Harvesting Times of Orchid Seed Capsules for the Green Pod Culture Process

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The following article first appeared in the *American Orchid Society BULLETIN* in April of 1976. It has been edited to reflect current nomenclatural concepts

The early work of Knudson (1922, 1924 and 1925), demonstrating that orchid embryos could be grown in vitro without the intricacies of a host-fungal relationship, has played an essential role in advancing orchidology. The hybridizing potential found in orchids, both at the inter-specific and inter-generic level, has been utilized by amateur and commercial orchid growers to produce thousands of artificial hybrids. The desire to observe the resulting hybrids quickly leads to research and advances in in vitro culture techniques. The availability of large numbers of orchid seeds, with little or no food reserve and relatively uniform cultural and genetic characteristics, has prompted researchers to use orchid seeds for in vitro nutritional and developmental studies. These studies have led to many innovations in in vitro culture techniques.

Refinements in aseptic technique and equipment (Sauleda, 1970) have lowered the rate of contamination during seed sowing and replating. The development of specialized culture media (Withner, 1959), both defined and undefined, for germination of orchid seeds and replating has increased the number of seeds germinating and accelerated seedling growth rates. These advances and developments have contributed to a substantial reduction in flowering time. *Phalaenopsis* Blume, *Oncidium* Swartz and *Dendrobium* Swartz, usually requiring four to five years to flower from seed sowing, can now be regularly flowered in less than two years.

Another advancement increasing the germination of orchid seeds and reducing flowering time was the development of a green pod culture process (Tsuchiya-Itaru, 1954). In most laboratories this process has replaced, whenever possible, the dry seed culture process.

In the dry seed process, the seed capsule is removed from the plant at the first sign of dehiscence. The seeds are separated from the seed capsule, treated with a sterilizing agent and sown using aseptic procedure. A large number of seeds may be lost by contamination as a result of incomplete seed sterilization. Overexposure to the sterilizing agent may also cause excessive seed loss due to burning. The time required by the sterilizing agent to decontaminate the seeds without burning the proto-embryo is sometimes difficult to estimate. The effect of the sterilizing agent may vary depending on the genus and the age of the seeds being sown.

In the green pod culture process, the seed capsule is removed from the plant after fertilization, but prior to dehiscence. The surface of the seed capsule is decon-taminated with a sterilizing agent, the seed capsule is opened and the seeds removed and sown using aseptic procedure. During this process the seeds are not contaminated by exposure to air, eliminating the need for contact with a sterilizing agent and the possibility of burning the seed. The result is an increase in the number of seeds germinated.

The difference in harvesting time between the dry seed process and the green pod culture process may be as much as six to eight months in some genera. This reduction in harvesting time decreases the time required for flowering.

Harvesting time for optimal germination is a factor which must be investigated and controlled. The seed capsule should be removed from the plant after fertilization, but prior to dehiscence. This paper will show the results of investigations establishing harvesting time for optimal germination of orchid seeds using the green pod culture process.

Hybridizing records accumulated during a fifteen-year period were used to determine the approximate optimal harvesting time for 28 genera. The minimum harvesting time was

determined for each species group by using the least number of days at which good germination occurred. The maximum was determined by using the maximum number of days at which good germination occurred. In each case the mean was calculated from a minimum of four seed capsules.

Harvesting Times for Selected Species and Hybrids

Pistillate Parent	Optimum Harvesting Range (Days)	Mean (Days)
Cattleya labiata Group	130-180	171
Cattleya Bifoliate Group	110-150	142
Cattleya flava, cinnabarina, harpophylla	110-120	117
Cattleya xanthina, perrinii, purpurata	120-180	170
Laelia rubescens, anceps	120-150	127
Rhyncholaelia species	130-180	160
Brassavola species	120-150	125
Cattleya coccinea	75-100	96
Epidendrum species and hybrids	100-120	119
Encyclia species and hybrids	130-180	160
Broughtonia species	60-75	66
Cattleya hybrids Labiata Group (white, lavender, pink, white with colored lip)	150-180	175
Cattleya hybrids Labiata Group (yellow, orange, art shades)	130-150	141
Cattleya hybrids Labiata Group involving former species of Sophronitis	130-150	147
Cattleya hybrids Bifoliate Group	110-150	138
Oncidium species (true)	110-140	122
Trichocentrum species (including former mule-ear *Oncidium* species)	180-240	207
Trichocentrum species (including former rat-tail *Oncidium* species)	110-130	121
Psychopsis species	90-120	100
Trichocentrum microchilum, splendidum	130-170	160
Tolumnia species	65-70	65
Rodriguezia species	110-130	123
Miltonia species (true)	120-140	130
Dendrobium devonianum, lituifolium, anosmum	160-250	186
Dendrobium nobile and its hybrids	150-180	163
Dendrobium bigibbum (*phalaenopsis*) and its hybrids	120-40	131
Dendrobium stratiotes, superbiens and their hybrids	150-200	162
Vanda species and hybrids	150-195	182
Ascocentrum species and hybrids	110-180	152
Ascocenda hybrids	120-190	171
Vandopsis species	160-180	165
Phalaenopsis species and hybrids	110-120	111
Rhynchostylis species and hybrids	150-250	187
Aerides species and hybrids	150-180	162
Renanthera species and hybrids	150-180	167
Maxillaria species	120-140	121
Chysis species	140-180	156
Ansellia species	120-150	130
Cyrtopodium species	150-270	182
Phaius species	120-150	135
Bulbophyllum (including *Cirrhopetalum*)	140-180	165

RESULTS AND DISCUSSION

Results of crosses made between plants with differing harvesting times indicate that the pistillate parent is mainly responsible for determining the harvesting time.

The harvesting time for a bifoliate *Cattleya* was experimentally determined to be 120-150 days. When reciprocal crosses were made, the harvesting time for the crosses coincided with the

harvesting time of the pistillate parent. When the bifoliate *Cattleya* was the pistillate parent, the harvesting time was 120-150 days, and, when the unifoliate *Cattleya* was the pistillate parent, the harvesting time was 150-180 days. Reciprocal crosses between *Vanda* and *Ascocenda* hybrids and between *Oncidium* Alliance species with different harvesting times also indicated that the pistillate parent determined the harvesting time.

Optimal harvesting time was found to be specific not only to genera and hybrids but to species and in some cases to individual plants.

The time intervals listed are meant as general guides for hybridizers attempting similar crosses for the first time. Harvesting times vary as a result of complex interrelations between genetic and environmental factors. Individual breeders must make adjustments to compensate for prevailing local conditions. - *72500 S. W. 46th Street, Miami, Florida 33175.*

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My Notes:

Cymbidium 9mths july – sept / Gordon mar – apr – jan/feb danger period –

David Butler Den 6 – 8 weeks, if before 1 September count weeks from 1 September – likely to be closer to 6 weeks – Hot/Cold 10 – 12 weeks

Den can burst overnight from 8 weeks