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Genetic variability and characterization of wood apple (*Feronia limonia* L.) grown population for identification of superior genotypes for Maharashtra state

Ujwal A Raut, PK Nagre and SG Bharad

Abstract

The present investigation entitled Genetic variability and characterization of Wood apple grown population for identification of superior genotypes for Maharashtra state was carried out for identify yield and quality parameters. The research work conducted at Department of Fruit Science, Dr. Panjabrao Deshmukh Krushi Vidhyapeeth, Akola. Total 145 genotypes were screen initially for study genetic variability further of which 25 promising genotypes selected and were analyzed for desirable character, of which nine most promising types consider for identify superior genotypes and evaluation was done from 2015-2022. The experiment was laid out in RBD design with four replication and data recorded for different parameters like morphological character, yield and biochemical character. In respect of morphological character flowering and duration of flowering of available germplasm varied from first week of February to first week of March. The study it is reveal that out of 9 promising genotypes variability recorded for different parameters i.e. fruit volume range between 450.33 to 264.12 CC. The fruit length recorded 14.86 to 11.30 cm, fruit width 15.62 to 10.45 cm. fruit weight 489.99 to 253.14 g. and number of fruit per trees range between 347.44 to 251.28, while yield recorded 170.80 to 66.47 Kg/Tree. The pulp weight recorded 297.34 to 154.82 g., seed weight 12.72 to 7.45 g., shell weight recorded range between 132.20 to 103.54 g. and thickness of fruit observed range between 3.32 to 2.26 cm. The quality attribute in respect biochemical parameters also showed wide range of variation i.e. TSS 14.49 to 12.68⁰Brix pulp percentage range between 66.27 to 55.16% acidity was ranged between 3.30 to 2.17%, total sugar was ranged between 2.19 to 1.95%, reducing sugars was ranged between 1.24 to 1.17%, non-reducing sugars 0.86 to 0.71% and pectin content was ranged between 1.76 to 1.12%. Therefore in all studied parameters genotypes AKWa1 were screened as a promising genotypes and this promising genotype recommended for commercial cultivation through vegetative propagation.

Keywords: Wood apple, *Feronia limonia* L., superior genotypes

Introduction

Wood apple (*Feronia limonia* L.) belongs to the family Rutaceae Swingle. Wood apple, a monotypic species, belongs to the sub-family Aurantiodeae; tribe-Citreae; sub-tribe-Balsamocitrineae, which comes under hard shelled citroid fruit tree group. The generic name of wood apple was assigned as *Limonia* but Swingle placed it to *Feronia*. Initially the scientific name was *Limonia acidissima* L., but it was ultimately changed to *Feronia limonia* (L.) Swingle. (Reuther *et al.*, 1967) [17]. (Gupta 1996) [4].

It is also popularly known as Kavath, Elephant apple, Monkey fruit, Curd fruit and Katha Bael in india. Wood apple is reported to be native of India and Sri Lanka generally cultivated in both peninsulas. It is one of the very hardy trees found all over the plains of northern, central, eastern and southern regions of India especially in the semi arid and arid regions. More common in southern Maharashtra and Madhya Pradesh also occur in the western Himalaya up to an elevation of about 500 meters. It requires a monsoon climate with a distinct dry season for initial growth (Lande *et al.*, 2010) [7]. Wood apple is highly heterozygous, cross pollinated fruit crop. It is continuously propagated by seeds. Due to predominant cross pollination and seed propagation wide variation exists among the genotypes with respect to tree size, shape, flowering time, fruit length, fruit diameter and quality characters such as TSS, acidity etc. Hence, it is necessary to select the genotypes having the desirable characters among the various genotypes. Present investigation was carried out to find out genetic variability on the basis of yield and yield attributes of different genotypes will helpful to conserve valuable germplasm and could be protected from being eroded, and its utilization in further wood apple

improvement programme. The wood apple genotypes are seedling originated and age of genotypes is sixteen-year-old. Out of 145 genotypes we select 25 genotypes for further investigation therefore selection of genotypes is fruit bearing trees used for investigation.

