 8. The maximum total sugar content (12.75%) was recorded in T_1 (Panchagavya @ 3%), followed by T_2 (Panchagavya @ 5%) (12.00%) and T_9 (Seaweed extract @ 3%) (11.73%), whereas the minimum (8.41%) was recorded in T_0 (Control). The higher sugar content under Panchagavya may be attributed to enhanced photosynthetic activity and improved accumulation and translocation of carbohydrates towards developing fruits Bisen *et al.*(2026).

Reducing Sugar (%)

The obtained data revealed significant differences in reducing sugar content among the treatmentsobserved in Table 4 and Fig. 8. The maximum reducing sugar content (4.85%) was recorded in T_1 (Panchagavya @ 3%), followed by T_9 (Seaweed extract @ 3%) (4.75%), whereas the minimum content (2.98%) was observed in T_0 (Control). The higher Reducing Sugar content under Panchagavya application may be attributed to enhanced carbohydrate metabolism and increased enzymatic conversion of complex carbohydrates into simple Sugars during fruit maturation. Improved nutrient availability and physiological efficiency under organic nutrient application promote photosynthetic activity and assimilate accumulation, resulting in higher Reducing Sugar content in fruits.

The present findings are supported by the observations of Chakraborty *et al.,*(2021) in strawberry, who reported that application of liquid organic fertilizer improved fruit quality attributes through enhanced nutrient availability, metabolic activityand better accumulation of soluble Sugars.

Non-reducing Sugar (%)

The data presented in Table 4 and Fig. 8 revealed that non-Reducing Sugar content was significantly influenced by organic substance application. Significant variation in non-reducing sugar content was observed among the treatments following the application of different organic substances. The maximum non-reducing sugar content (7.90%) was recorded in T_1 (Panchagavya @ 3%), followed by T_2 (Panchagavya @ 5%) (7.64%), whereas the minimum (5.43%) was recorded in T_0 (Control). The higher non-Reducing Sugar content under Panchagavya treatment may be due to enhanced carbohydrate synthesis, better photosynthetic activity, and efficient translocation of assimilates towards fruits, resulting in improved sweetness and fruit quality. Similar observations were reported by Ahir *et. al.,*(2022) in mango

CONCLUSION

The present investigation was carried out to study the effect of different biostimulants on growth, yield and quality attributes of ber cv. Apple Ber under the agro-climatic conditions of Rajnandgaon, Chhattisgarh. The results obtained during the investigation indicated that foliar application of different biostimulants influenced several important yield and quality parameters of ber. Among the treatments, Panchagavya @ 3% (T_1) showed comparatively superior performance for most of the important fruit and quality attributes.The application of Panchagavya @ 3% resulted in the highest fruit weight of 56.55 g and pulp weight of 51.97 g. The treatment also recorded the highest fruit yield of 55.60 kg plant^{-1}, corresponding to 22.24 t ha^{-1}. The improvement in fruit weight and yield under Panchagavya @ 3% may be attributed to better nutrient availability, enhanced physiological activities, improved photosynthetic efficiency and efficient translocation of photosynthates towards developing fruits. Panchagavya contains organic nutrients, beneficial microorganisms and biologically active compounds, which may contribute to improved nutrient uptake and plant metabolic activities.

In terms of fruit size, Panchagavya @ 3% recorded comparatively higher fruit length and fruit diameter, although the differences among the treatments for these parameters were statistically non-significant. The comparatively better fruit size under T_1 may be associated with improved nutrient utilization and greater accumulation of photosynthates during fruit development. Thus, the application of Panchagavya appeared to support better fruit development under the prevailing experimental conditions.The application of Panchagavya @ 3% also resulted in superior fruit quality. The highest ascorbic acid content (89.65 mg 100 g^{-1}), total sugar (12.75%), reducing sugar (4.85%) and non-reducing sugar (7.90%) were recorded under T_1. The improvement in these quality parameters may be related to enhanced metabolic activity and increased accumulation of carbohydrates and other biochemical constituents in the fruits. Better nutritional status of the plants may have promoted photosynthesis and carbohydrate synthesis, which subsequently contributed to improved fruit quality.Panchagavya @ 5% (T_2) generally exhibited the next best performance after Panchagavya @ 3%. However, the slightly lower values recorded under T_2 indicate that the response of ber plants may vary with the concentration of the biostimulant. This suggests that Panchagavya @

