

CHAPTER 7

GENERAL DISCUSSION

Orchid breeding is the most important way to establish new product to be completed in the world market. Fragrance is new character that breeder would like to incorporate into commercial cultivars. As dendrobiums are the number ones cut flowers and potted orchids from Thailand. Adding fragrance to dendrobiums might enhance market value for the future. Since, there are several Thai *Dendrobium* species that are known for sweet fragrant such as *Den. anosmum*, *Den. parishii*, *Den. peguanum* and *Den. scabrilingue*. If fragrance from those species could be incorporated to the commercial cultivars, value for Thai dendrobiums would be increased. However, there are some obstacles to overcome such as plant compatibility, fruit drop, pollinia viability and way to prove hybrids whether the hybrids are developed from two parents not parthenocarpic type. The results from this study might be able to solve those obstacles.

Hence to flowering period of each species and cultivar is not in the same time, keeping pollinia for breeding program need to be practiced. There was no report on such species, although there were some reports from others that might not have worked well for Thai *Dendrobium* species. Therefore experiment to study for appropriate temperature and storage period were conducted. It was found that keeping pollinia of four fragrant species, *Den. anosmum*, *Den. parishii*, *Den. peguanum* and *Den. scabrilingue* at 4 °C gave the best result in terms of the greatest pollinia viability percentage and storage period. It was significantly greater than those kept at 6 and 8 °C. At 4 °C, pollinia of *Den. scabrilingue* and *Den. peguanum* could be kept for 180 days whereas those of *Den. anosmum* and *Den. parishii* were 240 days without significantly losing viability percentage, but it was found that viability percentage started to markedly decline from 210 days onwards for *Den. scabrilingue* and *Den. peguanum* and from 270 days onwards for *Den. anosmum* and *Den. parishii*. However, after keeping the pollinia for 450 days, the viability percentage was still greater than 60 % which have high levels viability percentage for orchid pollination. At this level, the pollinia are still very good for breeding

program since each pollinia contain great amount of pollen that Pridgeon (1994) reported in the book 'The Illustrated Encyclopedia of Orchid' that there were thousands, even hundreds of thousands of pollen grains in one pollinium. The result was similar to that of Shijun's (1984) who was stating that pollinia of some species of *Dendrobium*, *Vanda*, *Cymbidium* and *Arachnis* could be kept air-dry at 4 to 6 °C for 280 days and Meeyot and Kamemoto (1969) reported that the pollinia of *Den. phalaenopsis*, *Den. undulatum*, *Den. strebloceras*, and *Den. Jaquelyn Thomas*, could be kept in air-dry storage at 7 °C for 12 months.

There was an interaction between temperature and storage period. Pollinia viability percentages were decreased when storage periods and temperature increased. However, this result could help to assure orchid breeders and growers to keep pollinia of some fragrant *Dendrobium* for interspecific or intergeneric hybridization in regular refrigerator in drug shelf where temperature is around 4–8 °C up to 450 days, which is more than a year and it could cover another flowering time.

Attempt in hybridizing different *Dendrobium* section had encountered some difficulty of incompatibility. Making crosses between commercial cultivar, *Den. Jaquelyn Thomas*, which is the hybrid derived from sections *Phalaenanthe* and *Spatulata*, and fragrant species belonging to section *Formosae* and *Stachyobium* was not successful. Eventhough growth hormone such as NAA was applied on pedicel, it could prolong flower drop for only 3-4 days. NAA could not help to extend development of ovary until fertilization could take place. Interestingly, *Den. Jaquelyn Thomas* was used as female plant, none of the flower set seed pod. On the other hand, *Den. Emma White* was use as female plant, one cross was very successful. Cross between *Den. Emma White* and *Den. parishii* could yield progenies and these progenies could be employed in the study on phenotypic distribution. In addition to that, *Den. Sonia 'Red'* and *Den. Anna* could be crossed with *Den. parishii* and yield progenies although the amounts of vigorous progenies were quite small, it still showed the compatibility of the parental plants. Thus, introduction fragrant from Thai *Dendrobium* species into commercial cultivar, type of cultivar employed in breeding program has to be taken into account. In the future, several commercial cultivars will require to be tested for compatibility with the fragrant species.

Phenotypic distribution of progenies had been scarcely done on flower, especially orchid. Results from this study on certain character such as pseudobulb length, pseudobulb width, leaf

length, leaf width, number of leaves, number of flowers, inflorescence length, flower width and flower longevity could provide very useful information for future breeding program. Some of quantitative characters such as pseudobulb length, leaf length, leaf width, number of leaves and inflorescence length had their distribution in negative dominance. However, this kind of inheritance was good for breeding compact *Dendrobium* as potted orchid. On the other hand, some characters, such as flower width and flower longevity, presented additive genes action, which could help to improve bigger flower and longer flower longevity.

In this study, 20 primers were used for screening polymorphic bands. Four primers could provide polymorphic band which could be confirmed the relationship of parental plants and progenies in cross between *Den. Emma White* and *Den. parishii*. Moreover, one band was amplified on fragrant plants, which might have been marker for fragrance. Unfortunately, when other crosses between commercial cultivar and fragrant species were tested, none of the result confirmed the speculation. Therefore, more primer are needed for future study. On the other hand, number of plants, interaction of environment on phenotype and population size might have to be considered in this study as well. In addition, Kaiser (1993) showed the result of fragrant analysis of *Den. anosmum* in 'The Scent of Orchid' book. There were about 33 compounds contributing in unique fragrant of *Den. anosmum*. It provided the information that there would have been more than one single gene involving in fragrance of orchid.

The result from RAPD technique analysis revealed that fragrant marker could not be easily obtained. More primers are needed in order to screen for specific character like fragrance, which must have been quantitative genes that governed this character. Qualitative character, such as color of *Phal. equestris*, was governed by single gene, the amount of testing primers were 920 primers. In this study, only 20 primers were used and it was found that OPF 10 could provide one single band in the cross of *Den. Emma White* and *Den. parishii*. Even though, this band was not found in other crosses, which *Den. parishii* was also used as pollen parent, it could reveal that in the future feasibility in finding marker for fragrance would not be too difficult. Number of parental plants, number of progenies, species and cultivar employed in the study are taken into account in further study.