1994 Kentucky Alfalfa Variety Test Report

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Introduction

Alfalfa *(Medicago sativa)* is historically the highest yielding, highest quality forage legume grown in Kentucky. It forms the basis of Kentucky's cash hay enterprise and is an important component in dairy, horse, beef and sheep diets. In 1993, 1.04 million tons of alfalfa hay were produced in Kentucky in addition that produced for haylage, silage, and grazing. At $100 per ton, the value of this alfalfa hay alone to Kentucky farmers would be $104 million. Choosing a good alfalfa variety is a key step in establishing a stand of alfalfa because it can make the difference between growing 5 tons of hay per acre per year or 8 tons as well as thicker, more persistent stands.

This report provides current yield data on varieties in the Kentucky Alfalfa Variety Trials as well as guidelines for selecting alfalfa varieties.

Considerations in Selecting an Alfalfa Variety

When choosing a variety, many factors must be considered. In producing high yields a desirable alfalfa variety will be locally adapted, high yielding, persistent, winter hardy, resistant to diseases, and available as either certified seed or as a protected variety.

Local Adaptation and Persistence. High yields in variety tests over a range of years and locations within the region are the best indication that a variety is locally adapted and persistent. Several varieties are adapted for use in Kentucky as determined from the test results in this report.

Winter Hardiness. Each variety has a fall dormancy rating ranging from 1 (very dormant) to 9 (non-dormant). Varieties with lower dormancy ratings start growing later in the spring and stop growing sooner in the fall. This growth habit can, but does not necessarily, reduce annual yields compared to less dormant varieties. Generally alfalfa should have a fall dormancy rating of 2-5 to perform well in Kentucky and have good winter survival. Ratings of 6 and above are not winter-hardy under Kentucky conditions.

Disease and Pest Resistance. In Kentucky, producers should use varieties that have at least an "MR" (moderate resistance) rating to four major diseases of alfalfa: Phytophthora root rot (PRR),

anthracnose (An), bacterial wilt (Bw), fusarium wilt (Fw) and Aphanomyces root rot (APH). Even higher levels of resistance are recommended on farms where the diseases have been diagnosed.

Phytophthora root rot is a fungal disease associated with poorly drained soils or excessive rainfall. This disease causes yellowish to reddish-brown areas on roots and crowns that eventually become black and rotten. The topgrowth of infected plants appears stunted and yellow.

Anthracnose, also caused by a fungus, attacks the stems of alfalfa, preventing water flow to the rest of the shoot and causing sudden wilting. These wilted shoots have a characteristic "shepherd's crook" appearance. Anthracnose can also cause a bluish-black crown rot.

Bacterial wilt and fusarium wilt are infections of the water-conducting tissues of alfalfa roots that do not cause any noticeable root rot. These diseases prevent water flow to leaves resulting in wilting of shoots and the eventual death of infected plants. Roots infected with bacterial wilt often have a yellowish-brown discoloration of the inner woody cylinder of the taproot. Fusarium infection can be recognized by brown to red streaks in the inner woody cylinder of the taproot.

Aphanomyces root rot is another fungal disease associated with poorly drained soils or excessive rainfall. Affected seedlings will be stunted but remain upright, unlike symptoms of damping off. In established plants, root symptoms are not as well defined as those for Phytophthora root rot but brown lesions on the taproot indicate where lateral roots were destroyed. This disease can be associated with Phytophthora root rot and, together, they may form a root disease complex. Aphanomyces root rot is known to affect new seedings on rare occasions in Kentucky but it is still unclear how it affects established alfalfa.

Finally, there is no varietal resistance to Sclerotinia crown and stem rot at this time. And, although confusing claims exist, no varieties have true genetic resistance to the alfalfa weevil and potato leafhopper. Claims of resistance to potato leafhopper is actually resistance to yellowing, commonly called "hopper burn". Incorporating resistance to these and other pests of alfalfa is the goal of alfalfa breeders nationwide.

Seed Quality. Buy either certified or Plant Variety Protected (PVP) seed, which will guarantee that the genetics and performance you are paying for are in the bag. Look for the blue tag, which must be attached to all bags of certified seed or look for Plant Variety Protection labelling, which is the proprietor's guarantee. Other information on the label will include the test

date, which must be within the previous nine months, and the level of germination and other crop and weed seed. Order seed well in advance of planting time to assure that it will be available when needed.

