Indian Research Journal of Extension Education
ISSN: 0972-2181 (Print), 0976-1071 (e-Print)
NAAS Rating : 5.22
Journal homepage: seea.org.in

RESEARCH ARTICLE https://doi.org/10.54986/irjee/2022/apr_jun/84-89

# Impact of Pruning Time on Bio-Chemical Parameters of Guava (*Psidium guajava* L.)

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*Received on January 10, 2022, Accepted on March 20, 2022 and Published Online on April 01, 2022*

## ABSTRACT

*The present study was conducted on seven different genotypes namely RHR-Guv-58, RHR-Guv-60, RHR-Guv-14, RHR-Guv-16, RHR-Guv-3, RHR-Guv-6 and Sardar with five pruning time i.e. 15th May, 15th June, 15th July, 15th August, 15th Sept. and no pruning (control). The experiment was laid out in Factorial Randomized Block Design with forty two treatments and was replicated two times. The biochemical parameters assessed were T.S.S., total sugars (Included reducing and non-reducing), acidity, ascorbic acid, sugar: acid ratio and shelf-life of fruit. The experiment was conducted for two seasons, and results indicated that the maximum TSS of fruit (12.33 $^0$Brix) was observed in Sardar. The maximum total sugars (8.08 %), reducing sugars (5.07 %), sugar: acid ratio (22.33) with minimum acidity (0.36 %) were recorded in $G_3$ (RHR-Guv-58) genotype. The maximum ascorbic acid of fruit (208.33 mg/100 g) and shelf life of fruit (9.75 days) was recorded in $G_4$ (RHR-Guv-14) genotype. Fruit quality of genotypes was remained more or less similar irrespective to pruning time.*

***Key words:*** *Genotypes; Pruning time; Quality; Shelf-life; Pulp texture.*

Guava (*Psidium guajava* L.), popularly known as the "poor man's fruit" or "apple of tropics" belongs to the family Myrtaceae and is native to tropical America stretching from Mexico to Peru. It is the fourth most important fruit crop in India after Mango, Banana and Citrus (*Nagar et al., 2017*). Being rich in vitamins 'A' and 'C' with seeds that are rich in omega-3, omega-6 polyunsaturated fatty acids and dietary fiber, the fruit is being marketed as 'super fruit' (*Nimisha et al., 2013*). The development of colour, sweetness, aroma and vitamin C are dependent on low temperature and dry atmosphere, owing to this fact the quality of winter season fruits is better compared to that rainy and spring seasons. Guava trees bear terminally, that's why pruning influences more sprouting of shoots, flowering, fruiting and consequently increase in the quality of guava (*Dubey et al., 2002*). Keeping in a view the above facts, it is felt to undertake the research work on effect of pruning time on bio-chemical parameters of guava (*Psidium guajava* L.) genotypes.

## METHODOLOGY

An experiment was carried out with an objective to study quality of guava genotypes at the Instructional-cum-Research Farm, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri. The present investigations were conducted on seven different genotypes namely Sardar ($G_1$), RHR-Guv-58 ($G_2$), RHR-Guv-60 ($G_3$), RHR-Guv-14 ($G_4$), RHR-Guv-16 ($G_5$), RHR-Guv-3 ($G_6$) and RHR-Guv-6 ($G_7$) with five pruning time i.e. 15th May ($P_1$), 15th June ($P_2$), 15th July ($P_3$), 15th August ($P_4$), 15th Sept ($P_5$) and no pruning (control) ($P_6$). The genotypes were pruned 75 per cent of current season growth of guava plants at different times to understand influence on quality. The experiment was laid out in Factorial Randomized Block

Design with forty-two treatments and was replicated two times. Observations on quality parameters were recorded. Guava fruits were analyzed at 3/4 ripening stage for quality. Five fruits from each treatment per replication were selected randomly and halved by Knife which was further pulped through a mixer. Eventually, homogenized fruit pulp sample was taken for biochemical analysis. Total soluble solids of fruits were determined with the help of a hand refractometer (Erma Tokyo-A$^0$32), total sugars, reducing sugars and non-reducing sugars of fruits were determined by volumetric method (*Lane and Eynon, 1960*) ascorbic acid of fruits were estimated by direct titration method using 2-6 dichlorophenol indophenol dye (*AOAC, 1990*) and also determined with the help of a NIR machine. The statistical analysis of the data for both the experiment was done as per the standard procedure (*Panse and Sukhatme, 1985*).

