USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

CREEPING FOXTAIL

Alopecurus arundinaceus Poir.

Plant Symbol = ALAR

Contributed by: USDA NRCS Idaho State Office

Photo: Lars Hedenäs

Photo: Swedish Museum of Natural History

Alternate Names
Creeping meadow foxtail, *Alopecurus ventricosus*

Uses
Grazing/livestock/pasture: Creeping foxtail is very well suited for pastureland or hayland. Because it does not undergo dormancy during the summer, creeping foxtail produces high yields of palatable forage season long. Plants break winter dormancy early in spring, and leaves remain green and palatable even during the hottest months. Studies indicate that creeping foxtail yields equal or exceed those of other comparable grasses.

Creeping foxtail is palatable to all classes of livestock. Cattle show preference to creeping foxtail over other widely employed pasture grasses. In separate studies, cattle preferred creeping foxtail to smooth brome (*Bromus inermis*), reed canarygrass (*Phalaris arundinaceus*) and tall wheatgrass (*Thinopyrum ponticum*). In another study, cattle preferred straw from seed production fields of creeping foxtail over thickspike wheatgrass (*Elymus lanceolatus*), western wheatgrass *(Pascopyrum smithii*), basin wildrye (*Leymus cinereus*) and others. It can be seeded in pure stands or with a legume.

This species produces numerous aggressive underground rhizomes. These contribute to long-lived stands and an ability to recover quickly from grazing.

Filter fields: Because of creeping foxtail's tolerance to high levels of fertilizer, particularly nitrogen and water, it can be used in filter fields for liquid waste disposal. It can also be used in a variety of other water settings including sewage treatment, food processing and livestock waste removal programs. With suitable moisture, creeping foxtail can also be used as an excellent silt trap. This species is known to tolerate up to six inches of silt per single deposition.

Erosion control: Creeping foxtail's vigorous rhizome production (up to 120 cm crown diameter/year) and water tolerance make it well suited to erosion control and stream bank stabilization. Creeping foxtail can tolerate both high water levels and periods of drought, it can be used on earthen dams where water levels fluctuate. It survives in a broad range of pH, making it suitable for mine spoils, saline seeps (tolerant to ECs of 12) bogs and acidic roadways.

Wildlife: All manner of wildlife benefit from the forage and cover provided by creeping foxtail. Elk and deer eat the succulent forage in the spring and fall. The tender spring growth also provides forage for geese and other waterfowl. Numerous species of birds use the dense growth for cover and nesting habitat. Creeping foxtail has been used for plantings around ponds, lakes, grassed waterways and other waterways.

Legal Status
Consult the PLANTS Web site and your State Department of Natural Resources for status (e.g.

threatened or endangered species, state noxious status, and wetland indicator values).

Weediness
In addition to aggressive rhizomes, creeping foxtail proliferates by windborne and waterborne seeds. Rapid reproduction can be useful in repairing damaged sites; however, creeping foxtail's ability to spread quickly may create management problems in canals, irrigation ditches and other waterways.

Please consult with your local NRCS Field Office, Cooperative Extension Service office, or state natural resource or agriculture department regarding this species' status and use. Weed information is also available from the PLANTS Web site.

Description
General: Grass Family (Poaceae). Creeping foxtail is a large, long-lived, rhizomatous, sod-forming, perennial grass introduced from Eurasia.

Culms are tall (5 to 12 dm) and stout (~8 mm). Cauline leaves are numerous, flat and green, mostly 6 to 8 mm (12), glabrous above and scabrous beneath. The membranous ligule is 1 to 5 mm long and is rounded to acute.

The inflorescence is a spike-like, cylindrical panicle, typically 4 to 10 cm long and around 8 mm thick, turning purplish or black with maturity. It has a very similar appearance to the seedheads of timothy, but creeping foxtail heads turn the dark colors described above with maturity and Timothy seedheads turn a brownish – buff color.

Individual spikelets are single flowered and urn-shaped (4 to 5 mm long, 1 to 1.5 mm wide). The glumes are fused basally and are strongly keeled with a ciliate margin, the hairs 1 to 2 mm. Lemmas are typically shorter than the glumes and may bear a straight to geniculate awn (1 to 2 mm) arising from below to slightly above mid-length. Anthers are usually purple but are occasionally yellow or orange.

Anthesis occurs early in the season. Seed maturation begins at the top of the inflorescence and proceeds downward. Spikelets disarticulate below the glumes with the spikelet falling as a single unit.

Creeping foxtail should not be confused with other grass species that share the common name foxtail. Creeping foxtail is a close relative of meadow foxtail (*Alopecurus pratensis*) and can be distinguished by having broader leaves (8-12 mm vs. 4-8 mm) and a dark purplish inflorescence. There are also many weedy species that bear the name foxtail, i.e. foxtail barley (*Hordeum jubatum*) and green foxtail (*Setaria viridis*). These may occupy the same habitats as creeping foxtail, but bear little or no resemblance.

Distribution: This species is native to the colder regions of Europe and Asia. It ranges naturally from the British Isles in the west to Siberia in the east going as far south as Turkey and Italy and possibly China.