3% provided a comparatively suitable concentration for obtaining better fruit productivity and quality under the conditions of the present experiment. The lower performance of the control treatment for important yield and quality parameters further indicates the beneficial contribution of biostimulant application.Overall, the findings of the present investigation demonstrate that foliar application of Panchagavya @ 3% was comparatively more effective in enhancing fruit weight, pulp weight, yield and important quality attributes of ber cv. Apple Ber. Therefore, Panchagavya @ 3% may be considered a promising foliar biostimulant for improving productivity and fruit quality of Apple Ber under the agro-climatic conditions of Rajnandgaon, Chhattisgarh. However, further evaluation over different seasons, locations and environmental conditions would be useful for confirming the consistency of this response and for developing suitable recommendations for commercial ber production.

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Table 1 : Effect of biostimulants on Physical parameters of ber cv. Apple Ber

Treatment	Fruit Length (cm)	Fruit Diameter (cm)	Yield/Plant (kg)
T_0 (control)	4.25	4.08	8.87^{m}
T_1 (Panchagavya 3%)	4.77	4.62	55.60^{a}
T_2 (Panchagavya 5%)	4.69	4.56	50.91^{b}
T_3 (Jeevamrit 5%)	4.56	4.34	40.32^{d}
T_4 (Jeevamrit 10%)	4.66	4.42	46.43^{c}
T_5 (Amrit Pani 3%)	4.44	4.21	36.18^{f}
T_6 (Amrit Pani 5%)	4.49	4.25	39.16^{de}
T_7 (Moringa leaf extract 4%)	4.33	4.15	25.84h
T_8 (Moringa leaf extract 6%)	4.38	4.18	29.97^{g}
T_9 (Seaweed extract 3%)	4.18	4.00	16.24^{j}
T_{10} (Seaweed extract 5%)	4.22	4.03	19.13^{i}
T_{11} (Humic acid 1%)	4.20	4.02	14.91^{jkl}
T_{12} (Humic acid 2%)	4.23	4.04	15.23^{jk}
SE(m)±	**0.06**	**0.08**	**0.17**
CD (P=0.05)	**N/S**	**N/S**	**1.38**

Table 2: Effect of biostimulantson Physical parameters of ber cv. Apple Ber

Treatment	Fruit weight (g)	Stone weight (g)	Pulp weight (g)	Specific gravity (g/cc)
T_0 (Control)	31.51^{l}	3.47	28.04^{m}	0.99
T_1 (Panchagavya 3%)	56.55^{a}	4.58	51.97^{a}	0.92
T_2 (Panchagavya 5%)	55.52^{ab}	4.55	50.97^{b}	0.93
T_3 (Jeevamrit 5%)	49.74^{d}	4.42	45.32^{de}	0.94
T_4 (Jeevamrit 10%)	52.27^{c}	4.47	47.80^{c}	0.95
T_5 (Amrit Pani 3%)	47.78^{e}	4.24	43.54^{f}	0.96
T_6 (Amrit Pani 5%)	49.74^{d}	4.35	45.39^{d}	0.97
T_7 (Moringa leaf extract 4%)	45.39^{fg}	3.95	41.44^{h}	0.98
T_8 (Moringa leaf extract 6%)	46.72^{ef}	3.98	42.74^{g}	0.98
T_9 (Seaweed extract 3%)	36.47^{hijk}	3.54	32.93^{l}	0.96
T_{10} (Seaweed extract 5%)	37.36^{hij}	3.59	33.77^{jk}	0.96
T_{11} (Humic acid 1%)	37.85^{hi}	3.61	34.24^{ij}	0.98
T_{12} (Humic acid 2%)	38.15^{h}	3.67	34.48^{i}	0.98
SE(m)±	**0.58**	**0.16**	**0.10**	**0.01**
CD (P=0.05)	**1.71**	**N/S**	**0.29**	**N/S**