## RESULTS AND DISCUSSION

*T.S.S. ($^0$Brix) of fruit* : The data on T.S.S. of fruit are displayed in Table 1, 2 and 3. Effect of various genotypes were found to be significant for the T.S.S. of fruit during the both the seasons and pooled results. The significantly maximum T.S.S. of fruit (12.27 and 12.19$^0$Brix) was observed in $G_1$ genotype and the minimum (11.11 and 10.98$^0$Brix) in $G_3$ genotype during both the season, respectively (Table 1 & 2). The similar trend was recorded in pooled data, i.e. maximum in $G_1$ genotype (12.23$^0$Brix) and minimum in $G_3$ genotype (11.04 $^0$Brix). T.S.S. of fruit was found to be non-significant due to effect of pruning time and interaction effect among the various pruning time and genotypes during both the season and pooled data. The significantly maximum T.S.S. of fruit (12.23$^0$Brix) was observed in $G_1$ genotype and the minimum (11.04$^0$Brix) in $G_3$ genotype. Result of conducted experiment showed that, time of pruning does not affect too much on T.S.S. but various genotypes get affected by pruning in that maximum T.S.S. was recorded in $G_1$ (Sardar) as compared to others genotypes. This is due to the effect of pruning on plants, attributed to lower leaves/ fruit ratio and better availability of carbohydrates reserved stored in pruned shoots at a correct time and characteristics of the genotype. Similar results regarding the effect of pruning time on T.S.S of fruit were recorded by *Sheikh and Hulmani (1996), Singh and Dhaliwal (2004)* and *Ali and Abdel-Hameed (2014)*.

*Total sugars (%) of fruit* : The data during season 1, season 2 and pooled data revealed that the statistically significant differences were recorded for the total sugars of fruit due to the various treatments of pruning time and genotypes. The maximum total sugars of fruit (8.07 and 8.02 %) were recorded in $P_1$ treatment, which was at par with $P_2$ treatment (7.90 and 7.86 %), whereas the lowest in $P_5$ treatment (7.59 and 7.62 %) during both the season, respectively. Similar trend was reported in the pooled results i.e. maximum in $P_1$ treatment (8.04 %), which was at par with $P_2$ treatment (7.88 %) and minimum in $P_5$ treatment (7.61 %). Effect of different genotypes was found significant for total sugars of fruit during the both season and pooled data. The $G_3$ genotype was observed maximum total sugars of fruit (8.09 and 8.07 %), which was at par with $G_6$ genotype (7.98 and 7.95 %), while the minimum (7.52 and 7.50 %) in genotype $G_1$ during the season, respectively. The pooled results indicated that, maximum total sugars of fruit (8.08 %) were noted in $G_3$ genotype, which was at par with $G_6$ genotype (7.97 %), while the minimum (7.51 %) in $G_1$ genotype. Present results reported that, improvement was observed in quality of guava fruit of pruned plants compared to control plants. This might be due to increase nutrient uptake by the trees and consequently more synthesis of carbohydrates and other metabolites and their translocation to the fruits. The similar results are conformity with *Singh et al., (2005)* and *Kumar and Rattanpal (2010)*.

