

**Y**ielding ability of four oat hay varieties—California Red, Montezuma, Sierra, and Curt—under two cutting regimes was previously reported in *California Agriculture* (May 1976). Since that time, additional information has been gathered on the three standard (California Red, Montezuma, and Sierra) and two new oat varieties, Cayuse and Swan.

Yields per acre and factors that influence palatability and nutritional value—grain yield, disease resistance, leafiness, and stem diameter—were compared. Influence of cutting stage on yield was evaluated over a two-year period under high fertility and with irrigation. Each variety tested has a particular set of characteristics that may be important in a given situation. All five were found to be highly suitable for producing high-quality hay.

Cayuse is a late-maturing oat developed by N.F. Jensen, Cornell University, New York, and released in the state of Washington. This variety matures approximately three weeks later than Montezuma under Sacramento Valley conditions. Cayuse is a tall oat, with a medium to coarse stem, but equal to all other varieties in leafiness. Both this variety and Swan are moderately susceptible to rust diseases and have some tolerance to barley yellow dwarf disease occurring in California.

Swan, developed from Kent-Ballidu cross, was released by the Western Australia Department of Agriculture in 1967. Seed of this variety has undergone selection and evaluation and is approved for certification in California. Swan is a tall oat, medium of stem, and with leafiness equal to that of Montezuma. When harvested at the soft-dough stage of maturity, Swan is five to seven days later than Montezuma. Swan was more resistant to lodging than other varieties in the tests. Because of its early maturity and stiffness of straw, Swan is a good choice for sowing with vetch.

## Hay yields

Cayuse oats had the highest average hay yield—approximately 4 tons per acre—during the six years of testing under dry-farming conditions. Swan was second in average yield at 3.6 tons per acre, followed by California Red, Montezuma, and Sierra (table 1). Varieties differed in yield ranking from year to year with changes in rainfall patterns and the occurrence of barley yellow dwarf, a virus that can cause severe stunting with accompanying low forage and grain yields in susceptible plants. California Red is extremely susceptible to barley yellow dwarf, which resulted in low production during 1974. Low

# Update: oat hay variety trials

Carl A. Schonert □ Thomas E. Kearney □ Melvin R. George

*Varieties and time of harvest were evaluated for influence on yield. All varieties performed well.*

yields of all varieties in 1977 were due to drought—9.2 inches of rainfall. Mild winters and late spring rains are beneficial to all varieties, especially the late-maturing Cayuse and California Red.

In the irrigated trials, Cayuse was again the top-yielding variety (8 tons per acre) followed by Sierra, Swan, Montezuma, and California Red (table 2). All varieties yielded extremely well under irrigation on the highly fertile soils at University of California, Davis. With irrigation, all varieties almost doubled the yields of dry-farmed plantings. Low yields of late-maturing Cayuse and California Red in 1981 were due to lack of moisture caused by hot, drying spring winds.

## Factors influencing quality

The plant's grain portion contributes significantly to dry matter yield and nutritional value when hay is cut at the dough stage but is less important at the flower stage. Grain yield is also important in that high-yielding varieties can be harvested for grain when prices are favorable, and it is a factor in the availability and price of seed.

Montezuma yields the most grain of the five varieties reported, partly because of its resistance to grain shatter. Sierra, Swan, and Cayuse are slightly less productive than Montezuma. Cayuse grain yields may be depressed in low-rainfall years under dry-farming conditions. Lack of moisture may prevent filling of kernels with this late-maturing variety.

California Red was clearly inferior in grain yield when compared with other varieties. Strong winds during the harvest period cause severe grain shatter in this variety. Also, its

susceptibility to barley yellow dwarf causes grain yield reductions, and where this is a major disease problem, California Red oats should not be used.

Oats are also affected by stem and crown rust diseases, which are most severe during warm, wet conditions that may occur with late spring rains. In severe infections, oat leaves become dry, and rust spores create a dustiness on diseased plants that makes the hay unpalatable to livestock. California Red and Cayuse show some tolerance to rust diseases occurring in Yolo County. Swan is moderately susceptible, and Montezuma and Sierra are susceptible to these diseases.

Fine stems and leafiness are often considered quality factors in oat hay, although their direct relation to hay quality is not known. California Red was superior in both characteristics; Montezuma was second to California Red in stem fineness and was only slightly less leafy. Swan and Cayuse oat stems are slightly larger in diameter than those of California Red and Montezuma, and the plants have a less leafy appearance. Sierra can have very coarse stems when grown in high-yielding environments, but it has many large broad leaves. All varieties are considered palatable to livestock.

Lodging, another characteristic that may affect hay quality, occurs mainly under irrigation and is seldom a problem under dry-farming. Varieties that lodge are difficult to harvest, and lodged, matted oats are often severely infected with rust and mildew under high-moisture conditions. Such severely infected oat hay is unpalatable to livestock.

Swan oats are most resistant to lodging, followed by Cayuse and Sierra. Montezuma



In oat hay variety trials in western Yolo County, Cayuse, a late variety, is nearly ready for harvest; most of the early varieties already have been harvested.

is less resistant to lodging than Cayuse or Sierra, and California Red is the most susceptible when grown on highly fertile soils under irrigation.