Table 3: Effect of biostimulants on qualitative parameters of ber cv. Apple Ber

Treatments	TSS (°Brix)	Acidity (%)	Ascorbic acid (mg 100 g^{-1})
T_0Control	10.95	0.52	81.99^{kl}
T_1Panchagavya(3%)	12.64	0.42	89.65^{a}
T_2Panchagavya(5%)	12.62	0.43	88.46^{ab}
T_3Jeevamrit (5%)	12.12	0.45	85.68^{de}
T_4Jeevamrit (10%)	12.07	0.45	85.23^{def}
T_5Amrit Pani (3%)	11.09	0.48	82.64^{jkl}
T_6Amrit Pani (5%)	11.15	0.47	82.75^{jk}
T_7Moringa leaf extract (4%)	11.38	0.46	83.64^{ij}
T_8Moringa leaf extract (6%)	11.42	0.46	84.44^{defgh}
T_9Seaweed extract (3%)	12.20	0.44	87.12^{bc}
T_{10}Seaweed extract (5%)	12.15	0.44	86.02^{cd}
T_{11}Humic acid (1%)	11.65	0.45	84.20^{defghi}
T_{12}Humic acid (2%)	11.76	0.45	84.65^{defg}
SE(m) ±	**0.34**	**0.00**	**0.36**
CD (5%)	**N/S**	**N/S**	**1.06**

Table 4: Effect of biostimulants on qualitative parameters of ber cv. Apple Ber

Treatment	Total Sugar (%)	Reducing Sugar (%)	Non-Reducing Sugar (%)
T_0 (control)	8.41 ^{l}	2.98 ^{g}	5.43 ^{m}
T_1 (Panchagavya 3%)	12.75 ^{a}	4.85 ^{a}	7.90 ^{a}
T_2 (Panchagavya 5%)	12.00 ^{ab}	4.36 ^{bcd}	7.64 ^{b}
T_3 (Jeevamrit 5%)	11.27^{bcde}	3.90 ^{de}	7.37 ^{c}
T_4 (Jeevamrit 10%)	11.18 ^{bcde}	3.87 ^{e}	7.31 ^{cd}
T_5 (Amrit Pani 3%)	9.62 ^{ijk}	3.71 ^{ef}	5.91 ^{kl}
T_6 (Amrit Pani 5%)	9.71^{ij}	3.72 ^{ef}	5.99 ^{k}
T_7 (Moringa leaf extract 4%)	10.17^{ghi}	3.58 ^{ef}	6.59 ^{hij}
T_8 (Moringa leaf extract 6%)	10.23 ^{gh}	3.63 ^{ef}	6.60 ^{hi}
T_9 (Seaweed extract 3%)	11.73 ^{bc}	4.75 ^{ab}	6.98 ^{e}
T_{10} (Seaweed extract 5%)	11.65 ^{bcd}	4.69 ^{abc}	6.96 ^{ef}
T_{11} (Humic acid 1%)	10.60 ^{fg}	3.94 ^{de}	6.66 ^{gh}
T_{12} (Humic acid 2%)	10.69 ^{f}	3.98 ^{de}	6.71 ^{g}
SE(m)±	**0.08**	**0.16**	**0.02**
CD (P=0.05)	**0.25**	**0.46**	**0.09**

Plate 1: Effect of different organic substances on fruit size, length,diameter and volume of ber cv. Apple Ber.



