

# ALFALFA VARIETIES FOR MICHIGAN IN 2000

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Michigan State University has seeded more than 100 commercially available alfalfa varieties in its alfalfa variety trials since 1992. Plant breeders, developers, and marketers submit both commercial and experimental alfalfa varieties to MSU for testing. Varieties in these trials are evaluated for yield and persistence for at least three years. Alfalfa trials have been established at East Lansing in southern lower Michigan, Lake City in central northern Michigan, Bad Axe in the Thumb of Michigan, and Chatham in the upper peninsula.

More than 95 percent of the varieties entered are evaluated at East Lansing. Trials at East Lansing are usually two to three times larger than trials at Lake City or Chatham. Yield data are expressed as an average over two or three years for 108 alfalfa varieties seeded at East Lansing from 1992-1997. Lake City

Selecting an appropriate alfalfa variety for an environment requires careful consideration. Yield and persistence of an alfalfa variety are only a part of establishing and maintaining an alfalfa stand. Good management practices are also important. Even the best alfalfa variety will not perform well under poor management conditions. Establish good stands on adequately drained soils. Adjust soil pH a full year prior to seeding. Fertilize before seeding and broadcast annually with phosphorous and potassium as recommended by soil tests. The appropriate cutting management system depends on the location, yield goal, forage quality desired, and desired stand life.

## **Three cuttings per year:**

Three cuts per year is the best cutting system in Michigan for long-term stands with good yields if fertilized adequately with potassium. Forage quality in a three-cut system should be adequate for beef cows, dairy replacement heifers and dry cows but may not be high enough in fiber (over 40% NDF) for high producing dairy cows. Alfalfa stands intended for long-term use, greater than five years, should not be cut more than three times per year. In addition, alfalfa stands in northern Michigan should not be cut more than three times per year. Recommended dates of the third and final cutting is different for northern and southern Michigan. Cutting schedules and approximate stages of maturity with three cuttings are:

### Southern Lower Michigan:

- 1st Cutting -- June 1-5 (late bud to early bloom)
- 2nd Cutting -- July 10-20 (1/10 bloom)
- 3rd Cutting -- August 25-October 15 (1/10 to full bloom)

### Upper Peninsula and Northern Lower Peninsula:

- 1st Cutting -- June 10-20 (late bud to early bloom)
- 2nd Cutting -- July 25 - August 15 (1/10 to 1/5 bloom)
- 3rd Cutting -- September 30 - October 15 (1/10 to full bloom)

## **Four cuttings per year:**

Four cuttings per year is recommended for the highest yields of high quality alfalfa for three- to five-year stands in southern lower Michigan. Four cuttings will usually produce 15 percent higher yields than the standard three-cut system and with higher forage quality. Best results are achieved with excellent drainage and high fertility of phosphorous and especially potassium. Four cuttings per year is not recommended for areas in northern lower Michigan (north of Clare) or the upper peninsula. A four-cut harvest schedule in northern Michigan may result in lower yields, decreased stand life, and increased weed invasion after the first year.

The cutting schedule for four cuts per year in Southern Michigan south of Clare is:

1st Cutting -- late May - June 5 (late bud to very early bloom)

2nd Cutting -- July 5-15 (early bloom to 1/10 bloom)

3rd Cutting -- August 15-25 (early to 1/10 bloom)

4th Cutting -- mid to late October (1/10 to full bloom; with little or no regrowth after cutting)

### **Five cuttings per year:**

Three alfalfa cutting management experiments comparing a five-cut system with the recommended four-cut system were conducted between 1986 and 1993 at East Lansing. Data from each of these studies indicated five cuttings will produce similar yields to four cuttings in the first year, but lower yields than four cuttings in following years. Five cuttings per year will result in higher quality alfalfa. A five-cut system, however, is usually not recommended because of increased weed invasion (and possible lower forage quality), short-lived stands, and decreased yield after the first year.

### Predicting First Cutting Quality in the Field

In recent years there has been increasing interest in predicting the advancing maturity and quality of the first cutting of alfalfa in the North Central States. Experience has taught us that visual estimates such as flowering or using the calendar can be misleading for predicting when to take the first cutting of alfalfa. Many producers using these methods have been disappointed in the quality of forage harvested. Dairy nutritionists have shown that neutral detergent fiber (NDF) should be used as harvest criterion when deciding when to harvest first cut. When NDF is too low there is a low ration energy density and protein is too high. If NDF is too high, the haylage will have lower NDF digestibility and a lower dry matter intake and the producer will need to purchase costly supplements. These situations result in a significant loss of income on a dairy farm.

There are three methods of predicting forage quality in the field for the first cutting.

Dr. Mike Allen, MSU Dairy scientist has researched the effect of growing degree days (GDD) upon first cut alfalfa maturity and development. His work has shown an excellent correlation between growing degree days and NDF. Based upon his research, cutting should begin when alfalfa's NDF reaches 40% at 700 growing degree days. If the alfalfa is to be utilized as haylage or if it will be mixed with feed that has a high NDF and low protein, the harvest should occur at 680 GDD when NDF is at 38%.

Dr. Ken Albrecht, UW Agronomist has researched the development of equations to predict the fiber and protein of first cut alfalfa. The PEAQ method is based on measurement of the most mature and tallest stem in an alfalfa sample. Using the measurements taken from the samples and applying them to an equation, NDF and ADF can be calculated.

The scissors program, developed in Wisconsin, involves clipping fresh alfalfa samples from the field and analyzing them quickly for quality components. Information on advancing maturity of the crop is obtained which helps producers decide when to make their first cut. The samples are analyzed in a forage laboratory using either Near Infrared Spectrophotometry (NIRS) or wet chemistry. The information gained by using the scissors method reveals the actual quality of the selected sample, because of this, it is crucial that the sample be a good representative of the rest of the field.

Through experience, we have found the GDD method to be the easiest to use in Michigan since the GDD are reported to all AOE dairy agents as well as all extension offices and DTN twice weekly. If a producer wants to further refine this system, a minimum-maximum thermometer can provide on-site readings. This instrument should be placed in the alfalfa field 4 feet above the ground in an approved weather station shelter. Fresh samples taken from the fields to be harvested can also be used to further check forage quality advancement. There needs to be careful selection of samples so they represent the field.

