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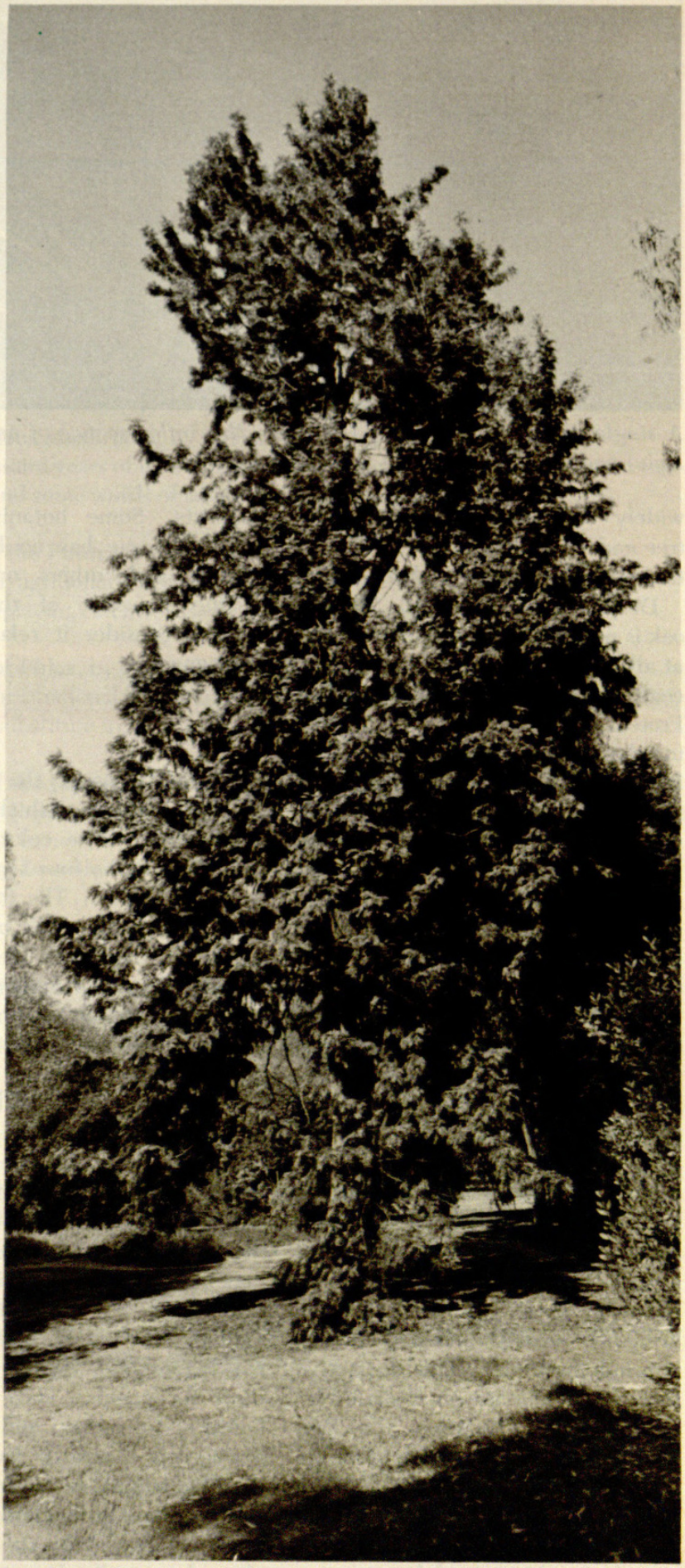
Plant Portraits: The Silk Oak

Grevillea robusta



In the continual search for uncommon house plants, people have explored the possibilities of using young trees. Among the few trees which can successfully be grown indoors is the silk oak, *Grevillea robusta*. Its chief attraction as a house plant is its evergreen, fernlike leaves, which are dark green above and silver-white on the undersurface. Only seedlings are grown indoors and they grow rapidly, soon becoming large specimen plants. They grow too large for indoor use in a year or two, but since the seeds germinate readily, it is easy and certainly worth the modest effort to start new plants each year. In areas of mild climate, such as Southern California, young trees may then be planted out in the landscape where they are valued for their springtime display of brilliant orange flowers.