Fig.1 : Effect of biostimulants on fruit length and diameter of ber

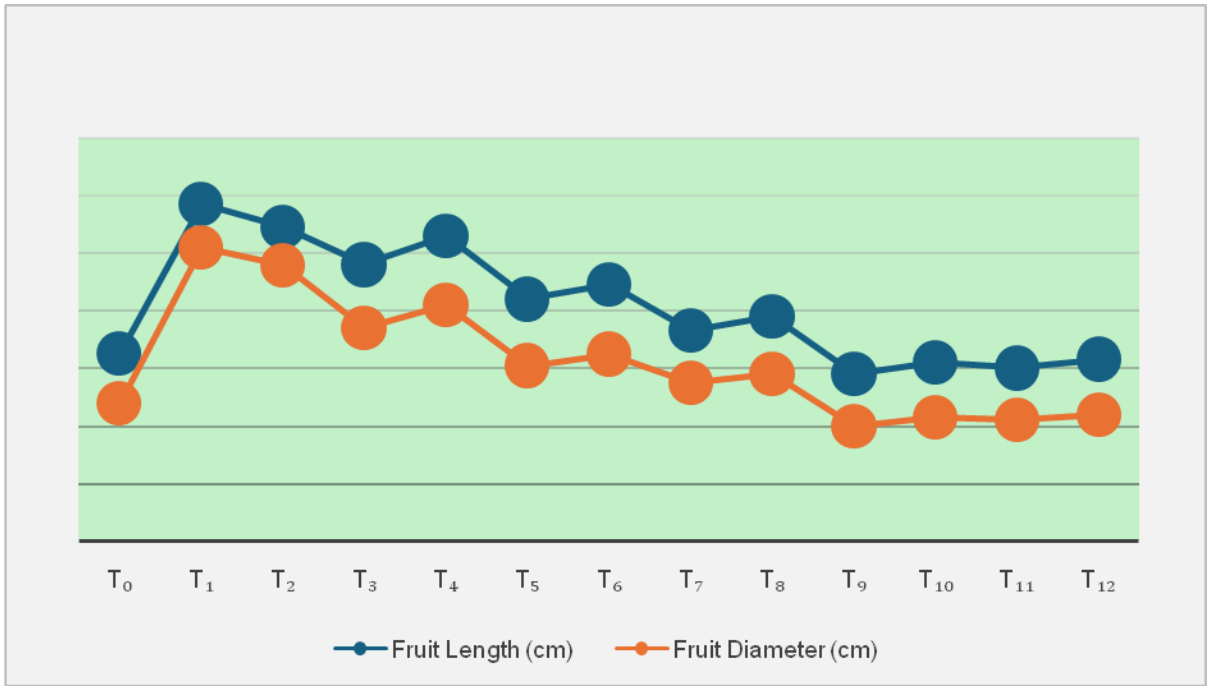


Fig.2: Effect of biostimulants on yield/plant (kg) of ber

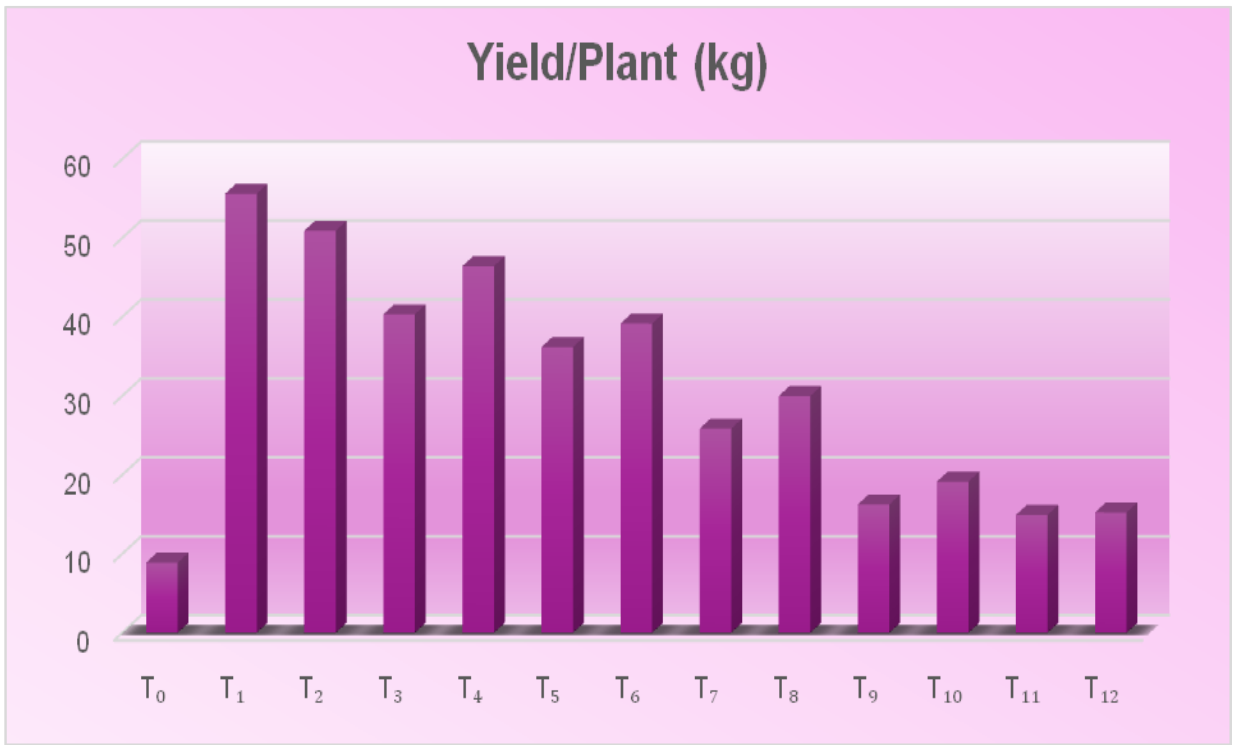


Fig.3 :Effect of biostimulants on fruit weight , stone weight and pulp weight of ber