*Reducing sugars (%) of fruit* : Effect of different pruning time was found significant during the both season and pooled data presented in Table 1, 2 and 3. The $P_1$ treatment was noted highest reducing sugars of fruit (5.04 and 4.94 %) and lowest in $P_5$ treatment (4.33 and 4.41 %) during both the season, respectively. The similar trend was recorded in pooled results, i.e. maximum (4.99 %) in $P_1$ treatment and lowest (4.37 %) in $P_5$ treatment. It was also observed that the reducing sugars of fruit were significantly influenced due to effect of different genotypes. The highest reducing sugars of fruit (5.12 %) were recorded in $G_3$ genotype and lowest in $G_1$ genotype (4.31 %) during the season 1. The $G_3$ genotype was recorded highest reducing sugars of fruit (5.03 %), which was at par with $G_6$ genotype (4.90 %) and lowest (4.24 %) in genotype $G_1$ during the season 2. The pooled analysis revealed that, maximum reducing sugars of fruit (5.07 %) were recorded in $G_3$ genotype

**Table 1. Effect of pruning time and genotypes on different bio-chemical parameters of fruit (Season 1)**

| Treatments | T.S.S. | Total sugars | Reducing sugars | Non-reducing sugars | Acidity | Ascorbic acid | Sugar: acid ratio | Shelf life |
|---|---|---|---|---|---|---|---|---|
| $P_1$ - 15th May | 11.51 | 8.07 | 5.04 | 3.04 | 0.39 | 197.43 | 21.06 | 8.46 |
| $P_2$- 15th June | 11.11 | 7.90 | 4.85 | 3.08 | 0.36 | 208.07 | 22.12 | 8.36 |
| $P_3$- 15th May | 11.30 | 7.63 | 4.48 | 3.16 | 0.40 | 198.93 | 19.41 | 8.02 |
| $P_4$- 15th May | 11.22 | 7.68 | 4.52 | 3.16 | 0.40 | 190.75 | 19.32 | 7.90 |
| $P_5$- 15th May | 11.35 | 7.59 | 4.33 | 3.25 | 0.40 | 188.68 | 19.18 | 7.16 |
| $P_6$ (Control) | 11.45 | 7.86 | 4.77 | 3.10 | 0.38 | 197.71 | 20.74 | 8.23 |
| S.E. (±) | 0.11 | 0.06 | 0.04 | 0.04 | 0.01 | 0.87 | 0.34 | 0.06 |
| CD at 5 % | NS | 0.16 | 0.11 | 0.12 | 0.01 | 2.41 | 0.94 | 0.17 |
| $G_1$- Sardar | 12.27 | 7.52 | 4.28 | 3.23 | 0.45 | 187.67 | 16.60 | 3.53 |
| $G_2$- RHR-Guv-58 | 11.05 | 7.67 | 4.50 | 3.17 | 0.37 | 195.50 | 20.97 | 8.33 |
| $G_3$- RHR-Guv-60 | 11.11 | 8.09 | 5.07 | 3.00 | 0.37 | 200.83 | 22.29 | 9.14 |
| $G_4$- RHR-Guv-14 | 11.13 | 7.80 | 4.69 | 3.13 | 0.39 | 206.33 | 19.97 | 9.25 |
| $G_5$- RHR-Guv-16 | 11.35 | 7.76 | 4.57 | 3.16 | 0.40 | 197.42 | 19.55 | 8.30 |
| $G_6$- RHR-Guv-3 | 11.11 | 7.98 | 4.93 | 3.03 | 0.37 | 198.33 | 22.03 | 9.13 |
| $G_7$- RHR-Guv-6 | 11.25 | 7.71 | 4.44 | 3.25 | 0.38 | 192.42 | 20.71 | 8.48 |
| S.E. (±) | 0.12 | 0.06 | 0.05 | 0.05 | 0.01 | 0.94 | 0.37 | 0.07 |
| CD at 5 % | 0.32 | 0.17 | 0.13 | 0.14 | 0.02 | 2.61 | 1.01 | 0.18 |
| Interaction (P×G) | | | | | | | | |
| S.E. (±) | 0.28 | 0.15 | 0.11 | 0.12 | 0.01 | 2.30 | 0.90 | 0.16 |
| CD at 5 % | NS | NS | NS | NS | NS | 6.39 | NS | 0.45 |