Due to cross pollination and predomination of seed propagation over a long period of time, it gives immense opportunity to locate elite trees having important horticultural traits. In spite of the fact that Wood apple can withstand adverse climatic conditions and can be grown in various types of soil.

Germplasm utilization of under cultivation is less and adopting vegetative methods of propagation for selected high yielding genotypes have been the major constraints for popularizing these nutritious sub-tropical fruits among the farmers (Arora and Rao., 1995) [2]. There are no advance cultivars available or selected in this important minor fruit species due to the lack of knowledge and evaluation studies of wood apple. Genetic variability of such a fruit species is under threat due to the large-scale urbanization, developmental activities and need to conserve the genetic variability of this minor nutritious crop by different *ex situ* and *in situ* approaches. Diverse characters of genotypes would assist in selection of better genotypes in crop improvement programme. Evaluation of genotypes can help in identifying a better source for diverse characters, (Lamani-2022, Yadav-2018 [26], Tamang-2020 and Singh-2026) [6, 24]. Thus, the genotype which show variability in morphological characteristics could be used directly in further improvement programme. The study of heritability and genetic advance would assist them in determining scope of further selection process. Genetic improvement in any crop depends upon variability present in that crop and there after these process helps in breeding and crop improvement programme. Study for effective selection of genotypes for a character i.e. improvement in yield and yield contributing character is basic plan for in crop improvement among wood apple genotypes.

Material and Methods

The present investigation entitled "Genetic variability and characterization of wood apple grown population for identification of superior genotypes for Maharashtra state" was carried at Department of Fruit Science, Dr. Panjabrao Deshmukh Agricultural University, Akola out of 145 genotypes of wood apple after evaluation and screening nine superior promising genotypes selected for record the morphological character, yield and quality parameters. The experiment was conducted in Randomized Block Design (RBD) with four replication. Initially the data for the study has been generated and pedigree of the genotypes were maintain. The general information age of the plant height, girth, behavior of the plant was maintain by documentation. The coding of the genotypes were recorded by giving code AKWa1 to AKWa145. The statistical analysis has been carried out initially for 145 genotypes and screening will be done and 9 promising genotypes were analyzed by statistical method suggested by (Panse and Sukhatme -1985) [12] and result were evaluated at 5% level of significance.

Result and Discussion

The data pertaining to morphological quantitative and qualitative attributes of wood apple exhibited a significant variation with respect to various parameters. Morphological

characters *viz.*, stem girth, tree height, growth habit, bark colour, primary branches, secondary branches and date of flower initiation recorded and exhibited significant variation. The studied genotype observed Semi dwarf to medium growing habit, Inflorescence –terminal umbellate cyme flower are Staminate or perfect. The Arrangement of flower is found Pentamerous. The number of flower panicles per branch.4-6 and number of flower per panicles.13-25. Tree growth habit, bark colour also recorded (Table-1). Studied genotypes tree growth habit were exhibited and four genotypes had tall growth habit, two genotypes were noted dwarf while two genotypes semi dwarf growth habit were observed with spreading habit. This may be due to some amount of genetic variability among the population. This was in concurrence with the earlier findings of Sappandi, (2005) [18] in wood apple; Abhilash *et al.*, (2018) [1] in Kagzi lime and Pavani *et al.*, (2017) [13]. Among 25 genotypes documented, 10 genotypes have blackish with crevices bark colour while 4 genotypes shows blackish, less crevices and while 6 genotypes shows blackish crevices whereas three genotypes have dark brown coloured bark. It may be due to the influence of environmental conditions and genetic influence. Similar findings were also registered by Kareedy (2003) [5] & in Charoli, Sappandi (2005) [18] in wood apple. The genotype AKWa1, AKWa2, AKWa4, AKWa5, AKWa6, AKWa7, AKWa9, AKWa11, AKWa13, flowering in first week of February while AKWa14 to AKWa26 shows first week of March. The genotypes AKWa1 shows initiation of bloom in the month of February. Ghosh *et al.*, (2011) [3] and Singh *et al.*, (2016) [21, 22, 23], Pradeepkumar (2022) [27] and Rajnagam and Sankar (2022) [15].