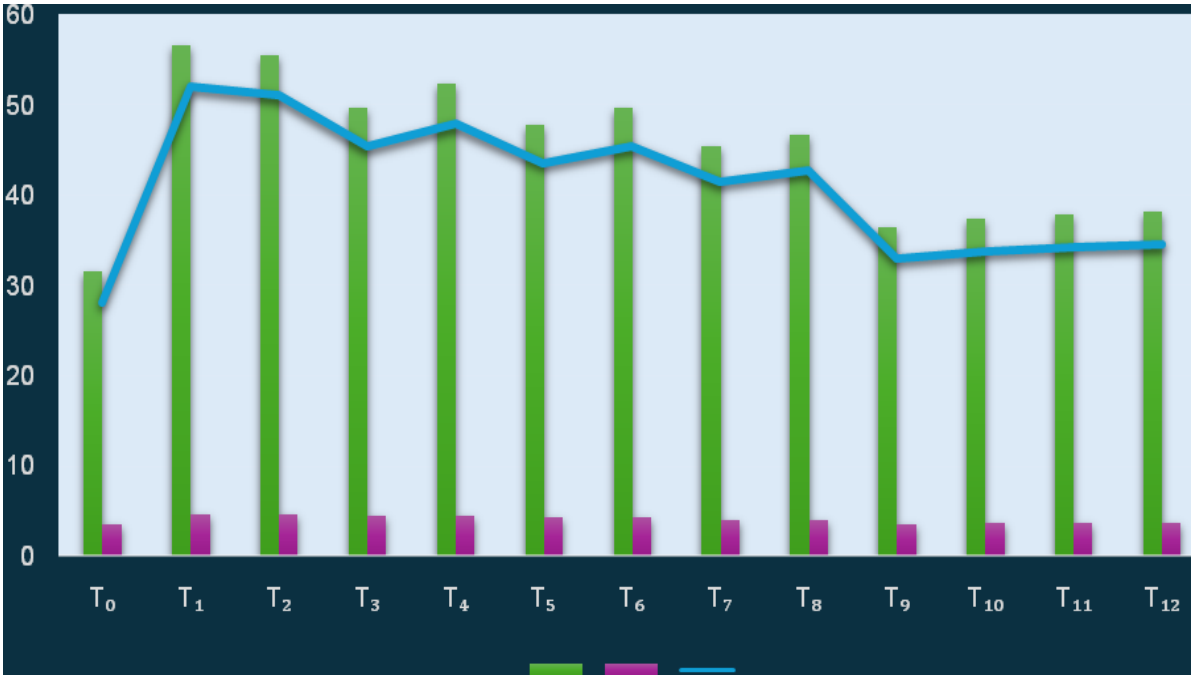


Fig.4: Effect of biostimulants on specific gravity (g/cc) of ber

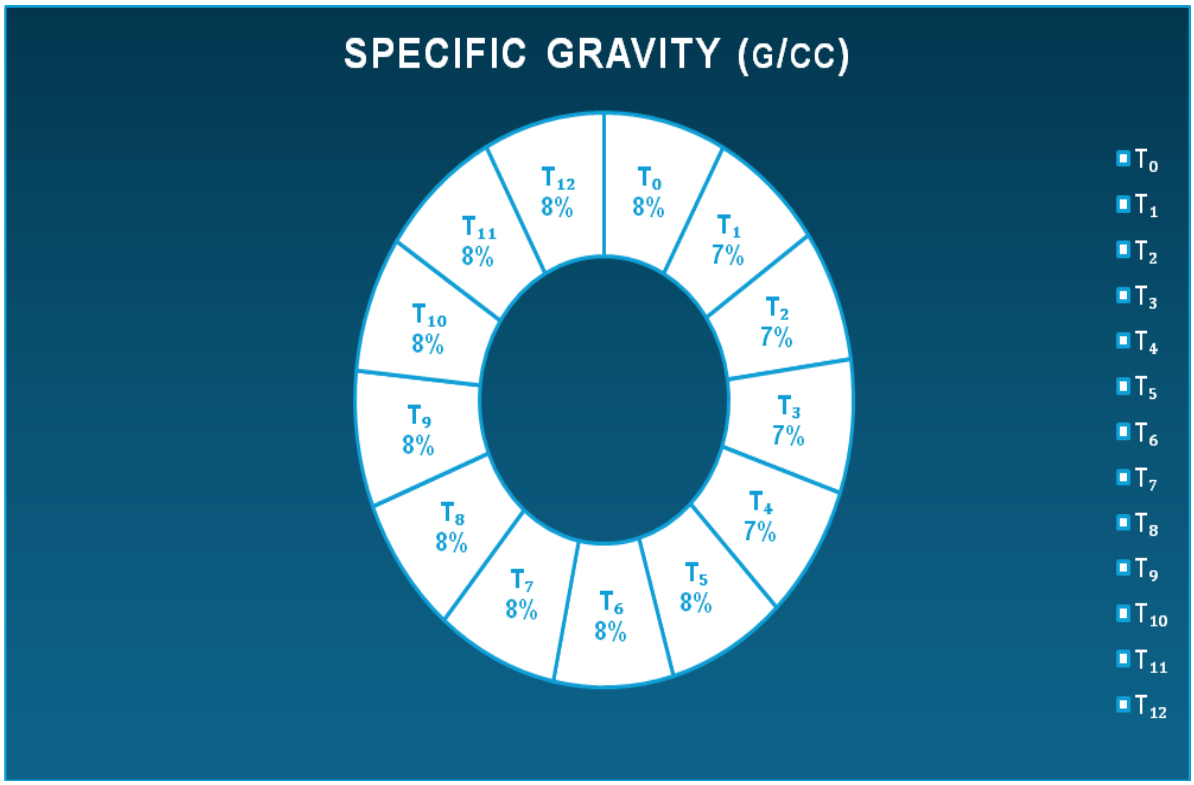


