Alfalfa Variety Recommendations for Michigan

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AG FACTS

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See Extension Bulletin E-1413, *Producing High Quality, High Yielding Alfalfa for Michigan (Alfalfa: Quality Means Profits)* for more information on growing alfalfa.

Michigan farmers should establish high alfalfa yield goals of 6 to 8 tons of hay per acre under the best soil management and climatic conditions (Fig. 1), and 5 to 6 tons under less favorable conditions. High yields depend on several establishment and management factors:

- Establish good stands, preferably by band seeding with inoculated seed. Seed rates of 12 to 16 lb/A are recommended. Use a cultipacker or press wheels after band seeding to help ensure better stands (See Extension Bulletins E-1017, *Good Stands for Top Alfalfa Production,* and E-961, *Clear Seeding of Alfalfa*). A cultipacker seeder also may be used for seeding.

- Fertilize according to soil test with phosphorus and potassium at seeding. Without a test, apply 400 lb/A of 0-14-42 or equivalent. (See Extension Bulletin E-550, *Fertilizer Recommendations for Vegetables and Field Crops.*)

- Correct soil pH by adding lime to obtain pH of 6.8 or higher.

Figure 1.
Nearly 8 tons hay per year for 10 years. Excellent varieties, four cuttings per year, excellent seedings, excellent tile-drained soil of pH 6.8, 700 lbs. of 0-14-42 per year, and good insect control contributed to the high yields for the 10-year period.

Recommended Varieties

(see tables for highest yielding varieties)

I. Short-term Stands
(2 to 4 years, moderately hardy or hardy)

Acclaim, Advantage, Apollo, Apollo II, Armor, Big Ten, Blazer, Challenger, Cimarron, Classic, Decathlon, DeKalb 120, DK135, Drummor, Duke, Endure, Enduro, Epic, Expo, Funk's G-2815, Funk's G-7730, Futura, Hiphy, Husky, Iroquois, Magnum, Milkmaker, Oneida, Peak, Pioneer 526, Pioneer 531, Pioneer 532, Saranac, Shenandoah, Thunder, Trident, Trumpetor, Vancor, Voris A-77, WL312, WL313, WL316.

II. Long-term Stands
(5 years or more or pasture, hardy only)

Apollo, Blazer, DeKalb 120, Duke, Epic, Funks G-7730, Hiphy, Iroquois, Oneida, Peak, Pioneer 526, Pioneer 531, Pioneer 532, Thunder, Vancor, Vernal, WL220.

- Use tiling for good drainage if natural drainage is poor.

- Cut early. Four cuttings with an early first cutting and a late cutting after mid-October in the southern half of the Lower Peninsula yield 15 percent more higher quality hay than 3 cuttings because the alfalfa is less mature and more digestible. The cutting schedule is based on the following dates with approximate maturities:

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

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

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

4th Cutting—October 15-31 (blossoming; no regrowth after cutting helps ensure good survival). (Fig. 2)

Alfalfa is in very early bloom when only one flower appears on every tenth plant.

Three cuttings are recommended under less intensive management in all of Michigan. The cutting schedules are:

Southern Lower Peninsula

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

Upper Peninsula and Northern Lower Peninsula

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

Under a three-cutting system, make the third cutting anytime in late August through October. Stands will be long-lived if they are well fertilized annually with potassium. Boron may sometimes increase yields on coarse-textured soils during dry periods. Third cuttings left after mid-September will decline rapidly in quality.

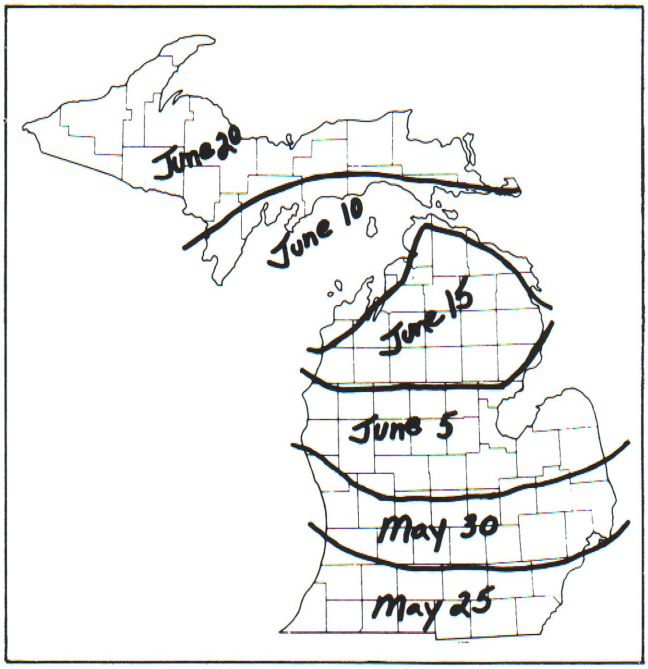
Approximate recommended dates of first cuttings are shown in Fig. 3.

Five cuttings produce the best quality hay but are not recommended, even in southern Michigan, because of weed invasion and short-lived stands.