Aside from its usefulness as a houseplant and as a landscape tree, the silk oak was at one time a valuable source of cabinet wood. In fact, it is because of the characteristics of its wood that it was given the common name of silk oak. In the early 1800s, lumbermen around Moreton Bay in Queensland noticed that the wood of *Grevillea robusta* greatly resembles English oak in the color and pattern of its grain but when newly cut has a definite sheen or silkiness which English oak does not have. From this the loggers named it the silky oak (usually called silk oak outside of Australia). The beautifully patterned wood was widely used for furniture, indoor fittings, and coach building. It was also used for barrel staves due to its elasticity and its reported capacity to hold nails well. As more and more of the trees were logged, the natural populations were decimated, and the wood of a different tree, *Cardwellia sublimis*, is now marketed as silk oak. *Grevillea robusta* is in no great danger of extinction, however, since it is

A single, finely-dissected leaf (a); fruits (b); inflorescence of numerous small flowers (c) showing closed (arched style) and open (erect style) flowers of G. robusta. *Photo by William Aplin*

widely cultivated as a landscape tree and houseplant in many areas of the world, including its homeland.

Despite its common name, the silk oak is not closely related to true oaks at all. It is a member of the Proteaceae, a family of plants named after Proteus, the sea god who was able to change his form at will, thus alluding to the baffling diversity of species. It is a family of some 1400 species of trees and shrubs (rarely herbs) and includes such well known ornamentals as *Protea, Grevillea, Hakea, Stenocarpus,* and *Macadamia ternifolia,* the macadamia nut tree now widely grown in Hawaii (representatives of each of these genera may be seen at the Los Angeles State and County Arboretum). The members of this family occur naturally in dry regions of the southern hemisphere only, particularly South Africa and Australasia, with a few representative in South America. Many are highly ornamental because their flowers are borne in large clusters, are often brilliantly colored, and have a very unusual structure. The distinctive structure of the flowers is shared by all members of the family. The Proteaceae, like many other families which have a relatively uniform floral morphology, appears to be isolated and its evolutionary affinities are often subject to debate among botanists. Some botanists believe the Proteaceae has no living close relative while others, on the basis of the structure of the peculiar flowers, consider it related to the Elaeagnaceae.

THE MEMBERS of the Proteaceae have flowers which have no petals at all. The colorful part of the flower is the four sepals (which look like petals). The four stamens are fused to the sepals opposite the lobes, and the sepals are fused into a perianth-tube or hypanthium. The ovary is simple (composed of a single carpel) and is often borne on a short stalk or stipe. In *Grevillea* the perianth tube is split down one side and curves down and away in a tight spiral. Before the flower is fully open the style arches up and out of the slit in the perianth but the stigma is held securely in the pouch-like tip of the perianth and is surrounded by the pollen-bearing anthers. The anthers shed their pollen before the stigma is released from its pouch. Thus, when the flower is fully open and the stigma is released, it already has pollen on it. The stigma is not receptive at this time and pollination and fertilization (followed by the production of seeds) usually do not occur until a bird visits the flower in search of food. When the bird inserts its beak into the flower to obtain nectar, the stigma touches the bird's forehead and deposits its pollen there. As the bird flies from plant to plant it carries pollen on its head ensuring effective cross-pollination and the production of seeds.

The relationship between the plant and the bird is somewhat mutualistic because both organisms benefit from the relationship. The bird receives food (nectar) provided by the plant while the plant is assured of reproductive success. A classic example of this kind of relationship is provided by one of the South African sugarbirds, *Promerops cafer,* which is completely dependent on flowers of certain species of *Protea* (*P. mellifera, P. incompta, P. longiflora,* and *P. scolymus*). The bird lives in the same habitat as the proteas, consumes the nectar secreted by the flowers, uses the fluff from the inflorescences to line its nest, and its peak breeding season coincides with the flowering period of the proteas. These birds are unable to adapt to any other food source and, as a result, they are dying out as increasing human population pressure forces agriculture to displace the proteas.

In addition to birds and bees, other animals such as butterflies,

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bats, and hawkmoths also visit flowers to feed on nectar. Plants which are specifically adapted to one particular kind of these animals frequently have a syndrome of floral features which attracts that animal to the exclusion of most others.