Fig.5: Effect of biostimulants on acidity (%)of ber

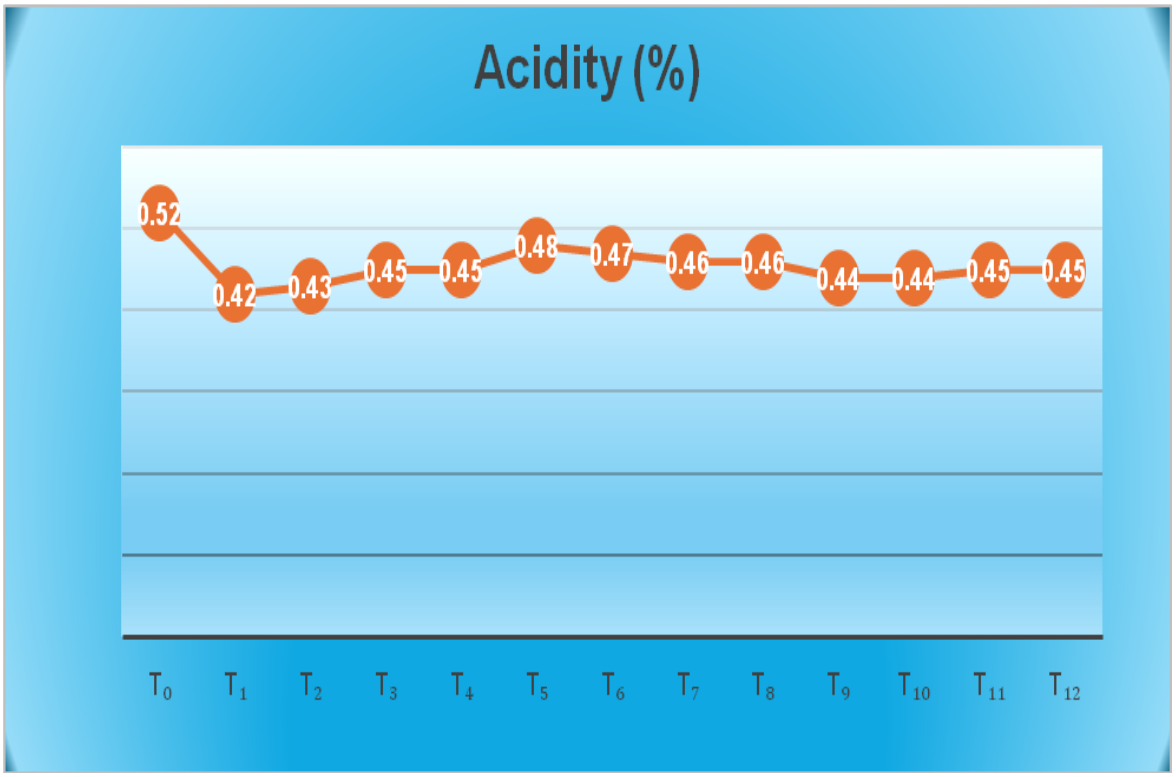