Yield attributing Characters

The data pertaining to yield attributing character the mean range value was recorded for seven year yield data shown in (Table – 2) for different character and the range of maximum and minimum values shows significant variability among the genotypes. Fruit volume range between 450.33 to 264.12 CC. The fruit length recorded 14.86 to 11.30 cm, the fruit width 15.62 to 10.45cm., fruit weight 489.99 to 253.14 g. and number of fruit per trees range between 347.44 to 251.28 while yield recorded 170.80 to 66.47 Kg/Tree. The pulp weight recorded 297.34 to 154.82 g., seed weight 12.72 to 7.45 g., shell weight 132.20 to 103.54 g. and thickness of fruit observed range between 3.32 to 2.26 cm.

The performance of selected elite genotypes of wood apple in respect fruit yield and quality parameters and recorded (Table-2) the genotype AKWa1 exhibit 450.00 CC volume of fruit and exhibit fruit weight 498.98 g. pulp weight 297.33 g, shell weight 127.33 g., seed weight 8.14g, fruit length 13.5 cm., width of fruit 14.86 cm. and number of fruits 347.44 per tree followed by AKWa2.

The difference of the fruits volume, size and weight may be due to different genetically character, photosynthetic activity and soil productivity or environmental factor. The similar fruits length variability in wood apple were reported by Shyamala Devi *et al.* (2018) [29], Sharma *et al.* (2014) [19-20] I" Vijayakumar *et al.* (2013) [25], Namdev (2010) [8] W. Variations in fruits' weight observed in the present studies may be attributed due to genetic factor or micro climate of germplasm collected area or soil fertility variability Findings were supported by the results of Khan *et al.* (2019) [28] from 110-225 g, Shyamala devi *et al.* (2018) [29] from 241.60 g,

Pandey *et al.* (2013) ^[30] from 140-256 g. The fruit weight is desirable character in wood apple in the term of potential yield. Pulp weight range from 297.34 to 154.82 g. and AKWa1 exhibit 279.34 g. pulp weight followed by AKWa2 218.88 g. The similar trend were recorded in the term of number of fruit 347.44 shell weight exhibit maximum in AKWa2 132.20 while shell thickness 3.32 in AKWa14.

Bio-chemical characters

Variability in chemical attributes was found among different elite selected wood apple genotypes. The quality attribute biochemical also showed wide range of variation i.e. TSS 14.49 to 12.68°Brix pulp percentage range between 66.27 to 55.16% acidity was ranged between 3.30 to 2.17%, total sugar was ranged between 2.19 to 1.95%, reducing sugars was ranged between 1.24 to 1.17%, non-reducing sugars 0.86 to 0.71% and pectin content was ranged between 1.76 to 1.12%. The highest seed weight (12.72 g) was recorded by the genotype AKWa19 followed by AKWa24 (12.12 g) whereas minimum seed weight (6.00 g) was recorded in the genotype AKWa17. Singh *et al.* (2016) ^[21, 22, 23] observed that the seed weight of wood apple ranged between 2.36 to 7.93 g. Similar variations in seed weight of wood apple were reported by Shyamala devi *et al.* (2018) ^[29], Yadav *et al.* (2018) ^[26] 2.4-7.9 g, Singh *et al.* (2016) ^[21, 22, 23] from 2.36-7.93 g, Pandey *et al.* (2013) ^[30] from 7.83-15.66 g and Ghosh *et al.* (2012) ^[32]. In general, The highest number of fruit recorded in AKWa1 341.44. Similarly, the highest yield per tree 170.80 kg and minimum yield per tree was observed to the tune of 66.47 kg/tree in AKWa19

However, among the genotypes of wood apple, maximum (14.49° Brix) total soluble solid was noticed in genotype AKWa2 followed by genotype AKWa1 (14.45° Brix). In contrast, minimum total soluble solid (12.85° Brix) was noticed by the genotype AKWa26, which is on par with the genotype AKWa19 (12.58° Brix). Similar trend of total soluble solid was reported by Yadav *et al.* (2018) ^[26], Singh *et al.* (2016) ^[21, 22, 23], Sharma *et al.* (2014) ^[19-20] and Ghosh *et al.* (2016) ^[33] in wood apple and Pandey *et al.* (2006) ^[31] in bael fruits.