Records indicate that creeping foxtail was introduced into the United States around the end of the 19th century. At the time, it was little used by farmers who lacked the specialized equipment to plant and harvest its small fluffy seeds. With the advent of more advanced machinery in the 1930's and 40's, it became more widely used in forage practices.

Presently, it is most commonly utilized throughout the Pacific Northwest, Intermountain West, Northern Great Plain States and western Canada. It is projected that creeping foxtail could be used as far east as the New England states.

For more information on distribution, please consult the plant profile page for this species on the PLANTS Website.

Adaptation
Creeping foxtail is adapted to cold temperatures and wet conditions. It is extremely winter hardy. It can establish and survive in areas where frost-free periods average less than 30 days annually. Studies indicate creeping foxtail outperforms smooth brome on flooded permafrost soils in Alaska. It also grows well at a broad range of elevations (500-9000 ft), but grows best on middle to high elevation wet to semi-wet sites.

This species is well adapted to areas of high moisture typically too wet for good production of most forage grasses, i.e. brome (*Bromus* species) and orchardgrass (*Dactylis glomerata*) and is a superior forage to other semi-wetland grasses, such as tall fescue and other wetland grasses, such as reed canarygrass, meadow foxtail and timothy. It usually occurs in areas receiving more than 18 inches of precipitation. It also grows readily along margins of ponds, lakes, bogs, ditches and in mountain meadows. It can withstand periodic flooding of 60 to 90 cm for up to 45 days. Some varieties are also somewhat drought tolerant, being able to survive in areas with widely fluctuating water levels and drought during later summer periods.

Creeping foxtail does well in a broad spectrum of soils provided there is sufficient available water. It can grow in sand, clay, peat and muck. It is moderately salt tolerant (up to 12 millimhos/cm) and tolerates both moderately acidic soils (pH 5.6 to 6.0) and slightly alkaline soils (pH 7.9 to 8.4).

Establishment

Creeping foxtail establishment techniques are similar to those for other forage grasses. For best results the seedbed should be weed free, moist and firmly packed. Follow seeding with a light harrowing or packing operation. Optimum seeding depth is 1/8 to 1/4 inch and no deeper than ½ inch.

Timing depends almost entirely on available moisture. Irrigated fields can be seeded in early to mid spring or late summer avoiding the hot mid summer period. Irrigated fall seedings can be successful as late as early to mid-September allowing for enough time (6 to 8 weeks) for seedling establishment before freezing temperatures. Where precipitation is required, seed when soil is moist but firm enough or frozen to support seeding equipment. Late fall dormant seedings (after October 20th in most areas), winter and very early spring seedings are most effective under non-irrigated conditions where seeds are not allowed to germinate until spring.

This species produces very light seed units (750,000 seeds/lb) which allow for low relative seeding rates for adequate stand establishment. It is recommended that a minimum seeding rate of 3 to 4 lb/acre is used for ease of handling and uniform distribution through seeding equipment . This rate provides 51 to 68 seed/ft^2.

It is popular to dilute the seed with inert materials, i.e. rice hulls, cracked corn or other cracked grains. For rice hulls, cracked wheat or cracked barley, dilute 3-4 lb/acre seed with 2 bushel/acre dilutor, and set the drill to seed the equivalent of 2 bushels of barley per acre. For cracked corn reduce dilutor to 1 bushel/ acre.

When seeding with a legume, it is recommended that one plant in alternate rows. Studies conducted with 'Lutana' cicer milkvetch (*Astragalus cicer*) and 'Eski' sainfoin (*Onobrychis viciaefolia*) showed increases in yield over a four-year period when planted in alternate rows.

Management

Young seedlings are small and weak. Growth is slow for the first 4 to 6 weeks even under irrigated conditions. Rhizomes can emerge as early as 8 weeks. With the emergence of rhizomes, growth is rapid. With adequate soil moisture inflorescences may develop in mid to late summer, but first year plants typically do not produce seedheads, or when they do, there is not enough seed for a profitable harvest.

Under non-irrigated conditions, it is not uncommon to have difficulty determining stand establishment the first growing season. Stand success should not be determined until the second or third growing season under non-irrigated conditions.

Applications of commercial fertilizer are not required during the establishment period; however, creeping foxtail responds very favorably to applications of 50 to 60 lb/acre actual nitrogen once established. Creeping foxtail plants show little response to applications of potassium, phosphates and secondary elements.

When planted with a legume, adjust fertilizer rates according to desires: For more grass production increase nitrogen, for more legume production increase phosphorus and potassium.

Weeds can be controlled using standard herbicide practices, although weeds should cause few problems with adequate fertilizer.

Pests and Potential Problems

Creeping foxtail has historically shown little damage from insects and other diseases; however, in some years leaf spot diseases have been recorded as a problem in Canada.