Description of the Tests

Alfalfa variety tests were established at Lexington (1990 & 1991), Bowling Green (1990 & 1992), Princeton (1990 & 1993), and Mayslick (1994). The soils at all locations are well-suited to alfalfa in that they are well-drained silt loams (Maury, Pembroke, Crider, and Lowell at Lexington, Bowling Green, Princeton and Mayslick, respectively).
The Bowling Green tests are on soils that are naturally infested with both Phytophthora and Aphanomyces root rot pathogens, the Mayslick soil is infested with only Aphanomyces, and the Lexington and Princeton tests are on soils that are not infested with detectable levels of either pathogen. Plots were 4 x 15 feet in a randomized complete block design with four replications. In each test, 20 pounds of seed per acre were planted into a prepared seedbed using a disk drill. Current management recommendations for Kentucky for soil fertility and weed and insect control were employed in all tests. Plots were harvested with a sickle-type forage plot harvester. First cuttings in the seedling year are delayed to allow the alfalfa to completely reach maturity as indicated by full bloom, which generally occurs about 80 days after seeding. Otherwise, harvests were taken when the alfalfa was in the bud to early-flower stage. Fresh weights were measured in the field and converted to dry matter production using long-term averages for alfalfa dry matter percent.

Results and Discussion

Weather data for Lexington, Bowling Green, Princeton, and Mayslick are presented in Table 1. The Mayslick weather data comes from the Ripley Research Farm 15 miles to the north at Ripley, Ohio. Generally speaking, the year was anything but average. Throughout the year at Mayslick cooler temperatures prevailed while Lexington and Princeton were warm in the spring and cooler than normal in the late summer and fall. Bowling Green was warm nearly all year. Precipitation was well above average for all locations in the spring except Princeton, while summer and fall were drier everywhere to some degree. Mayslick was slightly below normal each month, Bowling Green had some larger deficits but also some surpluses, and Lexington and Princeton were excessively dry. May was exceptionally cool with near to well below average precipitation across the state.

Yield data (on an oven-dry basis) for all tests are reported in

Tables 2-8. These tables list the varieties in order from highest to lowest total production (for the life of the test). Experimental varieties, which are not available for purchase, are listed separately at the bottom. Yields are given by cutting for 1994 and by year for each year of production. Percent stand ratings are included for the 1990 seedings.

Statistical analyses were performed on all alfalfa yield data (including experimentals) to determine if the apparent differences are truly due to variety or just due to chance. The variety with the highest numerical value in each column is marked with two asterisks (**) and those varieties not significantly different from that variety are marked with one asterisk (*). To determine if two varieties are truly different, compare the difference between the two varieties to the Least Significant Difference (L.S.D.) at the bottom of the column. If the difference is equal to or greater than the L.S.D., the varieties are truly different when grown under the conditions at a given location. The Coefficient of Variation (C.V.), which is a measure of the variability of the data, is included for each column of means. Low variability is desirable and increased variability within a study results in higher C.V.'s and larger L.S.D.'s.

With the exception of Bowling Green, alfalfa yields across the state were about 1.5 tons/acre lower than 1993. That yield difference is due in part to lower yields in the first and third harvests; however, yields of all cuttings were lower.

The 1990 seeding at Lexington declined visibly during the summer of 1992 and a Fusarium sp. was isolated from a number of crowns suggesting the probable cause. Yields in 1994 continued to reflect stand loss due to that infection.

Both tests at Bowling Green suffered from invasion of summer annual grasses. The 1990 seeding did not recover and compete to produce measurable yields after the third cutting (JUN29) in spite of maximum use of available herbicides. The 1992 seeding did, however, recover and produce at levels near those of unaffected tests at the other locations. The 1992 seeding at Bowling Green appears to be on a more drought-prone site than the 1990 test. Even with a surplus of moisture of moisture in August and near normal precipitation in September at Bowling Green, regrowth after the August cutting was negligible and so no harvest was taken from the 1992 test in September.

