Dalea—A Genus of Horticulturally Promising Legumes For Desert Landscapes

Greg Starr
Starr Nursery, Tucson, Arizona

Abstract

Dalea is a member of the family Leguminosae which includes many commonly cultivated plants used in southwestern desert landscapes. With 166 described species, it is surprising to learn that until recently Dalea has largely been neglected horticulturally. In this paper I discuss seven promising species that have been tested in landscape situations for five years. These include six shrubs and one spreading groundcover. All except the groundcover are extremely showy when at the peak of flowering. Each species is unique and all are highly recommended for landscaping in arid regions of the world.

Introduction

My interest in daleas as desert landscape plants started eight years ago when I began working as a horticulturist for the University of Arizona. I was working with Professor Warren Jones who had previously collected and introduced Dalea greggii to the nursery and landscape industry in southern Arizona. After observing and further evaluating Dalea greggii, I started searching for other daleas in southern Arizona and northern Mexico. After a few collecting trips, it became apparent that there were quite a few species of Dalea from this region that would be suitable for cultivation in the desert southwest.

A review of the literature of the last 100 years revealed that Dalea had been neglected horticulturally. Only five sources list any species of Dalea (sensu Barneby, 1977; see below) Nicholson (1887–1889), listed one annual and two shrubby species that had been in European cultivation, none of which have been found in cultivation today. In 1928, Bailey mentioned the same two shrubs given by Nicholson. By the time Bailey (1941) compiled Hortus II there were three other shrubby daleas in cultivation, of which only Dalea frutescens has been found in southern Arizona horticulture today. In 1949, Bailey treated one species and in 1978, Bailey listed three species, none of which seem to be available today. In the Western Garden Book, Clark (1979), only listed Dalea spinosa which Barneby placed in the genus Psorothamnus.

Dalea, often commonly called Indigo Bush, is named for the English botanist Dr. Samuel Dale (1659–1739). As defined by Barneby (1977) it consists of 166 described species which range from southern Canada south through Mexico, and into South America from Colombia to Argentina and northern Chile. Some species are found in the Caribbean, and one on the Galapagos Islands. In 1977, Barneby treated 161 species of Dalea, and has since described five new species, three in 1980 and two in 1981.

Generic Description

The genus Dalea is composed of annual and perennial herbs, and small to large shrubs. The plants are generally covered with glands which contain aromatic oils. Leaves are compound, either trifoliolate or odd-pinnate. The inflorescence is variable, flowers may be arranged into a dense, ovoid shape as in Dalea pulchra, they may be arranged in an elongate, conelike form as in Dalea bicolor var. ocurrantiana, or an elongate, cylindrical shape as in Dalea versicolor. Individual flowers are subtended by a bract and two small bracteoles, none of which are usually

Acknowledgements

I am grateful to many people who have helped me put this together. First to Professor Warren Jones for bringing the landscape value of Dalea greggii to my attention, and for his timely recommendations. Also thanks to Rebecca Van Devender and Dr. Charles Mason for their reviews and helpful suggestions in early drafts. Special thanks to Dr. Richard Felger who made many valuable suggestions and helped me see the paper from a different perspective. I am extremely grateful to Ron Gass for sharing his knowledge and plants, and providing the opportunity to make a collecting foray into the Chihuahuan Desert Region. Many thanks go out to Tony and Martha Burgess, Ray Turner, and the rest of the expedition to Baja California. Thanks also to Gene Joseph and Jane Evans for dragging me along into the Huachuca Mountains. Finally thanks to my wife Carol for her support and tolerance of my collecting and experimenting.
Landscaping Photographs of Dalea Species Discussed in Text. See Page 29 for Close-up Photographs of Flowers.
noticeable. The ten-ribbed calyx is either glabrous or pubescent with five ribs extending into noticeable teeth. The corolla consists of five petals representing the banner (upper petal), the wings (two side petals), and the keel (two lower petals). The banner may be blue, purple, or pink and match the wings and keel, or it may open white or yellow and darken with age. The small one seeded fruit is usually hidden in the mature calyx.

Currently there are seven distinctive species of Dalea in cultivation in southern Arizona. Differences include growth habit, flowering time, length of flowering season, profusion of flowers, and density of individual plants. Once recognized, these differences make it easy to tell the species apart. Although distinctive, they are similar in some of their landscape requirements. All are frost hardy in Tucson except Dalea bicolor var. orcuttiana [see below]. All the species are reasonably drought tolerant after they become established. Although water requirements vary with soil type and season these plants generally thrive with drip irrigation. Irrigations may be spaced one to two weeks apart in summer and two to four weeks apart in winter. Most grow best in full sun. In these seven species the petals are bicolored, the banner opening white, cream or yellowish and darkening with age to match the wing and keel petals which are various shades or combinations of magenta, rose, pink, or purple. The various combinations are noted below.

