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Evaluation of Local Chironji (*Buchananialanzan* Spreng.) Genotypes from Dhadgoan Tehsil in Satpuda Hill

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Abstract

Considering morphological, quantitative and qualitative characters, DCP-17 recorded higher values in all respect. From overall performance in respect of higher fruit weight, seed weight, kernel weight, kernel recovery, titrable acidity and TSS:acidity ratio four chironji genotypes *viz.,* DCP-5, DCP-15, DCP-17 and DCP-22 were identified as promising genotypes. However, among these 25 chironji genotypes, DCP-5, DCP-15, DCP-17 and DCP-22 were found most promising as they having distinct qualitative and quantitative characters for kernel yield.

Key words : *Evaluation, local chironji, genotypes, growth habit, reproductive attributes.*

Introduction

Chironji or Charoli, (*Buchananialanzan* Spreng.) is a potential dry fruit for dry lands. It is excellent tree of agro-forestry and social forestry. In the waste land development and dryland horticulture, it assumes great significance due to its multifarious uses and capacity to withstand adverse climatic conditions. The flesh of ripe fruit is very palatable and the oily kernels are rich source of fat, protein and minerals (1). The plant prefers dry sub-humid climate. It is a good species for growing over bare hill slopes. The species can be seen scattered in the farmer's field under the traditional agro forestry system in some places of Satpuda hill in combination along mango and Mahua fruit crops.

Due to negligence, poor attention and heavy biotic pressure, several tree species in different parts of India are depleting very fast and leading towards extinction. *Buchanaia lanzan* (Chironji) is one of them, which is depleting with a very fast rate and presently categorized under the threatened species. In the absence of conservation measures, it may extinct in the near future. Therefore, conservation and sustainable use of this type of species is an important necessity for ecologically sustainable development, food security and development of socio-economically poor communities of the nation. The local chironji genotypes from Dhadgoan tehsil in Satpuda hill may shows variability in various morphological, physical and fruit characters due to heterozygosity and seed propagation. Such variability in any crop may be a treasure for fruit breeder to improve genetic stock and this situation offers a great deal of scope for improvement of chironji by seedling selection. However, there are no systematic studies of variability and commercially no any established standard cultivar is released. Hence, in order to study the variability and to select better types for yield characters the present investigation entitled "Evaluation of local Chironji (*Buchananialanzan* Spreng) genotypes from Dhadgoan tehsil in Satpuda hill" was conducted.

Materials and Methods

The present research programme "Evaluation of local chironji (*Buchananialanzan* Spreng.) genotypes from Dhadgoan tehsil in Satpuda hill" was undertaken during January-May-2020. Different twenty-five fully grown healthy and vigorous chironji plants aged between 15 to 20 years were selected from 40-50 km radius of different villages and forest areas of Dhadgaon Tahsil in Satpuda hill for investigation. The geographic location of each genotype was noted down along with detail information and names of the farm holders for further investigation. These were assigned the accession numbers as Dhadgoan Chironji Plant-1 to 25 with acronym DCP-1 to DCP- 25 serially.Data recorded and collected on different reproductive biology, morphological and physical characteristics of chironji after rigorous several personal visits to the respective locations.

The different morphological and qualitative growth characters were observed visually as illustrated by (2) following NBPGR description and DUS characterization of chironji. Reproductive observations wererecorded during flowering season; Jan- May-2020. TSS and acidity were estimated by method suggested by (3).

Results and Discussion

All the 25 genotypes were studied for morphological, physical and qualitative characteristics of chironji genotypes.

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Table-1 : Morphological characteristics of selected chironji genotypes.

