B 16

Authentication of coconut hybrids using RAPD analysis

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Coconut palms, based on the plant stature and earliness, are classified into two major types *viz.,* 'talls' and 'dwarfs' which mainly differ in their pollination behavior of cross and self pollination respectively. Due to this, getting true to type progenies of desirable tall and dwarf cultivars has always been a challenge for the farmers and researchers. The conventional practice of the selection of seedlings based only on morphological traits such as petiole colour and vigour of seedlings often results in selection of out-crossed seedlings and undesirable offtypes. Hence, identification of molecular markers for distinguishing tall and dwarf character is imperative for isolating true-to-type high-yielding hybrid lines in the early stage of coconut breeding programmes and also in the commercial hybrid seedling production in coconut. In the present investigation, RAPD markers for this plant type trait were identified using a bulked DNA approach. Screening of tall and dwarf palm bulk DNA with 200 decamer primers revealed a RAPD primer OPBA3 which could clearly differentiate the both tall and dwarf bulks. For validation, the primer was used to screen individual tall and dwarf coconut palms representing different geographic regions. Primer OPBA3 produced a band of around 1200 bp present only in tall palms and a band of around 1300 bp present only in dwarf palms. The primer was also used to screen the parents and validate hybrids of Dwarf x Tall crosses. The results could pave the way for the development of SCAR markers for distinguishing tall and dwarf coconut accessions which would go a long way in establishing potential varietal identity, achieving varietal purity and thereby ensuring the quality of planting material in different Tall x Dwarf and Dwarf x Tall hybrid planting material production.

B 17

Estimation of out-crossing rate in West Coast Tall cultivar in coconut using microsatellite markers

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Understanding of mating system of a plant species has fundamental importance for formulation of genetic conservation and breeding programmes. The pattern of gene flow via pollen strongly influences the genetic structure within a population. Various genetic parameters, obtained from molecular marker studies, can be used to provide estimates' of mating system. The aim of this study was to estimate the rate of outcrossing in West Coast Tall (WCT) cultivar of coconut using microsatellite simple sequence repeats (SSR). Microsatellite markers possess great advantages for determining mating systems since these are co-dominant and multi-allelic markers, which can be reliably scored in a simple assay. Two WCT mother palms and their 88 progenies, collected as embryos every month from December 2011 to April 2012, were screened using 15 highly

polymorphic microsatellite primers. The mating parameters were estimated using mixed mating model (MLTR software) and the extent of similarity between the mother palms and their progenies were analyzed using the NTSYS software. The percentage similarity between the mother palm and their progenies, as deduced using microsatellite data, ranged from 55 to 74%. The progenies were also analyzed using a RAPD primer capable of distinguishing tall and dwarf palms. All the progenies were found to possess the tall-type marker indicating that the pollen was derived from tall palms in all the cases. The results revealed that WCT cultivar to be pre-dominantly out-crossing and indicate that proper sampling and breeding strategies are required to sustain the high genetic diversity found.

B 18

Evaluation of drought stress tolerance of *Oryza sativa* (MO.16)

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In the present study, the morphological, physiological and biochemical responses response of *Oryza sativa* variety Uma (MO.16) to drought stress during germination was evaluated. Germination percentage and vigour index were determined by exposing seeds to varying PEG concentration (0%, 2%, 4%, 6%). The result showed that drought stress decreased seed germination significantly. Carbohydrate, protein, proline, peroxidase activity and amino acid content were also determined. The results showed that there is no significant variation in amino acid content. But proline and peroxidase activity increase with increased concentration of PEG. The content of protein and carbohydrate was increased upto 4% PEG concentration. But in 6% PEG concentration protein content showed that significant decrease and slight decrease in carbohydrate content. Water content of root and shoot tissue was calculated i.e., Relative water content is decreased with the increase in PEG concentration.

B 19

Effect of brassinosteroid, glutathione and adenine sulphate on callogenesis of coconut (*Cocos nucifera* L.) plumule

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Coconut is one of the most important tropical plantation crops and was propagated so far through seeds. Coconut is a recalcitrant species as far as tissue culture is concerned. The increased demand for disease resistant palm requires massive multiplication of selected mother palms. Out of various explants, *viz.,* immature inflorescence, tender leaf and immature zygotic embryo and plumule tried, plumule was found to be a better explant for mass multiplication. The plantlet development from plumular explant involve various stages of development like callus induction,