

# PELARGONIUM TRICOLOR

A colourful candidate for cultivation

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Langeberg red-and-white form of *Pelargonium tricolor*.

Photo: Dave McDonald.

The major concentration of *Pelargonium* species is in the Worcester area of the south-western Cape. Radiating from this centre, *Pelargonium* species are distributed northwards into the dry karroid parts of southern Africa and eastwards along the southern coastal plains and mountains. A variety of growth forms have also evolved as species have adapted to different habitats. These growth-forms range from soft-leaved herbaceous plants to robust, tall woody species and from thick-stemmed succulents to cryptic bulbous geophytes.

Early explorers and plant collectors were soon intrigued by pelargoniums with their showy flowers and varied growth forms. These plants were consequently introduced into Europe early in the seventeenth century. Today the showy *Pelargonium* hybrids, which are often referred to as geraniums, are a feature of many gardens, patios and conservatories both in South Africa and abroad. However, apart from a few well-known species such as *P. cucullatum* and *P. betulinum*, interest in the cultivation of indigenous non-hybrid *Pelargonium* species has not been

widespread. This seems strange since many *Pelargonium* species are tolerant of a wide range of conditions and are therefore easily cultivated. On the other hand, there are those that present problems when attempting to cultivate them, and they have understandably been either ignored or avoided. An example of such a species is *Pelargonium tricolor*. But what is so special about *P. tricolor*? Let us explain!

## *Pelargonium tricolor*: the species

*Pelargonium tricolor* was first described in *Curtis' Botanical Magazine* in 1793 from plants that had been grown at the Royal Botanic Gardens, Kew. The seed was sent from South Africa by the early botanical explorer, Francis Masson. The plants first flowered in 1792 and Curtis published an accurate colour plate showing the two upper or posterior petals as red with black markings at the base. The lower petals were shown to be white, larger than the upper petals and, as Curtis observed, sometimes with a red stripe. Jacquin published a similar illustration of *P. tricolor* in his *Icones Plantarum Rariorum* in 1794 where he called the species *Pelargonium violareum*. However, since Curtis' name antedates that of Jacquin, the name *P. tricolor* takes precedence.

The temperamental nature of *P. tricolor* led horticulturists in the early 1800s to hybridize this species with other pelargoniums to "improve" it and make it easier to grow. In 1958 the hybrid cultivar, intermediate between *P. tricolor* and *P. ovale*, was named 'Splendide' by the Royal Horticultural Society. This hybrid has flowers similar to those of the *P. tricolor* parent and leaves similar to those of the *P. ovale* parent. But what of the striking but troublesome *P. tricolor*; why has the cultivation of this species not been more successful?

To answer this question let us explore the ecology of *P. tricolor* and see where that leads us in the "quest for zero defect" in its cultivation.

### Ecology and distribution of *Pelargonium tricolor*

Although Francis Masson collected material of *Pelargonium tricolor* from the Cape of Good Hope, the precise locality of his collection remains uncertain. Careful plotting of more recent collections shows that the species is found in Arid Fynbos vegetation on the dry aspects of the sandstone mountain outliers and perimeter mountains of the Little Karoo. The western-most recorded distribution is near Barrydale and the most easterly locality at Eseljagpoort south-east of Oudtshoorn. Curtis' illustration in 1793 was of the "classic" *P. tricolor*, but we now know that even though only one species is recognized, it has a fascinating array of flower colour forms and shapes throughout its distribution range.

In its natural habitat *P. tricolor* is a low shrublet up to 30cm in height with a spread of up to 25cm from the main stem. Plants tend to grow close to the ground under taller shrubs. *P. tricolor* plants are stimulated by disturbance such as fire. Immediately after a fire plants sprout vigorously from roostocks. The germination of soil-stored seed is also promoted by fire. A few months after a fire many seedlings are found where previously only a few old plants survived. A year to eighteen months later the rejuvenated old plants and the new plants reach prime condition. They then flower *en masse*, unhindered and unshaded by taller fynbos shrubs. Large amounts of seed are produced after this mass flowering which then replenishes the soil seed-bank.

As the other shrubby vegetation becomes more prominent in the vegetation succession, *P. tricolor* plants become smaller, less conspicuous and fewer in number. They produce fewer flowers and consequently less seed. Periodic fires are therefore important in the biology of this species.