- Topdress annually according to soil tests (see MSU Extension Bulletin E-550). Potassium is the most important fertilizer to add for high yields and persistence. Twelve pounds of phosphate (P_2O_5) and 60 lb of potash (K_2O) are removed by each ton of hay. A 6-ton crop requires the equivalent of 600 lb of 0-12-60 annually on most soils that test low to medium in phosphorus and potassium.
- Spray after the first cutting to control alfalfa weevil when necessary. Spray before the first cutting is removed in years when spring comes early.
- Control leafhoppers, if necessary, by spraying after the first, second or third cuttings. Four cuttings, rather than three, reduce leafhopper damage because of a shorter time interval of 5 instead of 6 weeks between cuts 1 and 2 and cuts 2 and 3.
- Use recommended harvest and storage methods, especially low moisture silage for maximum preservation.
- Use high-yielding, disease-resistant varieties (see above and pages 0-0).

Figure 2.
Take the fourth cutting after mid-October (note dry corn in background) in southern Michigan for highest yields and excellent stand life.

Figure 3.
Average recommended date of first cutting of alfalfa.



Winterhardiness—Important for Yield and Stand Life

Winterhardiness is necessary for all varieties in Michigan, but not to the extent once thought necessary for short-term stands. Varieties classified as moderately hardy are hardy for alfalfa stands left 3 to 4 years. Alfalfa usually reaches very early bloom about June 3 at East Lansing and June 10-15 in northern Michigan and the UP. If the first cutting is made in the very early bloom stage rather than earlier in the bud stage, stand life is improved, but quality is decreased slightly.

For long-term stands of 5 years or more or when used for pasture, use only hardy varieties to ensure maximum stand life. Hardy varieties usually reach bloom 3 to 4 days later—about June 5 at East Lansing and about June 15-20 in northern Michigan and the UP.

Do not cut stands intended for long-term use more than three times a year (See Extension Bulletin E-1413). For maximum stand life, cut twice each year. Hay quality will be lower than with more frequent cutting.

Disease Resistance

All alfalfa varieties sold in Michigan are resistant to bacterial wilt (*Cornybacterium insidiosum*), which was the primary cause of short-lived stands until the early 70s. Resistance to bacterial wilt is absolutely necessary. Variety resistance to Phytophthora root rot (*Phytophthora megasperma* f. sp. *medicaginis*) and anthracnose (*Collitotrichum trifolii*) is important for high yields if stands are to last longer than two years.

Phytophthora Root Rot

Alfalfa requires good drainage for satisfactory yields and excellent drainage for maximum yields. Many fields are well drained except for lower areas where stands are short lived. Phytophthora root rot, first detected in Michigan at East Lansing in 1972, is frequently the cause of poor stands in low, wet areas, or on imperfectly drained soils. It is most severe during the first two months of seedling growth, especially under conditions of poor drainage or excessive rainfall. The primary root decays about 1½ in. below the crown and the top of the plant becomes yellow-purple and stunted. The plant may die if wet conditions continue or may send out branch roots and recover if the wet conditions cease (Fig. 4).

Resistance to PRR is helpful if frequent rains keep the soil surface moist for 7 to 10 days within 1 to 2 months after seeding (Fig. 4). Resistance is particularly important on fine-textured soils such as Brookston or Conover loams likely to be imperfectly drained unless well-tiled. PRR is less harmful in older stands because older plants are not very susceptible. Yields may be reduced in older stands every year, however, especially if there are periods of 7 to 10 days of wet weather. For example, between 1981 and 1984 at East Lansing in two 3-year-old stands on a well-drained Brookston-Conover loam and in a 3-year-old stand at Lake City on a Kent silt loam, Oneida (resistant) yielded an average of 7.06 tons/hay/acre, 9 percent more than Iroquois (susceptible). These varieties are nearly identical except for resistance to PRR, which resulted in the 9 percent yield increase (Fig. 5). Most of the highest yielding varieties in our tests are resistant to PRR.

Use of PRR-resistant varieties will be of little benefit on poorly drained soils that are not suitable for alfalfa. Similarly, seed treated with *Apron* (a new fungicide that partially controls PRR on new seedings) by commercial seed firms (it is not sold to farmers) may improve stands and increase yields only if PRR-resistant varieties are used. Treating a PRR-susceptible variety, such as Vernal, with *Apron* is not helpful.

Figure 4.
Phytophthora root rot caused root decay on a PRR-susceptible variety in these 5-month-old alfalfa seedlings and resulted in lower 3-year total yields. Note new lateral roots on some roots which may develop enough for satisfactory winter survival. Resistant varieties are necessary for dependable seedling establishment.

