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Recommended Alfalfa Varieties for Michigan  
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Cooperative Extension Service  
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# Recommended Alfalfa Varieties for Michigan

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Department of Crop and Soil Sciences

Michigan farmers should establish high alfalfa yield goals of 6-8 tons of hay per acre under the best soil management and climatic conditions, and 4-6 tons under less favorable conditions. High yields depend on several establishment and management factors:

1. Good stands, preferably by band seeding with inoculated seed. Seed rates of 10 to 12 lb/acre for 2- to 4-year stands and 12 and 16 pounds for 5 years or more or for pasture are recommended. A cultipacker or press wheels after seeding should be used to help insure better stands (See Extension Bulletin E-1017, Good Stands for Top Alfalfa Production and E-961, Clear Seeding of Alfalfa.)

2. Proper fertilization (according to soil test) with phosphorus, and potassium at seeding. Without a test, 400 lb/acre of 0-26-26 is recommended. (See Extension Bulletin E-550, Fertilizer Recommendations for Vegetables and Field Crops.)

3. pH corrected by liming to 6.8 or above.

4. Good drainage, natural or by tiling.

5. Three cuttings instead of two in southern Michigan, the first in late May or early June, the second when starting to flower, the third any time when flowering starts in late summer or fall. Or, get an extra ton by taking the fourth cutting for silage or green chop in



Figure 1. Nearly 8 tons hay per year for 6 years. Excellent varieties, four cuttings per year, good seedlings, and excellent soil with good tile drainage, pH of 6.8, 700 lb. of 0-14-42 per year, and weevil control contributed to the high yield.

## Alfalfa—Recommendations for Michigan

ONLY WILT RESISTANT VARIETIES ARE RECOMMENDED

### I. SHORT TO MEDIUM TERM (2-4 years)

- Moderately hardy or hardy
- French, North American or intermediate types
- Recommended—520, Honeoye, Saranac AR, Saranac, Iroquois, Weevlchek, WL305, WL309, WL311, Thor, 521, 530, WL215, Citation, Anchor, Conquest, Hay-Lagemaker, Gladiator, Titan, Vernal, Nugget, Funk G-777, DeKalb 131, and Marathon.

### II. LONG TERM (5 years or more, or for pasture)

- Hardy
- North American Types
- Recommended—520, Weevlchek, Iroquois, Titan, Vernal, WL215, DeKalb 123.

mid- to late October after a third cutting about August 17-25 on the most intensively managed land in southern Michigan.

6. Adequate *annual* fertilization particularly with potassium and phosphorus 0 + 10 + 40 per ton hay removed plus 1 to 2 lb. boron per acre annually are recommended. (See E-527)

7. Spraying after the first cutting to control the alfalfa weevil when necessary.

8. Proper harvesting and storing methods.

9. Use of high-yielding, long-lived varieties.

The choice of alfalfa varieties is dependent on the yield goal and length of stand desired, soil conditions, availability of seed, and intended use—for hay (or silage) or pasture. Seed cost per pound should not be a highly important factor in variety selection since the total cost of establishment is affected only slightly by seed cost, especially when computed over several years.

## BACTERIAL WILT RESISTANCE NECESSARY

Resistance to bacterial wilt (*Corynebacterium insidiosum*) and winterhardiness are the two most important factors governing the selection of high-yielding varieties. Bacterial wilt causes death and stand thinning starting in the second harvest year. Since about ¾ of alfalfa stands in Michigan are left for 3 to 4 years and the remainder for a longer period, only wilt resistant varieties are now being recommended (see Fig. 2). An

adequate number of tested wilt resistant varieties is available.

### WINTERHARDINESS IS IMPORTANT

Winterhardiness is necessary for all alfalfa varieties in Michigan but not to the extent once thought necessary. Varieties classified as moderately hardy are hardy enough for Michigan for alfalfa stands left for 3 to 4 years. For stands intended for 5 years or more or when used for pasturing, hardy or very hardy varieties should be used to insure maximum stand life.

### CHARACTERISTICS OF VARIETY TYPES

Genetic stocks of alfalfa in the United States are of two general types—North American or French.

1. North American types are winterhardy or very winterhardy, start to blossom in late May or early June in southern Michigan, are generally fine-stemmed, moderate in recovery after cutting, and have moderate fall dormancy. Vernal is a well known variety representative of this type.

2. French (Flammande or Flemish) types were developed from stock originating in the Flemish area in northern France. They have been higher yielding than most North American types in short-to-medium-term stands. They are moderately winterhardy, flower 3 to 5 days earlier, recover more rapidly after cutting, are less dormant in the fall, and are generally not as fine-stemmed as North American types. Saranac is typical of this group and is well known to Michigan farmers since it has been grown here since 1967.