Species Accounts
Dalea bicolor H. & B. var. argyrea (Gray) Barneby. SILVER DALEA.

This variety of D. bicolor is a low rounded shrub, reaching a maximum height of about one meter, but usually only about 60 cm tall. Leaves are 1–3.5 cm long with 7–13 densely velvety-pubescent leaflets, each about 3–9 mm long. The leaves give the plant a striking silvery-gray appearance. Flowering is in fall; the spikes are compact, at first ovoid, later cylindroid. The calyx is about 4 mm long and densely short pubescent. Wing and keel petals are bright rose-purple. [Barneby, 1977; Correll & Johnston, 1970]. Native to the Chihuahuan Desert Region from New Mexico and Texas, south into northeastern Mexico.

D. bicolor var. argyrea was first grown in southern Arizona in 1970, but misidentified as D. oaxacana then as D. pulchra until about 1982 when it was finally identified correctly. Silver Dalea is a rounded, fast growing, evergreen shrub, reaching nearly one meter in two growing seasons from a one gallon container. Young plants will need protection from rabbits. The silvery appearance combined with cold hardiness and drought tolerance make this dalea a highly desirable landscape plant. D. bicolor var. argyrea may be confused with D. pulchra. The leaves and leaflets of D. bicolor var. argyrea are larger than those of D. pulchra; also D. bicolor var. argyrea flowers in the fall while D. pulchra flowers in the spring.

Dalea bicolor H. & B. var. orcuttiana Barneby. BAJA DALEA. [Dalea megalostachya (Rose) Wiggins].

An erect, robust, shrub to 1.2 m tall and wide giving the plant a rounded form. The stems are conspicuously glandular-tuberculate. Leaves measure 2.5–5 cm long, with the 9–21 leaflets each measuring 6–10 mm long. Flower spikes are dense and ovoid, elongating as flowering progresses to 6 cm long and cone-like in outline. The densely villous calyx measures about 7 mm long. Wing and keel petals are rose or purplish. [Barneby, 1977; Shreve and Wiggins, 1964]. This xerophytic shrub is native to washes, canyons, and rocky hillsides in Baja California from the Sierra San Pedro Martir south to the Sierra de la Giganta.

I collected cuttings of this attractive shrub from near El Rosario in northern Baja California in October 1981 and have been monitoring the plants for seven years. They are fast growing shrubs reaching a height of 1.2–1.3 m in two years. Best growth is obtained in a well drained soil containing some organic matter. This variety usually begins to bloom in September or October and flowers continuously through the winter and into spring. Flower spikes and actively growing stem tips were damaged at about 25 degrees F. The susceptibility of active growth to freeze damage is a problem for this winter growing species, however recovery is rapid once growth resumes. This variety of D. bicolor seems to be very rabbit resistant, even newly planted plants, left unscreened, have not been eaten.

Dalea formosa Torrey. FEATHER DALEA.

Low, rounded shrub usually 1 m tall or less, sometimes reaching nearly 2 m. The woody, divaricate branches are fissured in age and covered with peeling bark. Stems are somewhat stiff and usually glabrous below the inflores-
Dalea—A Genus of Horticulturally Promising Legumes for Desert Landscapes

(Continued from page 5)

cence. The small, glabrous leaves have 3–6 pairs of leaflets. The inflorescence of 2–9- or rarely 18-flowers reaches 3.5 cm long. The 8–13 mm long calyx is covered with long spreading hairs. Wing and keel petals are rose- or magenta-purple. Flowers may appear as early as March, continuing through the summer and into September. [Barney, 1977; Correll and Johnston, 1970; Benson and Darrow, 1981; Kearney and Peebles, 1951]. Feather Dalea occurs on rocky or gravelly slopes in the southwestern United States and northern Mexico.

One plant which was grown from cuttings collected near Superior, Arizona has not been fully tested in a landscape situation yet, but should be adaptable to cultivation in southern Arizona, and will make a nice addition to the nursery industry.

Dalea frutescens Gray. Black Dalea.

An attractive, rounded shrub, reaching about 1.2 meter tall and 1.5 meter wide. Individual branches are glabrous and sparsely dotted with glands. Main stem leaves are 1–2 cm long, with 4–10 pairs of obovate to broadly obovate lanceolate leaflets which measure 1.5–5 mm long. The 3–30 flowered inflorescences are usually subcapitate or oblong in age, sometimes reaching 35 mm in length. The calyx is about 4 mm long with a glabrous tube and silky-ciliolate teeth. Wing and keel petals are vivid pink-purple. Plants occur on rocky hillsides, stony clay flats, and in washes, usually associated with scrub oaks, juniper, or mesquite. [Correll & Johnston 1970, Barney 1977]. The species occurs in Oklahoma, Texas, New Mexico, and northeastern Mexico.