**Table 2. Effect of pruning time and genotypes on different bio-chemical parameters of fruit (Season 2)**

| Treatments | T.S.S. | Total sugars | Reducing sugars | Non-reducing sugars | Acidity | Ascorbic acid | Sugar: acid ratio | Shelf life |
|---|---|---|---|---|---|---|---|---|
| $P_1$ - 15th May | 11.34 | 8.02 | 4.94 | 3.07 | 0.38 | 202.79 | 21.23 | 8.42 |
| $P_2$- 15th June | 11.21 | 7.86 | 4.75 | 3.09 | 0.37 | 207.29 | 21.30 | 8.24 |
| $P_3$- 15th May | 11.11 | 7.68 | 4.54 | 3.14 | 0.38 | 201.43 | 20.20 | 8.05 |
| $P_4$- 15th May | 11.33 | 7.61 | 4.41 | 3.20 | 0.40 | 195.14 | 19.18 | 7.83 |
| $P_5$- 15th May | 11.20 | 7.62 | 4.41 | 3.22 | 0.41 | 193.00 | 18.81 | 7.11 |
| $P_6$ (Control) | 11.23 | 7.81 | 4.63 | 3.16 | 0.38 | 196.71 | 20.89 | 8.28 |
| S.E. (±) | 0.10 | 0.06 | 0.04 | 0.05 | 0.00 | 0.74 | 0.30 | 0.05 |
| CD at 5 % | NS | 0.17 | 0.12 | NS | 0.01 | 2.05 | 0.82 | 0.14 |
| $G_1$- Sardar | 12.19 | 7.50 | 4.24 | 3.25 | 0.47 | 188.92 | 16.16 | 3.61 |
| $G_2$- RHR-Guv-58 | 11.09 | 7.67 | 4.44 | 3.21 | 0.36 | 197.75 | 21.13 | 8.30 |
| $G_3$- RHR-Guv-60 | 10.98 | 8.07 | 5.03 | 3.03 | 0.36 | 201.92 | 22.36 | 9.07 |
| $G_4$- RHR-Guv-14 | 11.19 | 7.84 | 4.74 | 3.13 | 0.39 | 210.33 | 20.16 | 9.15 |
| $G_5$- RHR-Guv-16 | 11.07 | 7.69 | 4.56 | 3.11 | 0.39 | 201.08 | 19.92 | 8.31 |
| $G_6$- RHR-Guv-3 | 11.10 | 7.95 | 4.90 | 3.02 | 0.37 | 201.92 | 21.62 | 9.06 |
| $G_7$- RHR-Guv-6 | 11.04 | 7.66 | 4.36 | 3.27 | 0.37 | 193.83 | 20.54 | 8.43 |
| S.E. (±) | 0.10 | 0.06 | 0.05 | 0.05 | 0.00 | 0.80 | 0.32 | 0.06 |
| CD at 5 % | 0.29 | 0.18 | 0.13 | 0.14 | 0.01 | 2.22 | 0.89 | 0.15 |
| Interaction (P×G) | | | | | | | | |
| S.E. (±) | 0.25 | 0.16 | 0.12 | 0.12 | 0.01 | 1.96 | 0.79 | 0.14 |
| CD at 5 % | NS | NS | NS | NS | NS | 5.44 | NS | 0.38 |

and minimum (4.28 %) in $G_1$ genotype. Results have been revealed that, improvement was observed in quality of guava fruit of pruned plants compared to control once. This might be due to increase nutrient uptake by the trees and consequently more synthesis of carbohydrates and other metabolites and their translocation to the fruits. The results are found similar with *Nikumbhe (2014)* and *Raut et al., (2016*).