Many of the new varieties released in the last decade combine characteristics of both the North American and French types and are intermediate in their growth habit and performance.

### PROPRIETARY OR PUBLIC VARIETIES

Proprietary varieties are those developed by industry or seed firms having exclusive rights to market the seed. In the last decade, most new varieties have been developed by industry (see Table 1).

Public varieties have been developed by universities or the USDA. They can be distributed by any seed firm in Michigan. Vernal, Agate, and Saranac are examples (see Table 1).

### DATA FROM TESTING AT MSU

Recommendations are based on testing alfalfa at various Michigan locations by the Department of Crop and Soil Sciences during the period 1964-1976. Three years' of testing are required before varieties are con-

**Table 1. Bacterial wilt resistance, winterhardiness, sources, and distributors of currently available alfalfa varieties tested for 3 years or more at MSU (1964-1976).**

VARIETY	BWR <sup>1</sup>	WH <sup>2</sup>	S <sup>3</sup>	PRIMARY MICHIGAN DISTRIBUTOR
Agate	VR	H	5	Michigan State Seed Co., others
Anchor	R	H	8	Stanton Seed and Supply Co.
Apollo	R	MH	8	Stanton Seed and Supply Co.
A24	S	MH	3	Cowbell Seed Co.
A59	MR	MH	3	Cowbell Seed Co.
Citation	R	MH	8	Midland Cooperatives, Inc.
Conquest	R	MH	10	Peterson Seed Co., Savage, MN
DeKalb 123	R	H	2	DeKalb Hybrid Corn Co.
DeKalb 131	R	MH	2	DeKalb Hybrid Corn Co.
Dominor	MR	MH	9	Northrup, King and Co.
G-777	MR	MH	9	Funk Seed Intl., Inc.
Glacier	S	MH	9	Northrup, King and Co.
Gladiator	VR	MH	9	Northrup, King and Co.
Haylagemaker	MR	MH	—	Haylagemaker, Inc.
Honeoye	MR	MH	1	Michigan State Seed Co., others
Iroquois	VR	H	1	Michigan State Seed Co., others
Ladak 65	R	H	6	Seed very limited or unavailable
Marathon	R	MH	9	Cargill, Inc.
Nugget	R	H	8	Pfister Associated Growers
520	R	H	10	Pioneer Hi-Breds Intl., Inc.
521	MR	H	10	Pioneer Hi-Breds Intl., Inc.
530	R	MH	10	Pioneer Hi-Breds Intl., Inc.
Polar I	R	MH	9	Pride Seed Co.
Ramsey	R	VH	5	Seed very limited or unavailable
Ranger	MR	H	7	Michigan State Seed Co., others
Saranac	R	MH	1	Michigan State Seed Co., many others
Saranac AR	R	MH	1	Michigan State Seed Co.
Tempo	MR	MH	4	Farm Bureau Services
Teton	MR	VH	11	Unavailable; Bober Seed Co., SD
Thor	VR	MH	9	Northrup, King and Co.
Titan	VR	H	8	Stanton Seed and Supply Co.
Travois	R	VH	11	Unavailable; Bober Seed Co., SD
Vernal	R	H	12	Most seed firms
Warrior	MR	MH	9	Northrup, King and Co.
Weevlchek	VR	H	4	Farm Bureau Services
WL215	R	H	13	Cowbell Seeds, Inc.
WL305	MR	MH	13	Cowbell Seeds, Inc.
WL306	MR	MH	13	Cowbell Seeds, Inc.
WL307	MR	MH	13	Cowbell Seeds, Inc.
WL309	MR	MH	13	Cowbell Seeds, Inc.
WL311	R	MH	13	Cowbell Seeds, Inc.
WL318	MR	MH	13	Cowbell Seeds, Inc.

<sup>1</sup>Bacterial wilt resistance: VR = Very resistant; R = resistant; MR = Moderately resistant; S = susceptible

<sup>2</sup>Winterhardiness: VH = very hardy; H = hardy; MH = moderately hardy

<sup>3</sup>Source—Certification applicant or present national distributor

- |  |   |
|--|---|
| 1. Cornell University, N.Y. Agr. Exp. Sta. | 8. North American Plant Breeders        |
| 2. DeKalb Ag. Research, Inc.               | 9. Northrup, King and Co.               |
| 3. Farm Seed Research Corp.                | 10. Pioneer Hi-Bred International, Inc. |
| 4. Farmers Forage Research Cooperative     | 11. S. Dakota Agr. Exp. Sta.            |
| 5. Minnesota Agr. Exp. Sta. and USDA       | 12. Wisconsin Agr. Exp. Sta. and USDA   |
| 6. Montana Agr. Exp. Sta.                  | 13. Waterman Loomis Co.                 |
| 7. Nebraska Agr. Exp. Sta. and USDA        |   |

sidered for recommendation for short to medium-term stands. Five years' testing are required for recommendations for long-term stands or stands for pasture. Table 1 shows the bacterial wilt resistance, winterhardiness, origin, and distributors of alfalfa varieties tested at least three years since 1964 at Michigan State University and offered for sale in Michigan.

