NOTES ON NEBRASKA FLORA

BLOWOUT PLANTS

BY CURT TWEDT

The most striking habitat of the [Sandhills] uplands are the blowouts . . . conical depressions of varying depth and diameter . . . . The rim of the more or less conical depression is sometimes almost circular, but it is usually irregular with a general circular outline.

So wrote R. J. Pool in *Glimpses of the Nebraska Sandhills,* a descriptive account in the 1912 annual report of the Nebraska State Horticultural Society.

Anyone who has spent even a minimal amount of time in the Sandhills has surely wandered around or through a few blowouts like those Pool described. The crater-like depressions vary from a few tens of feet in diameter and five feet deep, to a few hundred feet across and 30 feet or more deep. Other blowouts may resemble broad, shallow trenches up to a few hundred feet long.

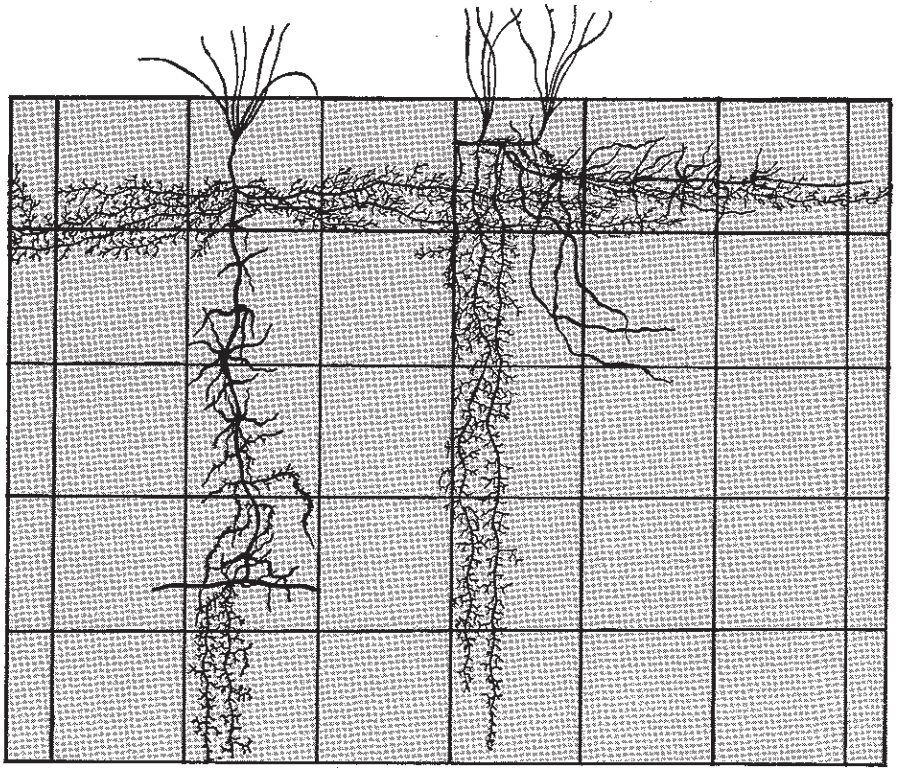
Wind is the designer and sculptor of blowouts. Grain by grain, thin layer by thin layer, sand is shifted to create these hollows on dune ridges or on long slopes. An early 1900's photograph by Professor Pool captured a textbook example of a Sandhills blowout which bears considerable resemblance to a volcanic crater.

Beginning almost from the time that raw sand is exposed by wind, a tug-of-war develops in the blowout. On the one hand, wind and glaring sun go about keeping the sand surface swept clean. The plant community, meanwhile, is at the ready with wind-borne seeds, stolons (runners) and rhizomes (underground stems). Although the blowout surface is often dry and hot during the growing season, moist sand is present only a few inches down. It is in this setting that a trio of plant pioneers begins the process of succession toward a stable vegetative cover. Enter blowout grass, bird-egg milkvetch, and winged dock.

The claim to being the earliest of plant pioneers on seemingly sterile sand usually belongs to the aptly named blowout grass (*Redfieldia flexuosa*). This species can occur in pure stands for a few years as it breaks ground for less hardy companions. Blowout grass reaches new locations as broken parts of seed heads blown tumbleweed-style across the dunes or perhaps dropped by a bird carrying nest-building material.

Blowout grass grows in clumps and may attain a height of two or three feet at maturity. Slender leaves tapering to long, threadlike ends are six to 18 inches long. Seed heads are pyramidal, sparse panicles which may comprise one-third to one-half the height of a mature plant. The species is classified as a warm-season grass, making much of its growth from early summer on, and setting seed from early August to late September.

Once established as a seedling, much of the success attained by blowout grass is derived from its roots and rhizomes. The profusely branched root system usually grows to depths of about five feet. In addition to the basically vertical primary roots, there is a considerable amount of shallow, horizontal root development, as well. A striking demonstration of *Redfieldia* root development was depicted in one of Professor J. E. Weaver's illustrations of excavated plants. The specimen shown had begun growth nearly



Aptly named blowout grass has a profuse root system including a network of rhizomes, horizontal stems growing a few inches below the surface. Illustration by J. E. Weaver.

four feet below the ground surface, probably several years previous to the excavation study. In response to a succession of shallow burials in layer after layer of wind-blown sands, the plant had grown, ladderlike, toward sunlight. Several tiers of former surface crowns were clearly identifiable.