## **Selection of an Alfalfa Variety**

### **I. SELECTION FOR SHORT-TERM STANDS -- UP TO FIVE YEARS.**

Most alfalfa stands in Michigan are left for three- to four-years. Varieties selected for short-term stands should be: 1) at least moderately winterhardy, 2) high yielding, and 3) resistant to bacterial wilt (BW) and anthracnose (AN). Resistance to Phytophthora root rot (PRR) is desirable when alfalfa is grown on fine-textured soils prone to waterlogging.

### **II. SELECTION FOR LONG-TERM STANDS -- OVER FIVE YEARS.**

Winterhardiness is of primary importance for long-lived stands. Winterhardy varieties may be slower to recover than moderately hardy varieties after a mid-September cutting. Compared to moderately hardy varieties, winterhardy varieties may flower three to five days later in the first cutting. Winterhardy varieties may be lower in yield than moderately hardy varieties in three- to five-year stands but are usually higher yielding after about five years, especially in northern Michigan.

Select high-yielding winterhardy varieties resistant to PRR for long-lived stands. Varieties in dormancy groups 1 and 2 are more likely than moderately hardy varieties (dormancy groups 3 and 4) to establish "permanent" cover. Varieties with asterisks in groups 3 and 4 have yielded higher than Vernal with similar persistence in the three- to seven-year trials at Lake City or Chatham in northern Michigan. They are considered winterhardy enough for long-term stands because of good survival at these northern locations.

### **III. SELECTION FOR PASTURES**

Varieties used in pastures should be selected for long-lived stands with resistance to Phytophthora root rot. Allowing adequate rest periods between grazing cycles will enhance longevity of alfalfa for pastures. Several commercial varieties are being marketed with improved tolerance to grazing. Alfalfa-grass mixtures in pastures will usually result in better meat and milk gains compared to grass mono-cultures. In addition, alfalfa will provide needed nitrogen for the grass from nitrogen fixation.

## **Winterhardiness and Fall Dormancy Ratings**

Fall dormancy ratings are determined by the amount of regrowth after a mid-September cutting. The higher the rating, the more regrowth and, in general, the less winterhardiness. Non-hardy varieties used in the West have ratings of 5, 6, or 7. They are usually not hardy enough for Michigan, even for short-term stands, except for one variety in dormancy group 5 (see table 8) which has yielded and persisted well at East Lansing in short-term stands.

### **Important Diseases in Michigan**

An alfalfa variety consists of plants, which are not genetically uniform. Thus, even in a "resistant" variety, only a portion of the plants will be resistant. Moderate resistance, for example, means that 15 to 30% of the plants are resistant but 70 to 85% are susceptible. Even a variety classified as resistant may suffer damage from a disease. Moderate resistance is generally considered adequate for good alfalfa production. Even resistant varieties, however, are susceptible to PRR or pythium diseases in the seedling stage.

Bacterial Wilt (BW). BW is present in all of Michigan. All of the named varieties sold in Michigan are adequately resistant to BW. "Common" alfalfa varieties sold by some seed companies are not recommended since the seed may be from susceptible plants.

Phytophthora Root Rot (PRR). This fungus disease, first found in Michigan in 1972, is now one of the state's most important alfalfa diseases. PRR occurs on heavy or poorly drained soils. Any soil, however, when saturated during a rainy period of seven to ten days may result in severe injury, especially to one- to two-month old seedlings. Seed companies have been treating alfalfa seed with the fungicide *Apron* for several years. Seed treating with *Apron* may be helpful in improving stands of resistant varieties. Treating a susceptible variety, such as Vernal, is probably not helpful. Most of the highest yielding varieties entered in our tests are resistant to PRR.

Anthracnose (AN). This disease, first found in Michigan in 1976, is becoming more severe each year. It occurs during hot, moist summers and is most common in the southern 1/3 of lower Michigan. The fungus infects stems and crowns and may kill some plants. It is now recommended that only anthracnose resistant varieties be planted in Michigan.

Verticillium Wilt (VW). First detected in Michigan in 1982, VW has not increased in severity as expected. It is generally introduced with infected seed. It usually is not a problem until the third year, and then primarily in the first cutting. Growing alfalfa for three to four years in rotation with corn will help break the disease cycle. Resistance to verticillium is recommended if planting alfalfa after alfalfa.

### **Important Insects**

Potato Leafhopper (PLH). PLH is currently the most damaging insect to alfalfa hay production in Michigan. Leafhopper injury usually occurs in the second and third cuttings. Injury symptoms start as a wedge-shaped yellowing on leaf tips and progress to yellowing and redness of the leaves. Decreases in yield, protein, and future growth may be caused by leafhopper infestations. There are several promising new alfalfa varieties with resistance to the potato leafhopper being evaluated at East Lansing. These new varieties may reduce the need for chemical control in some cases.

## **Alfalfa Varieties for Michigan in 2000**

Michigan State University establishes alfalfa variety trials each year at different locations in Michigan. These trials are harvested for at least three years after the seeding year. The following tables list the hay yields for the commercially available alfalfa varieties recently seeded in the trials at East Lansing, Lake City, and Chatham. Individual trials are identified by the seeding year and yields are in tons of hay per acre (12% moisture). Yield comparisons among varieties should be made within the same seeding or trial.

### **East Lansing in Southern Lower Michigan**

Yields are currently being obtained from trials seeded between 1996 and 1999 at East Lansing in southern lower Michigan. These trials are located on the Crop and Soil Sciences Agronomy Farm. Trials are managed for high yields (8 tons/acre) using four cuttings per year. High fertility with P and especially K is essential for obtaining high yields. Typical cutting dates are: Cut 1 - late May to early June (late bud to early bloom); Cut 2 - July 5-15 (1/10 bloom); Cut 3 - August 5-15 (1/10 bloom); Cut 4 - mid to late October with little regrowth after cutting. Table 1 lists the short-term average hay yields for the commercially available varieties entered in the trials seeded at East Lansing between 1990 and 1997. Hay yields for each year from the 1996 (three year) and 1997 (two year) seedings at East Lansing are in Tables 2 and 3.

### **Lake City in Central Northern Lower Michigan**

Lake City is 130 miles north of East Lansing and has colder winters. Both winterhardiness and persistence are important characteristics for alfalfa varieties grown at Lake City. Trials are managed for good yields (4-6 tons/acre) and long stand life. Trials at Lake City are typically cut three times per year: Cut 1 - June 10-20; Cut 2 - July 25 to August 5; Cut 3 - mid to late September. Yield data for the 1996 and 1997 seedings at Lake City are reported in Tables 4 and 5.

