Chromosome analysis in a natural and micropropagated Australian ornamental climber *Pandorea pandorana*

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ABSTRACT

Chromosome counts were made in natural and tissue cultured Australian ornamental climber Pandorea pandorana (SCH, AF and GS). Diploid (2n) chromosome numbers were found to be 28 in both naturally grown and tissue cultured plants although tissue cultured plants looked different morphologically as compared to naturally grown plants. Information on chromosome numbers obtained in this study would be useful in developing new horticulturally important hybrid varieties through interspecific hybridization.

1 INTRODUCTION

Australian endemic flora has great potential for the development of new varieties for the local and international ornamental plant market. The genus *Pandorea* consists of six species, three of which are endemic to Australia. These species have a range of variation in vegetative features and flower colour. Colourful, showy flowers are born on terminal inflorescence in these species. These species have a high potential for Australian horticultural industry. One of the species; *Pandorea pandorana* is a climber and is widespread in Australia. It also occurs in Papua New Guinea and Indonesia. This species is more suitable for landscape industry and is being widely used for this purpose. However, it has great potential for further improvement as a decorative climber. This species produces aesthetically

appealing flowers in a range of colours, which include white, pink, yellow and brown with pleasing green foliage. Popular commercial varieties of *P. pandorana* are 'Golden shower', 'Lemon Bells', and 'Ruby Belle'. For further improvement of such varieties through crossing and selection, plant breeders' would need information on chromosome numbers of this species. So far there is no report on chromosome number in this species. Information on chromosome number in different species within a genus is important to plan and produce inter-specific hybrids of economical importance. Therefore the main objective of this study was to analyze and determine chromosome numbers in *Pandorea pandorana* to facilitate further improvement of this horticulturally important plant species.

2 MATERIALS AND METHODS

Plant material used in this study was naturally growing variety "Golden-Shower" of *Pandorea pandorana* (SCH, AF and GS) and its tissue cultured counterpart. Tissue cultured plants showed several morphological variations as compared to naturally growing plants (Figure 1). Overall size of the plant, number of branches and leaf morphology were affected as a result of tissue culture. Tissue cultured plants have a more compact form and appear dull green, while naturally grown (control) plants look glossy green (Kancherla and Bhalla, 2001). To get good dividing cells from tissue cultured plants, small tissue cultured plant cuttings were grown in artificial growing medium. Root tips were collected from tissue cultured and naturally grown plants. Collected root tips of about 1 cm long were immediately fixed in freshly prepared fixative Aceto-alcohol (3 parts absolute ethyl alcohol:1 part glacial acetic acid). The root tips were kept in fixative and stored in the fridge for 24 hours. After 24 hours these root tips were washed twice with distilled water and transferred to 70% ethyl alcohol for storage until used for slide preparation and chromosome counting. Root tips were macerated in 1M HCl for 5 minutes at 60^{o}C in a water-bath. After maceration root tips were washed with distilled water with three changes. For slide preparation small portion of growing tip (1 mm) was cut with a sharp dissecting blade on a glass slide and stained with aceto-orcein following the method described by Tyagi *et al.* 1991. Photographs were taken using a mounted camera on a Binocular Light Microscope under brightly illuminated field. Chromosomes appeared as dark red spots/dots with grey cell background.

3 RESULTS AND DISCUSSION

Chromosomes were counted in naturally grown and tissue cultured plants of the species *Pandorea pandorana* (Figure 1). No variation was observed in the chromosome numbers in naturally grown and tissue cultured plants (Figure 2).