Many flowers visited by birds, for example, are bright red or scarlet-orange, colors which birds see well and are attracted to. Bird flowers are often long, narrow, and tubular, permitting a bird's beak to reach the nectar, but are often too narrow and deep to allow bees to enter the flower. Another characteristic feature of bird flowers is that they produce copious nectar. The South African proteas are called sugar-bushes or honey-pots because they produce such great quantities of nectar that it is easily collected in containers and consumed by the natives.

Features of the flowers such as color, shape, and the amount of nectar, are effective mechanisms to attract specific pollinators only so long as the plant is growing in its native habitat and has only to contend with animals which evolved in the same region. The precision of the floral mechanism often breaks down when plants (and animals like honeybees) are cultivated in regions other than those to which they are native. Several Australian species of *Grevillea* are cultivated in California at the Los Angeles State and County Arboretum. Many of these species are adapted to pollination by honey-eaters and spine bills, birds which are well represented in Australia but which do not occur in California. Honeybees, originally native to Southeast Asia, are also cultivated in California and visit several species of *Grevillea* in large numbers. However, the honeybees are too small to effectively pollinate the flowers and so are essentially robbing the plant because they consume the nectar provided by the plant and give nothing in return. Apparently there are few species of bees in Australia to compete with the birds for nectar. Thus, *Grevillea* species have probably never had to cope with nectar-robbing bees before and have not evolved burglar-proof flowers. Interestingly, hummingbirds, which are found only in the New World, also visit *Grevillea* in California and seem to be very effective pollinators. Were it not for the hummingbirds, some species of *Grevillea* cultivated in California would not be able to reproduce.

The silk oak rarely flowers when grown indoors, but mature trees grown outdoors are capable of producing a grand spectacle in springtime. Flowering is often erratic, however; in some years there may be a glowing spire of yellow-orange flowers, in others there may be only a few. The tree may drop its leaves before flowering, especially during dry periods, and the flowers are then even more conspicuous. It does not bloom as well along the coast as it does inland in hotter, drier areas.

THE SILK OAK does not get as tall in cultivation (50 to 60 feet) as it does in the wild (to 150 feet) but it should never be planted under transmission wires. A fast-growing shade producer, it is a good temporary tree to fill in for a slower growing, and sturdier species. It may also be used as a quick, tall screen, or clipped as a hedge. It will tolerate a fair amount of water if the soil is fast draining, otherwise it should be kept on the dry side (do not plant it in a lawn), and will thrive in poor and compacted soil. As a house plant, the silk oak does best in filtered light and cool temperatures (50-60°F). It requires ample water and good drainage. Any standard potting soil will suffice. Young trees planted outdoors may show some damage at 24°F; older trees are hardy to 16°F.

The only serious fault of the silk oak is its brittle wood. It is easily damaged in high winds and is not a good street tree unless the structure of the tree is strengthened by judicious pruning when it is young. Although it is evergreen, it has a habit of dropping a few leaves throughout the year. This is more of a nuisance than a fault, but this habit and its brittle wood diminish its usefulness and may relegate it to out-of-the-way areas. It has also been identified as the causative agent in some cases of contact dermatitis.

Several very large specimens of *Grevillea robusta* may be seen on the grounds of the Los Angeles State and County Arboretum. There are three large trees in the Australian section (C7) which have flowering branches close enough to the ground so that the curious flowers may be observed at close range. Although individually the flowers are small, they are sometimes produced in such abundance that the entire tree glows yellow-orange from a distance. The color of the flowers contrasts beautifully with the dark green foliage and can be striking when combined with a blue flowering tree such as *Jacaranda acutifolia*. Although the silk oak is perhaps too large and its wood too brittle to permit planting it in small gardens close to walks and houses, its tolerance of drought, poor soil and neglect, along with its occasionally spectacular floral display, are valuable features which should not be ignored. Ornamental plants which consume little water are almost certain to play a larger role in the future of horticulture in Southern California, especially if the drought we are currently experiencing becomes more severe and water rationing becomes imperative.

Dr. Deardoff is a member of the Department research staff involved in taxonomic studies.