It is evident from the observation that highest reducing sugars were found in genotype AKWa19 (1.26%) followed by AKWa1, AKWa2 & AKWa14 (1.23, 1.24 & 1.23%) respectively, whereas minimum reducing sugars was recorded in the genotype AKWa24 & AKWa17 (1.17%). The non-reducing sugar varied between 0.81% to 0.71%. The maximum non-reducing sugar was recorded in genotype AKWa19 (0.86%) While, minimum non-reducing sugar was observed in genotype AKWa1 (0.72%). The maximum total sugar content (2.19%) was recorded in genotype AKWa18 followed by AKWa19 (2.14%), whereas minimum (1.90%) total sugars have been found in AKWa2. Similar variations of sugars of wood apple were reported by Singh *et al.*, (2016) ^[21, 22, 23] & Pandey *et al.* (2013) ^[30] Yadav *et al.* (2018) ^[26]. Ram and Singh (2003) ^[16] and Pandey *et al.* (2006) ^[31] in bael.

The value of pectin content ranged between 1.76% to 1.12% being the highest in genotype AKWa1 (1.76%) and followed by AKWa2 (1.62%) which was minimum in the genotype the lowest value of it was observed in AKWa18 (1.12%).

There were showed significant variations among the wood apple genotypes with respect to different biochemical parameters (Table -6). Total soluble solids content of the fruit pulp found in the present experiment was in conformity with

the findings of Singh *et al.* (2016) ^[21, 22, 23] in which they reported that TSS value of wood apple ranged between 11.07-19.36°Brix. Titratable acidity was found in similar with that found by Sharma *et al.* (2014) ^[19-20] where they found that ripe fruits were less acidic (1.74%) than both unripe(2.92%) and half-ripe fruits (2.40%), respectively (Table-4) revealed that the estimated standard deviation and standard error of mean over the season and among over the genotypes in respect of standard deviation calculated in different characters of AKWa-1 and high standard of deviation noted in AKWa-1 genotype for fruit length 0.91, weight of fruit 38.27, number of fruits 38.86, Pulp weight 3.97 and pulp percent 0.97. The standard error of mean measures and compared with the population mean and SEM for fruit length 0.34, weight of fruit 14.50, number of fruits 14.72, Pulp weight 1.50 and pulp percent 0.36. The pectin content recorded in proposed genotype AKWa-1 1.76 and 1.62 in AKWa-2. Considering the yield potential of genotype AKWa -1 was found significant over other nine genotypes. In present investigation the studied wood apple genotype among all studied parameters in respect of fruit yield, fruit qualitative characters and biochemical characters it is recommended the genotype AKWa-1 for better yield with maximum fruit size, regular bearer recommended for cultivation under Maharashtra state.

Result

The studied genotypes of woodapple it revealed that, the significant variation observed in all available germplasm of woodapple all genotypes exhibited tall growth habit except two ie AKWa-4 and AKWa-13 while AKWa-1 and AKWa-2 observed semi dwarf growth habit. The lowering recorded maximum in 1ST week of February the genotype AKWa-1 and AKWa-2 revealed the better performance in respect of all parameters of fruit, yield character.

