Cereals for Hay in Central Oregon

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INTRODUCTION

Cereals such as barley, oats, rye, and wheat have characteristics that make them especially valuable for use as hay in Central Oregon. They grow rapidly and produce high forage yields rich in proteins, vitamins, and digestible carbohydrates. Since varieties exist for all climates and for fall or spring planting, it is possible to include cereal hay crops in most rotations (5).*

Cereals can be grown for hay before late summer seedings of alfalfa, and the alfalfa can be sown in the stubble of the cereal hay crop. The amount of forage produced from the same land area by this method may be twice that produced by using a companion crop or herbicide to seed alfalfa in the spring (2). Cereal hay crops also help clean up fields infested with weedy grasses. This report discusses production aspects that need attention for making the most profitable use of cereals for hay in Central Oregon.

SEEDING

High yields from any crop require planning and preparation that should begin several months before placing seeds in the soil. Cereals are adaptable and will grow in almost any situation, but they produce highest yields only under the most favorable conditions.

Soil Testing

The only way of determining soil fertility levels and fertilizer or lime needs is by having soils analyzed in a soil testing laboratory. Since accurate recommendations depend on reliable test results, samples submitted for analysis must represent the areas to be seeded. Use a soil sampling probe and follow the instructions of the Extension Service or soil testing laboratory for obtaining a representative sample. Have the samples analyzed for nitrate-nitrogen, phosphorus, potassium, and pH. Follow the recommendations to maintain optimum soil fertility levels for high production. Costs of soil tests are insignificant when compared to losses resulting from lack of needed fertilizer or lime, or to savings made from not applying them unnecessarily.

If alfalfa will be seeded following removal of the cereal hay crop, sample and test the soil in August or September of the preceeding year. Soil pH levels in Central Oregon have an annual cycle that reaches its lowest point in late summer. Liming recommendations are best made when based on a determination of the soil pH at its lowest level. Also, since lime reacts slowly in soils, it should be applied at least 6 months before seeding alfalfa. Lime, phosphorus, and potassium should be worked into the soil as needed according to soil test recommendations during the first phases of soil preparation in the fall.

Nitrogen Fertilizer and Seeding Rates

Decreasing production expenses is one way of increasing profits from crops. Using optimum seeding rates and soil fertility levels that maintain high yields can result in large savings and, consequently, more profit.

Table 1 presents the results of an experiment done to study effects of nitrogen fertilizer and seeding rates on oat hay yields. The study showed that average hay yields from Cayuse were about the same for all nitrogen or seeding rates that were used. Park hay yields were lowest for the low nitrogen and seeding rates combination, but yields were the same for other treatment combinations. The study indicated that, depending on variety, hay yields could be maintained at high levels while decreasing production costs by varying the amounts of nitrogen and seed used. For example, if nitrogen was the most expensive input, a lower nitrogen fertilizer rate and higher seeding rate could be used. Although this experiment was done only with oats, similar results probably would be obtained with other cereals.

Seedbed

Seedbeds should be moist and firm. Compact the soil before and after seeding, especially sandy soils which lose moisture rapidly if they are loose. Irrigating before seeding helps to firm seedbeds and results in uniform germination and emergence (6).

Varieties

Many cereal varieties exist that could be used for hay production in this area; varieties thought to be

* Numbers in parentheses refer to "Literature Cited," back of sheet.

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most suitable were tested during two years at Redmond. Table 2 shows that average yields ranged from 2.3 to 5.9 tons of hay per acre. Crude protein contents ranged from 5.6 to 13.5 percent. Only awnless varieties of barley and wheat should be used for hay to avoid problems in feeding. Rye usually is grown dry land in central Oregon and, under such conditions, produces more forage than other cereals.

Table 1. Dry forage yield of oat varieties grown for hay under irrigation with two nitrogen (N) fertilizer rates (160 or 80 lb/acre) and two seeding rates (SR) (160 or 80/lb acre) at Redmond, 1977-1978

Variety and treatment	Dry forage yield		
	1977*	1978**	average
	tons/acre		
Park, N_{160}, SR_{160}	6.0	6.1	6.0
Park, N_{160}, SR_{80}	7.4	6.3	6.8
Park, N_{80}, SR_{160}	7.1	5.2	6.2
Park, N_{80}, SR_{80}	5.6	4.6	5.1
Cayuse, N_{160}, SR_{160}	5.8	5.7	5.8
Cayuse, N_{160}, SR_{80}	6.5	6.1	6.3
Cayuse, N_{80}, SR_{160}	6.4	5.2	5.8
Cayuse, N_{80}, SR_{80}	7.9	5.0	6.4
LSD 0.05, tons/acre	1.5	0.7	0.8

* 1977: seeded 4/15; harvested 7/27.
** 1978: seeded 4/18; harvested 7/31.