### Early maturity

Early maturity can be important in both dryland and irrigated oat hay plantings. Late-maturing oats that fail to produce grain in an exceptionally dry spring may be lower in nutritional value and yield. In irrigated lands, early harvest may be beneficial for double-cropping.

Montezuma, harvested at the soft-dough stage in mid-May in dryland trials and in late May on irrigated land, was the earliest maturing of the varieties tested. Swan and Sierra were 4 to 6 days later, California Red 12 to 14 days later, and Cayuse 19 to 21 days later than Montezuma.

### Time of cutting

Oats may be cut during the flower stage as heads emerge from the boot. Harvest can be 14 to 21 days earlier by this system, but yields will be decreased as compared with dough-stage hay (table 3). The oat varieties tested yielded an average of 19 percent more dry matter when cut at the dough stage. Feeding tests (*California Agriculture*, May 1958), however, have shown that flower-stage hay has a higher protein and total digestible nutrient (TDN) content than oats harvested in the milk or soft-dough stage—perhaps an advantage in feeding some types of livestock. Flower-stage hay may yield fewer tons per acre, but it has more green leaves and more pliable stems than hay cut at the soft-dough stage of maturity. Cutting at the flower stage also allows earlier planting of a second crop on irrigated lands where double-cropping is practiced.

*Carl A. Schoner and Thomas E. Kearney are Farm Advisors, Cooperative Extension, Yolo County, and Melvin R. George is Agronomist, Cooperative Extension, University of California, Davis. This report is based in large part on work initiated by Dr. John D. Prato before his death in 1977.*

*The generous cooperation of Oscar Durst, Jr., in providing sites for dry-farmed oat variety tests is gratefully acknowledged.*

**TABLE 1. Hay yield of five oat varieties in dryland trials, Oscar Durst Ranch, Yolo County**

Harvest year	Planting date	Yield — tons dry matter per acre					LSD 0.05*	CV†
		Cayuse	Swan	Calif. Red	Montezuma	Sierra		
1974	1/28/74	1.77	1.81	0.99	1.82	1.59	0.48	20.6
1975	11/26/74	5.08	4.75	4.81	5.18	4.68	0.41	5.8
1977	11/04/76	1.72	1.58	1.63	1.76	1.82	0.20	8.6
1978	12/20/77	4.09	4.21	3.63	3.51	3.99	0.76	12.7
1980	12/11/79	5.00	3.84	4.12	3.63	—	0.59	9.8
1981	12/01/80	6.64	5.54	6.06	4.78	—	0.66	8.9
Avg. yield all years		4.05	3.62	3.54	3.45	—		
Avg. yield, 1974-78		3.17	3.09	2.77	3.07	3.02		

\*LSD 0.05 = the smallest yield difference that is statistically significant at the 5 percent level of probability.  
†CV (Coefficient of Variation) is a measure of the amount of unexplained variation present in a particular trial.

**TABLE 2. Hay yield of five oat varieties in irrigated area trials, UCD Agronomy Farm, Yolo County**

Harvest year	Planting date	Yield — tons dry matter per acre					LSD 0.05	CV
		Cayuse	Swan	Sierra	Calif. Red	Montezuma		
1975	11/27/74	9.17	8.28	7.51	7.59	6.36	0.59	5.5
1976	11/26/75	7.88	7.55	7.26	—	7.01	0.62	5.6
1977	12/21/76	7.39	6.34	7.47	6.38	5.71	0.70	7.0
1979	12/12/78	8.70	7.79	6.92	5.81	5.45	0.89	9.2
1980	11/11/79	9.44	7.60	7.22	6.60	6.52	0.80	8.9
1981	11/13/80	5.62	7.07	9.24	4.8	7.44	2.16	24.7
Avg. yield all years		8.03	7.44	7.60	—	6.42		
Avg. yield, 1975, 1977-81		8.06	7.42	7.67	6.24	6.30		

**TABLE 3. Hay yield of four oat varieties when cut at flower and soft-dough stages of maturity, irrigated area, UCD Agronomy Farm, Yolo County**

Year†	Yield — tons dry matter per acre*							
	Cayuse		Swan		Sierra		Montezuma	
	Flower	S. dough	Flower	S. dough	Flower	S. dough	Flower	S. dough
1979	7.33 (5/23)	8.70 (6/9)	5.80 (5/4)	7.79 (5/27)	5.01 (5/7)	6.92 (5/29)	4.98 (5/1)	5.45 (5/24)
1980	8.31 (5/21)	9.44 (6/8)	6.07 (4/28)	7.60 (5/21)	5.93 (4/28)	7.22 (5/19)	4.83 (4/22)	6.52 (5/15)
Average	7.82	9.07	5.94	7.70	5.47	7.07	4.91	5.99
Percent of soft-dough yield	86%		77%		77%		82%	

\*Yield differences between cutting stages are highly significant.  
†Harvest dates are in parentheses below each yield figure.