### **Bad Axe in the Thumb of Lower Michigan**

A trial was established in 1997 on the Greg Messing farm near Bad Axe, Michigan. Many producers expressed a desire to have alfalfa variety evaluations for the "Thumb" area of Michigan since this represents an area of the state with one of the highest concentrations of dairy and livestock animals. Bad Axe is located about 120 miles north east of East Lansing. Both winterhardiness and persistence are important characteristics of varieties grown in the Thumb since open winters can be the norm for the region. The soils of this area are Lake Bed soils which are prone to heaving as a result of freeze-thawing cycles. This trial is being cut four times a year: Cut 1 - June 1; Cut 2 - July 1; Cut 3 - August 10-15; Cut 4 - October 15-20. Yield data for this trial is reported in Table 6.

### **Chatham in the Upper Peninsula**

Trials lasting from three to five years have been completed at Chatham in the Upper Peninsula at the Michigan State University Upper Peninsula Experiment Station. Chatham is 300 miles north of East Lansing and has colder winters than Lake City, but with more snow. Winterhardiness and persistence are also important at Chatham. Alfalfa variety trials are usually cut three times per year from June 15 to October 1. Three-year hay yields for the varieties seeded in 1996 are in Table 7.

Table 1. Average yields in tons of hay per acre (12% moisture) for alfalfa varieties seeded in trials at East Lansing. Hay yields listed for trials seeded from 1992 to 1996 are 3-year averages. Two-year averages (1998-1999) are listed for varieties seeded in 1997.

Variety	Average hay yields, tons per acre					
	Three-year average					Two yr. Ave
	1992 seeding	1993 seeding	1994 seeding	1995 seeding	1996 seeding	1997 Seeding
2444	-	-	-	-	-	6.57
2888	-	-	-	6.90	8.09	-
3324	7.27†	-	-	-	-	-
8920 MF	-	-	-	-	7.40	-
9326	-	-	-	-	7.69	-
9429	-	-	-	-	8.31†	-
A 295	-	6.99†	-	-	-	-
ABT 205	-	-	-	-	7.47	-
ABT 405	-	-	-	7.10	-	-
Ace	-	-	-	-	7.69	-
Achieva	6.90†	-	-	-	-	-
Affinity+Z	-	-	-	-	7.75	-
Aggressor	-	6.92	-	-	-	-
Alpha 2001	7.45†	-	-	6.91	-	-
Amerigraze 401	-	-	-	-	7.49	-
Apollo Supreme	-	-	6.13	-	-	-
Aspen	-	-	-	-	-	6.19
Award	-	-	-	-	7.59	-
Benchmark	7.20	-	-	-	-	-
Big Horn	-	-	7.05†	-	-	-
BH 330	-	6.90	-	-	-	-
Callahan 501	7.15	6.90	-	-	-	-
Choice	-	-	-	7.12	7.96	6.62
Cimarron 3i	-	-	-	-	-	6.31
CG 545	-	6.92	-	-	-	-
Clipper	6.95	-	-	-	-	-
Columbia 2000	-	-	-	-	7.80	-
Crown II	7.57	-	-	-	-	-
Dart	7.05	6.86	-	-	-	-
Dawn	7.38	6.99	-	-	-	-
Demand	-	-	6.10†	-	-	-
Depend +EV	-	-	-	-	7.85	-
Dividend	-	-	-	-	7.67	-
DK 122	7.44	6.91	6.10	-	-	-
DK 127	-	-	6.50†	7.28	7.88	6.23
DK 133	7.48	6.75	6.35	-	7.88	-
DK 140	-	-	-	-	-	6.47
DK 141	-	-	-	-	8.13 †	6.28
Dividend	6.84†	-	-	-	7.88	-
Dominator	7.39	6.88	-	-	-	-
Echo	7.09	-	-	-	-	-
Enhancer	-	7.75†	-	-	-	-

Average hay yields, tons per acre

Table 1. (continued)

Variety	Average hay yields, tons per acre					
	Three-year average					Two yr. Ave
	1992 seeding	1993 seeding	1994 seeding	1995 seeding	1996 seeding	1997 seeding

Evolution	-	6.75	6.22	-	-	-
Excalibur I	-	-	-	-	7.66	-
Forerunner	-	6.48†	-	-	-	-
FQ 315	-	-	-	-	8.22†	-
G 2852	6.90	-	-	-	-	-
G 2833	7.48	6.67	-	-	-	-
Garst 620	-	-	6.71	7.29	-	-
Garst 630	7.85	7.30	6.61	-	8.21	-
Garst 631	-	7.72	6.32	7.20	-	6.53
Garst 645	7.59	6.98	6.51	-	-	-
Gem	-	-	-	-	7.64	6.37
GH 777	7.35	6.44	-	-	-	-
GH 787	7.41†	-	-	-	-	-
GH 788	-	-	-	-	8.30†	-
GH 794	-	6.41†	5.68	-	-	-
GH 797	-	-	-	7.04	-	-
Green Field	-	-	6.23	-	-	-
Hyland	8.13†	-	-	-	-	-
Imperial	-	-	-	-	8.03	-
Innovator + Z	-	-	6.49†	7.27	-	-
Iroquois	-	-	-	-	7.21	5.70
Laser	-	7.93†	-	-	-	-
LegenDairy	7.05†	-	-	-	-	-
Magnum III	8.30	-	-	-	-	-
Magnum III WET	-	-	-	6.77	-	-
Magnum IV	7.69†	-	6.70	6.89	-	-
Mariner	-	-	-	7.33	-	-
Max 329	-	-	-	-	7.76	-
Multi Gem	-	6.01	-	-	-	-
MultiQueen	-	6.76†	-	-	-	-
Multiplier	7.57	6.88	-	-	-	-
Nemesis	-	-	-	-	-	6.37
Oneida	-	-	-	-	7.45	6.01
Ovation	-	-	6.30	6.88	-	-
Pioneer variety 5246	7.25	7.01	-	-	-	-
Pioneer variety 5262	-	7.04	-	7.00	-	-
Pioneer variety 5312	-	-	-	7.25	-	6.56
Pioneer variety 5373	-	6.76	-	-	-	-
Pioneer variety 5454	7.86	6.93	-	7.57	8.05	6.59
Proof	-	6.75†	-	-	-	-
Quantum	-	-	5.99	-	-	-
Quest	7.11	-	-	-	-	-
Radiant	-	-	-	-	-	6.37†
Rainier	-	-	-	-	7.61	-
Rushmore	-	7.03	6.17	-	-	-
Saranac	-	-	-	-	7.45	-
Stampede	-	-	-	7.11	-	-
Sterling	-	-	5.98†	7.26	-	-

