



A.4 SILKY HAKEA

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Silky hakea (*Hakea sericea* Schrad; family Proteaceae) is one of the most pernicious of the alien invasive weeds that threaten the indigenous vegetation on the many mountain ranges of the Southern Cape Province. Approximately 450 000 ha of the so-called Mountain Fynbos is infested with the weed which costs some R250 000 per annum to control. Mountain Fynbos is important for many reasons. Due to its unique nature and the rich variety of species, this type of vegetation is of tremendous scientific value. The variety and beauty of the plants also make the Fynbos esthetically and commercially valuable. By 1982 the wild-flower industry already had an annual turnover of R4,5 million. Silky hakea infestations are also important hydrologically insofar as they reduce water runoff in the catchment areas. Apart from very limited use of hakea in the dried-flower industry, the plant has no other uses.

Silky hakea is sometimes simply called hakea, and is also known as "naaldebos" (needle bush), "naaldeboom" or "speldeboom".

Morphological description

Silky hakea is typically an erect shrub, 2 to 3 m tall, with a single main stem and a crown which is formed by a large number of multiple-branched, densely foliated stems. However, in thickets it becomes a slender, more or less unbranched tree of some 5 m. From a distance a dense stand of silky hakea appears dark green and velvety and in misty weather or after heavy dew, the plants have a silvery appearance.

The young stems are covered with fine, short hairs while the older stems are smooth and void of hairs, with a brown to grey colour. The firm, leathery leaves are dark green, needle-shaped and smooth with a sharp tip which easily pierces the human skin and then tends to break off. The mature leaves are about 1 mm in diameter and up to 40 mm long and they persist on the tree for several years.

During flowering time - June to September - the plant is covered with small, cream-coloured flowers, giving the entire plant a white appearance. The flowers are borne singly or in clusters of two

to six in the axils of the leaves. Months before the plant flowers the buds swell and then remain dormant. The sweet-scented flowers attract insects, mainly flies, for pollination, but it is suspected that reproduction can take place even if the flowers are not pollinated.

The fruits, called follicles are borne singly or in bunches all over the plant. The fruits are woody, about 30 mm long and 25 mm in diameter and resemble walnuts, with a projection bearing two horns. The young follicles are green, soft and juicy, turning purple-brown with lighter crack-like markings, during the first year. The markings disappear with time. The follicles are accumulated on the plant over the years. When the plant dies - as a result of a fire perhaps - the follicles dehisce, releasing two rough, black, winged seeds, about 8 mm long and 5 mm wide.

Silky hakea infestations can easily be identified against the mountain slopes since they form uniform, dark-green patches between the natural vegetation which varies in colour and texture.

Two other *Hakea* species have been proclaimed weeds in South Africa, although they are not yet as common as silky hakea. They are rock hakea (*H. gibbosa*) and sweet hakea (*H. suaveolens*). The rock hakea has larger fruit, longer, thicker and more hairy leaves and the flowers are a deeper shade of cream than those of silky hakea. Sweet hakea can be distinguished by the clearly divided, hairless leaves, the shiny, speckled fruits which occur in bunches and the flowers that are borne on an elongated inflorescence. A third *Hakea* species, the common or so-called saligna hakea (*H. salicifolia*, also known as *H. saligna*) is widely grown as a hedge plant, but it is not regarded as an aggressive weed. It is easily distinguished by its broad leaves. The indigenous mountain cypress (*Widdringtonia nodiflora*) is sometimes mistaken for silky hakea, but although it also bears ligneous fruits, the leaves are not needle-shaped.