Seed and Plant Production

Seed production practices for creeping foxtail are more involved and difficult than those of most other forage grasses. Harvest timing is critical for a good yield, and seed cleaning requires more time and equipment than for most other grass species. Stands should be planted in wide-spaced 36 to 48 inch rows, but rhizomes cause sod binding and row closing. This can be overcome by applying high levels of nitrogen and aggressive cultivation to maintain desired row culture.

During establishment, apply enough phosphorus for three years according to forage production rate. No nitrogen should be added until seedlings are established, or drill 50 lb/acre of 11-48-0 with the seed. Once seedlings are established apply 30 lb/acre N for dryland or 60 to 80 lb/acre N for irrigated fields.

Nitrogen application in the fall on established fields positively influences inflorescence size and number. Apply 100 to 150 lb/acre N each year. Studies have shown inflorescence production rose as nitrogen levels were increased up to 100 lb/acre actual N. After 150 lb/acre production tapered off as plants used more nitrogen for foliage than seed production. Seed yields with 100 lb/acre were as high as 570 lb/acre while yields of 350 lb/acre were achieved when no nitrogen was applied.

During establishment, enough water should be applied to get stands started. The soil surface should be kept moist to avoid crusting. In early September bring soil moisture up to field capacity. Established fields should be irrigated in spring through the boot stage. Soil moisture should be kept above 50% field capacity. Good soil moisture is necessary during the early phase of seed development to prevent moisture stress, but do not irrigate during flowering or seed ripening. After harvest irrigate to field capacity to promote vegetative production.

Since seed maturation is temperature dependent, different regions will be harvested at different times of year. For proper timing of harvest, attention must be paid to three indicators. (1) 75 percent or more of the seeds should be black. (2) 50 percent of the inflorescences have begun to shatter at the tip. (3) 75 percent of the stems are yellow up to 3 to 4 inches directly below the inflorescence. These three events often occur quickly over a three day period.

Plants are typically windrowed, dried (3 to 5 days) and picked up by a combine. Seed heads shatter readily. Hand harvested seeds yielded over 500 lb/acre while machine harvested fields yielded as little as 180 lb/acre. It is recommended that you slow the reel speed of both the windrower and combine to equal to or slightly higher than ground speed. It is also recommended to make these adjustments to the combine: (1) slow ground speed to allow more separating time; (2) shut off air flow by sealing the fan housing or inactivating the fan; (3) remove screens following the sieves; (4) adjust concave spacing to ¼ inch; (5) adjust cylinder speed to approximately 3500 ft/min. (750 to 850 rpm).

An alternative harvesting method employed by the NRCS Bismarck Plant Materials Center and others is the use of a seed stripper. For best results ground speed should be 1.5 to 2 mph. Tachometer speed can be from 1100 to 1800 rpm, and the brush speed should be around 425 rpm.

Typical production is 300 pounds per acre irrigated and 150 pounds per acre non-irrigated. Non-irrigated seed production is not recommended below 16 inches of annual precipitation.

Seeds should be dried prior to storage at temperatures not over 104º F (40º C). Store seed in bins at 12% moisture content or sacks (15%).

A barley debearder can be used to remove the fine hairs from the glume keels and to remove stems and chaff. The debearder should be run at 500 rpm long enough to break down stems. Seeds can then be cleaned using a #9 round hole in the top screen, 1/18" x ¼" slotted middle screen and a 6 x 36 wire mesh bottom screen. The fan should be set to a slow, light wind speed (100 to 150 rpm).

Cultivars, Improved and Selected Materials (and area of origin)

Foundation seed is available through the appropriate state Crop Improvement Association or commercial sources to grow certified seed.

'Garrison' creeping foxtail (*Alopecurus arundinaceus*) was named and released by the Natural Resources Conservation Service Plant Materials Center in Bismarck, North Dakota in 1963. The original collection was made in 1950 near Max, North Dakota where plants were growing on the margins of potholes. 'Garrison' is adapted to cold temperature regions where there is abundant water. It is especially well suited to higher elevation areas that receive 18 inches or more precipitation annually or along the margins of ponds, lakes, ditches and other waterways. It provides excellent forage for cattle and other classes of livestock by producing highly palatable leaves throughout the growing season. 'Garrison' has a high moisture tolerance and produces vigorous rhizomes making it an excellent choice for controlling streambank and shoreline erosion. Certified seed is available.

Breeder and Foundation seed is maintained by the Bridger, Montana PMC.

'Retain' creeping foxtail (*Alopecurus arundinaceus*) was selected by the South Dakota Agricultural Experiment Station and released in 1979. This is a five-clone synthetic single plant selection from 'Garrison.' 'Retain' is very similar to 'Garrison,' but this cultivar retains seed on the panicle making it possible to harvest with a direct cut combine. Like 'Garrison,' it is well adapted to wet areas and is flood tolerant. It is highly palatable to livestock. It matures early, heading in mid-May.

Breeder and foundation seed are maintained by South Dakota State University. Contact for availability.

Control
Contact your local agricultural extension specialist or county weed specialist to determine the best control methods in your area and how to use it safely.

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For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site<http://plants.usda.gov> or the Plant Materials Program Web site <http://Plant-Materials.nrcs.usda.gov>

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