Genotype No.	Growth habit	Compactness of branching	Flowering time	Time of fruit setting	Ripening Time
DCP-1	Up right	Sparse	3rd week of February	2nd week of March	2nd week of may
DCP-2	Spreading	Dense	2nd week of February	1st week of March	1st week of may
DCP-3	Spreading	Sparse	2nd week of February	1st week of March	2nd week of may
DCP-4	Up right	Dense	3rd week of February	1st week of March	1st week of may
DCP-5	Spreading	Dense	2nd week of February	1st week of March	1st week of may
DCP-6	Up right	Sparse	3rd week of February	1st week of March	1st week of may
DCP-7	Semi-Spreading	Sparse	3rd week of February	1st week of March	1st week of may
DCP-8	Semi-Spreading	Sparse	4th week of February	2nd week of March	2nd week of may
DCP-9	Up right	Sparse	2nd week of February	1st week of March	1st week of may
DCP-10	Semi-Spreading	Sparse	2nd week of February	1st week of March	1st week of may
DCP-11	Semi-Spreading	Sparse	3rd week of February	2nd week of March	2nd week of may
DCP-12	Spreading	Sparse	4th week of February	2nd week of March	2nd week of may
DCP-13	Up right	Sparse	2nd week of February	2nd week of March	1st week of may
DCP-14	Semi-Spreading	Sparse	3rd week of February	2nd week of March	2nd week of may
DCP-15	Spreading	Sparse	2nd week of February	4th week of February	4th week of April
DCP-16	Spreading	Dense	3rd week of February	2nd week of March	2nd week of May
DCP-17	Spreading	Dense	2nd week of February	1st week of March	1st week of May
DCP-18	Up right	Sparse	4th week of February	1st week of March	2nd week of May
DCP-19	Up right	Sparse	2nd week of February	1st week of March	1st week of May
DCP-20	Spreading	Sparse	2nd week of February	1st week of March	2nd week of May
DCP-21	Up right	Sparse	3rd week of February	1st week of March	2nd week of May
DCP-22	Spreading	Sparse	2nd week of February	4th week of February	1st week of May
DCP-23	Semi-Spreading	Dense	4th week of February	1st week of March	1st week of May
DCP-24	Spreading	Sparse	3rd week of February	2nd week of March	2nd week of May

Morphological traits : The data on the growth habit and compactness of branching of different chironji genotypes depicted in Table-1 showed wide variation in their morphological characters.

Growth habit : The chironji genotypes DCP-1, DCP-3, DCP-6, DCP-9, DCP-13, DCP-18, DCP-19, DCP-21 and DCP-25 exhibited up right growth habit. The genotypes DCP-2, DCP-4, DCP-5, DCP-12, DCP-15, DCP-16, DCP-17, DCP-20, DCP-22 and DCP-24 possessed semi spreading growth habit whereas genotypes DCP-7, DCP-8, DCP-10, DCP-11, DCP-14 and DCP-23 had spreading growth habit. The difference in growth habit among the genotypes may be due to inherent characters of individual genotypes and their acclimatization to varied agro-climatic conditions. Similar findings were obtained by (4) while studying genetic diversity of chironji plant under semi-arid ecosystem of western India.

Compactness of branching : Sparse and dense compactness of branching was noted among the different chironji genotypes. Majority of the genotypes exhibited sparse branching pattern whereas chironji genotypes *viz.,* DCP-1, DCP-2, DCP-4, DCP-5, DCP-16, DCP-17, DCP-23 and DCP-25 showed dense compactness of branching pattern.Similar findings were reported by (4) while studying genetic diversity of chironji plant under semi-arid ecosystem of western India. The difference in vegetative growth among the varieties may be due to inherent characters of individual genotypes and their acclimatization to varied agro-climatic conditions

Reproductive attributes

Flowering time : The data on the reproductive attributes *viz.,*flowering pattern,fruit set and fruit ripening time of different local chironji genotypes presented in Table-1 which reflected considerable differences. The earliest peak period of flowering (2nd week of February) was observed in local chironji genotypes *viz.,* DCP-2, DCP-3, DCP-5, DCP-9, DCP-10, DCP-13, DCP-15, DCP-17, DCP-19, DCP-20 and DCP-22, while it was noticed as late as 4th week of February in local chironji genotypes DCP-8, DCP-12, DCP-18, DCP-23 and DCP-25.

Time of fruit set : Fruit set started by the 3rd week of February and it was completed by 4th week of March in different genotypes. The earliest peak period of flowering (4th week of February) was observed in local chironji

Table-2 : Physic-Chemical characteristics of selected chironji genotypes.