Fig.6: Effect of biostimulants on TSS (°Brix) of ber

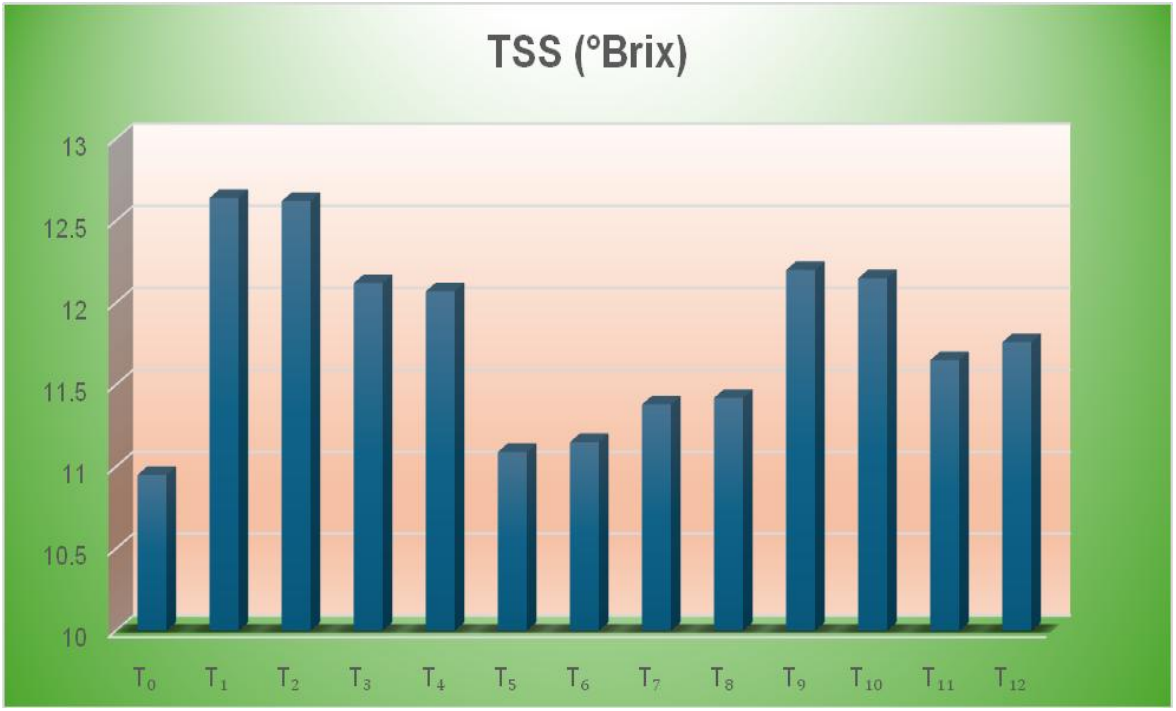


Fig.7: Effect of biostimulants on ascorbic acid of ber