Table 9 summarizes information about proprietors, distributors, fall dormancy, disease resistance, and yield performance across years and locations for all the varieties currently included in the Kentucky Alfalfa Variety Tests. Varieties are listed in

alphabetical order with the experimental varieties at the bottom. Remember that experimental varieties are not available for farm use, while commercial varieties can be purchased through dealerships. In this table, shaded areas indicate that the variety was not in that particular test (labelled at the top of the column) while clear blocks mean that the variety was in the test. A double Asterisk (**) indicates that the variety was the highest yielding variety in the test for that year. A single asterisk (*) means that the variety was not significantly different from the highest yielding variety. It is best to choose a variety that has performed well over several years and locations as indicated by the asterisks. Make sure seed of the variety is properly labelled and will be available when needed.

Summary

Consistent production of high yields of alfalfa is the result of good variety selection along with the implementation of good management techniques. Soil fertility should be maintained at recommended levels based on soil tests, and pests such as weeds, alfalfa weevil, and potato leafhopper should be controlled using the appropriate cultural and/or chemical methods. Harvesting established stands at the appropriate stage of maturity will produce four to five cuttings annually in Kentucky before mid-September. For further information about alfalfa management, refer to the University of Kentucky Extension publications listed in Table 10. These publications are available at the local county extension office.

TABLE 1. TEMPERATURE AND RAINFALL IN LEXINGTON, BOWLING GREEN, PRINCETON, AND MAYSLICK DURING 1993.

	LEXINGTON				BOWLING GREEN				PRINCETON				MAYSLICK			
	TEMPERATUR		RAINFALL		TEMPERATUR		RAINFALL		TEMPERATUR		RAINFALL		TEMPERATUR		RAINFALL	
MONT	F	DEP.	INCHE	DEP.	F	DEP.	INCHE	DEP.	F	DEP.	INCHE	DEP.	F	DEP.	INCHE	DEP.
JAN	25	-6	3.60	+0.03	30	-2	4.63	+0.81	30	-4	4.26	+0.40	21	-8	1.89	+1.8
FEB	36	+1	3.41	+0.15	40	+4	6.24	+2.11	41	+2	3.73	-0.71	31	-2	2.86	+0.2
MAR	43	-1	5.95	+1.12	47	+1	8.58	+3.48	49	+1	5.13	+0.69	39	-4	5.15	+0.9
APR	58	+3	6.02	+2.01	62	+5	5.74	+1.42	60	+1	5.48	+0.60	55	+1	7.77	+3.7
MAY	60	-4	4.05	-0.18	62	-4	3.31	-1.63	63	-6	0.84	-4.84	58	-5	4.83	+0.0
JUN	74	+2	2.01	-2.24	77	+4	5.89	+1.72	77	+2	4.19	+0.32	74	-3	3.42	-
JUL	76	0	2.62	-2.33	78	+2	3.73	-1.01	78	0	3.89	-0.41	76	+2	-	-
AUG	72	-3	5.86	+1.90	76	+2	5.02	+1.50	75	-1	1.69	-2.37	72	-1	3.82	-
SEP	65	-3	1.43	-1.85	68	0	3.69	-0.03	68	-1	2.28	-1.06	64	-3	2.82	-
OCT	57	0	1.71	-0.55	59	+1	2.35	-0.67	61	+1	2.65	-0.67	55	0	2.09	-

DATA FOR MAYSLICK COMES FROM THE RIPLEY RESEARCH FARM AT RIPLEY, OHIO, 15 MILES NORTH.

TEMPERATURES ARE IN DEGREES FAHRENHEIT.

DEP. IS DEPARTURE FROM THE LONG-TERM AVERAGE FOR THAT LOCATION.

Table 10. University of Kentucky agricultural extension publications related to alfalfa management.

Publication	Title
AGR-76	Alfalfa: The queen of the forage crops
AGR-107	Alfalfa: Quality means profits
AGR-64	Establishing forage crops
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AGR-90	Inoculation of forage legumes
AGR-18	Grain and forage crop guide for Kentucky
AGR-1	1992-1993 Lime and fertilizer recommendations
AGR-148	Weed control strategies for alfalfa and other forage legume crops
ENT-17	1993 Insect management recommendations for field crops and livestock
PPA-10d	Kentucky plant disease management guide for forage legumes
PPA-28	Alfalfa varieties: Relative disease resistance and winter hardiness
AGR-137	Alfalfa hay: Quality makes the difference
ID-97	Grazing alfalfa

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