Overall performance of different genotypes wood apple

In all 64 genotypes during study were evaluated and observation were recorded out of that 22 were selected for record the yield observation. again during study the only 9 promising good performing genotypes were considered for presentation. Among all 22 genotypes AKWa-1 bears fruit every year with other genotypes except AKWa-3. The selected nine promising genotypes data consider for statically analysis The nine genotypes analyzed statically and presented in Table 1 to 17. The all studied character the mean performance was maximum in genotypes AKWa -1 for volume of fruit, fruit weight, pulp weight, shell weight, shell thickness, seed weight, fruit length, number of fruit /tree and the biochemical characters pulp %, Total Soluble Solids (° Brix), Acidity (%), Total Sugar %, Reducing Sugars (%), Non Reducing Sugars (%) and Pectin Content (%) recorded. In respect of volume of fruit AKWa-1 and AKWa -2 observed 450.33 and 371.71cc respectively and minimum volume recorded in AKWa -19 (251.00) The fruit weight (g)489. 98 g followed by AKWa -14ie 334.55g g. the pulp weight recorded maximum in same genotypes which is observed 279.33 and 218.33 g in AKWa -1 and AKWa -2 respectively. the minimum pulp weight observed in genotype AKWa -19 ie 147.00 g. The data pertaining to shell weight g the AKWa-2 revealed maximum weight132.19.26g while AKWa -1 exhibited 127.33. The data pertaining to seed weight AKWa -1 8.14 g followed by AKWa-2 8.06 g less seed weight observed in AKWa-18 i.e. 7.14g. Fruit length and width of

fruit (cm) observed in AKWa-2 13.66 and 13.05 cm which is followed by AKWa-1 13.50 and width 15.03 and 14.86 cm respectively. Thickness of skull maximum in AKWa-14 3.40 mm followed by 3.16 mm in AKWa-1 genotypes, However the fruit yield in respect of number of fruit the significant result observed among all studied genotypes and revealed 347.00 number of fruit per tree followed by 286.66 in AKWa-2. The biochemical characters also recorded for studied genotypes of woodapple pulp% AKWa-1 observed 66.27% and followed by AKWa-1 66.24. (Table 18) TSS (°Brix) and

acidity% recorded 14.45 and 3.30% in proposed genotype The pectin content exhibit higher in AKWa-1 1.76% and it is recorded 1.64% in proposed genotypes AKWa-2. The Total sugar recorded the genotype i.e. Akwa-1 and AKWa-2 2.08 and 1.90. Reducing sugar and no reducing sugar 5 recorded 1.23 and 0.72 in proposed genotype. The proposed genotype of woodapple compare with release variety Ellora and Thar prabha for Fruit Yield, Fruit weight, Pulp percentage, Number of fruits / Tree Bearing habit and recorded better and significant response as compare to both varieties.

Table 1: Morphological Feature of Wood apple Genotype

Genotype	Stem Girth (cm)	Tree Height (m)	Growth Habit	Bark Colour	Primary Branches	Secondary Branches	Date of Flower Initiation
Plot No. 11							
AKWa-1	157 cm	11.3 & 6.8	SDG	Blackish, With Crevices	4	20	1 st week of Feb
AKWa-2	129 cm	10.7 & 7.0	SDG I	Blackish, With Crevices	2	11	
AKWa-4	91 cm	6.5	Dwarf	Blackish, With Crevices	2	8	
AKWa-5	141 cm	9.6	Tall	Blackish, More Crevices	3	27	
AKWa-6	96 cm	9.0	Tall	Blackish, Less Crevices	3	11	
AKWa-7	118 cm	10.3	Tall	Blackish, With Crevices	3	10	
AKWa-9	133 cm	8.6	Tall	Blackish, With Crevices	5	16	
AKWa-11	100 cm	7.6	Tall	Blackish, More Crevices	4	11	
AKWa-13	107 cm	8.0	Dwarf	Blackish, Less Crevices	2	11	
Plot No. 49							
AKWa-14	160 cm	11.6	Tall	Blackish, More Crevices	5	23	1 st week of Feb 1 st week of March 1 st week of Feb
AKWa-15	157 cm	11.7	Tall	Less Black, More Crevices	3	27	
AKWa-16	144 cm	10.8	Tall	Blackish, With Crevices	4	16	
AKWa-17	129 cm	9.8	Tall	Blackish, With Crevices	3	15	
AKWa-18	263 cm	11.0	Tall	Blackish, Less Crevices	3	13	
AKWa-19	90 cm	7.5	Tall	Blackish, With Crevices	2	10	
AKWa-20	86 cm	8.1	Tall	Blackish, With Crevices	2	13	
AKWa-21	109 cm	8.3	Tall	Blackish, With Crevices	2	12	
AKWa-22	203 cm	10.2	Tall	Blackish, More Crevices	2	13	
AKWa-23	80 cm	7.7	Tall	Blackish, Less Crevices	3	13	
AKWa-24	158 cm	11.8	Tall	Blackish, Less Crevices	2	13	
AKWa-25	143 cm	10.4	Tall	Blackish, More Crevices	4	20	
AKWa-26	106 cm	10.9	Tall	Blackish, Less Crevices	3	14	