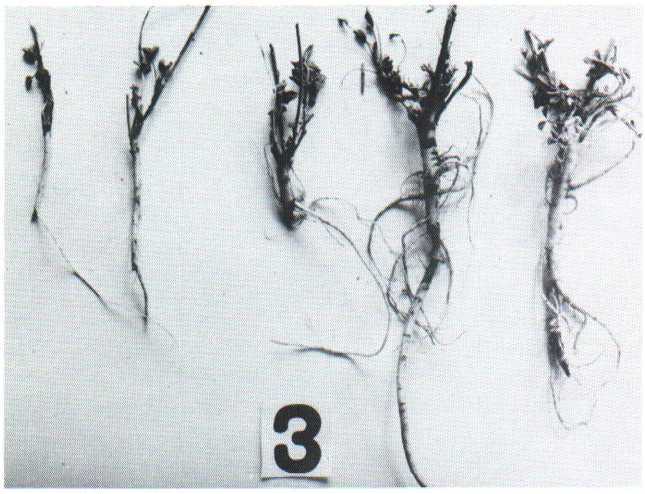
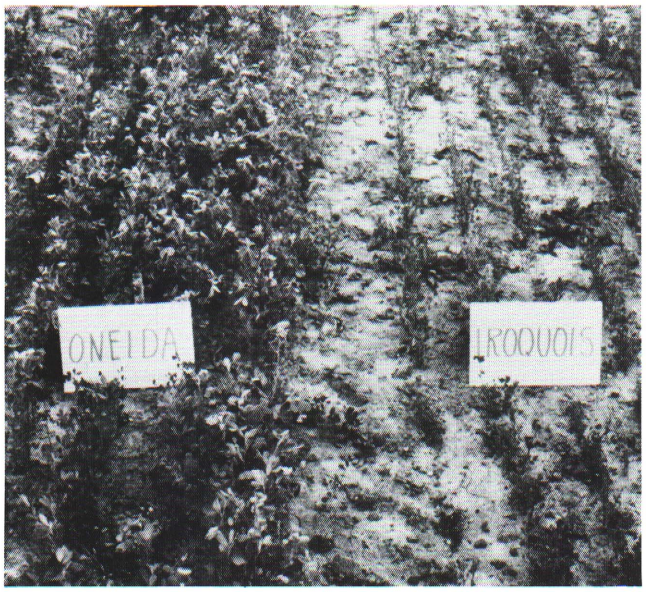


Figure 5.
Phytophthora root rot-resistant variety on the left had excellent stand after 10 days of rain totalling 1½ in. in September, but susceptible variety on right was severely injured. Three-year yields were 9 percent lower in the susceptible variety.



Anthracnose

Anthracnose on alfalfa was first identified in Michigan at East Lansing in 1976. It requires high moisture and high temperature (as in mid-Ohio) in most years. It may reduce yields in periods of moist, hot weather, which are most likely to occur in southern Michigan in the second crop between mid-June and mid-July. Anthracnose reduced yields 6 percent at East Lansing in 1975 when June was wet and hot. In 1982, anthracnose was severe in late September-October, which was a warm, wet period. Anthracnose reduces yields an average of 3 to 5 percent each year in southern Michigan, and may kill some plants and reduce stand life.

The typical symptom is a "shepherd's crook" caused by wilting of the top of the plant (Fig. 6). Diamond-shaped tan lesions with black borders occur near the base of the stems, sometimes killing the stems, crowns, and finally the root. Plant anthracnose-resistant varieties south of the Bay City-Muskegon line. Anthracnose resistance is not necessary north of this line.

Verticillium Wilt

Verticillium wilt (*Verticillium albo-atrum*) of alfalfa was first diagnosed in the U.S. in 1976 and identified in a 5-year-old Vernal alfalfa pasture on the Michigan State University farm in September 1982 (see Extension Bulletin E-744, *Alfalfa Analyst.* There have been no other reports in lower Michigan. Verticillium wilt was detected in 1984 in the lower part of the UP, adjacent to Wisconsin where it has been widespread since about 1980. Verticillium wilt is generally not found until fields are 2 to 3 years old.

Growing alfalfa for 3 to 4 years in rotation with corn breaks the disease cycle and should reduce possible spread in Michigan. Buying clean bagged seed (not bulk uncleaned seed) will reduce its spread because the fungus is carried in debris in poorly cleaned seed. Resistant varieties are not necessary in lower Michigan unless alfalfa follows alfalfa. Varieties resistant to Verticillium wilt are recommended in the UP, particularly in the Delta-Menominee-Dickinson area adjacent to Wisconsin.

Figure 6.
Anthracnose reduces alfalfa yields an average of about 4 percent each year in the area south of the Bay City-Muskegon line. Resistant varieties increase yields and improve stand life.

Leaf Diseases

Leaf diseases (see Extension Bulletin E-744, *Alfalfa Analyst*) may cause black spots on leaves followed by yellowing and leaf loss, particularly if the first cutting is not removed in the late bud or very early bloom stage and if the spring is wet. An early first cutting reduces leaf disease damage to a negligible amount. No varieties are particularly resistant to the various leaf diseases.

Insect Control

Two insects are of primary importance on alfalfa in Michigan: the potato leafhopper (*Empoasca fabae*) and the alfalfa weevil (*Hypera postica*). Other insects cause insignificant damage to alfalfa.

Potato Leafhopper

The potato leafhopper is Michigan's most damaging insect pest on alfalfa. Damage often attributed to boron deficiency in July and August, particularly on heavy soils, is generally due to the potato leafhopper.

The potato leafhopper does not overwinter in Michigan. The adults fly from southern states on air currents in late May to early June. The insects lay eggs on the alfalfa and eggs hatch into nymphs, which suck plant juices and cause alfalfa leaves to turn yellow and red. The light yellow-green nymphs are about ⅛ in. long and spindle shaped. They move and jump sideways when disturbed. The adults are winged and fly readily.