Distribution

Silky hakea is indigenous to South-Eastern Australia where it is found in Victoria, New South Wales and Tasmania. It also occurs in New Zealand and South Africa, where it is a serious pest. In its original habitat silky hakea does not normally form dense stands, but is kept in check by herbivorous insects. It grows mainly in the coastal heath or forms part of the undergrowth in the open, drought-resistant forests of the coastal mountain ranges of Australia. It is limited to acid, well drained soil types poor in nitrogen, phosphorus and certain trace elements. Silky hakea was imported into South Africa from Australia about 1830 and was originally used as a hedge plant. It was also used to control drift sand. Irregular pruning of hedges which led to seed formation caused the seeds to spread to the veld. The plant gradually began encroaching valuable grazing areas and was already proclaimed a noxious weed in 1925.

At present silky hakea occurs widespread along the coastal mountain ranges and the adjoining interior mountain ranges of the Cape Province, from Tulbagh southwards to the Strand, and from there in a wide strip eastwards along the coast as far as Grahamstown. It occurs as far as 100 km from the coast, threatening mountain ranges such as the Sederberg, Witzenberg, Hex River Mountains, Langeberg, Swartberg, Kammanassieberg, Suuranysberg, Kougaaberg, Baviaanskloof and the Great Winterhoek mountains. Isolated infestations have even been reported from Natal.

In broad outline the present distribution of silky hakea corresponds with the Bergfynbos areas which are mainly restricted to sandy soil formed from Table Mountain sandstone. It also occurs on mountain ranges in the winter rainfall areas or where rain falls throughout the year, and even on exposed sites near the sea.

Under ideal conditions the plant flourishes at the expense of any other vegetation, excluding indigenous bush and plantations. It requires a great amount of light and when growing under a dense leaf canopy it remains small and soon dies. It therefore rarely occurs in forests or plantations nor does it form dense infestations in Fynbos areas characterised by large plant species. It prefers rocky, mountainous areas where other vegetation is sparse and tends to spread on plateaux.

Although silky hakea originates from areas where the rainfall is distributed throughout the year, it nevertheless adapts very well to the Cape winter rainfall areas. The reason for this is probably that the summer drought is tempered by the moist south-eastern wind and also because the summers are fairly mild. The plants are also fairly resistant to drought although the leaves eventually become reddish during very dry periods and they may even die.

Growth and propagation

Silky hakea is well adapted to the growing conditions of the area in which it occurs. With adaptations such as the so-called proteoid roots it grows well on the mineral-deficient soil of this area. This characteristic, together with the fact that it has escaped its natural enemies from Australia, gives the plant tremendous advantage over the indigenous plants. It is also well adapted to fire. Proof of this is the protective ligneous follicle and the high rate of germination in the ash beds after a fire. After repeated veld fires the weeds will therefore progressively invade and eventually suppress the indigenous vegetation, giving rise to dense, impenetrable hakea thickets.

Silky hakea is exclusively propagated by means of seed, particularly after veld fires. It does not propagate vegetatively, although a tree that has not been cut down low enough could sprout again. Flowering time is in late winter, about June to September, but a few flowers are also sometimes formed in summer. The seed-bearing follicles do not drop when they are mature, but are accumulated on the tree. When the plant - or the seed-bearing branch - dies, usually as a result of fire, all the follicles dehisce within a few days due to desiccation and the winged seeds are released. Silky hakea produces large quantities of seed: a 16-year-old plant can bear more than 10 000 fruit, each containing two seeds, and seed densities of 1,5 million seeds per ha have been recorded for hakea plants.

The seeds are not dormant and can germinate immediately after release. Although the seeds remain viable in the fire-resistant follicles for many years, they do not survive for long in damp soil after release. The released seeds are also eaten by field mice and rats. Most of the seeds drop near the parent plant and give rise to dense stands after germination. However, the winged seeds can be scattered by wind, a fact which probably explains the distribution of silky hakea to isolated, remote mountain ranges. Although to a lesser degree, the seeds are also spread by water.

The vegetative growth of the plant reaches a peak during August and September. Flowers are usually only produced after the third or fourth year, and the plant can reach an age of 30 years or more.

