River plant

Palmiet

***Prionium serratum*, a Cape river plant**

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LEFT: During a fire, the thicker stems of *Prionium serratum* are not killed and recover rapidly, and side shoots develop prolifically after the plants are burnt.

This useful plant should be encouraged in rivers because it is important to the basic ecology of Cape rivers, providing an extremely suitable microhabitat in which insects, fish and birds can shelter, feed and breed.

Sparrman's early description of this plant is very apt: 'a kind of acorus with a thick stem and broad leaves, which grow out from the top, as they do in a palm-tree, a circumstance from which the plant takes its name.' (*Acorus calamus* is a reed-like Asian plant introduced into Europe as an herbal remedy.) *Prionium serratum* was so striking to the early European settlers at the Cape that even Van Riebeeck made reference to it, giving it the common name 'wilde palmit' for the first time in the literature. One of the larger rivers in the Western Cape, the Palmiet River, which flows through the Elgin Basin, is named after this plant that grows in abundance in it.

More recently the status of this plant has been raised as taxonomists have removed it from the Juncaceae (rush family) to a family of its own with only one species in it, aptly called the Prioniaceae.

This robust shrub (or is it a herb or a short tree?) has stems growing up to 2 m tall. The 'stems' are actually branching, aerial woody rhizomes (as in an iris' root-stock). The remains of old leaves enclose the stems and serve to protect the plants from damage during floods when boulders and stones move down the rivers and collide with the stems.

The plants characteristically form dense stands that seem to be a grouping of separate plants but are often a clonal system of interconnected stems, usually originating from one initial plant through vegetative reproduction.

The grey-green, strap-shaped, pointed leaves, up to 1.2 m long and 30-40 mm wide, crowd together in rosettes at the ends of the stems, similar to the arrangement of palm fronds. The leaves have spiny serrations on their margins and central keels, which can give an unsuspecting person a nasty cut. New leaves, as an indication of stem lengthening, can occur throughout the year. According to Goldblatt & Manning (see further reading list) the tiny brown flowers appear in terminal clumps on 1 m-long stalks during spring and summer (September to February). Flowering is earlier in examples our group studied, starting in July and reaching a peak between August and October in the Mountain Stream section of the Breede River, for instance, and a bit later, namely October-November in its floodplain section. Floods during this period could have a negative effect on a particular year's seed crop. Many minute seeds are held in three chambered dry fruits till the end of March and are presumably transported by water as they are light and tend to float when scattered on water.

Ecology

At first palmiet seems to be a typical fynbos plant that is restricted to the acid, nutrient-poor rivers and streams originating in our Cape sandstone mountains, stretching from the Gifberg to Port Elizabeth. Further study, however, reveals that it is also found in southern KwaZulu-Natal rivers in Natal Group sandstone (Goldblatt & Manning). In complete contrast, is the unexpected disjunct (completely separate) occurrence of plants in the Okavango swamps of Botswana (Fox & Young).

In the Mountain Stream reaches of the Eerste River in Jonkershoek our group found that clump sizes of palmiet were smallest where high stream flow velocities prevail, that the largest clumps occurred in the Foothill Zone around Stellenbosch, while the clumps declined in size again till the plant disappeared altogether in the Floodplain Zone from Faure to the sea. Palmiet is totally intolerant of saline conditions, thus along the Eerste River the plant disappears as soon as the river flows through the saline Malmesbury Group shales and coastal sands. Along the Berg River the lowest occurrence of plants occur where the high spring tide salt water sometimes penetrates.

It grows in pool microhabitats along the Silvermine River, where flow velocities are probably slower and organic debris, providing nutrients, accumulates. Alluvial deposits tend to accumulate in the clumps of *Prionium*, probably because the plants tend to slow down stream flow.

Prionium tends to avoid densely shaded areas, particularly under alien invasive plants such as *Acacia mearnsii* (black wattle) and *Quercus robur* (European oak), and prefers direct sunshine.

Fires

Populations of palmiet along the Silvermine River in the Cape Peninsula seemed, initially, to have been devastated by the January 2000 wild fires. A study of the populations along this river revealed some interesting reactions to fire.

• *Prionium* plants can survive fire well, sprouting again from terminal and epicormic buds. Vegetative reproduction by budding new sprouts from its stems, which can root individually, or while connected to the main stem if it falls over, is a useful adaptation as fires occur naturally during the plants flowering period. Baboons were seen to pluck terminal shoots for food and drop sections into streams while eating. Some of these shoots root and establish new colonies.

• Flowering appears to be enhanced by fire as virtually all the stems that survived the January 2000 fire on the Cape Peninsula flowered earlier next spring than their unburned counterparts. Mature unburnt stands of *Prionium serratum* examined along the Riviersonderend River during the same spring had virtually no mature flowering spikes as insects had damaged most of them. Fire is not only rejuvenating to plants but also serves to control damaging population build-ups of insects.