Table 1. (continued)

Variety	Average hay yields, tons per acre					
	Three-year average					Two yr. Ave
	1992 seeding	1993 seeding	1994 seeding	1995 seeding	1996 seeding	1997 seeding
SuperCuts	-	7.04†	-	6.68	-	-

Synergy	-	6.99†	-	-	-	-
Target II	-	-	-	-	8.20	-
TMF Multiplier II	-	-	-	-	7.38	-
Total	-	-	5.73†	-	-	-
Ultraleaf 87	7.23†	-	-	-	-	-
<b>Vernal</b>	6.44	5.28	6.01	6.29	6.89	5.74
Viking I	7.36	-	6.28	-	-	-
Vitro	-	-	-	-	8.03†	-
Webfoot MPR	-	6.45	-	-	7.60	-
WinterGold	-	-	-	-	8.09†	-
Wintergreen	-	-	-	-	7.94	-
WL 252 HQ	7.41†	-	6.22	-	-	-
WL 322 HQ	7.03	-	-	-	-	-
WL 323	-	6.68	-	7.07	-	-
WL 325 HQ	-	-	6.51†	-	7.64	-
WL 326 GZ	-	-	-	-	7.95	-
Zenith	7.00	6.53	-	-	-	-
Number of Varieties	34	35	24	21	38	16
Average yield	7.32	6.84	6.29	6.60	7.80	6.87

† Yields of this variety in this trial were obtained from experimental seed.



Table 2. Three-year (1997-1999) yields of alfalfa hay (12 % moisture), seeded May 1996, East Lansing, Michigan.

Variety	5-Jun	7-Jul	9-Aug	21-Oct	1999	1998	1997	3-yr.
					Total	Total	Total	Total
Tons of hay per acre								
WL 326 GZ	3.51	2.27	2.16	1.18	9.11	8.94	6.97	25.02
9429†	3.11	2.34	2.34	1.17	8.98	8.84	7.11	24.93
FQ 315†	3.47	2.25	2.15	1.06	8.93	8.59	7.13	24.65
Garst 630	3.45	2.26	2.08	1.18	8.97	8.59	7.07	24.63
Target II	3.77	2.27	2.01	1.11	9.17	8.51	6.92	24.60
9326	3.53	2.26	2.14	1.08	9.02	8.40	6.99	24.41
WinterGold†	3.34	2.23	2.09	1.02	8.68	8.59	7.00	24.27
2888	3.34	2.20	1.91	0.82	8.28	8.52	7.47	24.27
Pioneer Var. 5454	3.45	2.27	2.03	1.00	8.75	8.48	6.92	24.15
Imperial	3.36	2.17	2.05	1.08	8.66	8.41	7.03	24.10
Vitro†	3.33	2.25	1.93	0.95	8.45	8.50	7.14	24.09
GH 788†	3.31	2.18	2.03	1.10	8.65	8.92	7.33	24.08
WL 325	3.47	2.18	2.07	1.05	8.77	8.48	6.81	24.06
Choice	3.39	2.10	1.92	1.07	8.48	8.44	6.97	23.89
Wintergreen	3.36	2.09	1.98	1.01	8.45	8.17	7.18	23.81
DK 133	3.15	2.14	1.94	1.09	8.32	8.44	6.89	23.65
DK 127	3.20	2.13	1.98	0.95	8.26	8.28	7.10	23.65
Dividend	3.33	2.07	1.92	0.94	8.27	8.22	7.14	23.63
Depend + EV	3.23	2.03	1.91	0.94	8.11	8.32	7.13	23.56
Columbia 2000	3.52	2.11	1.84	1.00	8.48	8.26	6.66	23.40
Max 329	3.09	2.10	1.78	0.98	7.95	8.40	6.92	23.27
Affinity +Z	3.44	2.06	1.95	0.94	8.39	7.83	7.03	23.25
Ace†	3.00	2.22	2.11	1.03	8.38	8.07	6.61	23.06
Excalibur II	3.19	2.03	1.61	0.99	7.82	8.35	6.81	22.98
Gem	3.10	2.10	1.81	0.94	7.97	8.22	6.73	22.91
Rainier	3.14	2.20	1.99	1.08	8.41	7.83	6.59	22.83
Webfoot MPR	2.99	1.97	1.82	1.14	7.91	8.05	6.84	22.80
Award	3.14	2.08	1.93	0.99	8.15	8.07	6.56	22.77
Amerigraze 401 +Z	3.25	2.01	1.86	1.03	8.16	7.70	6.60	22.47
Saranac	2.88	2.03	1.72	0.89	7.51	8.02	6.83	22.36
Oneida	3.13	2.05	1.77	0.90	7.84	7.76	6.74	22.34
TMF Multiplier II	3.14	2.08	1.80	0.90	7.13	8.05	6.98	22.15
Iroquois	3.13	2.02	1.74	0.85	7.74	7.40	6.49	21.63
Vernal	3.18	1.91	1.64	0.86	7.60	6.99	6.09	20.68
Average	3.26	2.13	1.92	1.00	8.29	8.22	6.90	23.38
LSD (0.05)	0.31	0.23	0.31	0.26	0.93	0.91	0.49	
CV %	6.65	7.51	11.19	18.03	7.94	7.78	5.00	

† Yields of this variety were obtained using experimental seed that may not give performance identical to the commercially available seed.

Table 3. Two year (1998-1999) yields of alfalfa hay (12% moisture), seeded May 1997, East Lansing, Michigan.