Leafhoppers cause severe damage starting as wedge-shaped yellowed areas on leaf tips and then yellowing and reddening of the leaves. Damage occurs generally in the second and third cuttings starting about 3 to 4 weeks after cutting. It reduces protein, quality, and yields and reduces further growth. Some varieties are tolerant to leafhoppers, but this tolerance is only slightly helpful in reducing injury.

In a 4-cutting system in southern Michigan, 5, rather than 6, weeks between cuts 1 and 2 and cuts 2 and 3 generally reduce injury. Spraying with either *Sevin* or malathion or methoxychlor about 1 to 2 weeks after the second and third cuttings in mid-July or mid- to late August will reduce leafhopper injury (see Extension Bulletin E-1582 for control recommendations).

Alfalfa Weevil

The alfalfa weevil is the second most damaging insect pest on alfalfa in Michigan. The larvae hatch in mid-May to mid-June from eggs laid in the stem. Larvae eat young leaves and may seriously reduce yield in the first and second cuttings. Control by spraying with an insecticide to kill the larvae. No resistant varieties are available.

The weevil first appeared in Michigan in 1966. Damage was severe, particularly in southern Michigan, from 1969 through the mid-70s. Farmers sprayed with insecticides to reduce damage and to keep alfalfa competitive with other crops. Biological control was effected by introducing a wasp larvae that fed within the weevil larvae and sterilized the adult weevils. Spraying was generally not necessary until 1985. Weevil damage was severe again in 1985, so many farmers in southern Michigan sprayed to prevent serious damage to their first and second crops. Larvae eating regrowth of an unsprayed field after the first cutting in late May in Livingston County in 1985 caused severe stand loss in many parts of a monitored field.

Check fields at least twice a week starting in mid-May to determine if larvae damage (holes in the leaf) warrants spraying with a recommended insecticide (see Extension Bulletin E-672, *Insect Control*). The first cutting may need to be sprayed about May 20-25 in southern Michigan (a week or two later in northern Michigan and the UP) if weevils damage ¼ or more of the leaf tips and the alfalfa will not be cut for 7 to 10 days. If the first cut is heavily infested and is cut rather than sprayed, the regrowth may be injured (as noted above). Spray the field if ¼ of the plants show damage. If alfalfa is not pastured until mid-June (as when grazed rotationally), spraying, usually in late May or early June, may be necessary to prevent excessive loss.

Recommendations are Based on Testing at MSU

Recommendations are based on varietal testing by the Department of Crop and Soil Sciences during the period 1964-84 at East Lansing in southern Michigan, Lake City in the northern Lower Peninsula, and Chatham in the Upper Peninsula. Yields are shown in Tables 2, 3, and 4. Only those varieties now being sold in Michigan are included. Lime-coated seed is not recommended. MSU research shows it is no more effective than regularly Rhizobia-treated seed, and only 2/3 of the lime-coated seed product is seed; the remainder is lime, which is not effective in any way in such a small amount. All varieties listed are resistant to bacterial wilt.

Three years of testing are required before varieties are considered for recommendation for short- to medium-term stands (2 to 4 years).

Varieties for short-term stands may be hardy or moderately hardy and should have a higher yield than Vernal in at least one 3-year test (Tables 2, 3, and 4).

Varieties for long-term stands (5 years or more) or for pasture must be more winter hardy than for short-term stands. For long-term stands, 3-year yields at Lake City and Chatham are the best indicators of the winterhardiness necessary for long life. These stations have colder winter temperatures (often below 0°F for 2 to 3 days without snow cover, as in Chatham in January 1980) than at East Lansing. Hardy varieties that survive and yield well under such conditions are recommended for long-term stands (Tables 3, 4, and 5). Other varieties that perform well at East Lansing and are rated as hardy by the developing firm are also recommended for long-term stands (see variety recommendations on pages 8-10).

Variety resistance to Phytophthora root rot, anthracnose, and Verticillium wilt is shown in Tables 2, 3, 4, and 5. Disease resistance and winterhardiness are listed according to the Minnesota USDA tests (Minnesota Agricultural Experiment Station Item AD-MR-1953, 1986) or by developing firms. Varieties are listed as having appreciable resistance to the diseases if they have medium (15 to 30 percent) or high (30 to 45 percent) resistance according to the Minnesota test accepted by alfalfa breeders in the U.S. or by the resistance indicated by the firm developing the variety.

Names of the merchandising firms in Table 1 are listed by a code number for varieties in the tables.

Proprietary or Public Varieties

Proprietary varieties are those developed by industry or seed firms that have exclusive rights to market the seed. In the last decade, most new varieties have been developed by industry.

Public varieties used in Michigan have been developed by the USDA and/or universities. They may be distributed by any seed firm in Michigan. Vernal, Iroquois, Oneida, and Saranac are the only public varieties sold in Michigan.

New Varieties Yield up to 30% More than Vernal

At East Lansing, the high 3-year average annual yields (Table 2) ranged from 7.45 to 9.47 tons in the 3 tests, 21 to 30 percent more than Vernal, a standard, good, hardy variety. These yields are two to three times the average of state yields and show the high productivity of new varieties, most of which have multiple resistance to diseases.

