

Potential Uses of Indigenous Underutilized Fruit Crops

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Abiotic stresses caused by environmental factors are the most common yield-limiting factors globally, and they cause up to 70% of the yield losses in major fruit crops. In more detail, the individual potential yield losses induced by the different climatic adversities were reported to be the following: high temperature: 40–50%; salinity: 20%; drought: 17%; low temperature: 15%. Arid and semi-arid regions are considered the hotspot for abiotic stresses, such as extreme temperatures, intense solar radiation, salinity, drought and nutrient deficiency, where the commercial fruit crops either fail to grow or struggle to express their potential performance.

Under such climatic conditions, the integration of arid-zone underutilized fruit crops can be a better strategy to sustain the crop productivity under stress due to their typical morphological, physiological, anatomical and biochemical xerophytic characteristics that allow them to perform optimally under harsh climates. Therefore, adaptive traits such as those that increase the overall resilience and resistance to suboptimal environmental conditions do not necessarily result in a yield penalty. It is generally assumed that adaptive traits ensure yield stability in specific conditions, being fitness typically measured in terms of fertility, fruits and seeds.

In order to cope with abiotic stresses, the arid-zone underutilized fruit crops, such as ber (*Zizyphus* spp.), aonla (*Emblica officinalis*), bael (*Aegle marmelos*), jamun (*Syzigium* spp.) and wood apple (*Feronia limonia*), have modified and/or developed their organs to assure vital morpho-physiological functions (i.e., strong deep root system, a high root-to-shoot ratio for reaching into deeper moist soil layers and uptake more water and nutrients). Similarly, crops such as ber, bael, lasora (*Cordia mixa*) and pilu (*Salvadora persica*) have round, thick and barked stems for easier water storage and reduced cuticle transpiration.

Indian Jujube (*Ziziphus mauritiana* L.)

The Indian jujube (ber) belongs to the family *Rhamnaceae*, and it is known as the king of arid-zone fruits or as poor man's apple. The ber tree is fast growing and has a spreading canopy and a short bole; branches are slender, downy, brown bold spines in pairs. The ber tree is extremely drought-hardy due to the deep taproot system and xerophytic characteristics, such as (a) dormancy (leaf shedding) during the peak period of hot summer preventing transpiration, (b) waxy and hairy leaves, (c) thick bark. It grows well even in marginal or poor soils where most other commercial fruit trees either fail to grow or have very poor performance. The jujube seeds contain saponins, jujubogenin and obelin lactone. Jujube wood is utilized as fuel or charcoal making and its leaves are used as fodder for sheep and goats.

The fruit has a spongy, sweet, tasty pulp and is an excellent source of vitamins C, A, B, carotenoids, protein, Ca, P, K, Rb, Br, La and sugars (fructose, glucose and galactose). The smoke of its burning leaves is also utilized to cure cutaneous, cough and cold. Ber fruit is mostly consumed as fresh within 4–5 days after harvest due to the short shelf life. Thus, it is necessary to develop a value-added product at a farmer-field or industry level, and there is the need to work on the diversification and popularization of jujube products. It is the only fruit crop that can give good returns even under rainfed conditions due to its wide adaptability under a large variety of soils, water availability conditions and climates (with the exception of heavy frosts) in arid and semi-arid regions. In addition to nutritional and economic health, some jujube cultivars, such as Dragon, Mushroom, So and Teapot, are known for their landscape values, such as unique fruit shape, fruit color and tree shape, and are planted in gardens and backyards due to their dwarf habit and compact canopy.

Bael [*Aegle marmelos* L. (Correa)]

Bael is the only species of the genus *Aegle*, which belongs to the family *Rutaceae*; it is one of the oldest indigenous fruits known by various names in different parts of India, such as billi, Bengal quince, stone apple, golden apple and Japanese bitter orange. Bael has a wide distribution in various ranges of edaphic-climatic conditions due to its ability to withstand heat, drought and low-temperature poor-nutrient soil. It is deciduous, medium-sized, slender, gum bearing with a cauliflorous fruiting habit, deep taproot system, bold thorny branches and trifoliate leaves. Its trifoliate leaves resemble a trident, so people offer them to Lord Shiva Lingam to get rid of worry and suffering. Bael can be used as avenue and ornamental trees (golden color ripen fruit); shells of the dried fruit after removing pulp are used as fashioned cups, small containers, ornamental pills, snuff boxes, etc.

The bael fruit is a rich source of riboflavin used to cure beriberi, and unripe fruit is suggested to treat diarrhea and dysentery, whereas the marmelosin in

fruit has therapeutic properties being a good remedy for stomach ailments. However, all plant parts of bael contain various compounds with medicinal values, e.g., coumarins, alkaloids, sterols and essential oils, that have analgesic, antipyretic, anti-inflammatory, anti-antifungal, microfilaria, hypoglycemic, anti dyslipidemic, antiproliferative, wound healing, insecticidal and anti-fertility abilities. Bael fruit is consumed only in processed products, such as powder, preserve, nectar, toffee. These products have had high market demand during the COVID-19 pandemic period due to its ayurvedic medicinal values. Their current price in the market is high and for this reason, bael is becoming a remunerative crop for farmers of arid and semi-arid areas.

References

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