The currently cultivated clone of Black Dalea is from cuttings collected in the Davis Mountains of west Texas. It is a moderately fast growing shrub, reaching about 70 cm tall in two growing seasons from a one gallon container. Plants can be grown in filtered light as well as full sun, and provide a burst of color in the fall for three to five weeks, with some flower spikes still blooming for nearly two to three weeks more. The inflorescences of young plants seem to be susceptible to rabbit damage, but other parts have been left untouched. A plant left unscreened during its third year in the ground was not eaten even during periods of rapid growth and early flower development.

Dalea greggii Gray. Trailing Indigo Bush.

Subshrub with a woody base, and decumbent or prostrate herbaceous stems that root near the tips. Mat forming plants grow to nearly 0.5 meter tall and up to 5–7 meters across. Stems and leaves are densely silky-pilosulous giving plants a silvery appearance. Primary stem leaves are 0.6–3 cm long and consist of 2–4 pairs of obovate or oblong-elliptate leaves which are 2–9 mm long. Flowering spikes are dense, subglobose or ovoid, and becoming oblong-cylindric in age. Bracts are persistent through flowering, but deciduous with ripe fruit. Calyx is 4–6 mm long and densely pubescent with long, fine hairs. Wings and keel petals are pink or pink-purple. [Barney 1977, Correll & Johnston 1970]. Prostrate Dalea grows on stony hills and plains in west Texas and south into eastern Mexico. (figure 7). It occurs at elevations ranging from near sea-level in Tamaulipas to 2250 meters in Zacatecas.

Dalea greggii was named by Asa Gray for Dr. Josiah Gregg who first collected the species near Buena Vista, Coahuila in 1852. The clone in cultivation was collected near Saltillo, Coahuila, and has proven to be a valuable addition to horticulture in southern Arizona. The species is a fast growing groundcover, reaching a spread of four feet in 1 or 2 years from a 1 gallon container. Plants have been hardy to 16 degrees in southern Arizona, and can tolerate many soil conditions [Jones 1980]. Plants can tolerate filtered light as well as full or reflected sun. Flower spikes do not make a significant color display. Plants are valuable as a bankcover or groundcover and seem to be resistant to rabbits once plants are established.

Dalea pulchra Gentry. Bush Dalea.

A small shrub growing to about 1 m tall in nature, but can reach 1.5 m tall under cultivation. The small, densely pubescent leaves consist of 2–4 pairs of obovate or oblong-elliptate leaflets. Dense, globose or slightly ovoid flowering spikes are terminal on stem tips. The deciduous bracts are sometimes held between the calyces. Densely pilose calyces measure 4–7 mm long. Wings and keel petals are rose or pink-purple with a lighter colored edge. Native to grasslands and oak woodland in southeastern Arizona and Sonora.

Dalea pulchra is an attractive upright or rounded shrub that blends in well with other arid adapted plants in a desert landscape. This species has been in cultivation in southern Arizona since 1970. Bush Dalea blooms profusely in March and April, and can be planted with other spring flowering plants with similar flower colors. Best growth is achieved when plants are in full sun and in a slightly heavy soil supplemented with organic matter. The degree of rabbit damage has been variable, however young plants should be screened until they become established.

Dalea tentaculoides Gentry. Rare Dalea.

A low, almost rounded perennial, the primary stems many-branched near the base. The 2–6 cm long leaves consist of 9–17 pairs of oblong-elliptic or elliptic leaflets, each measuring 2.5–8 mm long. Leaves on short axillary branches contain 3–8 pairs of smaller leaflets. Dense, 1–2 cm long, globose or oblong flower spikes terminate leafy branches. The bracts and the calyx lobes have noticeable tentacle-like glands which distinguish this species from any other in cultivation. The thinly pilose calyces measure 5–8 mm long, the tube and lobes of nearly equal length. The wing and keel petals are rose-purple. [Barney, 1977]. Known only from the Sierra Baja and Baja California mountains in Santa Cruz and Pima Counties.
Plants in the Demonstration Garden at the Arizona-Sonora Desert Museum were grown from seed originally collected by Ron Gass near Ruby, Arizona in 1970. Dalea tentaculoides is a small, evergreen subshrub with herbaceous stems which are woody at the base. Plants bloom most profusely in March, April, and early May, then resume growth and sporadic flowering in the fall. Dalea tentaculoides is best grown in full sun, plants grown in partial shade have a loose, leggy appearance.

Dalea versicolor Zucc. var. sessilis (Gray) Barneby. (Dalea wislizeni Gray).

