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Assessing the suitability of treatments for successful karyotyping of selected *Phalaenopsis* cultivars

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Orchidaceae is considered as one of the largest flowering plant families and has acquired the attention of researchers in different aspects i.e., taxonomy, phylogeny, phytogeography, etc. In the family Orchidaceae, the genus *Phalaenopsis* has been attracted the eye of the global floriculture industry due to its specific commercial traits. Therefore, this genus has obtained a significant proportion of the global market as both pot plants and cut flowers. Hence, it is important to develop hybrids with specific commercial traits to meet the demand. Generally, the gene-trait interaction is the key point of the development of hybrids. Consequently, it is important to understand the chromosome morphology and the correlation between the chromosomes and the floral characteristics. Therefore, karyotyping based on modern and classical cytogenetic approaches in *Phalaenopsis* cultivars would reveal significant information associated with gene-trait interaction. However, the knowledge gap in chromosome characters of *Phalaenopsis* cultivars has hindered the development of quality improved cultivars with attractive traits. Therefore, it is important to infer the relationships of karyotypes with the chromosome characteristics and the ploidy levels of selected commercially valuable *Phalaenopsis* cultivars grown in Sri Lanka. Furthermore, it is important to assess the suitability of treatments for successful karyotyping. In this study, potted plants and tissue cultured specimens of four *Phalaenopsis* cultivars were selected, based on consumer demand. Tissue cultured specimens were obtained from the Floriculture Research Center, University of Kelaniya. The squashing method with 2 mM 8-hydroxyquinoline pretreatment at 3 different temperatures (16 °C, 18 °C and 20 °C) for 4 hours was used in chromosome preparation at mitotic division stages of the root tip cells. Both Feulgen staining and aceto-orcein staining were used as staining protocols in chromosome spread preparation. In chromosome spread preparation, tissue cultured specimens performed better than the specimens of potted plants. Pretreatment with 2 mM 8-hydroxyquinoline at 18 °C followed by aceto-orcein staining was successful for tissue cultured white *Phalaenopsis* cultivar in obtaining chromosome spreads at mitotic metaphase. Hence, pretreatment of tissue cultured plants with 2 mM 8-hydroxyquinoline at 18 °C and aceto-orcein staining can be suggested as suitable treatments for successful karyotyping of white *Phalaenopsis* cultivars.

Keywords: Aceto-orcein staining, Feulgen staining, Karyotyping, *Phalaenopsis*, Pretreatments

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