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# Oat production in Colorado

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## Quick Facts

- High-quality oats may bring premium prices in the marketplace.
- Oats grow best in the cooler regions of Colorado but can be grown in other areas.
- Barley Yellow Dwarf Virus is a major disease of oats.
- Oats are not considered an important host for the Russian wheat aphid.

As recently as 1950, annual oat production in Colorado varied between 150,000 and 200,000 acres. Recently production has declined to less than 40,000 acres. This decline parallels the population of horses in the state. Oats *(Avena sativa L.)* grow best in cooler regions of Colorado but can be grown in other areas. In warmer, drier parts of Colorado, acceptable yields and test weight are more difficult to obtain. Renewed interest in oat or oat bran products for human food and continued increase in the pleasure horse population and livestock feed have improved the market for quality oats.

## Variety Selection

Oat variety selection is difficult in Colorado because of limited availability of quality seed. Planting certified seed with a known germination, purity and variety is recommended. Frequently, feed quality oats contain noxious and other weed seeds, and may be of unknown varieties that may adapt poorly to your farm. Some oat varieties that can be grown in Colorado are described below.

*Border* was released by the Wyoming Agricultural Experiment Station and USDA in 1981. It is a medium short oat with good straw strength. Border is a high yielding, medium maturity, white, oat with good test weight.

*Cayuse* was released by Washington and Idaho in 1968, and later by Montana. It produces excellent yields under irrigated and dryland conditions. Cayuse is a moderately early oat with short, stiff straw, yellow grain, moderate test weight and moderate resistance to Yellow Dwarf.

*Colorado 37* was selected from a field of commercial oats in the San Luis Valley in 1900 and later released as a variety in 1920. Colorado 37 is a Swedish-type, plump, white, high test weight, late season, tall oat that tends to lodge under high-yield conditions. Colorado 37 produces only average yields but is known for high-quality grain.

*Corbit* was developed from a Cayuse/Orbit cross by USDA and the Idaho Experiment Station and released in 1977. Under irrigated conditions, Corbit exceeds Cayuse in yield and test weight

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and is similar to Cayuse under dryland culture. Corbit is a stiff strawed, mid-season, yellow oat with good lodging resistance. It has short plant height similar to Cayuse. Awns frequently occur on primary kernels.

*Garry* is a white, high-yielding oat from the cross Victory X Victory X Hajira-Banner developed at the rust laboratory in Winnepeg, Canada. It is resistant to most of the North American races of stem rust.

*Monida* was derived from a Cayuse/Otana cross made at Aberdeen, Idaho in 1975. Monida is similar to Russell in plant height but is later in maturity. Monida produces well under irrigated and dryland conditions.

*Ogle*, a cross of Brave X Tyler X Egdolon 23, was released by Illinois, Nebraska, Ohio, Pennsylvania, New York and USDA in 1981. It is a widely adapted medium maturity variety with moderate resistance to Barley Yellow Dwarf. It produces large yellow kernels with fair test weight.

*Rio Grande*, previously tested as AB5792, has short, stiff straw, matures early and has white seed with good test weight potential. It was developed in Idaho and released in 1989 by Idaho and Colorado.

*Russell* was selected from the cross Garry/-Mutrica Ukraine X Abegweit and released by Canada in 1960, is a medium-late maturing tall variety that has white kernels. Russell has fair standability and produces plump grain with good test weight potential. It has moderate resistance to older strains of rust but is susceptible to the newer ones. It is moderately susceptible to Barley Yellow Dwarf Virus.

Average yields of commonly grown varieties are shown in Table 1.

**Table 1: Oat variety comparisons in the San Luis Valley, Colorado 1986-1987.**

| Variety | Grain yield | | Test Wt | Head Date | Plant Height | % Lodge[1] |
|---|---|---|---|---|---|---|
| | bu/ac | lbs/ac | lbs/bu | days | inches from 6/1 | |
| Border | 152 | 4877 | 38.6 | 35.4 | 45 | 10 |
| Rio Grande | 152 | 4854 | 39.2 | 32.4 | 43 | 0 |
| Ogle | 143 | 4570 | 38.8 | 29.8 | 42 | 0 |
| Corbit | 142 | 4560 | 39.1 | 35.8 | 48 | 23 |
| Cayuse | 141 | 4531 | 37.8 | 33.3 | 44 | 0 |
| Colorado 37 | 120 | 3827 | 41.5 | 40.3 | 57 | 20 |
| Average | 142 | 4536 | 39.2 | 34.5 | 46 | 9 |

[1]*% Lodging is for 1986 only.*

## Fertilizer

Oats require good soil fertility. However, excessive amounts of nitrogen may be detrimental. A soil test is recommended to determine carryover soil nitrate and phosphorus levels as a basis for additional fertilizer applications. Irrigated oats grown on low fertility soils may require an additional 100 pounds of nitrogen or more to achieve 100-bushel yield. Additional plant nutrients, other than nitrogen or phosphorus are not usually required to increase yields. Oats for hay, growing on draughty soils high in nitrates may produce forage toxic to livestock.

## Planting Dates/Rates

Planting dates vary in Colorado, depending on location and elevation of the field. In southeast Colorado, oats may be planted as early as March 1, in northeast Colorado March 15th, and in the San Luis Valley after April 30. Oat seeds germinate when soil temperatures reach 40° F. Planting delays usually mean yield losses.