Variety	4-Jun	6-Jul	6-Aug	19-Oct	1999	1998	2-yr.
					Total	Total	Total
Tons of hay per acre							
Choice	2.88	1.53	1.68	0.85	6.94	6.30	13.24
Pioneer Var. 5454	2.98	1.58	1.67	0.86	7.09	6.09	13.18
2444	3.05	1.51	1.58	0.75	6.90	6.24	13.14
Pioneer Var. 5312	3.02	1.44	1.61	0.80	6.86	6.25	13.11
Garst 631	2.92	1.52	1.68	0.85	6.98	6.09	13.07
DK 140	2.66	1.53	1.68	0.83	6.70	6.24	12.94
Nemesis	2.78	1.49	1.58	0.78	6.63	6.11	12.74
Gem	2.84	1.56	1.60	0.81	6.81	5.93	12.74
Radiant†	2.67	1.55	1.64	0.81	6.66	6.08	12.74
Cimarron 3i	2.94	1.43	1.53	0.78	6.69	5.92	12.61
DK 141	2.78	1.51	1.56	0.80	6.64	5.92	12.56
DK 127	2.74	1.50	1.58	0.80	6.60	5.86	12.47
Aspen	2.68	1.51	1.56	0.76	6.52	5.86	12.39
Oneida	2.72	1.44	1.51	0.76	6.43	5.58	12.01
Vernal	2.75	1.34	1.49	0.69	6.27	5.20	11.48
Iroquois	2.65	1.36	1.49	0.69	6.20	5.19	11.40
Average	2.82	1.49	1.59	0.79	6.68	5.93	12.61
LSD (0.05)	0.35	0.16	0.18	0.09	0.65	0.52	
CV %	10.18	8.09	8.90	8.56	7.67	6.60	

† Yields of this variety were obtained using experimental seed that may not give performance identical to the commercially available seed.

Table 4. Three year (1997-1999) yields of alfalfa hay (12% moisture), seeded May 1996, Lake City, Michigan.

Variety	9-Jun	12-Jul	12-Aug	1999	1998	1997	3-yr.
				Total	Total	Total	Total
Tons of hay per acre							
Oneida	2.16	1.36	0.42	3.93	3.82	5.09	12.84
Avalanche +Z	2.22	1.38	0.31	3.90	3.86	4.78	12.55
Garst 620	2.20	1.34	0.39	3.93	3.69	4.82	12.44
TMF Multiplier I	2.13	1.30	0.27	3.69	3.84	4.83	12.36
Pioneer Var. 5454	2.07	1.32	0.33	3.72	3.84	4.75	12.31
DK 127	2.09	1.28	0.27	3.65	3.70	4.94	12.30
Garst 645	2.09	1.34	0.35	3.77	3.61	4.80	12.18
Saranac	2.03	1.24	0.34	3.61	3.43	4.97	12.01
2888	1.99	1.30	0.30	3.59	3.64	4.72	11.94
Vernal	2.03	1.25	0.25	3.53	3.43	4.99	11.95
Webfoot MPR	1.92	1.24	0.30	3.45	3.49	4.72	11.66
Dividend	1.99	1.20	0.30	3.49	3.53	4.61	11.64
Columbia 2000	1.98	1.22	0.28	3.48	3.49	4.59	11.56

Rainier	1.94	1.14	0.23	3.31	3.45	4.67	11.43
8920 MF	1.90	1.24	0.24	3.38	3.43	4.63	11.43
Average	2.07	1.28	0.32	3.67	3.65	4.80	12.04
LSD 5%	0.30	0.19	0.10	0.55	0.42	0.41	
CV%	10.10	10.77	22.32	10.40	8.01	5.90	

Table 5. Two-year (1998-1999) yields of alfalfa hay (12% moisture), seeded May 1997, Lake City, Michigan.

Variety	9-Jun	12-Jul	12-Aug	1999 Total	1998 Total	2-yr. Total
Tons of hay per acre						
4315	2.20	1.33	0.24	3.77	2.32	6.09
GH 797	2.30	1.23	0.25	3.76	2.33	6.09
Garst 620	2.18	1.26	0.30	3.73	2.36	6.09
Evolution	2.33	1.25	0.26	3.84	2.24	6.08
Pioneer Var.5312	2.17	1.30	0.28	3.75	2.22	5.97
Pioneer Var. 5454	2.17	1.23	0.28	3.69	2.20	5.90
DK 140	2.15	1.22	0.22	3.59	2.27	5.86
Feast	2.20	1.22	0.24	3.66	2.19	5.85
Iroquois	2.11	1.23	0.27	3.61	2.19	5.81
DK 141	2.05	1.19	0.25	3.49	2.32	5.81
DK 127	2.11	1.16	0.23	3.49	2.19	5.68
Vernal	2.10	1.22	0.27	3.59	2.09	5.68
Innovator +Z	2.16	1.16	0.27	3.59	2.07	5.66
Aspen	2.07	1.18	0.24	3.49	2.16	5.65
Saranac	2.02	1.18	0.22	3.42	2.10	5.52
Average	2.17	1.23	0.25	3.65	2.22	
LSD 5%	0.25	0.13	0.08	0.35	0.27	
CV%	8.06	7.35	20.62	6.7	8.74	

Table 6. Two year (1998-1999) yields of alfalfa hay (12% moisture), seeded April 1997, Bad Axe, Michigan.

Variety	7-Jun	8-Jul	11-Aug	10-Oct	1999 Total	1998 Total	2-yr. Total
Tons hay per acre							
9429†	3.50	1.84	1.33	0.49	6.73	7.03	13.76
DK 140	3.44	1.80	1.32	0.47	6.60	7.10	13.70
WinterGold†	3.39	1.80	1.28	0.44	6.51	7.02	13.53
ABT 405	3.39	1.70	1.17	0.38	6.23	6.99	13.22
WL 324	3.28	1.73	1.25	0.39	6.25	7.23	13.16

WL 325 HQ	3.34	1.85	1.28	0.47	6.53	6.48	13.01
Gem	3.23	1.75	1.23	0.44	6.26	6.69	12.95
Pioneer Var. 5454	3.26	1.75	1.20	0.39	6.20	6.74	12.94
Amerigraze 401 +Z	3.35	1.65	1.18	0.34	6.11	6.82	12.93
Pioneer Var. 5312	3.45	1.74	1.19	0.39	6.35	6.49	12.84
Choice	3.38	1.68	1.17	0.38	6.20	6.61	12.82
Oneida	3.39	1.65	1.17	0.40	6.20	6.60	12.81
Aspen	3.14	1.68	1.16	0.40	6.00	6.67	12.67
DK 127	3.16	1.67	1.19	0.38	6.01	6.58	12.59
GH 797	3.33	1.63	1.19	0.38	6.11	6.40	12.51
DK 141	3.17	1.66	1.16	0.40	6.01	6.32	12.33
Affinity +Z	3.16	1.58	1.11	0.33	5.80	6.53	12.33
Vernal	3.25	1.52	1.10	0.33	5.81	6.17	11.98
Ameriguard 301	3.03	1.56	1.13	0.48	5.83	5.89	11.72
Average	3.29	1.69	1.20	0.40	6.18	6.62	12.79
LSD (0.05)	0.42	0.22	0.24	ns	0.91	0.92	
CV %	9.01	9.21	13.99	28.41	10.31	9.8	

Table 7. Three year (1997-1999) yields of alfalfa hay (12% moisture), seeded June 1996, Chatham, Michigan.

