The Successful Propagation of *Eucomis comosa* 'Purple'©

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As a propagator at the Diggers Garden club many requests each month are made for the production of new and exciting lines for both addition in our gardens and also for listing in future plant catalogues. The requests come in the form of a single 6-inch pot left at the propagation-room door, or often as an article left on my desk, an article torn from the latest industry journal highlighting a new way to do something or a plant that we simply just must have. A lover of plants I am and the thrill of success with something new, something, never cracked, something never propagated by myself, and most undeniably something that someone says that I won't be able to grow, is a feeling that I will never tire of.

The request for *Eucomis comosa* 'Purple' came in the form of a black plastic bag housing several bulbs the size of small basketballs. Arriving in late 2001 these bulbs were planted into a herbaceous border at Heronswood where they still stand today. This paper details my work that lead to the successful propagation of *E. comosa* 'Purple'.

INTRODUCTION

The genus *Eucomis*, of the Liliaceae (Hyacinthaceae) family consists of 15 species of perennial bulbs, related to *Scilla* and *Ornithogalum* (Bryan and Griffiths, 1992). *Eucomis*, from the Greek *eukomis,* which means beautiful headed (Bryan, 1989), is commonly known as the pineapple flower. The *Eucomis* taxa are classified as hardy bulbs that grow in a range of conditions and climates ranging from full sun to dappled shade, they can be grown in both tubs and the garden and make an excellent cut flower.

Originating from South Africa the species *comosa*, also known as *E. punctata* (Compton, 1987), will grow to 60 cm tall in spring with flower spikes reaching to over 1 m in summer. *Eucomis comosa* 'Purple' is a cultivar that has not yet become widely available in Australia. A cultivar called 'Sparkling Burgundy' is available from overseas nurseries (Crownsville, 2003) although no decision has been made as to whether this is the same cultivar that is now present in Australia. It has been suggested, however, that the cultivar available overseas may have been originally sourced in Australia and it has now made its way back into the country. The staff at the Royal Melbourne Botanic Gardens has given the cultivar name 'Purple' whilst parentage is determined.

The *E. comosa* 'Purple' has fabulous purple strappy leaves with slightly wavy edges and spotted undersides. These purple leaves make a wonderful addition to any garden and are offset only by the production of the pineapple-like flowers. Kinsey (2003) documented that as the purple leaves turn bronzy green, red flower stems soar skyward with hundreds of pale pink flowers that open gradually along the stem. *Eucomis comosa* flowers are a cylindrical inflorescence bearing a dense raceme of star shaped flowers (Griffiths and Bryan, 1992). The cultivar 'Purple' bears pale pink flowers.

MATERIALS AND METHODS

On the property at Heronswood we have several bulbs from various sources of *E. comosa* 'Purple'. Many of the bulbs had been obtained from avid plant collectors and others from botanical gardens. Trials were conducted from several sources of the bulbs that were located both in boxes in the nursery and also in the garden.

Why Leaf Cuttings? Several methods were investigated when determining the correct propagation technique for *E. comosa* 'Purple'. Seeds for the cultivar were not only unavailable but would also prove to be variable. Division of the offsets would certainly have been a practical way to increase plant numbers but not in the capacity that we were trying to achieve. Hartmann, et al. (2001) suggest that micropropagation offers commercial potential but facilities to accommodate such procedures were unavailable.

The Method of Producing *Eucomis comosa* 'Purple'. Stephens (2000) in our proceedings wrote that by taking leaf cuttings 8 to 10 cm long and placing the basal end in rooting medium with no hormone treatment, roots will from along the basal cut followed by small bulbs. These small bulbs will sprout foliage forming new plants.

The method of leaf cuttings was decided on the basis that I had plenty of material to work with and that plant produced by this method would retain spectacular purple leaf and pale pink flower colour.

Trial 1.

Date: 28 Nov. 2001.