At Lake City, yields were 30 percent lower (Table 3) than at East Lansing (Table 2) because the soil conditions are less favorable, the season is shorter, and winters are colder. The highest yielding varieties in the 4 tests yielded between 5.77 and 6.25 tons per acre, 13 to 17 percent more than Vernal.

At Chatham in the UP, yields (Table 4) were between 3.94 and 6.60 tons per acre, 2 to 20 percent higher than Vernal. Some of the less hardy varieties yielded less than Vernal in the 1979-80 (A-78) test because of below zero temperatures with no snow in early January 1980.

How to Select a Variety

Short Term Stands (2 to 4 years)

- *High yield and winterhardiness.* All varieties in Tables 2, 3, 4, and 5 are adequately winterhardy for short-term stands anywhere in Michigan. Both hardy and moderately hardy varieties are included. Generally, the moderately hardy varieties are higher yielding than hardy varieties at East Lansing in southern Michigan. With colder temperatures in northern Michigan, hardy varieties may be more productive (Tables 3, 4, and 5).

Examine yield data for your area:

Table 2—East Lansing for southern Michigan up to the Bay City-Muskegon line.

Table 3—Lake City for the area between the Bay City-Muskegon line and the UP.

Table 4—Chatham for the UP.

Look at the high yields data for:

(1) Tests for your area and the summary of the tests

(2) The summary of the four tests for lower Michigan (Tables 2 and 3) and for the UP (Table 4).

Note: The highest-yielding varieties are near the top of the table.

- *Disease resistance.* Select disease-resistant varieties (Tables 2 through 5):

*Phytophthora root rot. As much PRR resistance as possible, particularly on somewhat imperfectly-drained soils.

*Anthracnose. Advisable south of the Bay City-Muskegon line, particularly in the southern tiers of counties.

*Verticillium wilt. Advisable in the UP adjacent to Wisconsin and wherever alfalfa is grown after alfalfa without an intervening crop.

Long Term Stands (5 years or more) or for Pasture

• *Winterhardiness and yield.* Winterhardiness is of primary importance for long-term stands or for pasture. Only hardy varieties are recommended because the alfalfa must withstand winter hazards for five years or more.

Hardy varieties tested at Lake City and Chatham are summarized in Table 5. Yield ratings are expressed as percentages of the standard Vernal. Vernal is hardy and has had a good record as a long-lived variety since the mid 50s. Other varieties included in the table, however, are as long lived as Vernal but are also higher yielding. Many also have Phytophthora root rot resistance, which will generally contribute to longer-lived stands.

Note: Only hardy varieties designated by MSU are approved for ACP payment.

• *Disease resistance.* Varieties should be resistant to Phytophthora root rot to help ensure better seedings and maintain better stands (Table 5), particularly if the fields are not well-drained. Anthracnose resistance is recommended in southern Michigan up to the Bay City-Muskegon line. Resistance to both is preferable. None of the long-lived varieties is resistant to Verticillium wilt.

Table 1.
Marketing firms that supply seed to Michigan farmers.

1. Agripro, Ames, IA, 50010
2. Americana Seeds, Bowen, IL, 62316
3. Amcorn Seeds, Bradley, MI, 49311
4. Blue Ribbon Prod., Plymouth, IN, 46532
5. Callahan Seeds, Westfield, IN, 46074
6. Cargill Seeds, St. Peter, MN, 56082
7. Countrymark, Columbus, OH, 43216
8. Dairyland Seeds, West Bend, WI, 53095
9. DeKalb-Pfizer, DeKalb, IL, 60115
10. Funk's Seeds Intl., Bloomington, IL, 61702
11. Garno-Glen Seeds, Stockbridge, MI, 49285
12. Great Lakes Hybrids, Ovid, MI, 48866
13. Great Plains Research, Stillwater, OK, 74076
14. Gries Seed Farm, Fremont, OH, 43420
15. Indiana Farm Bureau, Indianapolis, IN, 46204
16. Kaltenberg Seed, Waunakee, WI, 53597
17. Land O'Lakes, Webster City, IA, 50595
18. Mich. State Seed, Grand Ledge, MI, 48837
19. Northrup King Co., Stanton, MN, 55081
20. PAG Seeds; Minneapolis, MN, 55440
21. Paymaster Seeds, Monticello, IL, 61856
22. Pilgrim Seeds, West Bend, WI, 53095
23. Pioneer Hibred Intl., Johnston, IA, 50131
24. Research Seeds, P.O. Box 1393, St. Joseph, MO, 64502
25. Rupp Seed Co., Wauseon, OH, 43567
26. Scott Farm Seed Co., Mechanicsburg, OH, 43044
27. Sommer Bros., Pekin, IL, 61554
28. Stanton Seed Co., Saginaw, MI, 48605
29. Voris Seeds, Windfall, IN, 46076

Table 2.
Tons hay, 12 percent moisture, per acre in four 3-yr. tests. Tiled Brookston-Conover loam, pH 6.9, 0+100+600 per year plus 2 lbs boron/acre. Four cuttings per year: Cut 1 = late May to early June; Cut 2 = July 5-15; Cut 3 = August 15-26; Cut 4 = October 15-30.