*Non-reducing sugars (%) of fruit* : The $G_7$ genotype was recorded maximum non-reducing sugars of fruit (3.22 and 3.27 %) and minimum (2.98 and 3.03 %) in genotype $G_3$ during both season, respectively (Table 1 and 2). The similar trend was found in pooled mean, i.e. maximum (3.25 %) in $G_7$ genotype and minimum (3.00 %) in $G_3$ genotype (Table 3). As regards effect of pruning time and interaction effect between pruning time and different genotypes were non-significant for non-reducing sugars of fruit. Overall considering the results indicated that, the maximum non-reducing sugars were recorded in $P_5$ (15$^{th}$ September pruning time) treatment compared to other treatments. This might be due to the abundant availability of photosynthesis for limited number of fruits leads to increase in non-reducing sugars. The results coincided with findings of *Nikumbhe (2014)*.

*Acidity (%) of fruit* : This is very important biochemical parameter decides taste blend of guava. The data regarding effect of different genotypes on acidity of fruit was significantly influenced during both season and also for pooled results. The minimum acidity of fruit (0.37 %) was recorded in $G_2$, $G_3$ and $G_7$ genotype and maximum (0.45 %) in genotype $G_1$ during the season 1 (Table 1). The minimum acidity of fruit (0.36 %) was noticed in $G_2$ and $G_3$ genotype, while the maximum (0.47 %) in $G_1$ genotype during the season 2 (Table 2). The pooled results indicated that the minimum acidity of fruit (0.36 %) was observed in $G_3$ genotype, which was at par with $G_2$, $G_6$ and $G_7$ genotypes (0.37 %), while the maximum (0.46 %) in $G_1$ genotype (Table 3). The present results observed that the pruning time does not affect too much on acidity but genotypes differ in acidity. It might be due to the independent characteristic of genotype along with pruning effect and also might be due to the abundant availability of photosynthesis for limited number of fruits leads to increase in acidity.

**Table 3. Effect of pruning time and genotypes on different bio-chemical parameters of fruit (Pooled)**

| Treatments | T.S.S. | Total sugars | Reducing sugars | Non-reducing sugars | Acidity | Ascorbic acid | Sugar: acid ratio | Shelf life |
|---|---|---|---|---|---|---|---|---|
| $P_1$ - 15$^{th}$ May | 11.43 | 8.04 | 4.99 | 3.05 | 0.39 | 200.11 | 21.15 | 8.44 |
| $P_2$- 15$^{th}$ June | 11.16 | 7.88 | 4.80 | 3.08 | 0.37 | 207.68 | 21.71 | 8.30 |
| $P_3$- 15$^{th}$ May | 11.21 | 7.66 | 4.51 | 3.15 | 0.39 | 200.18 | 19.80 | 8.04 |
| $P_4$- 15$^{th}$ May | 11.28 | 7.65 | 4.46 | 3.18 | 0.40 | 192.95 | 19.25 | 7.87 |
| $P_5$- 15$^{th}$ May | 11.28 | 7.61 | 4.37 | 3.24 | 0.40 | 190.84 | 18.99 | 7.13 |
| $P_6$ (Control) | 11.34 | 7.83 | 4.70 | 3.13 | 0.38 | 197.21 | 20.82 | 8.26 |
| S.E. (±) | 0.10 | 0.06 | 0.04 | 0.05 | 0.00 | 0.81 | 0.32 | 0.06 |
| CD at 5 % | NS | 0.16 | 0.12 | NS | 0.01 | 2.24 | 0.88 | 0.16 |
| $G_1$- Sardar | 12.23 | 7.51 | 4.31 | 3.21 | 0.46 | 188.29 | 16.38 | 3.57 |
| $G_2$- RHR-Guv-58 | 11.07 | 7.67 | 4.55 | 3.14 | 0.37 | 196.63 | 21.05 | 8.32 |
| $G_3$- RHR-Guv-60 | 11.04 | 8.08 | 5.12 | 2.98 | 0.36 | 201.38 | 22.33 | 9.11 |
| $G_4$- RHR-Guv-14 | 11.16 | 7.82 | 4.64 | 3.13 | 0.39 | 208.33 | 20.07 | 9.20 |
| $G_5$- RHR-Guv-16 | 11.21 | 7.73 | 4.57 | 3.21 | 0.39 | 199.25 | 19.74 | 8.31 |
| $G_6$- RHR-Guv-3 | 11.10 | 7.97 | 4.96 | 3.05 | 0.37 | 200.13 | 21.83 | 9.09 |
| $G_7$- RHR-Guv-6 | 11.14 | 7.69 | 4.52 | 3.22 | 0.37 | 193.13 | 20.62 | 8.45 |
| S.E. (±) | 0.11 | 0.06 | 0.04 | 0.05 | 0.01 | 0.87 | 0.34 | 0.06 |
| CD at 5 % | 0.30 | 0.18 | 0.12 | 0.13 | 0.01 | 2.42 | 0.95 | 0.17 |
| Interaction (P×G) | | | | | | | | |
| S.E. (±) | 0.27 | 0.16 | 0.11 | 0.12 | 0.01 | 2.14 | 0.84 | 0.15 |
| CD at 5 % | NS | NS | NS | NS | NS | 5.93 | NS | 0.41 |