In addition to its strong root system, blowout grass develops a densely branching network of rhizomes. These specialized stems grow horizontally a few inches below the ground surface. At intervals of a foot or so, rhizomes form buds which may give rise to crown shoots, which in turn may support new clumps of aerial stems and leaves. This growth habit can be seen clearly, especially where blowout grass occurs in pure stands. Rhizomes commonly attain lengths of 20 to 40 feet. Where wind has scoured sand away from an established colony, several feet of these wire-like underground stems are exposed to view.

A member of the legume family, bird-egg milkvetch (*Astragalus ceramicus*) appears in blowouts and other disturbed sandy sites during the process of secondary plant succession. The genus *Astragalus* is represented by nearly one thousand species worldwide, mostly in arid or semi-arid grasslands. A few native species found in western North America are sometimes referred to as locoweed due to their toxic effects leading to behavioral alterations of livestock which have fed on the plants. Other members of the genus introduced from Asia, however, are planted to supplement native grasses of Great Plains livestock range.

Leaves of bird-egg milkvetch are about one-eighth inch wide, range from one to four inches long, and are typically grayish green. Most of the other *Astragalus* group have compound leaves, consisting of several leaflets attached to a common axis originating from a single point on the stem. (Familiar examples of compound leaves include those of honeylocust and green ash). Supported by vigorous rhizomes, the above-ground portions of bird-egg milkvetch may reach heights of a few inches to one foot or more. In very sparse stands, however, plants will develop a sprawling, vine-like growth form. Reduced leaf surface is a distinct advantage to plants exposed to nearly constant wind and soil temperatures of 140° during the growing season, in that water loss due to transpiration remains relatively low.

Flowering of bird-egg milkvetch takes place during June and early July. Blossoms may vary from pale yellow to pink with light purple tinges on the keel (two partly united petals commonly found on legume flowers). Individual flowers are one-half-inch or so long and are grouped in loose, two-inch clusters. Upon completion of flowering, the distinctive one-inch-long oval, paper-like pods take form. Looking a great deal like a bird egg, the cream-colored pod with light red flecks lends a nicely descriptive common name for the plant. The species name *ceramicus* is also appropriate, for the fully-formed pod bears strong resemblance to the surface texture of fine earthenware or china. Seeds are one-eighth-inch long, resemble miniature beans, and may number from two or three to 10 or more in a single pod. As the seeds mature and dry, they come loose from their attachments and rattle around, giving rise to another evocative local name — "rattle pod." Small rodents such as harvest mice and kangaroo rats often break open the fragile pods and carry the seeds away to nearby caches. Some of these seeds may not be eaten, so because of their overly ambitious harvest habits the rodents help plant future food supplies for others of their species.

During an early summer drive on State Highway 2 or almost any other Sandhills road, even the most casual observer will catch sight of our third plant pioneer. Variously known as winged dock, veined dock or sand begonia, *Rumex venosus* is a member of the buckwheat/smartweed family. Although common on road shoulders and windmill sites, winged dock is equally at home around healing blowouts. Not nearly so well adapted to raw sand as blowout grass, it is usually in the second or third wave of plant succession.

Once established, winged dock develops a system of tough rhizomes. Above-ground growth usually reaches heights of six to 15 inches and assumes a generally rounded shape. Tough, sparsely branched stems support several rather thick, glossy, lance-shaped leaves that measure about one inch wide and four to six inches long. Most plants of the smartweed group develop a specialized structure called the ochrea, an outgrowth of the leaf base which encircles the stem. In winged dock, the ochrea resembles a narrow funnel.

Winged dock's spike-like flowerheads can usually be seen from mid May to early August. Each one-inch-diameter flower's most conspicuous features are the six pink to medium red (occasionally yellowish green) prominently veined sepals. Petals, typically the most colorful parts of many types of flowers, are entirely absent.

By mid to late summer, triangular, shiny brown, quarter-inch achenes (fruits) have formed from the mature flower clusters. Dried sepal remnants become miniature sails to transport seeds when wind currents tear them from the stems and send them skittering across the sand. Winged dock seeds provide a limited amount of food for some of the native sparrows and other small birds in the Sandhills. The seeds are also found sparingly among the crop contents of sharp-tailed grouse taken by hunters in September and October. The ever-busy kangaroo rats also add dock seeds to their little underground grain bins. Mule deer and prong-horned antelope feed on fast-growing dock leaves when they are in the most succulent stage. The summer food habits of pronghorns lean heavily toward a variety of broadleaf weeds, and winged dock is certainly included most years.

In addition to the three species described briefly here, several other plants also play important roles in stabilizing blowouts. One of this stalwart lot, the blowout penstemon (*Penstemon haydenii*) was featured in *NEBRASKAland*, June 1982 (pp. 49-51). The plants of shifting sands offer ample opportunity for studies of adaptation to extremely demanding conditions.

In a way, they remind us of people who seem to thrive under adversity; those who come through in the toughest of situations.

Watercolor art of the Blowout Plants was done by Michele Angle Farrar. She can be contacted through NEBRASKAland Magazine, Box 30370. Lincoln, NE 68503.