flowers and the vase life extended by back breeding into the species. There are many points to consider, i.e. length of stem, number of flowers per stem, number of stems per bulb, etc.

The list of plants is endless, I am sure; most of the South African bulbs have hardly been touched by the hybridizer. South American bulbs and perennials, and Australian perennials all have a potential to be useful in our climate with selection and breeding, and a critical eye to the pitfalls on the way. In short, the field is vast for enthusiasts.

MICROPROPAGATION OF *XERONEMA CALLISTEMON*

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Abstract. A micropropagation method for *Xeronema callistemon,* a rare liliaceous plant endemic to New Zealand, is described. The explant material, consisting of the meristem sheathed in several leaves, was excised and sterilised. The trials were conducted with various media, supplemented with a range of cytokinins and auxins. The culture conditions were: light intensity, 2000 lux; photoperiod, 16 hr; and temperature, 25°C.

After preliminary stimulation on a medium containing full strength Murashige and Skoog minerals with 3 mg/l kinetin and 1 mg/l indoleacetic acid (IAA), shoot growth was best maintained on a medium containing 2 mg/l kinetin.

Shoot growth was dissected for further multiplication or transferred to a rooting medium containing half strength Murashige and Skoog minerals with 3 mg/l indolebutyric acid (IBA). The rooted plantlets were deflasked and gradually acclimatised to the greenhouse environment with a 98% success rate.

INTRODUCTION

Xeronema callistemon was discovered about 1920, on the Poor Knights Islands some 13 miles offshore from the North Island of New Zealand. The plants grow high on rocky windswept cliffs. Their closest and only relative is *X. moorei,* which grows in the mountains of New Caledonia.

X. callistemon looks very like a small flax plant with fan-like clumps of sword-shaped rigid leaves, each up to one metre long and 50 mm wide. In early spring (September) a stout flower stem appears, bearing a dense spike of bright red flowers up to 350 mm long, arranged in a brush-like cluster on the upper side. The flowers lack petals, but narrow red tepals hang below the pistil with the six stamens pointing upwards. From December the flowers mature into

dry brown capsular fruits with black spiny seeds. In cultivation, X. *callistemon* thrives best in a well-drained medium in rockerys or containers. It flowers after 10 to 15 years.

X. *callistemon* may be propagated from seed, although viability varies from year to year, or by division of the rhizomes. It is categorised as rare in the wild (1), although it is not uncommon in clutivation.

MATERIALS AND METHODS

X. *callistemon* plants were stripped of their outer leaves. The meristem, enclosed by several basal leaves measuring 10 to 15 mm, was excised. This explant material was disinfested with a wash in 0.6% sodium hypochlorite for 20 min., followed by three rinses in sterile distilled water, and a final dip in 0.2% sodium hypochlorite before plating.

The media trialed for shoot multiplication contained full and half strength Murashige and Skoog minerals (2) with Linsmaier and Skoog vitamins, 30 g/l sucrose, 7 g/l Davis agar, with the pH adjusted to 5.7. The strengths of hormones tested were 0 to 3 mg/l benzylaminopurine (BAP), 0 to 3 mg/l kinetin combined with 0 to 1 mg/l indoleacetic acid (IAA) (See Table 1).

The culture conditions were: temperature, 25°C; photoperiod, 16hrs; light intensity, 2000 lux. The plant material was subcultured each month.

The media trialled for root production were half strength Murashige and Skoog minerals with Linsmaier and Skoog vitamins, 30 g/l sucrose, 7 g/l Davis agar with the pH adjusted to 5.7 and supplemented with hormone levels of 0 to 10 mg/l IAA, 0 to 10 mg/l naphthaleneacetic acid (NAA), and 0 to 10 mg/l IBA.

Table 1. Media used in the micropropagation of X. *callistemon*.

Shoot proliferation:		
Full strength Murashige and Skoog minerals supplemented with:		
Myoinositol	100	mg/l
Thiamine HCL	0.4	mg/l
Sucrose	30	g/l
Davis agar	7	g/l
Kinetin	3	mg/l
IAA	1	mg/l
pH	5.7	
Shoot multiplication: full strength Murashige and Skoog minerals supplemented as above, plus kinetin, 2 mg/l		
Root elongation: half strength Murashige and Skoog minerals supplemented as above, plus IBA, 3 mg/l		

RESULTS

Within two months the explants showed a proliferation of bud growth on media with higher BAP, and with kinetin levels of 3 mg/l, in conjunction with IAA at 1 mg/l. Continued subculture on these media gave abnormal bud growth. Successful shoot production with a 3 to 4 fold multiplication rate each month was obtained using full strength Murashige and Skoog medium, with 2 mg/l kinetin.

Small clumps of shoots rooted most successfully on half strength Murashige and Skoog medium with 3 mg/l IBA, after 4 to 6 weeks. The rooted plantlets were deflasked and planted in seed trays containing a mixture of 50/50 peat/pumice-sand without fertilisers. The tray was enclosed in a plastic bag for 10 to 12 days then gradually hardened off to greenhouse conditions. It was important not to overwater. The survival rate was 98 to 100%.

DISCUSSION

The micropropagation of *X. callistemon* was devised in response to a demand for this rare plant. The seed is not always viable, and as the size of the "in vitro" plantlets at deflasking is the equivalent of two years old when produced from seed, micropropagation becomes a reliable and economical alternative.

Both juvenile and mature flowering plants have been initiated in culture, but as it is only three years since the first plants were deflasked it is still too early to determine whether micropropagation will shorten the time it takes to flower.

LITERATURE CITED

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