

NOTES ON PTEROSTYLIS PLUMOSA

E.D. Hatch

Pterostylis plumosa Cady belongs to an isolated section of the genus with several species and forms in Western Australia, only one of which extends to Eastern Australia and thence to N.Z.

The plants reproduce only by seed and not by multiple tubers; are very dependent on mycorrhiza and cannot be cultivated with any success. Round Auckland they are generally found on gum-clay, but sometimes on red sandstone (Karekare) and on volcanic scoria (Rangitoto). These dissimilar substrates however are all sterile and appear to abound in mycorrhizal fungi.

One of the characteristics of this species is that the seed often germinates in clusters of up to 14 plants in an area seldom exceeding 200 mm diameter. Solitary germination does of course occur, but the single plants tend not to be noticed until the rosette is well developed, or the plant is even in flower.

The seeds appear to germinate all at the same time but the young plants grow at varying rates, which seems odd in such a small area - although I have noticed a similar variation in the mycorrhizome clusters of P. brumalis.

Germination takes place after the autumn rains, and by mid-June the groups of seedlings are noticeable on the gum-clay beneath Leptospermum scoparium, or the horrible hakeas - Hakea sericea and H. gibbosa. During the first season some of the young plants will develop as many as 6 alternate, petiolate leaves on an erect stem up to 15 mm high, while others will not get beyond a single leaf. This erect early growth stage is reminiscent of the juveniles of some of the cauline-leaved pterostylids and may perhaps give us a clue to the evolution of the N.Z. grass-leaved species from an ancestral rosetted form.

The second season sees the development of the characteristic petiolate-leaved flat rosette. This rosette form, providing as it does a maximum area of chlorophyll for photosynthesis, produces a rapid increase in tuber size (1971).

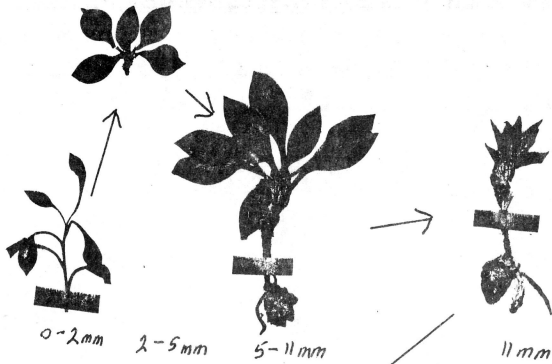
To take a specific case -

A tuber 5 mm diameter produced by 29 June, a juvenile-form rosette of 11 leaves with an overall spread of 37 mm. The largest leaf was 20 mm long (including 5 mm of petiole) and 7 mm broad. On 13 October (3½ months later) when the rosette dried off, the new tuber was 11 mm diameter and more than 10½ times the bulk of the original!

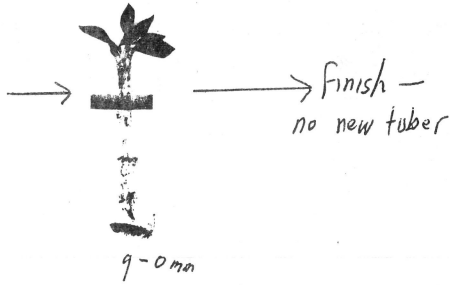
11 mm diameter incidentally is the 'rubicon' for this species, the size at which the plant 'changes into the adult form and produces a flower.

The uneven growth of the rosettes means that one plant in a group will sometimes 'go for flower' and begin to develop a flower stem direct from a flat rosette, without passing through the sessile-folded-leaf stage, which normally presages a flower. The plants are dependent on regular rainfall, and if as often happens, a dry windy spell of several weeks occurs in September, they will abort and dry off, even if they have got as far as forming a flower bud.

The seed has a penchant for germinating on banks and berms, and on the hummocks of dug-over gum-clay. The plants are subject to some natural



(figures indicate tuber size.)



Life History of *Pterostylis plumosa* Cady

1982 - 1986

[Signature]

hazards, drought and crumbling banks, and are often chewed (rabbits? opossums?); once by a weta which I caught in the act! Being both beautiful and conspicuous when in flower, they are also at the mercy of people and are dug up and trampled down. One seedling cluster I was carefully monitoring was buried under silt by a roadman intent on clearing a ditch.

