

## ORCHARDGRASS

### *Dactylis glomerata* L.

Plant Symbol = DAGL

Contributed by: USDA NRCS Idaho Plant Materials Program



'Paiute' Orchardgrass. Photo by Derek Tilley, Aberdeen PMC.

#### Alternate Names

Common Alternate Names: *Cocksfoot*

#### Uses

**Grazing/Hayland:** The primary use of orchardgrass is for pasture and hay forage production (Ogle, et al., 2011a). It is highly palatable to all classes of livestock. It is one of the best forage grasses for use in the Northern states under intensive rotational grazing systems. It is compatible with many legumes (alfalfa, birdsfoot trefoil, and various clovers) and with some grasses such as perennial ryegrass and tall fescue (Sullivan, 1992). The life cycles of orchardgrass and alfalfa match well.

**Erosion control:** Because of its dense network of non-rhizomatous roots, orchardgrass provides good erosion

control on sites where it is adapted. It is recommended for erosion control on forestland that has been burned or logged, often showing early establishment and eventually being replaced by native vegetation or other seeded species (Sullivan, 1992).

**Wildlife:** Elk and deer find orchardgrass highly palatable and will utilize it most of the year. Orchardgrass is sometimes used in grass-legume mixes for nesting, brood rearing, escape, and winter cover in upland wildlife and conservation plantings. However, upland birds and waterfowl often prefer taller grasses that develop sparser stands such as basin wildrye and tall wheatgrass. In areas disturbed by fire where orchardgrass has been seeded in a mixture with other grasses and forbs, wildlife use increases (Sullivan, 1992). The caterpillars of the Many-Lined Wainscot moth (*Leucania multilinea*) and the Little Wood Satyr butterfly (*Megisto cymela*) feed on the foliage of the grass and seeds are eaten sparingly by some songbirds including the horned lark and chipping sparrow (Illinois Wildflowers, 2012).

**Manure and biosolids application:** Orchardgrass can use high rates of Nitrogen (N) when grown on deep soils with adequate water supplies, making it valuable in nutrient recycling systems. It can be used in manure and biosolid applications to recycle large amounts of N (in excess of 300 pounds N/ac/yr) while simultaneously producing high quality forage (Sullivan, 1992).

#### Status

Orchardgrass is a restricted noxious weed for lawn/ turf seed in the states of Delaware, Maryland, New Jersey, Pennsylvania, Virginia and West Virginia (USDA-AMS, 2010).

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

#### Weediness

This plant may become weedy or invasive in some regions or habitats and may displace desirable vegetation if not properly managed. Please consult with your local NRCS Field Office, Cooperative Extension Service office, state natural resource, or state agriculture department regarding its status and use. Weed information is also available from the PLANTS Web site at <http://plants.usda.gov/>. Please consult the Related Web Sites on the Plant Profile for this species for further information.

## Description

*General:* Grass Family (Poaceae). Orchardgrass is a cool season, introduced, perennial, bunchgrass. Plants are 50-120 cm tall. The leaves are 2-8 mm wide, and 20-30 cm long, v-shaped near the base tapering to a narrow tip with a prominent mid-nerve on the lower surface. The sheath is closed, auricles absent and the ligule is membranous and often split, merging with the throat margins. The inflorescence is a panicle 5-20 cm long with spikelets laterally compressed, relatively small and 2-5 flowered in dense 1-sided clusters. Glumes are 3-6 mm long, 1-nerved, glabrous or pubescent and awn tipped. The lemma is keeled, 4-6.5 mm long, 5-nerved with a short awn from the tip. The palea is cupped inside the lemma. The seed is elongate (Majerus, 2009; Skinner, 2010). Orchardgrass can be diploid ( $2n=2x=14$ ), tetraploid ( $2n=4x=28$ ), or hexaploid ( $2n=6x=42$ ) and are separated into subspecies by chromosome number. Most populations are diploid (Moser, et al., 1996).

Orchardgrass is one of the earliest grasses to initiate growth in the spring and makes tremendous growth during cool conditions. It produces an extensive root system with rooting depths to 2 feet.

*Distribution:* Orchardgrass is native to western and central Europe and has been grown in North America since the 1750's. It is found throughout North America but is grown through much of the northeastern and north central United States and the high rainfall and irrigated regions of the Intermountain West and the Pacific Northwest (Sullivan, 1992; PLANTS Database). For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

*Habitat:* Orchardgrass is found in savannas, woodland borders, thickets, fence rows, old pastures, orchards and miscellaneous waste areas (Illinois Wildflowers, 2012). In the western United States it is found on areas that once supported sagebrush, grass, pinyon-juniper, ponderosa pine, aspen and Douglas fir plant communities.