### Flowers

The flowers of pelargoniums are generally irregular or zygomorphic with the upper petals often

much larger than the lower petals and streaked with patterns or "nectar guides". In some species the flowers are more regular (actinomorphic) but even in these the upper petals are differently coloured or marked. Usually the flower shape remains constant within a species but occasionally, such as in *Pelargonium tricolor*, flowers range from being distinctly irregular to regular, where the petals are the same size and regularly arranged. The irregular condition is, however, not entirely lost.

The striking flowers of *P. tricolor* are produced from early spring (August) to mid-summer (January) with a peak in October. The flowers are protandrous (the pollen is shed before the stigma of the same flower is receptive) and they also display heliotropism or phototropism (sun- or light-following). In addition, during the pollen-shedding phase, the flowers of some of the more open forms close to a certain extent at night.

A uniform character of the flowers is that they all have dark, either purple or black, warty spots at the base of the upper petals. Then, depending on the population, the flowers range in colour from those with upper petals red and lower petals white, through forms where all the petals display various shades of mauve to forms where all the petals are white. The crimson

and white forms are found furthest west (Langeberg: Barrydale), the white forms furthest east (Camfer and Eseljagpoort) and the intermediate mauve and streaked forms are found in populations dispersed in between the extremes.

### Pollination

At first glance the shiny warty spots on the *Pelargonium tricolor* petals look wet, suggesting the presence of nectar. What is the function of these embossed warty areas on the petals? It has been postulated that these warts might present a nectar reward for visiting insects that would in turn pollinate the flowers. The spots were chemically analysed for sugars and a negative result was obtained proving that the warts offered no reward to any visiting insects. Therefore what other possible function could the warts have?

A chance observation of a small black fly perching on the warts of a *P. tricolor* flower prompted an investigation to establish whether the warts have any role in attracting potential pollinators. A study conducted over three consecutive flowering seasons on the north slopes of the Langeberg near Barrydale showed that a species of fly, *Megapalpus capensis* (Family: Bombyliidae), with long mouthparts was a regular visitor to *P. tricolor* flowers. The flies usually landed on the dark warty



Rooiberg mauve form of *Pelargonium tricolor* flowering *en masse*.

Photo: Fiona Powrie.

spots, head downwards, and probed the short (2 mm) nectar tubes of *P. tricolor* flowers for the small amounts of nectar. In the process pollen was dusted onto the bodies of the feeding flies if the flowers were in the pollen-shedding phase. If the stigmas of the flowers were in the receptive state, the vigorous activities of the flies would ensure that pollen trapped on the bodies of these hairy insects would be brushed onto the stigmas. The conclusion of the study was that the dark warty spots on the petals function as "false nectaries" luring the *M. capensis* flies to the *P. tricolor* flowers. Although the fly *M. capensis* visits flowers of other plant species, it appears to have a strong attraction to *P. tricolor* flowers and it is considered to be the major pollinating agent.

### Cultivation of *Pelargonium tricolor*

The cultivation of *Pelargonium tricolor* has presented a number of problems but as it is such an attractive species, with potential as a pot plant, the pursuit of obtaining an "easy-to-grow", many-flowered variety is worthwhile.

The ideal *P. tricolor* plant must be vigorous and 'good-tempered', i.e. easy to grow. It should tolerate light shade (a highly desirable feature in a container plant), have attractive flower shape, colour and markings and have plentiful

flowers over a long period. None of the plants collected from the wild have all these characteristics. If the flower is good the plant is usually very difficult to grow. The most vigorous growth form has extremely cup-shaped flowers that hide the attractive markings. The best forms obtained so far are the "Rooiberg mauve" and the "Langeberg red-and-white", which could be enhanced by some additional vigour.

By hybridizing species one often obtains vigorous offspring. A similar effect can be achieved by crossing isolated populations of a species. Now that a wide range of *P. tricolor* forms are in cultivation at Kirstenbosch National Botanical Gardens, those which have highly desirable characteristics may be selected and crossed with forms that have characters the other parent lacks. Hopefully *P. tricolor* plants which will be ideal for cultivation will result.