Somatic mutations and/or deletion of a pair or single chromosome may occur in plants. Deletion of a chromosome pair may be lethal as compared to a single chromosome or point mutation. These changes in chromosome number or point mutation would result in morphological changes in plant's phenotype. However, there were clear countable

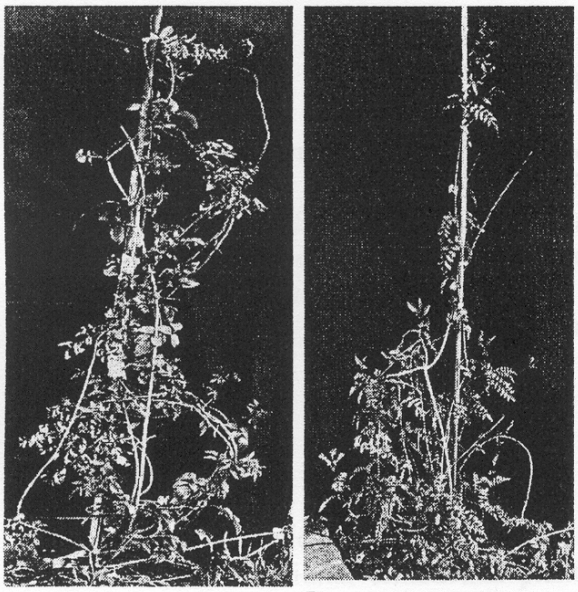

Figure 1. *Pandorea pandorana*: naturally grown plant (left), and tissue cultured (right) plant showing compact form

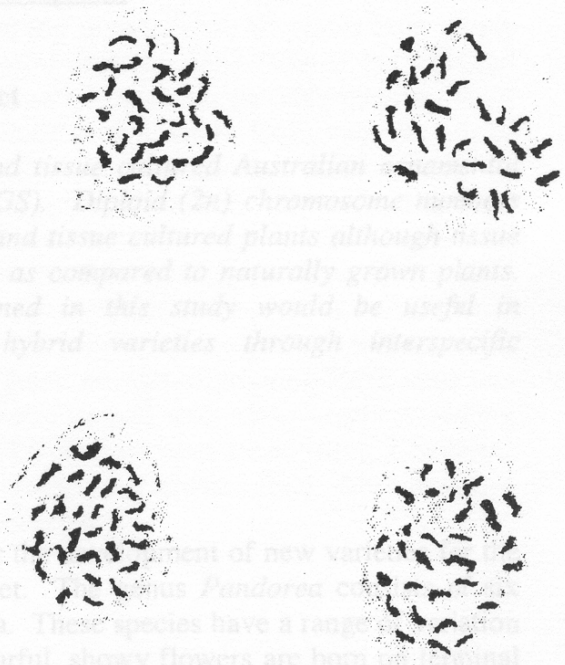

Figure 2. Mitotic (2 n = 28) number of chromosomes in *Pandorea pandorana*: naturally grown plant (top) and tissue cultured plant (bottom)

28 diploid (2n) chromosomes in this species (Figure 2). It is thus evident that morphological changes in tissue cultured plants were not due to the changes in chromosome number, but most probably, due to some cryptic changes in genes or gene complexes including point mutations. Chromosome numbers may vary within a genus in different species (Rye, 1979), but within species chromosome numbers are always constant and will not differ from one variety to the other unless a pair or a single chromosome deletion could occur in nature. Morphological variations observed in tissue cultured plants (as compared to naturally grown) that could be explained on the basis of minor somatic (point) mutations, which would be reflected in somaclonal variations. Plants regenerated from such somatic cells are bound to show phenotypic variation even if the number of chromosomes is the same. Interspecific hybrids have been successful in genus *Pandorea* (James and Knox, 1993). This report on chromosome numbers in *Pandorea pandorana* would help breeders in interspecific hybridization with other species having similar number of chromosomes to produce new promising hybrid varieties of horticultural importance.

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REFERENCES

James, E. A. and Knox R. B., 1993. Reproductive Biology of the Australian species of the genus *Pandorea* (Bignoniaceae). *Aust. J. Bot.* **41**, 611-626.

Kancherla S. L. and Bhalla, P. L., 2001. Phenotypic variations in micropropagated Australian ornamental climber *Pandorea pandorana. Hort Science* **36**, 348-350.

Rye, B. L. 1979. Chromosome number variation in the Myrtaceae and its taxonomic implications. *Aust. J. Bot.* **27**, 437 - 497.

Tyagi, A. P., McComb, J. and Considine J., 1991. Cytogenetics and pollination studies in the genus *Verticordia* DC. *Aust. J. Bot.* **39**, 261-272.