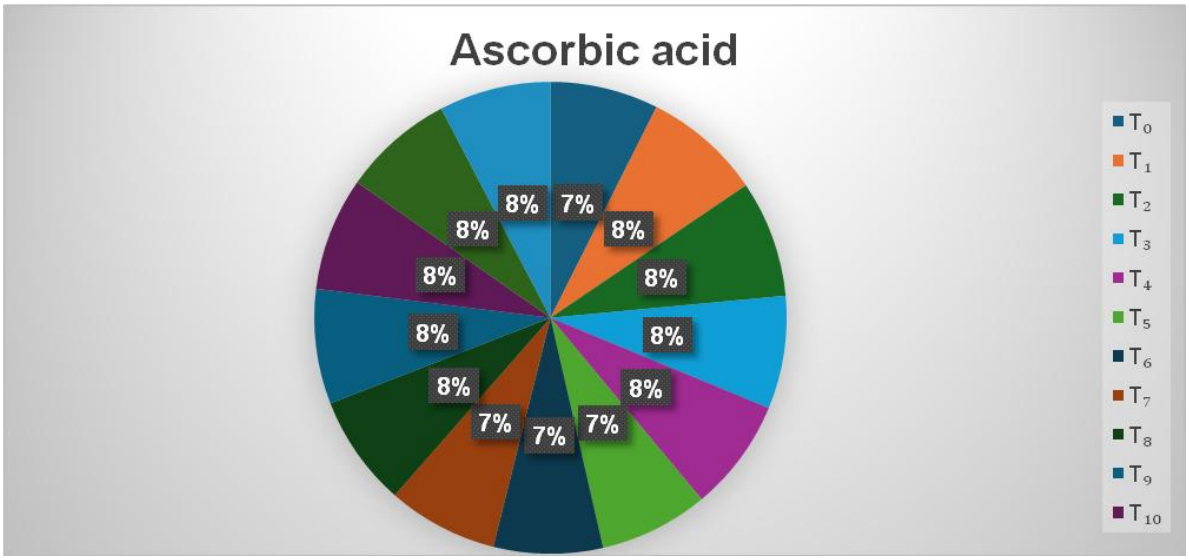


Fig.8 : Effect of biostimulants on Total ,Reducing and Non reducing sugar of ber

