

Twin Scale Propagation of Amaryllis Bulbs

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HISTORY

Amaryllis is the common name applied to hybrids and cultivars derived from various species in the genus *Hippeastrum*. They are from the family Amaryllidaceae (included in Liliaceae), and were from the genus *Amaryllis* when the initial hybridization was begun at the turn of the 18th Century. Later, when the genus *Amaryllis* was divided and these species were shifted to *Hippeastrum*, amaryllis was retained as a rather confusing common name

CULTIVATION

Hippeastrum species are mostly native to South America with some in western Africa. Hybrids of the Andean and temperate South America species are justly credited as being very hardy bulbs able to grow well in a very wide range of conditions. Amaryllises are winter dormant, flowering in mid to late spring (October/November), with leaf growth occurring with or immediately after flowering. Strong leaf growth then follows until mid to late autumn. In contrast, the "true" amaryllis, *Amaryllis belladonna*, is South African, summer deciduous, and blooms in late summer when leafless.

Mature bulbs generally have two flowering stems, about 40 to 60 cm tall, each with 4 to 6 flowers about 20 cm across. Colours range through all shades of red, orange, pink, and white, and include bicolours, and yellow.

Wet winters can be hazardous to bulb health, so most commercial open-ground growers lift mature bulbs in late autumn and store them indoors for sorting and sale. Young bulbs are evergreen until they reach maturity. They are normally left to grow under plastic cover for the first winter, greatly increasing bulb size.

PROPAGATION

Natural propagation is by offsets. Some cultivars average less than one offset per bulb per year, however the average is about 1.5 to 2. This makes the time lag for increasing stock rather lengthy and has led to development of more rapid methods of multiplication using tissue culture and twin scale production. One of the largest suppliers in the world, Hadeco Bulb Co. in South Africa, uses tissue culture to remove detectable viruses, and then twin scale propagation for multiplication.

The largest bulbs, those with a circumference of roughly 26 cm or greater, are selected for twin scale propagation. Not only can greater production be achieved from larger bulbs, but they will have definitely flowered the previous year so that rogues will have been removed. Leaves are removed and bulbs are lifted in late autumn. After lifting the bulbs are stored in racks or trays in drying rooms until surface dry. Drying takes up to 2 weeks and the bulbs will lose about 20% of their weight. This is very beneficial for twin scale propagation, as the scales of the bulb lose much of their crispness and become more flexible and less likely to snap.

Hygiene is important to prevent the spread of viral diseases. I use two knives — a medium kitchen knife and a standard grafting knife (without budder). The sap of amaryllis is quite slimy, so after each bulb the knife used is wiped with clean

paper, and the blade placed in methylated alcohol (spirits) while the other knife is in use. After removal of the blade from the alcohol, the residual alcohol is burned off the blade. There is some debate as to the effectiveness of this treatment.

The roughly pear-shaped bulb is tailed—removing the roots and root plate to the bottom of the outermost scale—starting with the kitchen knife. It is important for success that all scales remain attached to root plate. Next, the bulb is topped, removing the neck of the bulb to the beginning of its bulge. The dry onion-like outer scales are next peeled off along with any damaged fleshy scales. Damage normally shows as pink bruising, which mostly occurs from rough handling. The bulb is then cut into quarters by cutting through the centre of the root plate to the top of the bulb. Each quarter is then cut into 3 or 4 ‘chips’, again from the centre of the root plate to the top. This results in 12 to 16 chips (rather like a segmented orange). The procedure can stop here, as is commonly done when multiplying smaller bulbs such as *Narcissus* spp.

Each chip now consists of rows of scale segments attached to the root plate. At this stage it is often easier to prepare and use the smaller knife. The knife is used to carefully cut out unwanted bulb parts. The next season’s leaves will already be formed and are to the centre of the bulb. They are very thin, sometimes very faintly green with vertical veins and are removed. Flower buds (1-5 cm tall) will also have been formed, and will be towards the middle of several chips and must be removed. Any offshoot initiations should also be removed, as they will normally have been cut. Brown, rotten patches between chips are normally the rotten base of the previous season’s flower stems. These look alarming, but only need to be removed.