• The number of stems in a clump killed during the fire appears to be directly proportionate to the size of the clump. As the clumps get larger so correspondingly more stems are killed. Stem deaths proved to be related to stem diameters and stems less than 8 cm in diameter are more likely to be killed by fire than larger stems. The ratio of small to large stems is relatively consistent, independent of clump size. Generally more stems survive a fire than are killed by it, except in local patches, for instance where heat radiates off large boulders in the clumps and causes severe damage.

• The close proximity of dense stands of both indigenous *Virgilia divaricata* or exotic trees (mainly *Acacia longifolia* and *A. saligna*) to *P. serratum* clumps causes their stems to grow longer and thinner than in open areas. High temperatures associated with the burning trees appear to make these palmiet plants more susceptible to fire damage.

• Sprouting from stems of burnt plants is far more extensive than in nearby unburnt plants. This is clearly a response to fire, which stimulates the plants to regenerate vegetatively. (Sprouting after fire is a strategy found in more than 60% of the fynbos species examined by Van der Merwe in Swartboskloof Jonkershoek.)

Problems

Palmiet is said to block waterways through filling them. Under natural conditions this belief could originate from the tendency of immersed stems rooted on the edges of the riverbanks to bend outwards over into the channels as water levels subside during dry

RIGHT: Melanie Withers with a mature *Prionium serratum* shrub. The 'stem' is actually an aerial, woody rhizome (as in an iris). The remains of old leaves enclose the stems and serve to protect the plants from damage during floods.

***Prionium* tends to avoid densely shaded areas, particularly under alien invasive plants such as *Acacia mearnsii* (black wattle) and *Quercus robur* (European oak), and prefers direct sunshine.**

Some farmers consider it to be a 'nuisance-plant' blocking river channels, but it actually stabilizes riverbanks by bending sideways against the banks during high flows protecting them from erosion.

Flowering in *Prionium serratum* is enhanced by burning. The brown flowers are very small, and appear in terminal clumps on 1 m-long stalks.

periods, creating the impression of invading the rivers, while the stems in fact generally fold back against the banks as soon as water levels rise and water flow velocities increase. Palmiet stems that are washed out during floods are considered to be a serious menace because they block bridges and dams. In actual fact they have a far lesser tendency to block structures than the rigid stems of exotic woody invasives, such as large *Acacia mearnsii* and *Eucalyptus camaldulensis* (river gum) trees, which tend to topple over into rivers and form major barricades blocking rivers.

Uses

Latrobe (c. 1810) mentions plaited straw hats made from the strong fibres in the leaves, while Pappe records that the bases of the leaves supply strong coarse fibre for brooms and brushes and suggests that the rest of the leaves have finer fibres that are useful for 'a variety of economic purposes'. (Any innovative entrepreneurs around!) The young rootlets are said to furnish a good dish for the dinner table and Botswana locals use the roots as a food source especially when their cereal crops fail. The roots are pounded between stones; the pulp is then separated from the fibres and cleaned to make a porridge.

Some farmers consider it to be a 'nuisance-plant' blocking river channels, but it actually stabilizes riverbanks by bending sideways against the banks during high flows protecting them from erosion. It also improves water quality by slowing the flow in rivers assisting suspended sediments to settle out.

Cultivation

During the restoration of the Du Toit's Kloof Road verges, following construction to upgrade the N1 between the Huguenot Tunnel and the Worcester exit from the valley, a number of crossings over streams and rivers had to be restored after being disturbed.

Prionium plants were an important requirement in the re-vegetation plan. Micky Levitt, the on site horticulturalist in this project, applied principles she had observed in nature, using water filled trenches exposed to full sunlight and lined with black plastic to lay down *P. serratum* stems to root. This copied the tendency of stems in pools to follow receding water during the dry season and settle on the exposed substrate where they set roots thereby expanding colonies.

The tendency to use rivers as conduits for transference of irrigation water during summer in the Western Cape (currently being done in the Berg and Breede Rivers) retards vegetative reproduction in *Prionium* because the stems do not get sufficient time to set root, because there is an unnaturally short period of low flow between releases of irrigation water.

This useful plant should be encouraged in rivers because it is important to the basic ecology of Cape rivers, providing an extremely suitable microhabitat in which insects, fish and birds can shelter, feed and breed. It also contributes to nutrient cycling along rivers and serves to protect banks from erosion and brings about the deposition of sediments.

Further reading

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The authors

Melanie Withers studied Botany at the University of Stellenbosch. Some information presented in this article was extracted from her third-year project along the Silvermine River. She recently handed in her M.Sc. thesis in Ecological Assessment, which evaluates the South African Riparian Vegetation Index in selected rivers in the Western Cape.

Charlie Boucher has been involved in research in Cape flora and vegetation for at least 35 years. He studied the vegetation in the Kogelberg Biosphere Reserve, Betty's Bay, for his M.Sc. degree at the University of Cape Town and the vegetation of the Western Cape's coastal foreland for his Ph.D. at the University of Stellenbosch. He has a particular interest in threatened Cape plants and alien invasive species and recently he has specialized in river and wetland vegetation in the Cape and in Lesotho. He lectures in Ecology at Stellenbosch University.