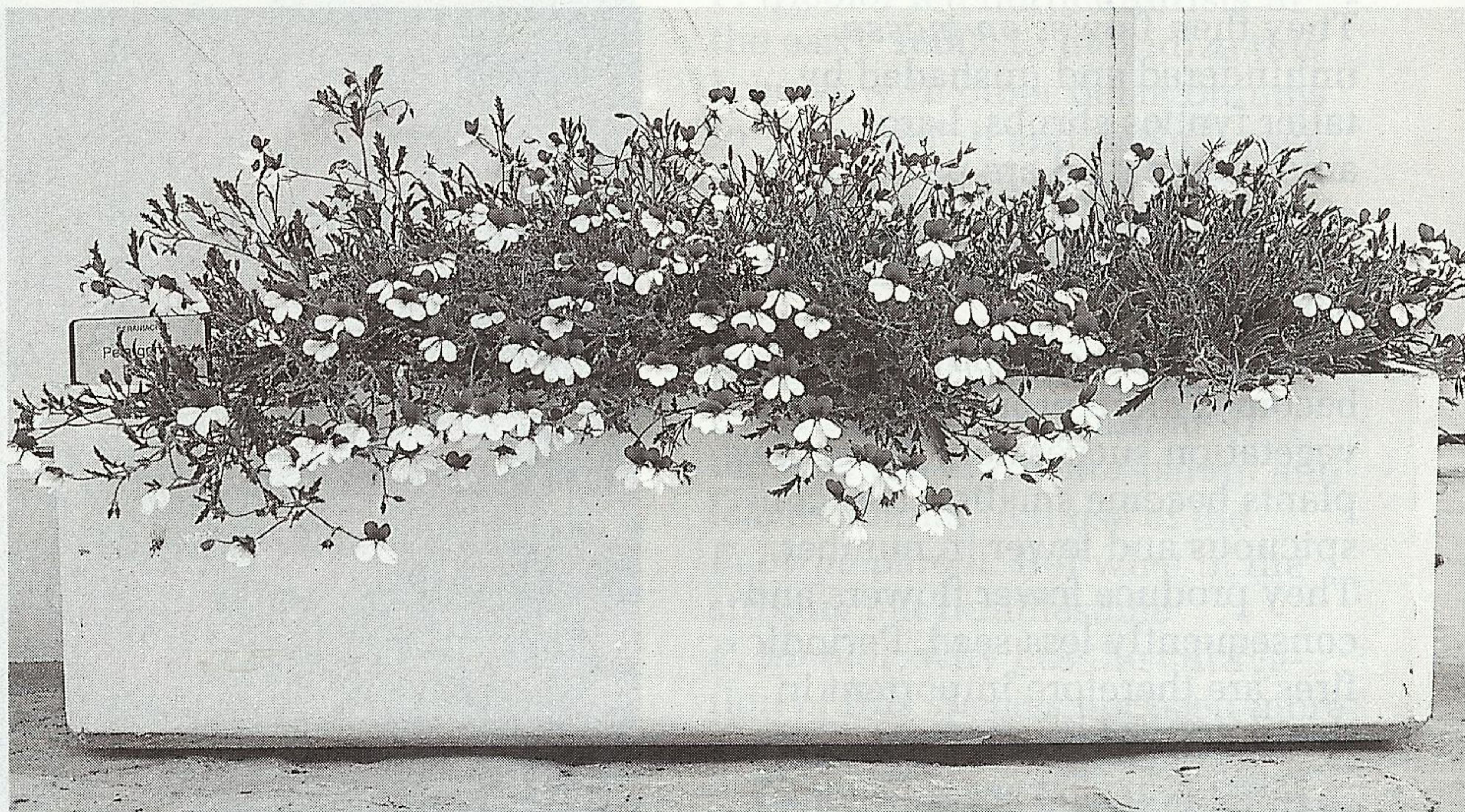
### Propagation by seed

Although many seed pods are set, very little viable seed is produced (this may be because the collection at Kirstenbosch, until recently, consisted of just one clone and self sterility could be the problem). Germination is poor, but may be improved by cleaning the seed and nicking the seed coat before sowing (hard seededness being a common

problem with pelargoniums). The seed should be sown in late summer or early autumn, at a depth of approximately 2-3 mm, in 10 cm deep seed trays filled with a light well-drained medium. Germination will take 10-14 days or longer if the temperature is not fluctuating through about 15°C between day and night. The seedlings can be pricked out into individual containers once they have produced two or three leaves.