*Chandra and Govind (1995)* reported similar results in guava that better quality of fruits observed in fruits of pruned guava plants compared to control.

*Ascorbic acid (mg/100 g) of fruit* : The data related to ascorbic acid of fruit were found to be significant due to the effect of different pruning time and various genotypes and their effect of interaction. Effect of pruning time reported that, the $P_2$ treatment was recorded maximum ascorbic acid of fruit (208.07 and 207.29 mg/100 g) and the minimum (188.68 and 193.00 mg/100 g) was recorded in $P_5$ treatment during season 1 and season 2, respectively. In pooled results similar trend was noticed, i.e. maximum in $P_2$ (207.68 mg/100 g) and minimum was in $P_5$ treatment (190.84 mg/100 g) (Table 3). As regarding effect of genotypes, significantly maximum ascorbic acid of fruit (206.33 and 210.33 mg/100 g) was observed in $G_4$ genotype, which was superior over rest of genotypes and minimum (187.67 and 188.92 mg/100 g) in $G_1$ genotype during both the season. Pooled results are showed same trend, i.e. maximum in $G_4$ genotype (208.33 mg/100 g) and minimum in $G_1$ genotype (188.29 mg/100 g). The results indicated that the maximum ascorbic acid content in fruit increased with pruning as compared to control ones. This might be due to the abundant availability of photosynthesis for limited number of fruits leads to increase in ascorbic acid. As well as prevalence of low temperature increases ascorbic acid in fruit The results are similar findings of *Dubey et al. (2002), Prakash et al. (2012)* and *Mali et al. (2016)* who registered the highest ascorbic acid content in fruits produced by trees subjected to severe pruning, also observed improved ascorbic acid content in fruits of guava after pruning.

*Sugar: acid ratio of fruit* : Significant differences in sugar: acid ratio of fruit was recorded due to effect of pruning time and genotypes. In pooled results, the maximum sugar: acid ratio of fruit (21.71) was noted in $P_2$ treatment and minimum (18.99) in $P_5$ treatment in pooled data. Data in respect to effect of different genotypes revealed that, during both the season, highest sugar: acid ratio of fruit (22.29 and 22.36) was observed in $G_3$ genotype and minimum sugar: acid ratio (16.60 and 16.16) in $G_1$ genotype. In pooled results, significantly maximum sugar: acid ratio of fruit (22.33) was recorded in $G_3$ genotype and minimum (16.38) in $G_1$ genotype. Overall considering the results revealed that, maximum sugar: acid ratio was noticed in pruned plants as compared to control plants of guava. This is might be due to healthy shoot canopy, better sun light distribution in canopy, better sun light utilization and better photosynthetic rate in pruned plants. *Shirsath (2013)* and *Nikumbhe (2014)* reported similar results that maximum sugar: acid ratio was recorded in pruned plants compared to control plants in guava.

