



RESEARCH NOTE

Custard apple (*Annona squamosa* L.) variability in semi-arid region of Gujarat

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Abstract : The richness of plant genetic resources and extent of genetic diversity in custard apple provides ample opportunities for improvement in different ways. Wide range of genetic diversity with respect to various aspects of phenology viz., growth, flowering, fruiting behaviour and nutritional and qualitative characters in custard apple offer immense opportunity to explore the germplasm for superior genotypes from existing population growing under Gujarat. Since, genetic diversity is important source of crop improvement for developing promising varieties for livelihood and health security, hence its collection, ex-situ conservation and characterization is necessary under rainfed conditions of semi-arid ecosystem of Gujarat, so as to explore and conserve the source of promising genes for creating better yield, quality and having high medicinal significance and resistance to abiotic stress through selection and hybridization from the different part of Gujarat.

Key Words : Biodiversity, Field repository, Health security

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Custard apple (*Annona squamosa* L.) can be called as a delicacy of dry region due to its very sweet delicate flesh. It is a deciduous or semi deciduous tall woody shrub of about 5-6 meters height having irregularly spreading branches. The fruits are rich in carbohydrate mainly in the form of sugar (23.5%), protein (1.6%), calcium (17mg/100g), phosphorus (47mg/100g) and iron (1.5mg/100g). It is one of the finest fruits introduced in India from tropical America and found in wild and cultivated form in many parts of the country *i.e.*, Assam, Bihar, Madhya Pradesh, Maharashtra, Odisha, Rajasthan,

and Uttar Pradesh, Andhra Pradesh, Telangana and Tamil Nadu. Along with Maharashtra, Gujarat is another large custard apple growing state. *Annona* fruits grow well throughout the plains of India at elevations not exceeding 4,000 ft. It prefers a tropical climate, but with cool winters. The fruit tolerates a variety of conditions, from saline soils to droughts. Farmers usually cultivate the trees on hills in barren lands. The tree displays yellow trumpet shaped flowers that emit a pleasant sweet smell, with only a small number of flowers setting fruit. The fruits are variable in shape with the outer being covered

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in rounded knobs, with the inside containing a custard like flesh. Custard apple contain antioxidant like vitamin C and vitamin A the fruit rich in potassium and magnesium that protect from cardiac diseases and control blood sugar. It is also rich source of copper content which help to cure constipation. Annonaceae family presents a large intra and inter-specific variability offering an ample scope for studying genetic variation. Despite this great variability, germplasm banks that contain *Annona* spp., mainly *Annona squamosa*, are rare throughout the world, which is a limiting factor for selecting and crossing among elite cultivars (Pinto *et al.*, 2005).

An extensive survey was made to collect superior germplasm, to determine variability for growth habit, physical and biochemical traits and also to find out the elite genotypes having good fruit quality from the wild genetic diversity rich regions of Gujarat (Malpur forest, hills of Santrampur, road side of Poyali, Hathimata, Godhra, Dediapada, Sagbara, Waghai) growing under different weather conditions.

The naturally grown custard apple plants may be seen frequently in patches in the forest of Sntrampur. Owing to its seed propagation in wild form, its adaptability has reached to the maximum in marginal areas as well as its native place. Since, there is fast genetic erosion in custard apple genotypes due to rapid deforestation, industrialization, animal grazing, uncontrolled urbanization and increasing population pressure in these areas, its collection and conservation has become most important as *ex-situ* conservation.

Some improved selection have been developed in the country that still do not perform very well due to one or another reason into particular region due to lack of certain desirable qualities for both desert and processing purpose and physiological incompatibility. Genetic diversity is important source of crop improvement for developing promising varieties for various purposes, hence its collection, conservation and characterization is very essential in field gene bank. The source of promising genes for its further utilization in creating better yield, quality and having high medicinal significance and resistance to abiotic stress through selection of useful wild germplasm.

Thus, genetic improvement of custard apple is confined only to selection of promising genotypes and genetic transformation from seedling progenies. The existing custard apple population harbours a wide range of diversity. The wider the variability, the greater are the

chances of improvement for various desirable traits. The information on nature and degree of genetic variability could be helpful for further improvement through selection and hybridization.

Diversity in custard apple:

Vegetative characters:

The growth habit in different genotypes is visually observed erect, spreading, semi- spreading and drooping foliage with dense and sparse type among all the characterised genotypes. Tree shapes of different genotypes are irregular, semi circular and elliptical types in Gujarat region of India. The leaf shape was oblong and narrow lanceolate, size (10-20 cm 2-5 cm) with conspicuous veins.

Fruit morphological characters:

The fruits of the different genotypes varied their physical-morphological character in *i.e.*, shape (Nearly round, round, round spherical, obovat, obdeltoid and irregular), fruit colour (light green, pale green, yellowish green, dark green). There were found in variability with respect to fruit stem end cavity *i.e.*, (sunken, depressed, highly depressed and shallow depressed). The stone shape was observed triangular, semi elliptical and elliptical and color was black, dark brown in all the genotypes. The colour of pulp was found white and creamy. Fruit physical attributes. The fruits of different genotypes considerably varied with respect to measurable qualitative traits. The fruit weight, fruit length, fruit breadth, pulp weight, rind weight, rind thickness, seed weight, specific gravity, number of seeds per fruit, seed length, seed width, seed thickness, flakes with seed, flakes without seed, total flakes, flakes length and flakes width ranged between 110.45–335.37g, 45.32–84.12 mm, 55.28–90.35 mm, 50.75–205.87g, 33.47–143.28g, 2.29–8.61mm, 7.27–26.12g/fruit and 0.85–1.37, 12–63, 9.40–15.60mm, 5.12–8.32mm, 2.90–5.10mm, 12–63, 2–25, 22–68, 17.72–28.85mm and 10.15–18.36mm, respectively.

Fruit chemical attributes:

The genetic variability of fruit chemical attributes in terms of total soluble sugar (26.61–32.63°Brix), fruit acidity (0.20–0.30%), vitamin C content (18.25–38.24 mg/100 ml of pulp), TSS: acidity ratio (88.70–156.75), reducing sugar (11.26–15.16%), total sugar (12.48–18.48%), maganesium (21.24–38.65mg/100g fruit),



Fig. 1 : Custard apple genotype in Malpur village, Lunawada, Gujarat



Fig. 2 : Variability in seed colour, shape and size in different genotype



Fig. 3 : Bearing behaviour in custard apple



Fig. 4 : Variability in fruit colour, shape, size and flakes structure in different genotype

potassium (257.26-295.74mg/100g fruit), sodium (4.26-15.27mg/100g fruit) and calcium (15.35-21.43mg/100g fruit) were observed among the various genotypes collected for evaluation.

Summary:

Based on the observations on variation in qualitative and quantitative characters among the custard apple genotypes, it may be concluded from the study that various genotypes showed wide genetic diversity with respect of the physico-chemical attributes in the Gujarat region. Some of the genotypes were collected from

Poyali and Hathimata areas showed very few numbers of seed, it may be useful in developing seedless variety in custard apple. Therefore, existing variability provide excellent opportunities for developing high yielding selection having superior qualities both desert and processing purpose.

REFERENCES

Pinto, A.C., Cordeiro, M.C. de Andrade, S.R., Ferreira, F.R., de C. Figueiras, Alves, R.E. and Kinpara, D.J. (2005). *Annona future*. International Centre for Underutilised Fruits, University of South Hampton, SO171BJ, UK.

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