## Adaptation

Orchardgrass is adapted to moderate to well-drained basic to acidic soils (pH 5.8-7.5) on textures ranging from clay to gravelly loams and shallow to deep soils. It does not grow well in saline soils and areas with high water tables within the rooting zone. Orchardgrass performs best in areas that receive 18 inches annual precipitation or on irrigated sites but will establish and persist in areas that receive as little as 16 inches of annual precipitation. It will not tolerate soils that are saturated with water for extended periods of time. It will tolerate cold winters (to -30°F) if snow insulates the ground during the coldest weather and it has good tolerance to high summertime temperatures and humidity (Oregon State, 2004). The optimum day/night temperature for orchardgrass is 73/54°F (22/12°C) Blaker and Jung (1968). Orchardgrass is well-adapted to shady areas.

## Establishment

A clean, firm, weed-free seedbed is recommended (Ogle, et al., 2011b). Dryland and erosion control seedings should be made in the late fall or very early spring. Irrigated seedings should be made in early to mid spring. Do not seed after the spring moisture period is well advanced or a failure may occur because of dry seedbed conditions and hot summer temperatures before the grass is well established. A deep furrow or double disc drill with press wheels is recommended for seeding orchardgrass but it is also easily established with common agricultural drills. The recommended seeding rate for orchardgrass in the Intermountain West is 4 pounds pure live seed (PLS) per acre (Ogle, et al., 2011a) and in the Midwestern states the seeding rate is 10 pounds PLS/ac. Published seed weights range from 427,200 seeds per pound (PLANTS Database) to 645,000 seeds per pound (Oregon State, 2004). If broadcast seeded or planted for critical area treatment, double the seeding rate. Adjustments in seeding rate should be made when seeding in mixtures. When planted with a legume the seeding rate for orchardgrass is 4-6 pounds PLS/ac. Seeding depth should be ¼ to ½ inch.

Because of its shade tolerance, orchardgrass is well-adapted to mixtures with legumes and orchardgrass-alfalfa mixtures have yielded more beef per acre than orchardgrass in mixtures with other legumes. It is also more competitive with legumes than are other cool season grasses such as smooth brome, perennial rye, or Kentucky bluegrass (Moser, et al., 1996).

## Management

Under dryland conditions new plantings should not be grazed until late summer or fall of the second growing season. The plants may be severely damaged by overgrazing especially in the seedling year. Under irrigated conditions the new planting should not be grazed until late summer or fall of the first growing season. The plants may be severely damaged by grazing too soon.

The minimum plant height prior to initiating grazing or hay harvesting is 6 inches for orchardgrass and a minimum stubble height of 4 inches should remain at the end of the grazing or hay harvesting season (Ogle, et al., 2011b). Use no more than 60% of the annual growth during the winter season or 50% during the growing season. Close grazing in the fall is consistently associated with winterkill. This plant responds well to rotation-deferred grazing systems. Periodically the grass should be allowed to mature and produce seed for continuation of the stand. If orchardgrass is harvested late each year, the stand will become thin and bunched. Alfalfa-orchardgrass hay should be harvested when the orchardgrass is in the boot to seedhead stage.

Orchardgrass responds very well to good fertility management. It is one of the most responsive pasture grasses to nitrogen applications. One strategy to even out

the forage production is to fertilize the stand after the first and second cutting or grazing period to boost late spring and summer production. Apply fertilizer based on soil tests (Ogle, 2011b). Nitrogen should not be applied to legume-orchardgrass mixtures, as the grass will increase competitively, to the point of eliminating the legume.

### **Pests and Potential Problems**

Since orchardgrass is grown in many of the humid regions of the United States, there are many foliar diseases that attack it. Foliar diseases cause leaf death and reduce the quality and quantity of both hay and pasture. The use of varieties with disease resistance and good cultural practices are the best methods of reducing the buildup of disease in a stand.

Stripe rust (*Puccinia striiformis*), leaf scald (*Rynchosporium orthosporum*), and orchardgrass mottle virus (CfMV) are the major diseases having economic impact on forage production. These plant diseases cause reduced forage yield and quality and are not harmful to livestock with the exception of causing respiratory sensitivity in horses (Oregon State, 2004). Selecting resistant varieties is the best means of disease control since few fungicides are labeled for use on pastures or hay.