Entry	8-Jun	30-Jul	24-Sep	1999	1998	1997	3-yr.
				Total	Total	Total	Total
Tons of hay per acre							
Oneida	1.95	1.42	0.97	4.33	4.19	4.20	12.73
Saranac	1.90	1.27	0.80	3.97	4.43	4.14	12.53
Pioneer Var. 5454	1.90	1.44	0.84	4.17	4.20	4.01	12.39
DK 127	1.89	1.38	0.85	4.11	3.98	4.26	12.35
Iroquois	1.91	1.43	1.01	4.35	3.94	3.92	12.22
Excalibur II	1.86	1.30	0.88	4.05	4.00	4.14	12.18
Columbia 2000	1.85	1.17	0.86	3.89	4.02	3.92	11.83
Vernal	1.76	1.38	0.69	3.83	3.82	3.72	11.36
Mean	1.88	1.35	0.86	4.08	4.06	4.05	
5% LSD	0.10	0.16	0.06	0.25	0.34	0.45	
CV (%)	3.7	8.26	4.84	4.19	5.61	7.8	

### Fall Dormancy and Disease Resistance

Listed below are the names and marketers for several alfalfa varieties that are available to Michigan producers.

Varieties are grouped by fall dormancy rating. A rating of 1 is the most dormant and 5 is the least dormant. Fall dormancy ratings of 1 or 2 are generally dormant enough for long-term stands. All varieties reported here, according to our procedures, are winterhardy enough for short-term stands (2 to 5 years).

Disease resistance ratings are included for Bacterial wilt (BW), Phytophthora root rot (PRR), Anthracnose (AN), Verticillium wilt (VW), and Fusarium wilt (FW). Low Resistance (LR) means 6-14% of the plants of the variety are resistant to the disease; moderate resistance (MR) means 15-30% of the plants are resistant. Varieties with 31-50% resistance are resistant (R) and those with more than 51% are considered highly resistant (HR). Both fall dormancy and disease resistance ratings are listed here as presented by seed companies; none of these characteristics have been evaluated in Michigan State University trials.

Table 8.

Fall dormancy 1 - Very Winterhardy		Disease Resistance *				
Variety	Marketer	BW	PRR	AN	VW	FW
Pioneer variety 5151	Pioneer Hi-Bred	R	-	-	-	R
Spredor 3	Novartis	HR	MR	R	MR	MR

Fall dormancy 2 - Winterhardy (long-term stands, 5 years or more, mostly with 3 cuttings).

Variety	Marketer	BW	PRR	AN	VW	FW
620	Garst	HR	HR	HR	R	R
636	Garst	HR	R	MR	R	R
A 295	PGI/MBS	HR	HR	R	R	HR
Alfagraze	America's Alfalfa	MR	LR	MR	-	R
Avalanche +Z	America's Alfalfa	HR	HR	HR	HR	HR
Clipper	Payco	HR	R	R	R	HR
Columbia 2000	Allied Seed	R	MR	MR	MR	R
Defiant	Agripro	HR	HR	HR	HR	HR
Dividend	Agway/Allied Seed	HR	HR	HR	R	HR
DK 122	DeKalb	HR	HR	HR	R	R
Evolution	Mycogen	HR	HR	HR	R	HR
Flagship 75	Peterson Seed	HR	HR	R	R	HR
Forerunner	Research Seeds/Brown Seed	HR	HR	HR	HR	HR
Iroquois	Public	HR	-	-	-	-
LegenDairy	Cenex/Land O'Lakes	HR	HR	HR	HR	HR
Mohawk	Public	HR	-	HR	-	MR
Mariner	Allied Seed	R	HR	MR	MR	HR
Nordic	Garst	HR	HR	R	R	R
Oneida	Public	HR	HR	-	-	R
Pacesetter	Research Seeds/Brown Seed	HR	HR	HR	R	R
Pioneer variety 5262	Pioneer Hi-Bred	HR	R	-	LR	MR
Profit	Novartis	HR	R	MR	R	HR
Quantum	Renk Seed	HR	HR	HR	HR	HR

Sterling	Cargill	HR	HR	HR	R	HR
Vernal	Public	R	-	-	-	MR
Viking I	Novartis	R	R	R	HR	HR
WL 225	W-L Research	HR	HR	MR	R	HR
WL 252 HQ	W-L Research	HR	HR	HR	R	HR
Wrangler	Public	R	HR	LR	LR	R

Fall dormancy 3 - Moderately Winterhardy (2- to 5-year stands, with four cuttings per year in southern lower Michigan).