Oats should be planted with a grain drill 1 to 2 inches deep in a firm seedbed in 6- to 12-inch-wide drill rows. Seeding rates of 50 to 90 pounds per acre are recommended. The lower rate of 50 pounds is favorable for dryland production or oat seedings used as a companion crop for establishing perennial forages. Rates of 90 pounds per acre are recommended for irrigated production.

## Irrigation

Oats may be irrigated by flooding, furrow irrigation or sprinkler in Colorado. Oats planted in fields with a full profile of water will respond to several additional irrigations. When total water is limited, oats respond most favorable if irrigated during the early boot stage. Additional irrigations should be scheduled at tillering, jointing and grain fill. The number of irrigations should be adjusted by availability of winter moisture, timeliness and amount of spring and summer rains, and the water holding capacity of the soil. The total consumptive water use of oats varies from 12-acre inches in cooler regions up to 18-acre inches in warmer areas. Net irrigation should equal total consumptive use minus effective precipitation.

## Diseases and Insects

Barley Yellow Dwarf Virus (BYDV) causes serious yield losses in barley, oats and wheat throughout the state. The symptoms of BYDV include yellow stunted plants found singly or in groups among normal plants. Leaf discoloration

varies from shades of yellow to red (especially in oats), or purple. The disease of oats has historically been called "Red Leaf" and frequently is mentioned in older publications. BYDV is spread by aphid vectors such as the oat bird cherry aphid, corn leaf aphid, English grain aphid and greenbug. Sources of resistance exist for some races of BYDV.

There are two types of smut that attack oats: 1.) Loose smut *(Ustilago avenae)* infects the oat floret during pollination and growing hyphae remain inside the seed until seed germination the following year. At this time, the fungal growth resumes and develops as the plant matures. The dark brown to black spore masses replace most or all of the floral parts of the infected plant. At harvest, most of the spores have been released and the naked panicle remains. 2.) Covered smut *(Ustilago kolleri)* infects the oat inflorescence at pollination. Subsequent spore formation replaces the oat seed. Usually, the outer glumes remain on the infected plant until harvest protecting the masses of smut covered by a white membrane.

Planting smut resistant varieties is the most effective way to reduce the incidence of either loose or covered smut of oats. The use of systemic fungicides used as seed treatments for smut control is common. Other oat diseases have not been a problem in Colorado.

Oats are not considered an important host for the Russian wheat aphid (RWA) *(Diuraphis noxia)*. Infestations have been found on oats but reproduction on the oat plant is limited. Significant yield damage from RWA has not been detected, however, limited study has occurred. Other insects that attack oats include grasshoppers, cutworms, greenbug *(Toxoptera graminum)*, apple grain aphid *(Rhopalosiphum fitchii)* and English grain aphid *(Macrosiphum granarium)*.

## Harvest and Storage

Most oats are direct-combine harvested after the grain moisture drops below 14 percent moisture. If field weeds are a problem, swathing when grain moisture reaches 20 percent followed by a drying period is recommended. Swathing allows green weeds to dry out before threshing, which reduces the weed refuse in the grain. After a drying period of seven to 10 days, thresh oats with a combine fitted with a pickup attachment. Oats stored in large bins should be managed according to guidelines presented in Service in Action sheet .117, *Managing stored grain.*

## Weed Control

Oats are sensitive to injury from herbicide application; exercise care. To accomplish selective weed control apply 2,4-D, Banvel + MCPA, or MCPA + 2,4-D. Some oat injury can be expected from 2,4-D. Herbicide application must be early when weeds are small and oats are in the five-leaf stage. Late summer or early fall herbicide application on stubble is an effective control on annual or perennial weeds after harvest. If grain production is intended for the health or human food market, chemical use may be unauthorized. Herbicides should not be used if oats are underseeded with perennial forage legumes.

## Oat Hay

Oats are sometimes cut for hay, especially when the grain crop is damaged by drought or when oats are seeded with alfalfa as a companion crop. Oats grown for hay should be cut and cured in the soft-dough stage. Because they are harvested at an immature stage of growth during a cool portion of the year, the potential for $NO_3$ toxicity is high. As a general rule, oat hay should always be tested for $NO_3$.

## Oats for Silage

Oats can be successfully ensiled and fed to livestock. If considering oats for silage, compare feed value between oats and legumes. Legume silage is higher in protein, and more desirable for dairy cattle.

The stage of maturity of oats at harvest influences silage quality. Digestible protein and available energy decrease with advanced maturity of the crop. Early harvest produces highest protein levels. High prices for grain and protein favor early cuttings in spite of lower yields. For highest quality oat silage, cut oats in the boot stage, wilted to 65 percent to 70 percent moisture before ensiling. (Nebguide G74-141)

## Oats for Grain

Oat markets are highly specialized and premiums are paid for USDA grade number 1 oats that have a test weight greater than 36 pounds per bushel, less than .1 percent heat damage, less than 2 percent foreign material and more than 97 percent sound oats. These high-quality oats usually have been cleaned. Oats sold for human consumption and the race horse market must meet these standards.

Oats used for human consumption must be free from undesirable fractions prior to milling. The goal in milling is to obtain the maximum yield of clean, uniform, sound, whole oat kernels (groats) free from hulls, floury material, extraneous matter and undesirable flavors. Oats that have 98 percent or higher sound cultivated oats (SCO) and a test weight above 36 pounds per bushel may bring a premium. Oats that have less than 95.5 percent SCO may be discounted.

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