Stripe rust appears as orange pustules arranged in rows on the leaves. It overwinters in areas with mild winters and then is distributed in the spring by wind. Its major impact to forage is reduced digestibility. In the case of leaf scald and orchardgrass mottle virus, adequate fertility and water enable the plant to outpace the disease. Early harvest minimizes quality loss to forage and reduces spread of these diseases (Oregon State, 2004).

More than 30 insect species have been identified in orchardgrass stands and damage sometimes results in lower yields, quality and stand longevity but little is known about the economic losses incurred (Oregon State, 2004).

In seed production fields, choke disease (caused by an endophytic fungus named *Epichloe typhina*) reduces stand longevity. It prevents the flower head from emerging and prevents seed production on the infected tiller. Research is being conducted to identify control methods (Oregon State, 2004).

### **Environmental Concerns**

Orchardgrass has been grown in North America since the 1750's. It does not spread vegetatively. Seeds can collect on animal coats and be transported long distances. Livestock watering and bedding areas are typical sites where orchardgrass may colonize. It may spread into adjoining degraded plant communities via seed under ideal conditions.

### **Control**

Orchardgrass can be a problem weed in turf type tall fescue and bluegrass lawns. Infestations of lawns are common where the site was previously in pasture or hay production but most often results from contaminated seed used to establish the lawn. The first line of defense is to purchase turf seed that is not contaminated by orchardgrass. When there are a few weedy patches, orchardgrass can best be cut out with a shovel. Plant stems need to be removed to a depth of 3-4 inches in the soil and the holes should be refilled and seeded or sodded immediately. If the area has a large number of plants, chemical control will be most efficient. A nonselective herbicide can be spot applied (which will also kill the desired turf species). Then the area can be reseeded or resodded 5-7 days later (Johnson, 2008).

Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named, and other products may be equally effective.

### **Seed and Plant Production**

When planting orchardgrass for seed increase, the recommended row spacing is 28 to 40 inches. Seed should be planted to a depth of 1/4-1/2 inch into a clean, weed-free and firm seedbed. Cultivation of the seed crop will be needed to control weeds and maintain the row culture. The seeding rate is 1.2 pounds PLS/ac for 36 inch row spacing which will plant 30 PLS per linear foot of row (Cornforth, et al., 2001).

Fertilization of seed production fields is essential to maintain high yields of seed, especially following the first seed production year. Soil testing is recommended to ensure proper fertilization (Cornforth, et al., 2001). During establishment, apply 30 to 60 pounds actual Nitrogen (N) per acre (lower rate for dryland, higher rate for irrigated) and 50 to 80 pounds per acre on established stands.

Orchardgrass has a moderate rate of seed shatter and requires close scrutiny of maturing stands to determine optimum harvest date. Seed is generally harvested in mid July and the preferred method of harvest is to swath the field when seed is in the hard dough stage prior to shatter. Allow 2-3 days curing time in the windrow and then combine using a pickup attachment. Direct combining can be an option but the field must be monitored closely and seed harvested when seed is mature and before seed shatter occurs. The seed should be dried to 12 percent moisture content if stored in bins and to 15 percent if stored in sacks. Average seed production of 250-300 pounds per acre can be expected under irrigated conditions. Seed remains viable for at least ten years

under good (cool and dry) seed storage conditions. Seed production declines as stands get older.

Crop residue from seed fields must be removed after each harvest to maintain plant health, plant vigor, and future seed yields. Seed fields are usually productive for at least 4 years with good management practices.

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

There are many orchardgrass releases available. Consult local experts to select the best release available for your area and intended use. Orchardgrass cultivars fall into two categories; early maturing and late maturing. Late maturing varieties are best suited in mixtures with alfalfa because they will have similar growth rates. The early maturing varieties tend to have larger forage yields. The most common and commercially available public releases are described below.

**‘Boone’** was released in 1966 and is early maturing. It was cooperatively developed by the Kentucky Agricultural Experiment Station and USDA-ARS. It was developed by mass selection of plants from naturalized stands that traced to farms in the orchardgrass growing area of Kentucky. It is well-adapted to the central and south central portions of the U.S. Breeder seed is maintained by the Kentucky Agricultural Experiment Station (Buckner, 1966).