Genotype no.	Average fruit weight (g)	Seed weight (g)	Pulp weight (g)	Kernel Recovery (%)	Kernel weight (g)	TSS (°B)	Acidity (%)
DCP-1	1.28	0.66	0.60	15.15	0.10	19.18	1.26
DCP-2	1.15	0.62	0.50	12.90	0.08	20.22	1.19
DCP-3	1.30	0.67	0.58	14.93	0.10	19.24	1.25
DCP-4	1.32	0.67	0.62	17.91	0.12	19.18	1.27
DCP-5	1.34	0.68	0.65	16.18	0.11	22.10	1.10
DCP-6	1.22	0.64	0.58	14.06	0.09	20.12	1.19
DCP-7	1.29	0.67	0.62	13.43	0.09	20.20	1.20
DCP-8	1.22	0.65	0.55	13.85	0.09	18.15	1.31
DCP-9	1.27	0.66	0.60	15.15	0.10	19.57	1.27
DCP-10	1.24	0.65	0.56	13.85	0.09	18.54	1.32
DCP-11	1.23	0.64	0.59	15.63	0.10	19.32	1.25
DCP-12	1.27	0.67	0.59	14.93	0.10	21.12	1.15
DCP-13	1.26	0.66	0.58	13.64	0.09	20.14	1.20
DCP-14	1.23	0.63	0.60	14.29	0.09	21.56	1.14
DCP-15	1.30	0.63	0.66	15.87	0.10	19.25	1.25
DCP-16	1.30	0.68	0.60	13.24	0.09	20.85	1.18
DCP-17	1.38	0.71	0.66	18.18	0.12	23.15	1.06
DCP-18	1.28	0.66	0.61	15.15	0.10	20.64	1.18
DCP-19	1.16	0.61	0.55	13.11	0.08	21.61	1.13
DCP-20	1.30	0.66	0.61	15.15	0.10	19.45	1.24
DCP-21	1.23	0.64	0.58	14.06	0.09	20.97	1.17
DCP-22	1.35	0.68	0.64	14.71	0.10	22.27	1.08
DCP-23	1.26	0.65	0.61	13.85	0.09	21.51	1.13
DCP-24	1.29	0.66	0.62	13.64	0.09	20.00	1.20
DCP-25	1.29	0.66	0.60	15.15	0.10	19.50	1.23
Range	1.15 to 1.38	0.61 to 0.71	0.50 to 0.66	12.90 to 18.18	0.08 to 0.12	18.15 to 23.15	1.06 to 1.32
Mean	1.27	0.66	0.60	14.72	0.10	20.31	1.20
SD	0.05	0.02	0.04	1.31	0.01	1.22	0.07
Variance	0.00	0.00	0.00	1.71	0.00	1.48	0.00
SE	0.01	0.00	0.01	0.26	0.00	0.24	0.01
CV (%)	4.00	3.00	6.00	8.89	11.00	6.00	6.00

genotypes DCP-15 and DCP-22, while it was noticed as late as 2nd week of March in DCP-1, DCP-8, DCP-11, DCP-12, DCP-13, DCP-14, DCP-16, DCP-24 and DCP-25.

Fruit ripening time : The earliest fruit ripening (4th week of February) was observed in DCP-15 and DCP-22, while it was noticed as late as 2nd week of May in DCP-1, DCP-3, DCP-8, DCP-11, DCP-12, DCP-14, DCP-16, DCP-18, DCP-20, DCP-21, DCP-24 and DCP-25.The data on fruit ripening time of different local genotypes showed considerable differences. Wide variability in respect of period ripening time was recorded in mango, mahua, jamun, tomato and chironji (4, 5). Variability in ripening time was also recorded in jamun genotypes (6) in mango and (7) in tamarind.

Physical Characters

Average weight of fruit (g) : The data on physical characteristics of local chironji genotypes are presented in Table-2. The results clearly indicated the extent of variation recorded for physical characteristics of local chironji genotypes from different locations. The average fruit weight varied from 1.15 to 1.38 g with mean value of 1.27g. The average fruit weight ranged from 1.15 to 1.38 g with mean value of 1.27g. The highest fruit weight (1.38 g) was recorded in DCP-17 which was closely followed by DCP-22 (1.35 g), DCP-5 (1.34 g), DCP-4 (1.32 g), DCP-15(1.30), DCP-16 (1.30 g) and DCP-20 (1.30g), while; lowest fruit weight (1.15 g) was recorded in DCP-2.