EAST LANSING, SOUTHERN LOWER PENINSULA

Exp. 84, 1979-81 Seeded 1978 3-yr. average			Exp. 04, 1981-83 Seeded 1980 3-yr. average			Exp. 14, 1982-84 Seeded 1981 3-yr. average			Exp. 24, 1983-85 Seeded 1982 3-yr. average		
Variety	**Tons**	**%Vernal**	**Variety**	**Tons**	**%Vernal**	**Variety**	**Tons**	**%Vernal**	**Variety**	**Tons**	**%Vernal**
Hiphy	8.86	125	Big 10	9.47	124	Pioneer 531	7.45	121	Pioneer 526	9.00	130
WL 312	8.84	125	WL 313	9.40	123	WL 316	7.44	121	Epic	8.94	130
Peak	8.80	124	Hiphy	9.38	123	WL 313	7.42	120	DK 135	8.83	128
Pioneer 531	8.77	124	Armor	9.36	123	Pioneer 526	7.38	120	Acclaim	8.81	128
Blazer	8.68	123	Funk's G-2815	9.22	121	DeKalb 120	7.24	118	Pioneer 532	8.66	126
Oneida	8.54	121	Duke	9.22	121	Hiphy	7.15	116	Peak	8.63	125
Apollo	8.33	118	Epic	9.15	120	Pioneer 532	7.11	115	Challenger	8.58	124
DeKalb 120	8.31	117	Voris A77	9.00	118	Epic	7.07	115	Endure	8.56	124
Voris A77	8.28	117	Peak	8.91	117	Saranac	7.02	114	Advantage	8.53	124
Trident	8.20	116	Blazer	8.86	116	Armor	7.01	114	Husky	8.52	124
Iroquois	8.11	115	Futura	8.78	115	Futura	7.01	114	Shenandoah	8.50	123
Saranac	8.10	115	DeKalb 120	8.62	113	Peak	6.99	113	Magnum	8.50	123
WL 220	7.80	110	Magnum	8.62	113	Voris A77	6.90	112	Enduro	8.50	123
Vernal (check)	7.07	100	Oneida	8.62	113	Magnum	6.90	112	Pioneer 531	8.49	123
			Funk's G-7730	8.54	112	Duke	6.84	111	Blazer	8.48	123
			Pioneer 531	8.46	111	Oneida	6.83	111	Excalibur	8.47	123
			Decathlon	8.36	110	Blazer	6.78	110	Milkmaker	8.45	123
			Cimarron	8.35	110	Thunder	6.78	110	WL 316	8.43	123
			Vancor	8.32	109	Apollo II	6.78	110	Drummor	8.41	122
			Classic	8.10	106	Iroquois	6.53	106	Hiphy	8.30	120
			Iroquois	8.04	106	**Vernal** (check)	6.16	100	Apollo II	8.24	119
			Saranac	7.81	102				Classic	8.23	119
			Vernal (check)	7.62	100				Futura	8.23	119
									Expo	8.15	118
									DeKalb 120	8.15	118
									Vancor	8.02	116
									Trumpetor	7.94	115
									Oneida	7.93	115
									Trident	7.92	115
									Iroquois	7.90	114
									Saranac	7.88	114
									Decathlon	7.74	112
									Vernal (check)	6.90	100

Table 3.
Tons hay, 12 percent moisture, per acre in four 3-yr. tests. Kent silt loam, pH 7.0, 500 lbs. 0-20-20 at seeding. Topdressing annually—500 lbs. 0-14-42+2 lbs boron/acre, 3 cuttings per year: Cut 1 = June 10-20; Cut 2 = August 10-20; Cut 3 = October 1-15.

LAKE CITY, NORTHERN LOWER PENINSULA

Exp. 83, 1979-81 Seeded 1978 3-yr. average			Exp. 03, 1981-83 Seeded 1980 3-yr. average			Exp. 13, 1982-84 Seeded 1981 3-yr. average			E-23, 1983-85 Seeded 1982 3-yr. average		
Variety	**Total**	**%Vernal**	**Variety**	**Total**	**%Vernal**	**Variety**	**Total**	**%Vernal**	**Variety**	**Total**	**%Vernal**
DeKalb 120	6.25	117	Pioneer 531	5.65	113	DeKalb 120	5.77	114	Pioneer 526	5.97	113
Peak	6.04	113	Iroquois	5.58	111	Oneida	5.73	113	DeKalb 120	5.80	110
Blazer	5.86	110	Hiphy	5.57	111	Thunder	5.69	113	Blazer	5.77	109
Pioneer 531	5.86	110	DeKalb 120	5.41	108	Peak	5.68	112	Pioneer 532	5.60	106
Hiphy	5.78	109	Oneida	5.39	108	Pioneer 532	5.62	111	Oneida	5.57	105
Apollo	5.71	107	Peak	5.38	107	Magnum	5.59	111	Iroquois	5.56	105
Saranac	5.67	106	Funk's G-7730	5.37	107	Futura	5.58	110	Futura	5.56	105
Iroquois	5.62	106	Magnum	5.33	106	Epic	5.51	109	WL 316	5.50	104
WL 220	5.61	105	Epic	5.32	106	Blazer	5.50	109	Magnum	5.47	103
Oneida	5.57	105	Big Ten	5.32	106	Pioneer 531	5.50	109	DK 135	5.45	103
Voris A77	5.57	104	Saranac	5.21	104	Pioneer 526	5.49	109	Pioneer 531	5.38	102
WL 312	5.42	102	Futura	5.14	103	WL 316	5.44	108	Expo	5.38	102
Vernal (check)	5.33	100	Blazer	5.10	102	Duke	5.38	107	Saranac	5.36	102
Trident	5.27	99	Armor	5.06	101	Voris A77	5.36	106	Trident	5.32	101
			Cimarron	5.02	100	Saranac	5.34	106	**Vernal** (check)	5.28	100
			Vernal (check)	5.01	100	Hiphy	5.33	105			
			Funk's G-2815	4.99	100	Iroquois	5.23	103			
			Duke	4.94	99	**Vernal** (check)	5.06	100			