**‘Dawn’** is a medium maturity orchardgrass released in 1989 by RR. Kalton, P.A. Richardson, and J. Shields. It is an eight-clone synthetic variety with five of the eight parental clones from selections of plant introductions from Russia. It has improved rust resistance compared with other cultivars and is very winterhardy. Parent clones and Breeder seed is maintained by Land O’ Lakes Research Farm, Webster City, IA (Alderson and Sharp, 1994).

**‘Hallmark’** was released in 1969 by the Farmers Forage Research Cooperative. It is early maturing, vigorous, high yielding, and has good resistance to leaf disease and good seed yields. Superior clones of ‘Boone’, ‘Potomac’, and clones from the University of Illinois and the Eastern States Farmers Exchange were selected to form Hallmark. Breeder Seed is maintained by the Farmers Forage Research Cooperative, West Lafayette, IN (Alderson and Sharp, 1994).

**‘Latar’** was released in 1957 and is still commonly seeded in pasture and hayland plantings. It has low lignin (fiber) content and digestibility is very high. It matures 10 to 14 days later than common orchardgrass and is usually in the pre-bloom stage when alfalfa is at the optimum growth stage for cutting hay. Therefore a mixture of Latar and alfalfa makes high quality hay. Forage yields of ‘Latar’ are at least as much per acre as

the earlier maturing varieties and forage quality is generally superior. The venerable old ‘Latar’ has lost some of its market-share to newer cultivars, which exhibit disease tolerance and winter hardiness. Breeder seed is maintained by the Pullman, Washington Plant Materials Center (Alderson and Sharp, 1994).

**‘Paiute’** was cooperatively released by the U.S. Forest Service and Aberdeen Plant Materials Center in 1983. The source germplasm for Paiute was a collection from Turkey. It is a cultivar that produces an abundance of basal leaves and leafy upright stems. Its intended use is for forage production on semi arid lands. ‘Paiute’ is considered somewhat more drought tolerant than other varieties of orchardgrass. However, it generally does not perform well in areas with less than 16-inches annual precipitation. At very high elevations (6500 feet plus), it may perform well at slightly lower rainfall amounts. It matures too early to be compatible with alfalfa. Breeder and Foundation seed is maintained by the Aberdeen, Idaho Plant Materials Center (Alderson and Sharp, 1994).

**‘Pennlate’** was released by the Pennsylvania Agricultural Experiment Station in 1957. The four parent clones of Pennlate originated from introduced varieties and strains of late-maturing orchardgrass. It is a high yielding, late maturing variety which is compatible with alfalfa and is recommended for use in Pennsylvania and is adapted to adjacent areas of New York and Maryland. Breeder and Foundation Seed are maintained by the Pennsylvania Agricultural Experiment Station (Cleveland, 1963).

**‘Persist’** originated from seed collected from 6 year or older stands of orchardgrass throughout Tennessee that were planted out in single solid seeded rows and subjected to clipping or grazing to a height of 1 inch 4 times per year for 4 years. Seventy two individual plants were cloned and from these clones, six clones were selected based on vigor, progeny tests, disease ratings and synchrony of flowering. Persist was released in 2002. It is especially productive and persistent in the southern portion of the middle southern states. Breeder and Foundation seed is maintained by Tennessee Agricultural Experiment Station and has Plant Variety Protection (USDA-ARS, GRIN, 2012).

**‘Potomac’** is a productive, persistent, rust-resistant cultivar that produces good yields but matures too early to be compatible with alfalfa for hay. When alfalfa is ready to cut, ‘Potomac’ is too mature to produce good quality hay. When seeded in a monoculture, ‘Potomac’ often produces very high yields. This variety should be used where early maturity is needed and as a single species hay. Oregon Foundation Seed and Plant Materials Project and the Washington Crop Improvement Station maintain Breeder and Foundation seed (Alderson and Sharp, 1994).

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## Citation

Bush, T, Ogle, D., St. John, L., Stannard, M., Jensen, K. Ed. (rev) St. John, 2012). Plant Guide for Orchardgrass (*Dactylis glomerata*). USDA-Natural Resources Conservation Service, Aberdeen Plant Materials Center. Aberdeen, Idaho 83210.

Published December, 2012

Edited: 10Aug00 jlk; 24sept02 lsj; 22oct02 ms; 24jan03 kbj; 03jan03 dgo; 11feb03 jsp; 27apr05 rln; 25may06jss; 6nov2012ls; 6nov2012djt; 7nov2012jk; 7nov2012jab; 12nov2012gm; 5dec2012mvg

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