Average seed weight (g) : It is revealed that, average seed weight varied from 0.61 to 0.71 g with mean value of 0.66 g. The highest seed weight was recorded in DCP-17(0.71 g) which was followed by DCP-5(0.68 g) and DCP-16 (0.68 g), DCP-22 (0.68 g), DCP-3 (0.67 g), DCP-4 (0.67 g), DCP-7 (0.67 g) and DCP-12 (0.67 g), DCP-1 (0.66 g), DCP-9 (0.66 g), DCP-13 (0.66 g), DCP-18 (0.66 g), DCP-24 (0.66 g) and DCP-25 (0.66 g) while; lowest seed weight (0.61 g) was recorded in DCP-19.

Average pulp weight (g) : The highest pulp weight was recorded in DCP-15 (0.66 g) and DCP-17 (0.66 g) and it was closely followed by DCP-5 (0.65 g), DCP- 22 (0.64 g), DCP-4 (0.62 g), DCP-7 (0.62 g) and DCP-24 (0.62 g), DCP-18 (0.61 g), DCP-20, DCP-61 (0.61 g), DCP-1 (0.60 g), DCP-9 (0.60 g), DCP-14 (0.60 g), DCP-16 (0.60 g) and DCP-25 (0.60 g) while; lowest pulp weight (0.50 g) was recorded in DCP-2.

Average kernel weight (g) : The average kernel weight varied from 0.08 to 0.12 g with mean value of 0.10 g. The highest kernel weight (0.12 g) was recorded in DCP-4 and DCP-17 (0.12 g) which was followed by DCP-5 (0.11 g), DCP-1 (0.10 g), DCP-3 (0.10 g), DCP-9 (0.10 g), DCP-11 (0.10 g), DCP-12 (0.10 g), DCP-15 (0.10 g), DCP-18 (0.10 g), DCP-20 (0.10 g), DCP-22 (0.10 g) and DCP-25 (0.10 g) while; lowest kernel weight (0.08 g) was recorded in DCP-19 and DCP-2 (0.08 g).

Kernel recovery (%) : The results clearly indicated wide of variation observed for kernel recovery (%) of chironji genotypes from different locations. The average kernel recovery percentage varied from 12.90 to 18.18 % with mean value of 14.72 %. The highest kernel recovery percentage (18.18 %) was recorded in DCP-17 which was followed by DCP-4 (17.91%), DCP-5 (16.18%) and DCP-15 (15.87%) however; lowest kernel recovery percentage (12.90 %) was noted in DCP-2.

The extent of variation observed for physical characteristics of chironji genotypes from different locations. The study was undertaken to investigate the nature and extent of variability present in chironji and high degree of variability was observed with respect to fruit yield, fruit size, and fruit weight (4). Variability in yield characters was also recorded in bael genotypes (8).

Qualitative Characters

Total soluble solids (^{0}Brix) : Chironji fruits are rich source of total soluble solids and acid content. The results of present experiment clearly indicated the wide of variation amongst total soluble solids (°Brix) of local chironji genotypes from different locations. The perusal of data presented in Table-2 revealed that, total soluble solids (°Brix) varied from 18.15 to 23.15°Brix with mean value of 20.31°Brix. The highest total soluble solids (23.15 °Brix) was recorded in DCP-17 which was followed by DCP-22 (22.27°Brix) and DCP-5 (22.10°Brix) while; lowest total soluble solids (18.15°Brix) was noted in DCP-8.

Acidity (%) : Chironji fruits are also rich source of acids. The results clearly indicated the extent of variation in acidity (%) of local chironji genotypes from different locations. The perusal of data presented in Table-2 revealed that the acidity varied from 1.06 to 1.32% with mean value of 1.20%. Local chironji genotype DCP-10 recorded highest acidity (1.32%) whereas DCP-8 (1.31%), DCP-4 (1.27%) and DCP-9 (1.27%) while; lowest acidity (1.06%) was noted in DCP-17.

Conclusions

Most of the local chironji genotypesin this investigation showed variation in tree characters like growth habit, leaf morphology, peak period of panicle emergence, flowering, fruit set, fruit attributes, ripening time, seed, kernel and quality attributes.

From the available facts and figures of different local genotypes of chironji under present study it is concluded that, local chironji genotypes *viz.,* DCP-5, DCP-15, DCP-17 and DCP-22 were found superior in respect to morphological, quantitative and qualitative characters. These promising genotypes could be chosen and used in the further breeding programme in order to develop variety after advance study on desirable traits.

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