Dangers

Hakea defaces the unique Bergfynbos with its rich variety of plants by forming monotonous patches of dark-green shrubs and certain endangered species are even threatened by extinction. The old, dry hakea stands are highly flammable and cause such hot fires that all indigenous flora and fauna in the vicinity are destroyed. Those regular veld fires - characteristic of the areas where hakea occurs - promote the distribution of hakea seeds even though they



FIG. 1 - A dense infestation of silky hakea against a mountain slope



FIG. 2 - The entire plant appears white at flowering time



FIG. 3 - A twig with flowers



FIG. 4 - The seeds are protected inside ligneous follicles

destroy mature plants. The fire releases the hakea seeds from the follicles, allowing them to germinate and, due to reduced competition from surrounding vegetation, the young seedlings have a better chance of survival. Moreover, field mice and rats which feed on hakea seeds, are also killed by veld fires. Since all the seeds produced by a plant during its lifetime germinate simultaneously after a fire, dense, pure stands of silky hakea result. These plants with their sharp, needle-shaped leaves make the mountain slopes unattractive and inaccessible to mountaineers. However, the young hakea plants do not have the same soil-binding properties as the indigenous Fynbos so that the danger of erosion after a fire is increased. Transpiration caused by the large amount of foliage in a dense hakea infestation considerably reduces the runoff to rivers and dams from such a mountain catchment area. In addition it is extremely difficult to eradicate silky hakea because of the large areas already infested, the inaccessibility of the terrain, the high cost of control measures and the shortage of labour.

Legislation

Under the Conservation of Agricultural Resources Act of 1983 (Act No. 43 of 1983), silky hakea has been proclaimed a weed throughout the Republic. This means that no-one may distribute the species or allow it to be distributed. Silky hakea is a prohibited weed in the Transvaal, Natal and the OFS, and may therefore not occur on any land in these provinces. In the Cape Province, where it is not a forbidden weed, it must, however, also be controlled.

Control

Since veld fires - which do occur periodically despite strict control measures - are the main reason for the spread of silky hakea in South Africa, it is very important that single hakea plants or colonies must be removed before a veld fire can cause the seeds to spread. Mechanical control is the quickest and most effective method to control silky hakea. When applied on a large scale, as is being done by the Department of Environment Affairs at

present, the trees are chopped down below the first branch, stacked and allowed to dry out for 8 to 12 months. In the interim many of the seeds that are now released are eaten by field mice so that only a small percentage of seed germinates. Subsequently the whole area is burnt down to destroy the young seedlings together with the dead plant matter. It is desirable to repeat this process after 2 years and thereafter every third year for the next 10 years and to remove any seedlings that emerge in the mean time by hand. In the case of smaller infestations, it is adequate to chop down the trees and to eradicate all seedlings by hand.

Although chemicals *are* registered for hakea control, their effect is unsatisfactory, among other reasons because of the side-effects of the chemicals on the surrounding vegetation, and the fact that the worst infestations occur on mountain slopes, a fact which makes aerial spraying extremely dangerous. Due to the needle-shaped leaves of the species, the leaf area which comes in contact with the poison is often too small to ensure effective uptake.

Three insects for biological control of silky hakea have been released. The main impact of these insects will be on seed production of the weed, but biological control has no direct effect on existing hakea stands. The effect of insect damage is only realised in subsequent generations of the weed, resulting in a reduced rate of spread and lower densities of the weed. Silky hakea is also killed by a fungus which causes gum to exude from affected branches. This fungus is widespread and has already killed off large infestations of the weed.

Two natural obstructions can be used to check the northward spread of silky hakea, namely the Breede River and the Langkloof with its westward continuation into the Little Karoo. The weed has already crossed these barricades, but some of these infestations can still be eradicated, e.g. those on the Rooi Mountains and the Langeberg. Although other infestations - those at Ladismith on the Small Swartberge, the Van Stadensberg and the Grahamstown area will be difficult to eradicate, it is nevertheless possible to prevent further spread.

More particulars about the control of hakea will be found in Leaflet No. A.4.1 of this series.