Material: The cuttings were taken from nonflowering stock growing in poly boxes in the nursery. The stock was in a sunny position with regular irrigation and had been planted into what can be described as a general potting media.

***Cuttings*:** The cuttings were taken from the bottom two-thirds of approximately 50-cm long leaves and were approximately 5 cm in length. The sides of the leaf blade were removed and the cuttings received no hormone treatment. Seventy-eight cuttings were taken in total.

***Mix/Environment*:** The mix used was 1 peat : 10 perlite (v/v). The cuttings were placed into the main propagation tunnel in community trays, received 21 °C bottom heat and daily hand watering.

***Observations*:** Over a 3-month period no root or bud development became evident. The cuttings didn't rot and didn't show any signs of stress.

***Results*:** At 4 months the cuttings were thrown out. Whilst listening to a conversation about the trials, the nurseryman who was instructed to throw the cuttings out noted how he was intrigued by the species, how he had seen that they had done nothing for months but when disposing of them how he had seen evidence of small roots and basal swelling. The rubbish dump had of course been emptied. A very good lesson learned.

Trial 2.

***Date*:** 23 May 2002.

***Material*:** The cuttings were taken from the herbaceous border flowering plants.

The plants were growing in full sun to dappled shade, received regular irrigation, were mulched, and looked fantastic.

***Cuttings*:** The length of the cuttings stayed as with the previous trial, 5 cm, yet remained as a whole slice of the leaf without removing any of the leaf blades. Only the lower third of the leaf was used and cuttings again received no hormone treatment. One hundred and eighty cuttings were taken in total.

***Mix/Environment*:** As with the first trial the mixed used was 1 peat : 10 perlite (v/v) and 21 °C bottom heat was maintained. Irrigation was again as with the first trial although I endeavoured to keep the cuttings a little dryer than I had previously by watering only on every 2nd day.

***Observations*:** After a 5-week period several roots had started to develop along the base of the leaf cuttings. After 7 weeks it had become evident that small bulbuls were developing at the base of the leaf also. The cuttings were left a little longer and at 10 weeks it was easy to determine that each leaf cutting was going to produce an average of three bulbuls. At just under 4 months (13/9/02) the leaf sections were cut apart, each with a bulb attached, and potted. Most leaf sections also demonstrated some root growth. A total of 475 new plants were potted in total. The plantlets were potted into a regular square forestry tube in a standard potting medium.

The plants were placed into a growing-on tunnel for a period of 2 months and then moved into a position of full sun in our nurseries standing ground. By early 2003 it was evident that the bulbs would outgrow their original pots so they were transferred into a larger square tube. At this stage the roots had reached 15 cm in length and the plants displayed the distinguishing characteristics of the parent bulbs. As of 29 Feb. the plants had reached 30 cm in height.

RESULTS AND DISCUSSION

A dramatic difference in the results of the two trails can clearly be seen in the observations. These may be attributed to the following main differences between the trials.

Table 1. Trial characteristic comparison.

	Trial 1	Trial 2
Material	Nonflowering nursery stock	Flowering garden stock
Cuttings	Leaf blade trimmed off Lower two thirds of leaf used	Leaf blade remained Lower third of leaf used
Environment	Cuttings watered daily by hand	Cuttings watered every second day by hand
Timing	Cuttings taken late November when plant would normally be preparing to flower	Cuttings taken late may after flowering when plant is preparing for dormancy

At 9 months after the original cuttings were taken it is evident that the bulbs were large enough to hold over the dormancy period that was to follow. It had been suggested that *E. comosa* grown by seed would take 3 to 4 years to flower therefore I would assume that the *E. comosa* 'Purple' grown by leaf cuttings would take 3 years to flower.

The results indicate that taking leaf cuttings as the plant goes into dormancy may have a positive effect on the rate at which roots and small bulbs are produced. It would have been interesting to be able to identify any stress that may have been evident in the plants produced from Trial 1. I would assume that sitting in the hot bed for such along period of time would have negative effects on the growth of the new plants although no stress signs were observed before discarding.