There is a tendency (not invariable) for the plant to flower and die. I managed (years ago) to keep an Australian specimen in cultivation for 10 years, during the first 5 of which the plant flowered; the rosettes became smaller and the stems shorter, while the flower itself remained much the same (cf. 1949). Eventually only a rosette was formed, and this in its turn became smaller until the plant finally failed to appear. I have had less luck with N.Z. plants in cultivation. They will build up nicely to flowering size, followed by one or two seasons with small mature-form rosettes, then die.

In the wild, progressive deterioration after flowering also takes place, the rosettes of the following season being only half the size of those which produced the flower. None of my marked plants flowered 2 seasons running.

To return to our specific case -

On 29 June of the year following, the 11 mm tuber mentioned above had produced a mature-form rosette with 10 leaves, an overall height of 25 mm and a leaf spread of 15 mm. I examined this plant at more or less weekly intervals until seed-set, with the following results -

July	6	30 mm - overall height
	13	34 mm
	20	40 mm
	27	45 mm
August	3	51 mm - bud forming
	10	59 mm
	17	64 mm
	24	71 mm
	31	82 mm - lateral sepals showing
September	7	93 mm - bud exposed
	14	110 mm - bud free of the floral bract
	21	125 mm - ovary free of the floral bract
	23	- flower begins to open, lateral sepals pull away from the galea near the centre, exposing the yellow labellum-hairs, but remaining attached at the tips
	24	- lateral sepals and labellum horizontal
	25	135 mm - flower fully open, lateral sepals deflexed
	28	138 mm
October	5	145 mm - flower fertilised, lateral sepals folded back up against the galea as in the bud, but labellum remaining exerted, ovary 7 mm high x 3 mm diameter
	13	- growth finished, rosette leaves withering, ovary 7 mm diameter.
	24	- ovary dehisced, seed dispersing

The new tuber produced by this plant was 9 mm diameter, smaller than that with which it began the season. This 9 mm tuber (year 3 now)

produced in its turn a mature-form rosette with only 5 leaves - a much smaller plant than that produced by the 5 mm tuber at the beginning of the study. This was in fact its last gasp. No new tuber formed and the plant died.

The pollination mechanism is insect-attractive but on some sites, notably the western and southern coastal aspects of the Waitakere Ranges, the plants are subjected to severe wind-buffeting which is more than enough to shake the pollinia loose and deposit some grains on the stigma. Be this as it may, all the flowering plants I observed set seed.

REFERENCES

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A SHOWY LILY (LILIUM FORMOSANUM) ON THE MOVE?

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In mid February 1986 on the Coromandel Peninsula, I was struck by the showy, roadside and sand dune weed, Formosa lily (Lilium formosanum). It was present from the eastern end of the Kopu-Hikua Road, north to Cooks Beach (just south of Whitianga), being more common north of Tairua. Along the highway it was growing in roadside gravel, usually in small groups of separate plants, many kilometres apart. On the sand dunes at Cooks and Hotwater Beaches the lilies were locally abundant and often close together.

Flowering stems were about 0.5 m tall (sand dune plants up to 1 m) and had 1-2-(4) horizontally held, slender funnel-shaped flowers, 14-18 cm long; making it one of N.Z.'s longest flowered, wild plants. (Though it does not match the long-pendulous, white flowers of the angel trumpet (Brugmansia candida) which measure some 25 cm in length.) Leafy stems of Formosa lily are obvious in December and the flowers open January-March, flowers on the same stem open within days of each other. The flowers are scented, white, many streaked with purple on the outside and last some six days. The seed capsules are about 8 cm long; take about three months to ripen and are packed with small winged seeds. Wind and humans are probably the main dispersal agents of the seed but vehicle tyres (graders?) possibly assist.

The variety pricei is described by Syngé (1980) as a hardy dwarf usually less than 60 cm tall, flowering quickly from seed and with flowers which are more deeply suffused purple-chocolate (although this character is variable). Some flower within six months from seed (Harrison 1971). It also has fewer flowers (Bailey & Bailey 1976). Price collected this variety in 1912 at 2950 m A.S.L. on a Taiwanese mountain. The hardy plants of the eastern Coromandel and also of Auckland appear to be this variety, though some lack the dark streaked corolla.