

Breeding Bromeliads for New Zealand Gardens[©]

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INTRODUCTION

Since the 1800s bromeliads, particularly those with colourful inflorescences, have been widely grown for the pot plant market. However in more recent times some of the pattern-leaf types have become popular garden plants in warmer parts of New Zealand (NZ). The aim of this paper is to introduce you to the range of foliage patterns and colours that are appearing in N.Z.-bred bromeliads and to give my impressions on the factors affecting these foliage colours both in the nursery and the landscape.

BACKGROUND

The Bromeliaceae family consists of around 2,400 species in some 59 genera with more species being added on a regular basis as they are identified in the wild. While the vast majority of these are native to South America there are a few species found in the southern states of America and one in West Africa.

Bromeliads come in all shapes and sizes, ranging from the tiny, epiphytic Spanish moss, *Tillandsia usneoides*, to large terrestrial species like *Puya raimondii* which grows 3–4 m tall with an inflorescence up to 9 m. There are tough, spiny, desert-dwelling succulent bromeliads and soft, lush, tropical rainforest ones. Some have brightly coloured inflorescences while with others it is their patterned and coloured foliage that catches the eye. The most widely known bromeliad of all is the pineapple.

BROMELIADS IN NEW ZEALAND GARDENS

Until the late 1980s bromeliads were relatively uncommon in N.Z. gardens. A few such as *Billbergia nutans* and some *Neoregelia* species and cultivars could be found in some gardens, but most of the bromeliads in the country were held in private collections. Around that same time gardens created by Roberto Burle-Marx in South America featuring plantings of large terrestrial bromeliads were being publicised world-wide and leading gardeners in N.Z. started experimenting with them here. It quickly became obvious some bromeliads performed well outdoors in warmer parts of the country. So boosted by a trend towards subtropical style gardens, the quest for new taxa began. At Kiwi Bromeliads we chose to concentrate on the genus *Vriesea*, though we have also done some breeding work with *Alcantarea* and *Pitcairnia*, the latter as a cut flower.

We started with a fairly limited range of plants, including *V. heiroglyphica*, several forms of *V. fosteriana* and *V. gigantea*, a plant which in N.Z. is called *V. platynema* 'Variegata', and some hybrids mostly of unknown parentage. We chose deliberately to stick with those that made good outdoor garden plants, avoiding others, such as *V. splendens*, which though it has great foliage and flower characteristics does not have the cold tolerance we are looking for. All our production takes place in an unheated twin-skin plastic house. The only extra heat provided (to 18–20 °C) is for seeds sown in winter, using in-bench heating cables. Tempera-

tures in the greenhouse range from a high of 35 °C or more on summer days to an occasional low of 1–2 °C at night in winter, with all sorts of fluctuations in between. In summer we hang white 50% shade cloth above the plants and remove it again for the winter months.

COLD TOLERANCE

The aim is to produce hybrids that are as cold tolerant as possible. In the early years we used to think all vrieseas needed relatively warm conditions, but as time goes by we've learned that some of our hybrids have survived quite cold conditions with little or no damage. We've heard of them surviving temperatures as low as -4 °C (in Motueka, South Island, N.Z.) without damage, but that should be taken as an exception rather than the rule. Under the shelter of taller trees and shrubs where white frost crystals don't form on the foliage they should tolerate temperatures as low as -2 °C for very short periods. Last winter in Auckland our vrieseas survived a series of frosts unscathed while *Alcantarea imperialis*, vireya rhododendrons, and other subtropical plants nearby were damaged.

FOLIAGE COLOUR AND FORM

Architectural form, patterned foliage, and colourful tones are their stand-out features. So what makes for great colour? Generally, the three main factors affecting foliage colour and pattern intensity in *Vriesea* cultivars appear to be genetics, age, and light.

Genetics. Parents used in breeding will obviously pass on characteristics to the offspring. For example, *V. hieroglyphica* has shiny, recurved leaves with dark patterns while *V. gigantea* has upright, greyish, nonreflective foliage. Others taxa have a range of colour traits, such as red leaf tips, spots, or flushes of colour above or below the leaves. In some cases we can be fairly confident what the results of a cross between two parents will be, but in others it's simply a shot in the dark.

Age. Good things take time and the same applies to vrieseas. As the plant matures the colour and patterning intensifies. At point of sale a pattern-leaf vriesea is usually around 3 years old and only just beginning to reach its potential. As it grows larger the colour and patterning gets more pronounced. And at 2–3 years old vrieseas are not as slow growing as you might think, once planted in the garden they can easily double or triple their size in 12 months.

Light. While they can grow well in shade (even heavy shade) they can be equally as successful in quite bright light with the added benefit of more intense colouration. Experiments by local gardeners over the last few years have led us to realise many *Vriesea* cultivars can stand more sun than we had previously imagined. As a general rule, colour and patterns will be brighter and more intense in good light than in shade. But too much sun, for too long, can fade some colours and in extreme cases may even cause yellowing and leaf burn. Of course beauty is in the eye of the beholder — I've seen vrieseas that to me look faded from excess sun but other people find them very attractive. As a guide, partial shade with exposure to sun for part of the day seems best for most taxa, but each garden will have its own local variations in light intensity. Genetics also plays some part here, in that a cultivar bred from a shade-loving species, such as *V. hieroglyphica*, may be less sun tolerant than others, or depending on the other parents involved in the cross may have

increased sun tolerance. I have also noticed that once the plant is taken out of the greenhouse into the garden the colours often become more intense even though the overall light intensity outdoors appears to be the same or even slightly less than it was in the greenhouse. I suspect the filtering effect greenhouse plastic has on ultra-violet radiation is responsible.

Other factors that have a lesser effect on foliage colour are:

Nutrition. This can include the garden soil type, potting mix if you're growing in containers, and any fertiliser you might use. As a rough guide once planted in reasonable garden soil *Vriesea* cultivars need little extra feeding. If the foliage looks exceptionally pale or growth is very slow, then feed sparingly with a general garden fertiliser, preferably one containing relatively high levels of potassium (K). Excessive nitrogen (N) compared to K will lead to greener foliage with a loss of colour intensity but as the N is used up colours will return. So don't overfeed. If you do apply fertiliser, do it during a period of active growth such as spring and early summer, when there's plenty of moisture in the soil. In the nursery we use 100% granulated composted pine bark with Plantacote® 8-month slow-release fertiliser (NPK 14 : 8 : 15) as the main source of nutrients and regular foliar applications of NPK 21 : 4 : 17 at around 1,200 ppm.

Hybridising Time-Line. You need lots of patience. Our parent plants flower naturally in early summer (Nov. to Jan.) so that's when the majority of the pollinating takes place. You can force many bromeliads to flower using ethylene but in our experience with large mature vrieseas it isn't always successful, so we tend to leave them to flower naturally. For us the flowers open at night or early morning and are usually closed by mid-morning on the same day. All pollination is done by hand, even where we want self-pollinated seed, as in our conditions many vrieseas do not normally self pollinate. It takes up to 6 months for seed to ripen; they require light for germination, around 15–20 °C, and high humidity. After 6–12 months seedlings are ready for pricking out. At this stage they are green, showing no signs of foliage patterns or colour and around 10–15 mm high. It is often a further 12 months before young plants are ready for potting by which time some colour potential may be showing. But it's during the next 6–12 months (or more) that you really start to see the results of the cross you made. During the selection process that follows we select out what we think are the good ones, sometimes resulting in much of the offspring of a cross being destined for the compost heap and only a few offered for sale or further vegetative propagation.