The reduction in the amount of watering perhaps may have been simply compensating for the change in climatic conditions and may not have influenced the result. As the cuttings showed no signs of rotting it would be fair to say that overhead watering was not a negative factor.

The difference in the cuttings I assume has played a part in the difference in result also. Trial 1 was from nonflowering stock would indicate that the leaves were perhaps juvenile and by using the bottom 2/3 we reduced our rate of success even further. In the second trial where leaves from flowering stock were used cuttings were only taken from the bottom third of the leave blade. These factors would indicate that cuttings taken from the lower leaves of the older bulbs are going to be more successful.

In an effort to maximise propagation material my cuttings were shorter than had been suggested by Stephens (2000). In the next production season I will trial varying leaf cuttings lengths to determine if this has any effect of the number of bulbils produced.

CONCLUSION

With correct timing and mature leaf material *E. comosa* 'Purple' can be successfully propagated. Excellent strike rates and retention of favourable characteristics are achievable via this method of propagation.

When produced at the beginning of the plants dormancy period, leaf cuttings taken from flowering plants using the lower third of the leaf blade will produce 2 to 4 small bulbs. At 9 months after the original cuttings are taken healthy bulbs to 3 cm in diameter with roots and foliage to 30 cm in length can be produced.

Further work on the species, to be conducted in the next production season, will identify the effect of cutting length on the number of bulbs produced and also on the bulb size after one seasons growth.

Correct DNA testing and parentage identification will enable us to give the plant an appropriate name.

The plants were listed in the Diggers Perennial and Rose Catalogue in early 2003 and sales to date look very impressive indicating an interest within the gardening public in the cultivar.

In the completion of this research I learned two very good lessons: firstly, to have patience, and secondly, to take pictures of everything, because if it does work you might just want to show everyone.

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A Perspective on the Need for Intensive Breeding Programs for Ornamental Plants and the Role of Biotechnology©

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INTRODUCTION

One aspect about ornamental horticulture that is so enticing is the vast diversity of plants we have available with which to work. Most of these plants are unique selections or cultivars. If one asks the question "where do most of our cultivars come from?", the answer is not the same as one would get if the question addressed most agronomic, forestry, or vegetable crops. Our selections of ornamentals, especially woody genera, most likely are derived from chance finds or selections gleaned from the landscape or production fields by observant horticulturists. This source contrasts with the agronomic/forestry/vegetable producers, which most likely develop their selections utilizing intensive, structured breeding programs. Another question then arises: Should we use intensive, structured breeding programs more commonly to improve our perennial and woody ornamentals?

One obstacle to using intensive breeding for woody plants is the biology of perennial plants. The longer life cycles of perennial plants makes multiple generations of breeding not only highly time-consuming, but expensive. For example, a typical hypothetical woody plant may require about 5 years to commence flowering as a seedling. Three generations of breeding are often required to achieve the early goals in a program with each generation including at least three seasons for selection of traits. The final selections will need more extensive testing in out-plantings in multiple regions. Putting this altogether, it can easily require 25+ years to properly complete the early phases of a woody ornamental intensive-breeding program. Not only does such a time period encompass much of the professional life of the breeder, but also who is willing to predict the market demand for a product two to three decades down the road? This is especially difficult in a market where a wide diversity of plants is the norm, thus limiting the potential economic return from any single group of new releases. On the surface, undertaking an intensive-breeding program for perennial and woody ornamentals seems too risky and expensive.

The main goal of this presentation, however, is to argue the opposite position. I feel our industry needs to invest more into well-structured and intensive breeding programs for improving woody ornamentals. I feel that such approaches can generate far more "product" than might initially be perceived, thus making the "cost" much more reasonable. In addition, the incorporation of modern biotechnological methods can shorten the overall breeding cycle, thus making intensive breeding