Finally, starting from the outside, each chip is cut into twin scales by running the blade between each pair of scales and cutting through the root plate. The aim is to work to the centre of the chip with each twin scale having a proportion of root plate. With the exception of the outside twin scales, any that crack from the root plate should be discarded. Also, it is often better to leave the centre group of 3 or 4 scales together as they are less successful than the outer scales. This procedure gives 50 to 80 twin scales per bulb. Each is capable of producing a new bulblet, with outer twin scales often producing 2 to 3 bulblets. An experienced operator can prepare 5 to 6 bulbs per hour.

The twin scales are placed in baskets to heal (become nearly dry to touch, about 1 to 2 hours) before being treated with fungicide. A 0.2% benomyl dip for 1 to 2 min has been most recommended and given me my best results. Some success has been achieved with sodium hypochlorite at 0.7%, but results have been erratic. No treatment will result in nearly complete failure.

The most popular medium is slightly moist vermiculite, achieved by adding 1.5 litre of water to each 10 litre of vermiculite. It is important that the medium not get any wetter, as rotting will result. The twin scales are mixed into the vermiculite at a fairly thick rate (about 1:2 ratio), so that each twin scale is just separated from the next by medium.

The medium is poured into trays (‘stores’ as they are called) to a depth of about 10 cm. Clean recycled polystyrene fruit boxes are ideal, as they can be stacked and still allow some air movement. Trays should be kept in a warm area (about 25°C) with high humidity, not in direct sunlight, and covered with plastic if air movement is too great. Trays should not be placed under mist although fog may be good. The aim is to protect the twin scales from drying out, yet not allow them to become wet.

Several other methods are in use. Some propagators put the vermiculite/twin scale mixture in sealed plastic bags. I always find that half the bags end up as fungal nightmares, but others swear by this system. Another good method is to use 15 cm deep trays, with about 5 cm of moist potting mix topped by vermiculite, into which the twin scales are inserted. With this method it is important that the scale bases not be pushed into the potting mix as they will begin to rot. The advantage of this latter method is that roots can grow into the potting mix and early bulblets can become established.

Within days the twin scale edges begin to turn red—this is a healthy sign. If they turn pink, it is an indication that rotting has begun, and a suggestion that the medium is too moist or that the fungicide treatment was not effective. It is generally considered that if the twin scales are still alive and healthy after 2 weeks then the procedure has been a success. Shortly after this a trained eye can observe bulblet initiation on the root plate either on the edge or in between the pairs of scales. The outside twin scales will produce more bulblets in a much quicker time than will inner twin scales. Large-scale operators often separate the two types and store them in separate trays. Bulblet development may take up to 12 weeks, and after this time bulblets can be planted out. Roots and leaves will soon be formed. It takes 3 to 4 years to reach a 2-flower stem sized bulb, but in that time 50 to 100 bulbs have been produced from each parent bulb.

AMARYLLIS AS A SALE PLANT

Open-ground growers currently realize about \$6 to \$10 wholesale for each dormant amaryllis bulb. This compares to \$1 to \$2 for hippeastrums. At Swan's Nursery we plan to trial the sale of amaryllis as young plants in small pots, using mature flowering plants as displays. Amaryllis can be forced into early flower from late winter (July) by the use of heated rooms, or delayed slightly by cool storage. Amaryllis bulbs can flower in 4 to 6 weeks when exposed to light and temperatures consistently above 20°C. Such treatments can result in display plants for about a 5-month period. There is currently a small demand for flowering plants in containers.

Due to the higher production costs of amaryllis it is important to select cultivars that are distinctively different from the common garden types. My favourite cultivars are:

- 'Apple Blossom'—pale pink fading to white centre, softly fragrant
- 'Basuto'—deep red
- 'Bold Leader'—bright red
- 'Carnival'—red and white striped, (difficult to sell, like garden types)
- 'Milady'—deep pink
- 'Intokazi'—tall pure white
- 'Summertime'—deep pink with white centres

Twin scale propagation can also be applied to many other bulbs. I have used it successfully with *Lycoris africana* (syn. *L. aurea*) (yellow nerine), *Muscari* sp. (yellow grape hyacinth), *Haemanthus coccineus* (blood lily) and *Nerine* cultivars. It is also used for \times *Amarine*, a relatively new generic cross between *Amaryllis belladonna* and *Nerine bowdenii*. Success is likely with many other tunicate bulbs.

REFERENCES

- Genders, Roy.** 1973. *Bulbs, a complete handbook*. Richard Clay Ltd, Great Britain.
Growing Amaryllis. 1981. *Grower Guide No. 23*, Grower Books, Great Britain.