

Makmal Sitogenetik MPOB has transferred several services as follows:

M PORIM TT No. 49 (1998). **Chromosome Painting in Oil Palm Hybrids**

Genomic *in situ* hybridisation (GISH) method was developed to distinguish between *oleifera* and *guineensis* chromosomes. Hence, this is a useful method for oil palm breeders to assess the genome composition of backcrosses and oil palm hybrids.

MPOB TS No. 18 (2007). Flow Cytometry Applications

Flow cytometry is a rapid and convenient technique that allows accurate determination of: (1) nuclear DNA content and genome size in plants, and (2) the ploidy level of any organisms. It is a useful tool for research ranging from evolutionary studies to genome mapping and ploidy manipulation.

MPOB TS No. 49 (2008). Plant Mitosis and Meiosis: Cytogenetical Analysis

Cytogenetics is a branch of genetics involved with the study of chromosomes and cell division. Fluorescent and non-fluorescent dyes can be used to visualise the chromosomes. Mitosis and meiosis are both processes of cell division and occur in somatic and reproductive cells, respectively. By doing cytogenetical analysis, mitotic and meiotic cells can be analysed to observe any abnormalities in chromosome morphology or process.

MPOB TS No. 58 (2009). Plant Molecular Cytogenetic Analysis

Molecular cytogenetics involves a combination of molecular biology and cytogenetics. In general, this involves the use of a series of techniques referred to as the fluorescence *in situ* hybridisation

(FISH), in which DNA probes are labelled with differently coloured fluorescent tags to visualise one or more specific regions of the genome. The technology enables: (1) the location of DNA sequences such as ribosomal DNA and transgenes to be determined, (2) the identification of individual chromosome pairs using specific ISSR and RFLP markers, and (3) *Elaeis oleifera* and *E. guineensis* chromosomes to be distinguished in interspecific hybrids.

MPOB TS No. 111 (2012). Image Cytometry (ICM): Genetic Analysis of Oil Palm Calli and Suspension Cultures

For oil palm calli and suspension cultures, genetic variation analysis, estimation of genome size and observation of nuclei activity are not possible via flow cytometry due to the low population of nuclei present. Hence, image cytometry or ICM method was developed to address this issue. The approach is to quantitate the chromogenic areas of the black and white nuclei images followed by calculation of integrative optical density (IOD) via image analysis software.

MPOB TS No. 125 (2013). Oil Palm Haploid Technology: Screening for Naturally Occurring Haploids

Haploids are individuals with gametic chromosome number (n) or having a single set of chromosomes. Haploids are used to produce double haploids ($2n$) where the chromosome number is doubled using chemicals such as colchicine or oryzalin which interfere with tubulin formation during mitosis. Haploids and double haploids are useful in breeding and genetic studies.

BACKGROUND

The above services have been done for agencies like FELDA, FRIM, UKM and MARDI. The above applications are applicable in any plant

species; hence, requests have been received from a number of organisations dealing with oil palm and other plant species. However, since 2005 requests for services could not be entertained due to man power constraint. Nevertheless, we have accepted students and staff from other agencies to be trained.

On 2 December 2013, the Genetics Society of Malaysia and MPOB jointly organised a pre-satellite workshop entitled *Workshop on Cytogenetics: Visualising Mitotic and Meiotic Chromosomes using Fluorescent and Non-fluorescent Dyes* in conjunction with the 10th Malaysia Genetics Congress. It was a hands-on workshop, hence the number of participants were limited to 15. The participants consisted of research officers, postgraduate students and sales representatives from MARDI, MPOB, UMS, UPM, UKM, AAR and Straits Scientific Sdn Bhd. A survey was conducted to ascertain a way to help the research community in Malaysia on the understanding of cytogenetics, molecular cytogenetics, cytometry and haploid technology.

CONCLUSION

In that survey we have shortlisted three methods to help the research community. They include conducting workshops, make the CDs available on *Penyediaan Sitologi Analisa Sitogenetik & Sitogenetik Molekul* and/or provide experimental manuals. It was concluded from the survey that it would be helpful to provide assistance in all the three aspects. CD and experimental manuals will also be provided at the venue of the workshop. Hence, judging from the success of previous co-jointly organised workshop with the Genetics Society of Malaysia, it is anticipated that a workshop will be organised yearly by Makmal Sitogenetik MPOB upon obtaining management approval. This will help build capacity and capabilities in the area of cytogenetics. All the services that have been previously transferred will now be housed under Makmal Sitogenetik MPOB.

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