Main characters of proposed Woodapple AKWa -1 genotypes

Sr. No.	Characters	AkWa-1
1.	Initiation of bloom	February
2.	Full bloom	March
3.	Colour of Flower	Greenish-Yellow
4.	Avg Number of fruit per tree	347
5.	Fruit weight (g)	489.27
6.	Pulp (%)	66.27%
7.	Pectin content (%)	1.76
8.	Fruit shape	Round
9.	Fruit colour	Greenish white
10.	Fruit maturity	October
11.	TSS (°Brix)	14.45
12.	Acidity	3.30%
13.	Seed Weight (g)	8.14
14.	Shell weight(g)	127.33

Table 2: Performance of elite woodapple genotypes in respect of Fruit, yield and quality parameters.

Genotype	Fruit length (cm) Mean±	Fruit width (cm) Mean±	Fruit wt (g) Mean±	Number of Fruit/Tree Mean±	Pulp weight (g) Mean±	Seed wt (g) Mean±	Shell wt (g) Mean±	Skull Thickness of Fruit (mm) Mean±
AK Wa-1	14.86±0.34	15.62±0.59	489.99±14.50	347.44±14.72	279.34±1.50	8.14±0.24	127.92±0.39	3.18±0.10
AK Wa-2	15.03±0.40	14.60±0.37	322.17±0.77	287.53±0.58	218.88±0.38	8.06±0.31	132.20±0.66	3.13±0.15
AK Wa-14	13.06±0.18	12.63±0.26	334.55±5.29	251.28±0.68	214.36±2.48	8.74±0.20	125.68±0.45	3.32±0.14
AK Wa-17	12.01±0.21	11.50±0.25	263.81±0.48	259.19±0.61	154.82±0.77	6.00±0.29	108.73±0.34	2.60±0.10
AK Wa-18	11.69±0.38	10.45±0.49	272.84±1.62	253.05±0.46	161.22±0.51	7.13±0.39	117.66±0.49	2.49±0.14
AK Wa-19	10.76±0.38	10.91±0.44	253.14±0.70	262.57±0.44	146.66±1.19	12.72±0.47	108.68±0.51	2.26±0.08
AK Wa-24	11.82±0.23	11.56±0.36	281.79±0.58	264.42±0.42	176.77±1.21	12.12±0.41	103.54±0.54	2.41±0.11
AK Wa-25	11.30±0.33	9.98±0.52	262.25±0.69	273.31±0.87	156.60±1.16	7.45±0.37	105.16±0.70	2.72±0.09
AK Wa-26	13.33±0.46	12.56±0.34	326.04±1.13	273.18±0.90	208.49±0.72	8.580.22	120.90±0.77	2.92±0.14

Table 3: Performance of elite woodapple genotypes in respect of Fruit, biochemical parameters.