Variety	Marketer	BW	PRR	AN	VW	FW
DK 120 **	DeKalb	HR	R	LR	-	R
2888	Novartis	HR	HR	HR	R	HR
2444	Novartis	HR	HR	HR	R	HR
2980	L.L. Olds	HR	HR	R	R	R
3324	L.G. Seeds	HR	HR	HR	R	HR
2833	Novartis	HR	HR	HR	R	HR
9323	Research Seeds/Shissler	HR	HR	R	R	HR
9326	L.G. Seeds	HR	HR	R	R	HR
Accolade	Chemgro	R	R	R	HR	R
Achieva	Allied Seed	R	HR	HR	R	HR
Agriboss	Agribasics	HR	HR	HR	MR	HR
Allegiance	United Agriseeds	R	R	HR	R	R
Ameriguard 301	America's Alfalfa	HR	HR	HR	R	HR
Arrow**	America's Alfalfa	HR	HR	MR	R	HR
Attainer	Hoffman/Lemke	HR	HR	HR	HR	HR
Benchmark	Research Seeds/Ag Venture	HR	HR	HR	R	HR
Blazer XL	Cenex/Land O'Lakes	R	HR	HR	R	HR
Bolt ML	Research Seeds/Jung	R	HR	HR	HR	R
Bronco	Jung	HR	HR	MR	R	HR
Break Thru	Custom Farm	HR	HR	MR	R	HR
Callahan 501	Callahan	R	R	R	R	R
Centurion **	Agway/Allied Seed	HR	R	R	R	R
Class	Union	R	MR	-	MR	HR
Columbo	PGI/MBS	R	R	R	HR	-
Crown II	Cargill	HR	HR	HR	R	HR
Cut `N' Graze	Agripro	HR	R	MR	LR	HR
Dart **	Agripro	HR	HR	R	R	HR
Dawn **	Agripro	R	R	R	R	HR
Demand	Agripro	HR	HR	HR	R	HR
DK 125 **	DeKalb	HR	R	HR	R	R
DK 127	DeKalb	HR	HR	HR	R	HR
Encore	Research Seeds/Spangler	HR	HR	HR	R	HR
Envy	Peterson	R	-	-	MR	-
Feast	Agripro	HR	HR	HR	R	HR
FQ 314	Cargill	HR	HR	HR	HR	HR
Forecast 1000	Dairyland	HR	HR	R	R	HR
G-2841 **	Novartis	HR	R	HR	R	HR
Variety	Marketer	BW	PRR	AN	VW	FW
Garst 645	Garst	HR	HR	HR	R	R
Genesis	Pfister Hybrids	HR	HR	HR	R	HR

GH 777	Golden Harvest	HR	HR	R	R	HR
GH 787	Golden Harvest	HR	HR	HR	R	R
GH 788	Golden Harvest	HR	HR	HR	R	HR
Green Field	Peterson	HR	HR	HR	R	HR
Haymark	Countrysmark	R	R	HR	-	HR
Husky	Plant Genetics	R	MR	MR	-	R
Hyland	Oasis	HR	HR	R	R	HR
Impact	Peterson	HR	R	MR	R	HR
Imperial	America's Alfalfa	HR	HR	HR	R	HR
Innovator +Z	America's Alfalfa	HR	HR	HR	R	HR
MagnaGraze	Dairyland	HR	HR	R	R	HR
Magnum III WET **	Dairyland	R	R	MR	MR	R
Majestic	Agway/Allied Seed	HR	R	HR	HR	-
Max 329	SeedMart	HR	HR	HR	HR	HR
Milkmaker	Plant Genetics	R	MR	MR	-	HR
Multi-Gem	Clark Seeds	HR	R	R	R	R
MultiKing 1	Novartis	HR	HR	HR	R	-
Multiplier **	Mycogen	HR	HR	HR	R	-
Multistar	Countrysmark	HR	HR	HR	R	HR
Nemesis	Renk Seeds	R	HR	HR	HR	HR
Oneida VR **	N.Y.S.I.P.	R	MR	MR	HR	HR
Paramount	Wyffels Hybrids	HR	HR	HR	R	HR
Pioneer variety 5246 **	Pioneer Hi-Bred	HR	HR	R	HR	HR
Pioneer variety 5312	Pioneer Hi-Bred	HR	HR	HR	HR	HR
Proof	Keltgen Seed	HR	HR	HR	R	HR
Radiant	AMPAC Seed	HR	HR	HR	HR	HR
Rainier	Novartis	HR	HR	HR	R	HR
RFV 2000	Custom Farm Seed	HR	HR	HR	R	HR
Shield **	Great Lakes	HR	R	HR	R	R
Stampede	Allied Seed	HR	HR	R	R	HR
Sure	Cenex/Land O'Lakes	HR	R	HR	R	HR
Surpass	Andrews Seed	HR	R	MR	R	HR
Thrive	Great Lakes Hybrids	HR	HR	HR	R	HR
Thunder	Agripro	R	R	MR	-	HR
TMF Multiplier II	Mycogen	HR	HR	HR	HR	HR
Trident II	Cargill Hybrid	HR	HR	R	R	R
Total +Z	America's Alfalfa	HR	HR	HR	R	HR
Ultimate	Terra	HR	R	HR	R	-
Ultra	SeedTec	HR	R	HR	R	HR
Ultraleaf 87	La Crosse Seed	HR	HR	HR	R	HR
Venture	Agripro	HR	HR	R	R	HR
VIP	Research Seeds	HR	R	R	R	R
Vitro	North-Gro	HR	HR	HR	R	HR
Webfoot **	Great Lakes Hybrids	R	R	LR	-	MR
Webfoot MPR	Great Lakes Hybrids	HR	HR	HR	R	HR
Wintergreen	Renk Seeds	HR	HR	R	R	HR
WL-317	W-L Research	HR	HR	R	R	HR
WL-324	W-L Research	HR	HR	HR	R	HR
WL 325 HQ	W-L Research	HR	HR	HR	R	HR
Zenith	Supercroft	HR	HR	HR	R	-

Fall dormancy 4 - Moderately Winterhardy (2- to 5-year stands with up to four cuttings per year in southern lower Michigan).

