Centre of origin and the Bt brinjal controversy

The probability of crop-to-wild gene flow depends on the geographic distribution of crops and their wild relatives. In this context, caution has been advised in relation to the release of transgenic crops into their centres of origin, i.e. the geographical regions in which they were domesticated, and where wild relatives and/or weedy forms persist. In countries with high plant biodiversity like India, where almost 400 species of crop wild relatives are found, this is a relevant approach. The Indo-Burma zone, or the Indian subcontinent itself are regions in which the brinjal eggplant, Solanum melongena L., may have originated. Other parts of Asia have also been suggested as candidate areas, and the precise centre of origin remains in question. However, within the Bt brinjal controversy the importance of the centre of origin is not so much its precise location, as the contention that brinjal wild relatives can be expected to occur there. Indeed, in India there are over 20 wild (as well as weedy or introduced) Solanum species which, along with S. melongena, are members of subgenus Leptostemonum (Dunal) Bitter, the ‘spiny solanums’. Several of these are crossable with brinjal under experimental conditions, and interspecific hybrids are therefore a possibility in the wild. Hybrids which may arise as a result of crosses between Bt brinjal and the wild relatives could develop extreme weediness or invasiveness, thus disrupting ecological balance.

Wild relatives of brinjal include its putative progenitor, S. incanum L., whose Saharo-Sindian distribution covers northeast Africa and the Middle East, as well as Pakistan and parts of India. There have been varying views on the presence of S. incanum in India, and several workers in the western hemisphere have considered the eastern part of its range to be limited to Iran, however, collections in some herbaria (e.g. Kew) from Pakistan and northwest India comprise specimens which clearly conform to the neotype of S. incanum L., as elected by Hepper and Jaeger. In any case, the centre (of distribution) of S. incanum cannot therefore be specified as Africa, as suggested by recent authors. Some discrepancy may have arisen around the relationship between S. incanum and the allied taxa S. campylacanthum A. Rich. subsp. Campylacanthum Samuels, S. campylacanthum subsp. panduriforme (Dunal) Samuels and S. lichtensteini Willd., which have distributions limited to eastern and southern Africa. In addition, all three species are sometimes grouped together as the species aggregate S. incanum sensu lato, causing additional confusion.

As discussed recently by Hanur, a theory had suggested that the wild progenitor of brinjal was to be found in the savannah habitats of Indo-China. At that time there was no evidence of its existence, but it was subsequently proposed that S. cumingii Dunal, from southeast Asia, may be the elusive missing ancestor, and may itself have evolved from S. incanum. The presence of an ancestral form in Southeast Asia tallied with the premise held at the time, that primitive S. melongena cultivars were limited to this region. However, the precise taxonomic affinities of S. cumingii remain in question. Another hypothesis purports that the missing wild ancestor may have been discovered in southern India late last century, although it is likely that the collected samples were of hybrid origin. These alternative theories were based on studies performed over 20 years ago, when information on S. incanum and S. melongena landraces was limited.

Molecular analyses have demonstrated that there is strong similarity between S. melongena and S. incanum, conforming to the general consensus that brinjal originated from S. incanum. Updated distribution information on S. incanum depicts a typically Saharo-Sindian pattern whereby, if India were deemed to be the centre of origin of brinjal, then future studies into ancient landraces in the northwest of the country might provide fruitful information on domestication events.


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