### Propagation from cuttings

Fortunately 90 to 100% rooting of cuttings can be achieved, so it is possible to produce large numbers of clones from the original parent plants. Cuttings are best taken during periods of active growth. In the western Cape this is during autumn, although acceptable results are obtained at other times of the year. A cutting about 7 cm long should be taken and the leaves and stipules stripped from the lower two thirds. The bases of the prepared cuttings should then be dipped in Seradix No.2 (IBA 3000ppm in a powder preparation), and placed in a tray of coarse river sand. The completed cutting tray is treated with a fungicide such as Kaptan (5 g/5 l) before being placed in a cold frame or a sheltered spot. The cuttings should be kept damp but care must be taken not to over-water or they will rot and the success rate will



Above: *Pelargonium tricolor* displayed to good effect in a trough. Photo: Fiona Powrie.

Left: Eastern white, cup-shaped form of *Pelargonium tricolor*. Photo: Fiona Powrie.

be low.

Occasionally, within a few days of the cuttings being prepared, the sand around the cuttings will blacken. This is thought to be the result of the damaged plant tissues releasing phenolic compounds. A similar phenomenon is encountered when trying to propagate pelargoniums in tissue culture. These phenolic compounds are toxic to the plants so it is best to remove the cuttings from the tray, wash them well under running water and replace them in fresh sand.

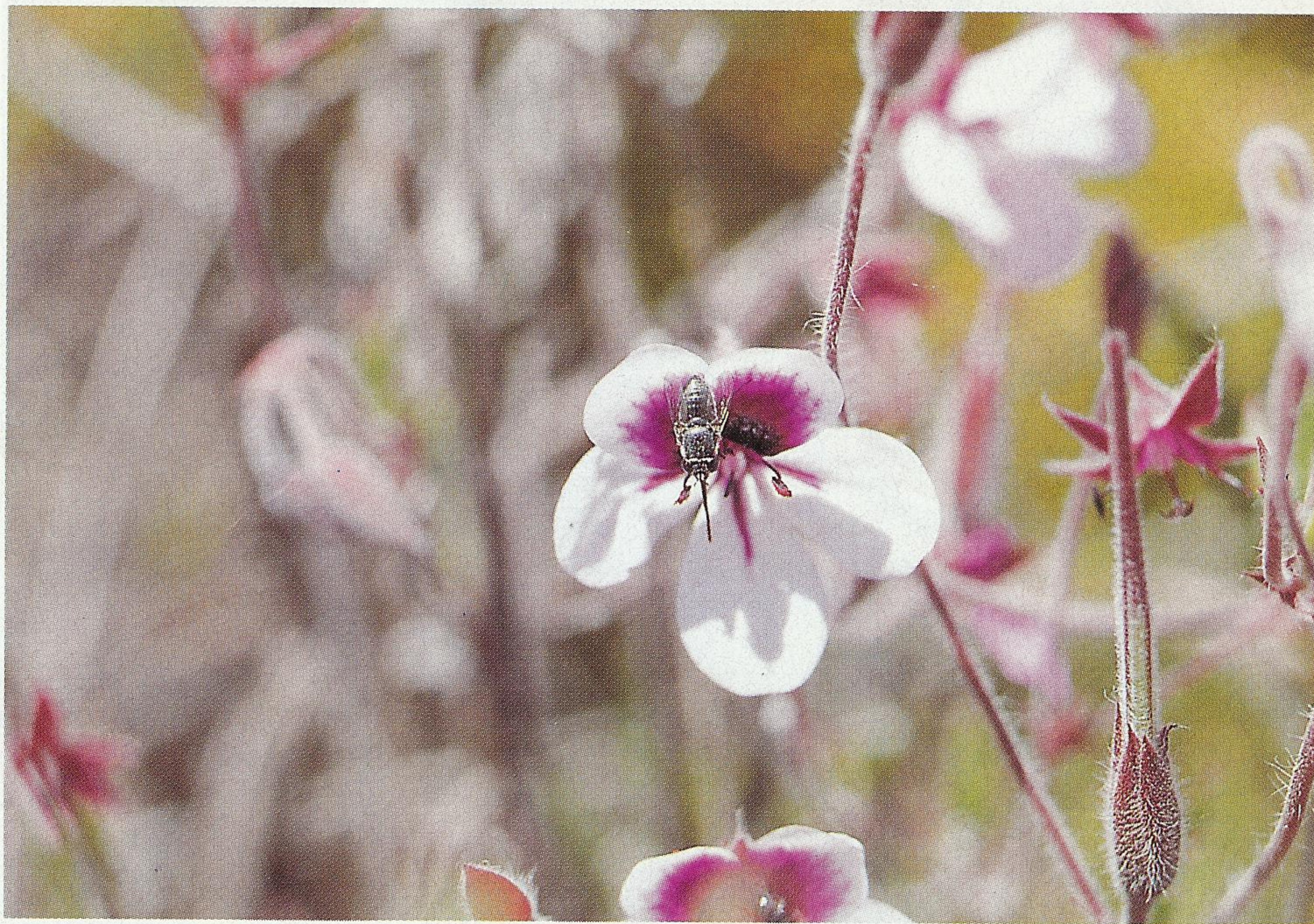
Rooting takes 4 - 6 weeks, followed by a two week hardening-off period when the cuttings are fed with a seaweed product such as Kelpak, at weekly intervals. This promotes root development. Potting of the rooted cuttings must be done very carefully as these plants are extremely sensitive to root disturbance and often die at this stage.