*Shelf life of fruit (days)* : The effect of pruning times and genotypes was found to be significant during both the season and pooled results for shelf life of fruit. Effect of pruning time indicated that, the maximum shelf life of fruit (8.46 days) was recorded in $P_1$ treatment, which was at par with $P_2$ treatment (8.36 days) and minimum (7.16 days) in treatment $P_5$ during the season 1 (Table 1). In the season 2, maximum shelf life of fruit (8.42 days) was noted in $P_1$ treatment and lowest (7.11 days) in $P_5$ treatment (Table 2). The pooled results reported that, the maximum shelf life of fruit (8.44 days) was recorded in $P_1$ treatment, which was at par with $P_2$ treatment (8.30 days) and the minimum (7.13 days) in $P_5$ treatment (Table 3). Effect of genotypes revealed that, the maximum shelf life of fruit (9.25 and 9.15 days) was noted in $G_4$ genotype, which was at par with $G_3$ genotype (9.14 and 9.07 days) and $G_6$ genotype (9.13 and 9.06 days), while the minimum (3.53 and 3.61 days) in $G_1$ genotype during both the season, respectively. In pooled results $G_4$ genotype was recorded significantly maximum shelf life of fruit (9.20 days), which was at par with $G_3$ genotype (9.11 days) and $G_6$ genotype (9.09 days) while the minimum (3.57 days) in $G_1$ genotype (Table 3). The results indicated that maximum shelf life of fruit was recorded in the pruning time of 15$^{th}$ May ($P_1$) but later it was decreased from June to September pruning treatments and control. It might be due to slow rate of respiration of fruit due to which slow degradation of fruit taking place in low temperature. *Nikumbhe (2014)* reported that maximum shelf life of fruit was recorded in 15$^{th}$ May compared to other treatments in guava.

*Pulp texture* : Information regarding the pulp texture of genotypes $G_2$, $G_3$, $G_4$, $G_5$, $G_6$ and $G_7$ is having very crisp pulp texture at maturity and at ripe stage also. Genotype $G_1$ has soft pulp texture at mature stage of fruit and mashy pulp texture at ripe stage of fruit. Pulp texture is very important quality parameter of fruits of guava that is related to less or more preference of fruits of guava by consumers in the market (Table 4).

**Table 4. Effect of genotypes on pulp texture**

| Treatment details | | Pulp texture | |
|---|---|---|---|
| | | Mature | Ripe |
| $G_1$ | Sardar | Soft | Mashy |
| $G_2$ | RHR-Guv-58 | Very crisp | Very crisp |
| $G_3$ | RHR-Guv-60 | Very crisp | Very crisp |
| $G_4$ | RHR-Guv-14 | Very crisp | Very crisp |
| $G_5$ | RHR-Guv-16 | Very crisp | Very crisp |
| $G_6$ | RHR-Guv-3 | Very crisp | Very crisp |
| $G_7$ | RHR-Guv-6 | Very crisp | Very crisp |

The results of present research it can be concluded that, the genotype RHR-Guv-60 is better in quality parameters like lustrous fruit, crispy pulp texture, maximum total sugars, reducing sugars and sugar acid ratio with minimum acidity thus it can be evaluated for cultivation as *mrig bhar* crop.

*Acknowledgements* : The authors are thankful to Department of Science & Technology, Ministry of Science & Technology, Govt. of India and Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra (India) for fellowship, technical assistance, field availability and accommodation of the research in the university schedule.

## CONFLICTS OF INTEREST

The authors can confirm that there are no potential conflicts of interest.

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