Genotype	Volume (cc) Mean±	TSS (°Brix) Mean±	Pulp% Mean±	Acidity% Mean±	Total Sugar (%) Mean±	Reducing sugar (%) Mean±	Non reducing sugar (%) Mean±	Pectin (%) Mean±
AK Wa-1	450.42±2.36	14.45±0.38	66.27±0.36	3.30±0.01	2.08±0.01	1.23±0.01	0.71±0.006	1.76±0.01
AK Wa-2	371.71±0.57	14.49±0.32	66.24±0.23	3.48±0.04	1.90±0.02	1.24±0.01	0.81±0.003	1.61±0.01
AK Wa-14	335.42±0.57	14.20±0.33	58.71±0.34	3.12±0.01	2.07±0.01	1.23±0.01	0.81±0.004	1.56±0.01
AK Wa-17	264.42±0.61	12.68±0.27	55.16±0.19	2.48±0.14	2.06±0.01	1.17±0.01	0.83±0.006	1.20±0.01
AK Wa-18	270.57±0.42	14.28±0.42	56.06±0.26	3.22±0.01	2.19±0.11	1.25±0.01	0.76±0.005	1.12±0.01
AK Wa-19	251.00±0.53	12.58±0.13	62.09±0.21	3.17±0.17	2.14±0.01	1.26±0.01	0.86±0.005	1.24±0.01
AK Wa-24	276.00±0.48	13.80±0.19	60.19±0.26	2.89±0.01	1.95±0.01	1.17±0.01	0.78±0.008	1.26±0.01
AK Wa-25	280.42±0.75	13.70±0.32	57.27±0.26	3.18±0.04	1.96±0.01	1.18±0.00	0.77±0.007	1.51±0.01

Table 4: Estimated Standard deviation and Standard Error of Mean for different characters in AKWa-1.

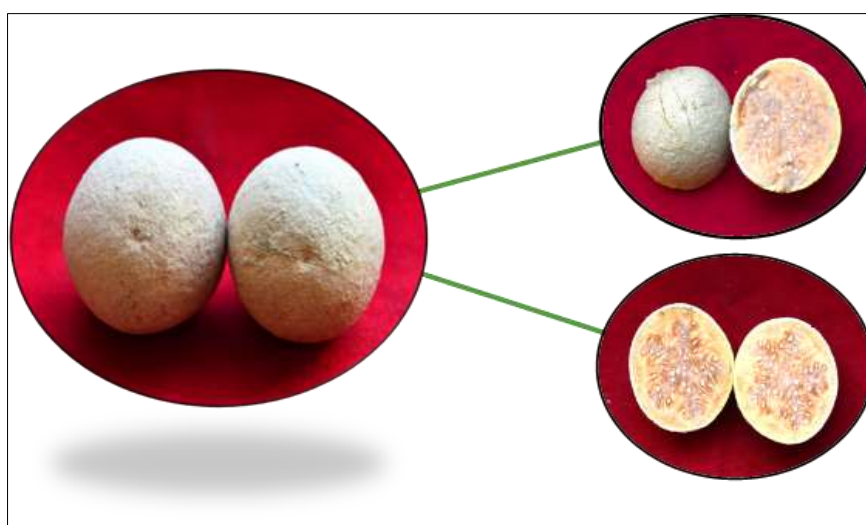
Sr. no.	Particular	Mean	Standard Deviation	SEM
1	Fruit length (cm)	14.86	±0.91	±0.34
2	Width of fruit (cm)	15.62	±1.57	±0.59
3	Fruit wt (g)	489.99	±38.27	±14.50
4	Number of fruits per tree	347.44	±38.88	±14.72
5	Pulp wt (g)	279.34	±3.97	±1.50
6	Seed wt (g)	8.14	±0.64	±0.24
7	Shell wt (g)	127.92	±1.02	±0.39
8	Shell thickness	3.18	±0.28	±0.10
9	Volume (cc)	450.42	±6.27	±2.36
10	TSS °Brix	14.45	±1.01	±0.38
11	Pulp%	66.27	±0.97	±0.36
12	Acidity	3.30	±0.03	±0.01
13	Total suagr	2.08	±0.04	±0.01
14	Reducing sugar	1.23	±0.03	±0.01
15	Non reducing sugar	0.71	±0.02	±0.006
16	Pectin%	1.76	±0.03	±0.01