#### Cultivation

The natural habitat of *Pelargonium tricolor* indicates that it requires well-drained acidic soils, light shade, winter rain and hot dry summers. The difficulties with this species in cultivation suggest that it is not very tolerant to changes in its growing conditions.

The most critical factor in the care of these plants is watering. They are very sensitive to over-watering and must be watered only when dry. The frequency of watering varies depending on the weather, the soil mix used and the type of container. A plant in a clay pot with a very sandy mix, under hot windy conditions will need much more water than one in a plastic pot with a good loam soil, under cold, wet conditions.

A warm position with bright light but little direct sun suits *P. tricolor*. It will grow in a well-drained rockery in the western Cape if lightly shaded and should grow successfully as a garden plant in the drier winter rainfall areas with acid, sandy soils. Plants should not be allowed to become root-bound in pots. Regular potting on (once or twice a year) into a slightly larger pot with some fresh soil keeps the



Rooiberg light mauve form with streaked anterior petals and the pollinator, a fly (*Megapalpus capensis*) sitting head-down on the "warts" of the upper petals.

Photo: Dave McDonald.

plants in good condition. Care should be taken not to disturb the roots. These plants also do well when planted in a deep trough or planter. It should be kept in mind that the roots in nature would be cool, even though the aerial parts of the plant may be subjected to high temperatures. The soil in a pot may be subject to large temperature fluctuations and care must be taken that it does not overheat. Pots can be sunk into gravel to overcome this problem.

The Kirstenbosch collection plants are grown in half general mix 1:2:2 loam:compost:Philippi sand plus balanced fertilizer and half silica sand (3-4 mm). This mixture seems to suit the plants during the hot dry summers as well as overcoming many of the winter watering problems encountered when using the general mix only. Additional feeding of plants may be necessary during the active growing season. All the plants are grown in plastic pots.

Although *P. tricolor* requires careful attention for successful cultivation, it is not particularly difficult to grow. By understanding the ecology of the species many of the pitfalls encountered with its cultivation can be avoided. Unexplained deaths do occur among older plants grown in

pots, however; senescence (growing old) is a natural phenomenon in this species. This can be overcome by simulating the natural disturbance regime of intermittent fires, by cutting plants back. This rejuvenates the plants and the removed shoots may be used for cuttings. Using these methods the grower should easily keep the species in cultivation. The effort involved in the care of *P. tricolor* is well rewarded by five months of striking beauty when it flowers. ♀

*P. tricolor* plants are available from Kirstenbosch at the annual plant sale held every year in autumn. They will also be available at the Kirstenbosch Garden Shop, next to the parking area, during the Pelargonium promotion period from 3rd to 17th October 1992.

#### Further reading

Powrie, Fiona. (1989). Pelargonium propagation and cultivation. Kirstenbosch propagation notes  
Van Der Walt, J.J.A. (1977). *Pelargoniums of Southern Africa*. Vol. 1. Purnell, Cape Town.