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Study of parental polymorphism in castor (*Ricinus communis* L.) using SSR and EST SSR markers

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ABSTRACT

The present investigation has been undertaken to study the polymorphism between the four diverse castor genotypes (DPC 9, RG-72, Haritha and Kranthi) selected for making three crosses (DPC 9 x RG-72 and DPC 9 x Haritha for tolerance to drought; Kranthi x Haritha for resistance to wilt). The variation among these parents was characterized using 22 SSR and 143 EST SSR markers. Four each of SSR and EST SSR markers showed polymorphism with all the four parental lines. Five microsatellite markers each were polymorphic between RG 72 / DPC 9 and DPC 9 / Haritha (22.72%), and seven markers between Kranthi and Haritha (31.81%). Twenty four EST SSR markers were polymorphic between RG 72 / DPC 9 and Kranthi / Haritha (16.78%). Fourteen markers were polymorphic between DPC 9 and Haritha (9.79%). The results indicating that there is high conservation of coding sequences among the genotypes within the species.

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Key words : Castor, Parental polymorphism, SSR, EST SSR markers

INTRODUCTION

Oilseeds occupy a pride place in Indian economy next to food grains. Castor (*Ricinus communis* L.) plays an important role in the country's vegetable oil economy. India accounts for 59% of global castor area and 81% of world castor production and ranks first in area and production in the world. India meets more than 80% of world's requirement of castor oil and its derivatives and earns foreign exchange of about Rs. 2253 crores annually through its exports. Castor is the third most important oilseed crop of Andhra Pradesh in terms of acreage and economy after Groundnut and Sunflower. In Andhra Pradesh castor is cultivated in an area of 1.57 lakh ha, with a production of 0.80 lakh tones and productivity of 511 kg/ha (2008-09). The major reasons for the dismal state of production in the state are erratic rainfall and poor management practices. Apart from which, biotic and abiotic stresses constitute the major yield destabilizing factors which do not as well realize the full potential of the currently available varieties. Among the biotic constraints, Fusarium wilt and Botrytis grey rot contribute significantly to yield losses. Though wilt resistant varieties were developed and are under cultivation, breakdown of resistance has become a serious concern. Further, clear indications were observed for existence of more than one race, which is common for soil borne pathogens. Among abiotic stresses, drought is very important multidimensional stress affecting factor that acts on the growth and development of plant at various levels of their organization. It is the largest single factor for reduction of yield globally. Castor is cultivated mostly in shallow and less fertile soils during *Kharif* season under rainfed conditions in South India in which intermittent dry spells occur affecting the crop. Even though Castor is a drought hardy crop, evolving crop genotypes which have enhanced drought tolerance is the most successful and the cheapest strategy to cope up with drought. So breeding for drought tolerance is a major objective to maximize yield levels.

Molecular marker technology, among its variety of applications, enables precision in selection/screening at genotype level and in unfolding the hitherto hidden variability of breeding value. However, recent advances in molecular biology have equipped scientists with a wide choice of marker assisted techniques to identify both quantitative and qualitative traits. Among them the marker associated quantitative trait loci (QTLs) relating to quantitatively inherited traits like yield and drought tolerant

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