Variety	Marketer	BW	PRR	AN	VW	FW
630 **	Garst	HR	R	MR	MR	R
631	Garst	HR	HR	R	R	HR
Ace	UAP	HR	HR	HR	R	HR
Action **	Research Seeds	R	R	HR	MR	R
ABT 405	AgriBioTech	HR	HR	R	HR	HR
AF 21	Asgrow/O's Gold	HR	R	HR	R	R
Affinity + Z	America's Alfalfa	HR	R	HR	HR	HR
Aggressor	America's Alfalfa	HR	HR	HR	R	HR
Allegro	Keltgen Seed	HR	HR	HR	R	HR
Variety	Marketer	BW	PRR	AN	VW	FW
Alpha 2001	Great Lakes Hybrid	HR	HR	HR	HR	HR
Amerigraze 401	America's Alfalfa	HR	HR	HR	R	HR
Apollo Supreme	America's Alfalfa	HR	R	HR	R	HR
Applause	L.G. Seeds	HR	R	HR	R	HR
Aspen	Brown Seeds	HR	HR	HR	R	HR
Asset	Allied Seed	HR	HR	R	R	R
Award	Asgrow	HR	HR	HR	HR	HR
BH 330	Beachley-Hardy	HR	HR	HR	R	HR
Big Horn	Cargill Hybrid	HR	HR	HR	R	HR
Chief	Mycogen Seeds	HR	HR	R	R	R
Cimarron	Great Plains Research	HR	MR	R	LR	HR
Cimarron VR	Great Plains Research	HR	MR	HR	R	HR
Cimarron 3i	Great Plains Research	HR	HR	HR	R	HR
Choice	Countrymark	HR	HR	R	R	HR
Crystal	PGI/MBS	HR	HR	R	R	HR
Depend +EV	Agripro	HR	HR	HR	HR	HR
DK 133 **	Dekalb	HR	HR	HR	R	HR
DK 140	Dekalb	HR	HR	HR	R	HR
DK 141	Dekalb	HR	HR	HR	HR	HR
Dominator	Agripro	HR	HR	HR	R	HR
Dynasty	Dairyland	HR	R	MR	R	R
Echo	Callahan	R	R	MR	R	R
Emerald	Hoffman/Plains	R	R	MR	MR	R
Empress	Blaney Seeds	HR	HR	R	R	HR
Enhancer **	Rosen's, Inc.	HR	HR	R	R	HR
Enterprise	Mershmen	HR	HR	R	R	HR
Excalibur **	Allied Seed	R	LR	MR	R	HR
Excalibur II	Allied Seed	HR	HR	HR	R	HR
Flint	Plant Genetics	R	R	HR	LR	HR
Forecast 3000	Dairyland	HR	R	R	R	HR
Fortress **	Novartis	R	HR	R	R	R
G-2852 **	Novartis	HR	R	HR	R	R
Gem	Countrymark	HR	HR	HR	R	HR
GH 737	Rob-See-Co	R	HR	MR	R	R
GH 755	Golden Harvest	HR	HR	HR	R	HR
GH 794	Golden Harvest	HR	HR	HR	R	HR
GH 797	Golden Harvest	HR	HR	HR	HR	HR



Variety	Marketer	BW	PRR	AN	VW	FW
Gourmet Hay	Fred Gutwein & Sons	HR	R	HR	R	HR
Haygrazer	Great Plains Research	HR	R	R	R	HR
Homestead	Terra	HR	HR	HR	R	R
HYGain	Hyperformer	HR	HR	R	R	HR
Jade	NC+ Hybrids	HR	HR	R	R	HR
Key	Great Plains Research	HR	HR	HR	HR	HR
Laser	J-V Seeds	HR	HR	R	R	HR
Legend	Cenex/Land O'Lakes	HR	R	HR	R	HR
Legacy	Genesis	HR	HR	R	R	HR
Magnum III **	Dairyland	R	R	MR	MR	R
Magnum IV **	Dairyland	HR	HR	R	R	HR
Magnum V	Dairyland	HR	HR	R	R	HR
Medallion	Seedway	HR	R	R	R	-
MultiQueen	Fred Gutwein & Sons	HR	HR	HR	R	HR
Ovation	Callahan	HR	HR	HR	HR	HR
Patriot	Mycogen	R	R	R	R	R
Pioneer variety 5364 **	Pioneer Hi-Bred	R	MR	MR	MR	R
Pioneer variety 5373	Pioneer Hi-Bred	HR	MR	HR	R	HR
Pioneer variety 5432	Pioneer Hi-Bred	HR	MR	-	R	HR
Pioneer variety 5454 **	Pioneer Hi-Bred	R	HR	HR	MR	HR
Pioneer variety 54V54	Pioneer Hi-Bred	HR	HR	HR	HR	HR
Pioneer variety 5472	Pioneer Hi-Bred	HR	MR	MR	MR	HR
Precedent	Wyffels/Doeble	HR	HR	R	R	HR
Prism	Beachley-Hardy	HR	HR	HR	R	R
Pro-Cut	L.G. Seeds	HR	HR	R	R	HR
Pro-Cut 2	L.G. Seeds	HR	HR	R	R	R
Promise	Garst	HR	HR	HR	R	HR
Quest	Renk Seed	HR	HR	R	R	HR
Ram Rod	Bio-Plant	R	R	MR	R	R
Recovery	PGI/MBS	R	R	R	R	R
Resistar	Countrymark	R	HR	R	HR	HR
Rushmore	Novartis	HR	HR	HR	R	HR
Sabre	Kinder Seed/Allied Seed	HR	R	HR	HR	-
Salute	Lynks Seed	HR	R	MR	MR	R
Saranac **	Public	R	-	-	-	-
Stine 9227	Stine	HR	HR	HR	R	HR
SuperCuts	Seedmart	HR	HR	HR	HR	HR
Synergy	Crow's Hybrids	HR	HR	HR	HR	HR
Target II	Rupp Seeds	HR	HR	MR	MR	R
Terminator	Plant Genetics	HR	R	R	MR	-
TMF Generation	Mycogen Seeds	HR	HR	HR	HR	HR
Trident	Cargill Hybrid	R	HR	MR	-	HR
Ultimate	Terra Int.	HR	R	HR	R	R
Vector	L. Peterson Ltd	R	R	R	MR	HR
Vernema	Public	MR	LR	LR	MR	-
Voyager II	Lemke Seeds	HR	HR	R	R	HR
WL-320 **	W-L Research	R	R	MR	MR	HR
WL-322 HQ	W-L Research	R	R	MR	R	-
WL-323	W-L Research	HR	HR	HR	R	HR
WL-326 GZ	W-L Research	HR	HR	HR	R	HR
WL-332 SR	W-L Research	HR	HR	HR	R	HR

Fall dormancy 5 - hardy enough for 2- to 5-year stands in southern lower Michigan.

<u>Variety</u>	<u>Marketer</u>	<u>BW</u>	<u>PRR</u>	<u>AN</u>	<u>VW</u>	<u>FW</u>
Belmont	Great Plains Research	HR	HR	HR	HR	HR

\* BW = Bacterial Wilt, PRR = Phytophthora Root Rot, AN = Anthracnose, VW = Verticillium Wilt, FW = Fusarium Wilt.

\*\* Varieties in fall dormancy groups 3 or 4 which have been evaluated at Lake City or Chatham and are hardy enough for long-term stands.

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