In nature, these plants are small shrubs reaching about 7 dm tall and wide. Under cultivation, plants may reach 1 meter or more. The leaves consist of 4–12 pairs of oblanceolate, elliptic, or obovate leaflets. Long, relatively thick flowering spikes terminate short axillary shoots. The spikes measure 12–15 mm across and up to 5 cm long. Individual calyces are densely pilose with silky hairs and measure about 7 mm long. Wings and keel petals are lavender or bright purplish. This variety is native from southeastern Arizona, south along the west side of the Sierra Madre Occidental into Sonora and Chihuahua.

Plants grown from cuttings collected in southeastern Arizona are evergreen shrubs which start to flower in September or October, continue through the winter and spring. The plants can be grown in filtered light as well as full sun. They are fast growing, reaching a height of nearly one meter in two years.

Cuttings collected by the author in December of 1985, from an extremely low growing plant in the Huachuca Mountains seem to have considerable landscape promise. The plants have flowered and a specimen was sent to Dr. Barneby at the New York Botanical Gardens. He identified the specimen as Dalea versicolor var. sessilis. These plants are very prostrate in habit, not reaching over about 10–12 cm tall, and spreading to about 30 cm across in only one year. They started blooming in the fall of 1986 and continued until April 1987. They have been through one summer in Tucson and a winter low of 21 degrees, and show promise as a potential groundcover. Additional
testing for growth rate and planting exposure will be conducted before a final evaluation can be made.

Discussion
Over the past century, Dalea has been treated taxonomically, but until recently has been neglected horticulturally. This is surprising considering there are 166 species in the New World with many in Mexico where early European horticulturists frequently received plants from. With only seven species having been cultivated in southern Arizona since 1970, Dalea is still being neglected by many horticulturists. However, there is a variety of choices in regard to size, shape, habit, and flowering time. With increased awareness of water usage and changing attitudes towards more informal landscapes, the popularity of daleas as landscape plants may increase. Their fine textured foliage and bursts of flowers make the indigo bush an ideal desert landscape plant for arid regions. The richness and diversity of the genus Dalea became especially apparent last September 1986 while on a collecting trip with nurseryman Ron Gass. Three different species with promising landscape potential were brought back. Perhaps one of these three daleas will become as firmly established in the nursery industry as Dalea greggii has become.

Literature Cited

Arid Land Plant Resource Impact—Betterment of the Quality of Life for Desert Dwellers: Results of a 60-year Public-Private Partnership in Environmental Horticulture and Conservation in Central Arizona

(Continued from page 16)

for sale to discourage illegal digging in the desert and to encourage landscaping use of plants which use less of our dwindling water reserves. This "propagated plant program," which is one of the most popular features of the Arboretum to many visitors, pays state sales tax and underwrites the salaries of several Arboretum employees who also contribute materially to other Arboretum programs. 5) It has researched and cooperated with U. of A. research to discover new uses for desert plants. A good example is the now famous discovery of liquid wax in the seeds of the jojoba plant. Classic root studies and soil erosion control research pre-dated the U.S. Soil Conservation Service and contributed materially to the impetus for forming this government agency. These facts are prominently cited in the enabling document that placed the Arboretum on the National Register of Historic Places. 6) It has functioned as a plant introduction and testing station to select, cultivate and screen plant species from other arid regions which might be adaptable for growing in the southwestern United States. 7) It has provided educational programs whereby hundreds of school classes at all levels annually receive quality talks and tours relating to the desert and its resources, emphasizing the plants and their values both practical and aesthetic. 8) It has established a semi-technical journal Desert Plants which has a world-wide circulation and has become the leader in the subject of desert plant science. 9) It makes seeds and propagules of arid land plants available around the world by request and by publication of a seed exchange list available to researchers, educational institutions, government agencies and other non-profit organizations. 10) It provides a place for the quiet recreation of tranquility and retreat where vegetation provides the backdrop for thought and planning and where the less tangible "goods" are evident which Thompson valued as plant contributions to humanity. In this respect, bird-watching attracts a considerable percentage of the Arboretum's visitors each year. 11) It has advocated setting aside of natural areas to preserve precious habitats. A good example [see Desert Plants 8: 50] was the impetus it provided for the original establishment of Saguaro National Monument. 12) Finally, it has tried to implement the all-encompassing plan of its founder to strengthen the interface between humanity and the plant kingdom. In this regard Thompson wanted the plant resources of the world to be more fully exploited. Exploitation in his dictionary did not have the negative connotation with which we have wrongly saddled it today. Exploitation to him consisted of bringing the forces of science and industry to bear on a resource so that it would yield the greatest value for humanity. He would have approved of using these forces to preserve endangered species and critical habitat as thoroughly as he would have approved of using them to promote genetic engineering of plants. The Arboretum's twelfth accomplishment is really one for the future. Although the 60-year experiment has already produced some initial results, we expect that the real pay-off lies considerably down the road.

—F.S. Crosswhite and C. D. Crosswhite