Table 2.
Summary of varieties tested.

EAST LANSING, SOUTHERN LOWER PENINSULA

Variety	Winter hardiness[1]	Disease resistance[2]	Seed firm[3]	Yield as % of Vernal	No. of 3-yr. tests
Acclaim	MH	P A	2	128	1
DK 135	MH	P A V	9	125	1
WL 312	MH	P A	3, 11	125	1
Advantage	MH	P A	9	124	1
Big Ten	MH	P A	12	124	1
Challenger	MH	P A	6	124	1
Endure	H	P A	20	124	1
Husky	H	P A	25	124	1
Milkmaker	MH	P	16	123	1
Shenandoah	MH	P A	13	123	1
Enduro	MH	P A	22	123	1
Peak	H	P	5, 18, 24	122	4
Epic	H	P	14, 24, 27	122	3
WL 313	MH	A	3, 11	122	2
WL 316	MH	A V	3, 11	122	2
Drummor	MH	P A	19	122	1
Pioneer 532	H	P A	23	121	2
Hiphy	H	P	7, 15	121	4
Funk's G-2815	MH	P A	10	121	1
Pioneer 531	H	A	23	120	4
Pioneer 526	H	none	23	120	1
Armor	MH	P A	1, 28	119	2
Classic	MH	none	7, 15	119	1
Blazer	H	P	17, 26	118	4
Apollo	H	P	1, 28	118	1
Expo	MH	P A	21	118	1
DeKalb 120	H	P	9	117	4
Futura	MH	P A	8	116	3
Magnum	MH	A	8	116	3
Voris A77	MH	P A	29	116	3
Duke	H	P A	1	116	2
Trident	MH	P A	20	116	2
Oneida	H	P	4, 18	115	4
Apollo II	MH	P A V	1, 28	115	2
Trumpetor	MH	A V	19	115	1
Vancor	H	P A	19	113	2
Funk's G-7730	H	P	10	112	1
Saranac	MH	none	4, 18	111	4
Decathlon	MH	P A V	6, 21	111	2
Iroquois	H	none	4, 18	110	4
Cimarron	MH	A	13	110	1
Thunder	H	P A	1, 28	110	1
WL 220	H	P A	3, 11	110	1
Vernal (check)	H	none	18, many	100	4

[1]Winterhardiness—as designated by developing firm and/or by Minnesota or Michigan winterhardiness ratings.

[2]Disease resistance
P = Phytophthora root rot
A = Anthracnose
V = Verticillium

[3]Seed firm—See Table 1 for firm name

Table 3.
Summary of varieties tested.

LAKE CITY, NORTHERN LOWER PENINSULA

Variety	Winter hardiness[1]	Disease resistance[2]	Seed firm[3]	Yield as % of Vernal	No. of 3-yr. tests
Thunder	H	P A	1, 28	113	2
DeKalb 120	H	P	9	112	4
Peak	H	P	5, 18, 24	111	3
Pioneer 526	H	none	23	111	1
Pioneer 531	H	A	23	109	4
Pioneer 532	H	A	23	109	2
Blazer	H	P	17	108	3
Oneida	H	P	4, 18	108	3
Epic	H	P	14, 24, 27	108	2
Magnum	MH	A	8	107	3
Funk's G-7730	H	P	10	107	1
Apollo	H	P	1	107	1
Hiphy	H	P	7, 15	106	4
WL 316	MH	A V	3, 11	106	2
Iroquois	H	none	4, 18	106	4
Big Ten	MH	P A	12	106	1
Saranac	MH	none	4, 18	106	4
Voris A77	MH	P A	29	105	2
WL 220	H	P A	3, 11	105	1
Futura	MH	A	8	103	3
Duke	MH	P A	1	103	2
DK 135	MH	P A V	9	103	1
Expo	MH	P	21	102	1
WL 312	MH	P A	3, 11	102	1
Armor	MH	P A	1	101	1
Vernal (check)	H	none	18, many	100	4
Trident	MH	P A	20	100	2
Cimarron	MH	P A	13	100	1
Funk's G-2815	MH	P A	10	100	1

[1]Winterhardiness—as designated by developing firm and/or Minnesota or by Michigan winterhardiness ratings.

