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REVIEW

The advent of genomics in mulberry and perspectives for productivity enhancement

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Abstract Sericulture in India is a highly remunerative industry, especially for the rural population. Mulberry is an extremely versatile plant, having multifaceted applications, the most important being the sole feed for the monophagus silkworm, *Bombyx mori*. Profitability of the sericulture industry is directly correlated with production of high-quality mulberry leaves. However, mulberry productivity is severely impacted by abiotic as well as biotic stresses. Therefore, to develop stress-tolerant mulberry with desired characteristics, a comprehensive understanding and utility of biotechnological resources is essential. Research efforts on mulberry encompass broad range of fields in plant biology from breeding, molecular markers, transcriptomics, proteomics, and metabolomics. Additionally, a large number of mulberry germplasm accessions have been maintained and evaluated in several countries. Identification of superior cultivars under stressed regimes is extremely important, and therefore, physiological traits have often been used as proxy genetic markers for assessing stress tolerance index. Mulberry genomic resources have provided a limited but an important list of novel candidate genes, thus enhancing the scope for future investigations for improvement of its productivity. The present review article gives a bird's eye view of current initiatives of genomics advancements in mulberry research and enumerates the prospects for enhancing its productivity.

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Introduction

Silk, known as "Queen of textiles", originated in ancient China where its use was reserved for the royalty and has continued to lure people through antiquity. Silk is associated with luxury, elegance, class, and comfort. Sericulture, both an art and a science of raising silkworms for silk production, has better prospects in developing countries as silk production is largely a cottage industry. India has the distinct advantage of practicing sericulture throughout the year, yielding about 4–6 crops/year as a result of its tropical climate (Gangopadhyay 2008). Trends in international silk production indicate that India is the second largest producer of raw silk, accounting for more than 18% of global raw silk production. India has also the unique distinction of being the only country producing all the four kinds of silk—mulberry, eri, muga, and tasar, but the major quantity of silk is produced by cocoons of *Bombyx mori*, the silkworm. The insect being monophagus feeds only on the leaves of mulberry plants; therefore, mulberry cultivation plays a cardinal role in the sericulture industry. Mulberry is an important component of combined pastoral system (Talamucci et al. 2000) as its leaves are used as a forage supplement for animal husbandry (Benavides 2000). Mulberry contains unique medicinal compounds of great pharmaceutical worth in its leaf, fruit, stem, seed, and roots having anti-microbial, anti-hyperglycemic, anti-hyperlipidemic, antidiabetic, chemopreventive, neuroprotective, and anti-oxidative potential (Andallu and Varadacharyulu 2003; Chen et al. 2006; Chen and Li 2007; El-Beshbishy et al. 2006; Kang et al. 2006; Konno et al. 2006; Singab