Table 2. Dry forage yield and crude protein content of cereal varieties grown for hay under irrigation at Redmond, 1977-1978

Variety	Dry forage yield			Crude protein (1977)
	1977*	1978**	average	
	tons/acre			%
Oats				
Burnett	5.1	4.8	5.0	7.8
Cayuse	6.6	5.0	5.8	8.8
Chief	5.5	4.8	5.2	8.3
Corbit		5.9	5.9	
Froker	5.5	4.0	4.8	5.6
Kanota		4.7	4.7	
Lodi	4.3	3.6	4.0	5.6
Markton	7.2	3.6	5.4	8.7
Montezuma		4.3	4.3	
Noble	4.4	3.7	4.0	7.7
Nodaway	6.4	3.8	5.1	7.8
Park	6.5	4.6	5.6	9.5
Spear	5.5	4.6	5.0	7.9
Texas Red	5.2	4.8	5.0	7.3
Barley				
Belford	4.8	3.8	4.3	7.8
Rye				
Ryman	2.7		2.7	13.5
Stark I	4.1	2.1	3.1	7.0
Triticale				
M75-8654	2.3		2.3	11.8
Wheat				
Galgalos	7.0	2.4	4.7	7.6
LSD 0.5, tons/acre	1.6	1.8	1.2	

* 1977: seeded 4/26; seeding rate 100 lb/acre; nitrogen fertilizer rate 100 lb/acre; harvested 7/27.
** 1978: seeded 4/18; seeding rate 80 lb/acre; nitrogen fertilizer rate 80 lb/acre; harvested 7/31.

Seeding Depth

Cereals are best sown ¾-inch deep on heavy soils and 1 to 1½ inches deep on sandy soils. Sowing too deeply may result in killed or weakened seedlings.

Seeding Time

The best time for seeding spring cereals for hay in central Oregon is between March 15 and April 15. By then, soils usually are warm enough for germination and contain enough moisture for early growth until it is possible to irrigate. Seedlings begun during that period tolerate spring frosts better than seedlings from later seedings.

Winter cereals should be seeded in October. Seeding earlier than October increases damage from diseases, and seeding later reduces yields because seedlings may be heaved from the soil by frosts.

IRRIGATION

Dry soil conditions kill more seedlings than any other cause. Although cereals are sown more deeply than crops having smaller seeds, adequate soil moisture is important to obtain uniform stands. Sandy soils dry out rapidly near the surface; soil moisture may be sufficient to germinate seeds, but seedlings may die if the soil dries before they root enough to become established. Irrigate as frequently as necessary to keep the soil moist during establishment.

A major problem in producing any crop in central Oregon is achieving proper irrigation. Since the amount of water needed by plants changes during the growing season, frequency of irrigations must also change. Less frequent irrigations are usually required in spring and late summer than during mid-summer. Plants require adequate moisture for normal growth; water deficiency for any length of time reduces yield and promotes early maturity. Tillering, boot, flowering, and milk are critical cereal growth stages when they are less able to withstand water stress.

Central Oregon soils generally are shallow and have low water-holding capacities; moisture conditions in such soils change rapidly. Consequently, irrigations should be made when available moisture reaches 50 percent of a soil's water-holding capacity (3). Almost all central Oregon soils have water-holding capacities of 1.5 to 2.4 inches per foot of soil (Table 3). Irrigation needs can be predicted if the soil's water-holding capacity is known. For example, a soil such as Deschutes loamy sand stores 1.5 inches of water per foot of soil; if the soil is 2 feet deep, it can hold only 3 inches of water. A shallow, light-textured soil such as this should be irrigated when soil moisture reaches 50 percent of water-holding capacity, or 1.5 inches of available water. On hot summer days, water loss (evapotranspiration) from a vigorously growing crop is about 0.3 inches per day. At this rate, 50 percent of the water would be lost from the soil in 5 days; ideally, it should be irrigated that often during hot, drying weather. With longer times between irrigations, plants would be under moisture stress after 5 days, and forage yields would be reduced.

Each irrigation should apply only enough water to fill the soil up to its water-holding capacity. Not only is it inefficient to apply more water than can be stored in a soil, but over-irrigation is harmful to plant growth and leaches nutrients, particularly nitrogen and sulfur, from soils.

Table 3. Available water-holding capacities of major soils in central Oregon

Soil type	Avg. available water-holding capacity
	in/ft
Agency sandy loam	2.2
Agency loam	2.2
Deschutes loamy sand	1.5
Deschutes sandy loam	1.7
Lamonta loam	1.7
Madras sandy loam	2.2
Madras loam	2.3
Metolius sandy loam	2.4
Ochoco sandy loam	2.4
Prineville sandy loam	1.6
Willowdale loam	2.9

Adapted from Simonson, G. H., and M. N. Shearer (3).

WEEDS

Apply herbicides on spring cereals as soon as the plants have 4 to 6 inches of growth, before the heads start into the boot stage. Depending on the herbicide, applications on winter cereals should be made after they have 3 to 9 leaves or 6 to 8 inches of growth, before the heads start into the boot stage. Effective chemical control of weeds is achieved only when weeds are small. Identify the weeds you are dealing with, use the proper herbicide to control them, and follow instructions on the label. The County Extension Agent can advise you on correct use of herbicides (1).

INSECTS

Insects usually do not cause problems in growing cereals for hay in central Oregon. Occasionally, however, aphid populations can increase to the point that yields are reduced. If you suspect that there is an insect problem, contact the County Extension Agent for assistance.

DISEASES

Although diseases usually are not serious in central Oregon cereal hay crops, using only good-quality seed of rust-resistant varieties that have been treated for smut ensures that problems do not develop. Seeding at proper times also decreases occurrence and seriousness of diseases affecting cereals.

HARVEST

All cereal hays are more palatable and have higher nutritive value when harvested at earlier growth stages. Barley is the earliest to make a hay crop, wheat is intermediate, and oats is latest (5). Chemical analyses and feeding trials have shown that the early dough growth stage is the best time to harvest cereals for hay. At that stage, most of the protein, ash, phosphorus, calcium, and dry matter have accumulated in the plants (4).

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