

GENETIC DIVERSITY ASSESSMENT IN *PONGAMIA PINNATA* (L.) PIERRE AND *MADHUCA LATIFOLIA* ROXB.: OIL YIELDING TREES OF JHARKHAND

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ABSTRACT

Twenty-four *Pongamia pinnata* (Karanj) and twenty-three *Madhuca latifolia* (Mahua) genotypes collected from different zones of Jharkhand were subjected to Mahalanobis D-square (D^2) statistics to elucidate the genetic diversity based on pod/seed traits. *P. pinnata* and *M. latifolia* genotypes were grouped into 5 and 8 clusters respectively, indicating wide diversity. The clustering pattern proved that geographical diversity need not necessarily be related to genetic diversity. In *P. pinnata*, cluster-II had maximum number of genotypes followed by cluster-I and cluster III. Cluster means indicated a wide range of variation for all the pod/seed traits. In *M. latifolia* the genotypes in cluster VII and IV were most heterogeneous and can be best used for within group hybridization. Cluster means indicated crosses involving under cluster III and I may result in substantial segregates and further selection for overall improvement of species.

Key words: *Pongamia pinnata*, *Madhuca latifolia*, Mahalanobis D-square, Genetic divergence.

Introduction

Global bio-diesel production is set to reach some 24 billion litres by 2017 (Parikh, 2005). Shortage of edible oil for human consumption in developing countries like India does not favour its use for bio-diesel production. Shortage of edible oil in India – hence Mahua (*Madhuca latifolia*), usage of non-edible oil – hence Pongamia (*Pongamia pinnata*) are potential tree species for human consumption and biodiesel production respectively. For several reasons, both technical and economical, the potential of *P. pinnata* and *M. latifolia* is far from being realized.

Pongamia pinnata (L.) Pierre, synonymously known as *Pongamia glabra* Vent., *Derris indica* (Lam) Bennett., *Millettia novo-guineensis* Kane & Hat. and *Cytisus pinnaus* L. is an arboreal legume, belongs to the subfamily Papilionoideae, more specifically the tribe Millettieae. The tree forms the subject of recent reviews covering its chemistry and biological activity (Meera *et al.*, 2003), phytochemical constituents, traditional uses and pharmacological properties (Chopade *et al.*, 2008) and future prospects as a biodiesel yielding species (Scott *et al.*, 2008). *Pongamia pinnata* has been documented to include variable forms with a wide range of pod as well as seed size and shape variations (WOI, 1969). Seeds contain 30 to 40% oil. Characterization and selection of CPT's is essential for the improvement of this species in addition to experiments on controlled crossing among selected genotypes (Mukta and Sreevalli, 2010). Under the National Network on Integrated Development of *P.*

pinnata in India, about 432 CPTs have been identified from 120 districts of the country (Kureel, 2007).

Madhuca latifolia synonymously known as *M. indica*, *Bassia latifolia* belongs to family Sapotaceae is commonly known as Indian Butter Tree is deciduous and indigenous to the Indian subcontinent. Sweet fleshy corolla and ripe fruits, used as a major source of industrial alcohol as well as country liquor. The seeds contain valuable edible oil ranging from 38 to 57 % used for cooking and as medicine. Seed cake is used as organic manure and fish meal. Although well known for wide adaptability and amplitude of uses, little attempt has been directed to improve it as a crop plant.

Analysis of phenotypic diversity in germplasm collections can facilitate reliable classification of accessions and its identification with future utility for specific breeding purposes. There are very few studies on phenotypic diversity involving a limited number of germplasm and their suggested use in hybridization with respect to *P. pinnata* and *M. latifolia*. Genetic diversity between individuals enables evolution and adaptation of species to take place within a changing environment and is thus essential for the long term survival of a species (Newton *et al.*, 1999). The diversity within the species has been increasingly recognised as a tangible, economic resource directly equivalent to a country's mineral wealth, thus they have been referred to as Plant genetic resources. People conserve diversity because they wish to exploit it (Maxted *et al.*, 1997). The exploitation of genetic diversity for crop improvement has been the

Cluster means in *Pongamia pinnata* indicated a wide range of variation for all pod/seed traits, while in *Maduca latifolia* it indicated crosses involving under cluster III and I may result in substantial segregates.

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