Table 5: Performance of selected elite genotypes of woodapple in respect fruit Yield and quality parameters (promising types 7 years pooled)

Genotype	Volume (cc)	Fruit wt (g)	Pulp wt (g)	Shell wt (g)	Seed wt(g)	Fruit length (cm)	Width of fruit (cm)	Thickness of shell (mm)	No of fruit /tree	Mean
AKWa-1	450.33	489.986	279.33	127.33	8.14	13.5	14.86	3.16	347.44	170.80±27.78
AKWa-2	371.71	322.173	218.33	132.19	8.06	13.66	15.03	2.66	287.53	92.64±0.79
AKWa-14	336.66	334.554	214.33	125.68	8.74	13.8	13.05	3.40	251.28	84.08±3.74
AKWa-17	263.33	263.807	154.66	109.72	6.00	12.066	12.096	2.50	259.33	68.38±0.69
AKWa-18	270.57	272.84	161.22	117.66	7.13	11.3	11.69	2.66	253.33	69.04±1.22
AKWa-19	251.00	253.14	147.00	108.66	12.72	11	10.753	2.56	262.00	66.47±0.42
AKWa-24	276.66	281.793	177.33	103.66	12.12	12.03	11.81	2.80	264.00	74.51±0.35
AKWa-25	280.42	262.251	156.60	105.16	7.45	11.56	11.33	2.63	273.66	71.68±0.83
AKWa-26	326.85	326.044	208.49	120.66	8.58	13.2	13.33	2.65	273.66	89.07±0.82
'F' test	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE (m)±	0.873	5.082	1.134	0.520	0.45	0.283	0.358	0.113	4.876	3.513
CD at 5%	2.48	14.495	3.234	1.482	0.92	0.808	1.022	0.323	13.90	10.021

Table 6: Performance of different woodapple genotypes for Physico-chemical quality of fruits (Promising types 7 years pooled).

Genotype	Pulp (%)	Total Soluble Solids (0Brix)	Acidity (%)	Total Sugar%	Reducing Sugars (%)	Non Reducing Sugars (%)	Pectin Content (%)
AKWa-1	66.27	14.45	3.30	2.08	1.23	0.72	1.76
AKWa-2	66.24	14.49	3.48	1.90	1.24	0.81	1.62
AKWa-14	58.71	14.20	3.12	2.07	1.23	0.81	1.56
AKWa-17	55.16	12.68	2.48	2.06	1.17	0.83	1.20
AKWa-18	56.06	14.28	3.22	2.19	1.25	0.76	1.12
AKWa-19	62.09	12.58	3.17	2.14	1.26	0.86	1.24
AKWa-24	60.19	13.80	2.89	1.95	1.17	0.78	1.26
AKWa-25	57.27	13.70	3.18	1.96	1.18	0.77	1.51
AKWa-26	63.06	12.85	3.07	2.03	1.28	0.75	1.45
'F' test	Sig	Sig	Sig	Sig	Sig	Sig	Sig
SE (m)±	0.27	0.31	0.09	0.04	0.01	0.01	0.01
CD at 5%	0.76	0.88	0.28	0.11	0.02	0.02	0.03



Transverse Section -AKWa-1

Conclusion

The studied genotypes flowering recorded in 1st week of February to last week of March. The genotype AKWa-1 and AKWa-2 revealed the better performance in respect of all parameters of fruit and yield contributing character. The genotype AKWa-1 shows maximum volume of fruit i.e. 450.33 cc and number. The fruit weight recorded significantly superior in genotypes AKWa-1, which was recorded 489.98 gm followed by AKWa-14 (334.55 gm). The Pulp Wt. (gm) recorded 279.34 followed by 218.33. The average Pulp% also recorded max. in both the genotype 66.27% and 66.24%. In present investigation the studied wood apple genotype among all studied parameters in respect of fruit character and biochemical character it is recommended for the genotype AKWa-1 for better yield, bigger fruit size, regular bearer maximum pulp contain recommended for cultivation of hot

and dry climate under Maharashtra state.

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