A perspective on soybean genetic resources in relation to vegetable soybean

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Abstract: The immature pods of vegetable soybean used for human consumption are popularly known as edamame in Japan, maodou in China or green soybean in North America. On a dry weight basis, vegetable soybean has a protein and oil content similar to grain soybean, but contains more provitamin A, vitamin C, starch and sucrose.

AVRDC: The World Vegetable Center’s genebank houses 15,316 Glycine accessions and vegetable soybean account for 13% of the Glycine max collection. The breeding program employed selections from local landraces and the transfer of desirable traits from grain soybean. Efforts are in progress to promote its cultivation in South, Central Asia and Africa.

Key words: edamame, genetic resources, Glycine max, green soybean, maodou

The immature pods of vegetable soybean are harvested and the shelled green beans are consumed after cooking or steaming (Fig. 1). Sold as a fresh or frozen vegetable, it is popularly known as edamame in Japan, maodou in China or green soybean in North America. Compared to grain soybean, vegetable soybean seeds are larger (over 30g/100 seeds), have a milder flavor, nuttier texture and are easier to cook. On a dry weight basis, vegetable soybean has a protein and oil content similar to grain soybean, but contains more provitamin A and vitamin C, starch, and sucrose. It also contains health-promoting isoflavones and tocopherol (Shanmugasundaram and Yan, 1999). China, Japan, Taiwan and Thailand are the main producers (Fig. 2), while Japan is the main consumer, importing about half of its annual requirements.

Breeders are interested in traits related to high pod yield, pod size and colour, seed size and colour, seed number per pod, seed appearance, high sugar content and flavour, resistance to downy mildew and pod borers, early maturity, high nodulation, and ease of mechanical harvesting.

AVRDC: The World Vegetable Center began developing improved vegetable soybean lines in 1981. The Center’s genebank houses 15,316 Glycine accessions and vegetable soybean types account for about 13% of the Glycine max collection characterized so far. Over 3000 breeding lines have been distributed to researchers worldwide. The breeding program employed selections from local landraces and the transfer of desirable traits from grain soybean. Breeders also use lines which are less sensitive to photoperiod and temperature to extend adaptability to more tropical zones.

As quality is of paramount importance, breeders tend to cross between parents which may share elite pedigrees. Mimura et al (2007) recently studied the genetic diversity of 130 vegetable soybean cultivars and landraces from Japan, China and the US and found that Japanese cultivars had a narrow genetic base compared to those of other countries. Germplasm from China, US, Canada, and Korea could be good sources for broadening the genetic base and disease tolerance of future Japanese varieties.

In order to enhance the taste of vegetable soybean and to broaden its market appeal beyond Japan, breeders have successfully utilized the fragrance genes from Japanese cultivars Dadachamame and Chakaori that confer a ‘basmati’ flavor to beans. Molecular markers for the fragrance trait have been developed (Juwattanasomran et al 2010) which would facilitate the selection for the fragrance trait in breeding programs.

AVRDC: The World Vegetable Center is promoting the cultivation of vegetable soybean world wide. Efforts are in progress to promote vegetable soybean cultivation in South Asia, Central Asia and Africa, and production has recently expanded in India, Bangladesh, Vietnam Mauritius and Sudan. Asian production is not only for domestic consumption but also for export.

References