[2]Disease resistance
P = Phytophthora root rot
A = Anthracnose
V = Verticillium wilt

[3]Seed firm—See Table 1 for firm name.

Table 4.
Tons hay, 12 percent moisture, per acre in two 3-yr. tests and one 2-year test. Chatham sandy loam pH 7.6, 0-56-330 per year plus 2 lb boron/acre. Three cuttings per year: Cut 1 = mid- to late June; Cut 2 = early August; Cut 3 = October 15.

CHATHAM, UPPER PENINSULA

Exp. A-78, 1979-80 Seeded 1978 2-yr. average			Exp. A-80, 1981-83 Seeded 1980 3-yr. average			Exp. A-81, 1982-84 Seeded 1981 3-yr. average		
Variety	Tons	%Vernal	Variety	Tons	%Vernal	Variety	Tons	%Vernal
Peak	3.94	102	Pioneer 531	6.60	125	Pioneer 532	6.21	112
Saranac	3.94	101	Saranac	6.39	121	WL 316	6.18	111
Pioneer 531	3.93	101	Hiphy	6.09	115	Saranac	6.13	110
Vernal (check)	3.88	100	Magnum	6.09	115	Hiphy	6.10	110
Oneida	3.88	100	Futura	6.06	115	DeKalb 120	5.91	106
DeKalb 120	3.83	99	WL 313	5.97	113	Pioneer 531	5.90	106
Iroquois	3.81	98	Classic	5.90	112	Iroquois	5.89	105
Apollo	3.79	98	Oneida	5.89	112	WL 313	5.88	105
Hiphy	3.74	97	Iroquois	5.80	110	Duke	5.88	105
Blazer	3.62	93	DeKalb 120	5.75	109	Oneida	5.86	105
WL 312	3.49	90	**Vernal** (check)	5.28	100	Pioneer 526	5.82	104
Trident	3.36	87				Magnum	5.82	104
						Futura	5.63	101
						Vernal (check)	5.57	100
						Classic	5.53	99

Table 4.
Summary of varieties tested.

CHATHAM, UPPER PENINSULA

Variety	Winter hardiness[1]	Disease resistance[2]	Seed firm[3]	Yield as % of Vernal	No. of 3-yr. tests
Pioneer 532	H	A	23	112	1
Saranac	MH	none	4, 18	111	3
WL 316	MH	A V	3, 11	111	1
Pioneer 531	H	A	23	110	3
Magnum	MH	A	8	110	2
WL 313	MH	A	3, 11	109	2
Futura	MH	A	8	108	2
Hiphy	H	P	7	107	3
Oneida	H	P	4, 18	106	3
Classic	MH	none	7	106	2
DeKalb 120	H	P	9	105	3
Duke	H	P A	1	105	1
Pioneer 526	H	none	23	105	1
Iroquois	H	none	4, 18	104	3
Peak	H	P	5, 18, 24	102	1
Vernal (check)	H	none	18, many	100	3
Apollo	H	P	1, 28	98	1
Blazer	H	P	17, 26	93	1
WL 312	MH	P A	3, 11	90	1
Voris A77	MH	P A	29	87	1
Trident	MH	P A	20	87	1

[1]Winterhardiness—as designated by developing firm and/or by Minnesota or Michigan winterhardiness ratings.

[2]Disease resistance
P = Phytophthora root rot
A = Anthracnose
V = Verticillium wilt

[3]Seed firm—See Table 1 for firm name.

Table 5.
Relative 3-year yields of recommended hardy varieties for long-term stands based on testing at Lake City and Chatham in the northern half of Michigan.

Variety	Relative yield, % of Vernal	No. of 3-yr. tests	Disease resistance[1]	Seed firm[2]
DeKalb 120	115	7	P	10
Thunder	113	2	P A	1, 28
Pioneer 532	110	3	A	23
Pioneer 531	109	7	A	23
Peak	109	4	P	5, 18, 24
WL 220	109	2	P A	3, 11
Pioneer 526	108	2	none	23
Epic	108	7	P	14, 24, 27
Funks G-7730	107	1	P	10
Hiphy	106	7	P	7, 15
Oneida	106	6	P	5, 18
Duke	106	3	P A	1
Iroquois	105	7	none	5, 18
Blazer	104	4	P	17, 26
Apollo	103	2	P	1, 28
Vernal (check)	100	7	none	18, many

[1]P = Phytophthora root rot
A = Anthracnose

[2]Seed firm—See Table 1 for firm name.

Pesticides must be registered with the U.S. Environmental Protection Agency and the Michigan Department of Agriculture before they can be used legally in Michigan. Purchase only those pesticide products that are labeled for the crop and pest you wish to manage. Remember that the pesticide label is a legal document on pesticide use. Read the label carefully and follow all instructions closely. The use of a pesticide in a manner not consistent with the label can lead to the injury of crops, humans, animals and the environment. The use of a pesticide inconsistent with the label directions can also lead to civil or criminal fines and/or condemnation of the crop. Pesticides are good management tools for the control of pests on crops, but only when they are used in a safe, effective and prudent manner according to the label.

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5:86-10M-Major Revision-SDC/HP-Price: 45 cents.