Seven-year summaries of alfalfa testing are shown in Table 2 for East Lansing and Table 3 for the Kellogg Farm near Battle Creek. Recent 3-year tests with new varieties are reported in Table 4 for East Lansing and

Table 5 for Lake City in northern Michigan. Table 6 is a 3-year test in Chatham in the Upper Peninsula. These data and practical observations in the state provide the basis for recommendations for (1) short to medium-term and (2) long-term or pasture stands.

### OVER SEVEN TONS PER YEAR FOR SEVEN YEARS

Ten of 36 varieties produced an average yield of over 7 tons of hay per year at East Lansing in the 7-year period 1970-76, Table 2. Two varieties produced 7.5 tons or more. One variety, 520, yielded nearly 8 tons (7.81) of hay per acre per year for the 7-year period. This is three times the state average of 2.7 tons per acre. The excellent yields were due to annual fertilization with potassium, to the excellent class I Brookston soil, and four cuttings per year rather than three. Four cuttings per year increased the yield about one ton per acre per year (based on other MSU research). Other recommended management and fertilizer practices followed are listed on the first page.

### OVER NINE TONS PER YEAR FOR THREE YEARS

Two varieties produced over 9 tons hay per acre in 1976, Table 4. For a 3-year average (1974-76), one strain yielded over 9 tons hay per year; 21 to 40 varieties tested yielded over 8 tons hay. Michigan farmers would find it difficult to get such high yields since there would normally be a 5 to 10% greater haying loss under farm conditions than under experimental tests. The high yields do show, however, that under ideal soil and climate conditions as noted on page 1, the excellent new wilt-resistant varieties now available will produce high yields under Michigan conditions.

### VARIETIES—SHORT TO MEDIUM TERM

520, Honeoye, Saranac AR, Saranac, Iroquois, Weevlchek, WL305, WL309, WL311, Thor, 530, 521, WL215, Citation, Anchor, Conquest, Haylagemaker, Gladiator, Titan, Vernal, Nugget, Funk G-777, DeKalb 131, and Marathon are recommended because of excellent yields for 3 to 4 years and good stands in the third or fourth year (Tables 2, 3, 4, 5 and 6).

### VARIETIES FOR LONG TERM STANDS OR PASTURE

520, Weevlchek, Iroquois, Titan, Vernal, WL215 and DeKalb 123 are particularly good varieties recommended for long-term stands or for pasture. All had good yields for 7 years and good stands in the seventh year indicating strong survival and winterhardiness for long life. All are hardy, a desirable characteristic for long life.

Vernal is the oldest variety in this group but it is still an excellent variety since it has high yields in all

**Table 2. Alfalfa variety trial, seven harvest years, seeded August 1969, East Lansing, Michigan. Brookston loam, tilled every 50 feet. Four cuttings each year (late May, July 10-12, Aug. 22-26, Oct. 15-30) except three in 1970. Weed free, 0 + 98 + 588 in 1976, pH 6.8.**

VARIETY OR STRAIN	TOTAL YIELD, TONS/ACRE, 12% MOISTURE										
	3 yr. Avg.					7 yr. Avg.					
	1970-72		1976			1970-76		WR <sup>1</sup>	WH <sup>2</sup>		
	Yield	Vernal %	1973	1974	1975	Yield	Vernal %			Yield	Vernal %
520	8.25	111	7.20	8.53	7.11	7.07	112	7.81	112	R	H
WL305	7.74	104	7.16	8.41	7.19	7.19	114	7.59	109	MR	MH
Weevlchek	8.02	108	6.49	8.07	6.95	6.17	97	7.40	106	VR	H
Iroquois	7.90	107	6.45	8.12	6.69	6.69	106	7.38	106	VR	H
Atra 55	7.87	106	6.91	8.20	6.42	6.26	99	7.34	106	MR	H
WL202	7.72	104	6.74	7.90	6.30	6.62	105	7.25	104	R	H
Titan	7.82	106	6.09	7.13	6.79	6.75	107	7.18	103	VR	H
WL215	7.62	103	6.77	7.67	6.45	6.12	97	7.12	102	R	H
522	7.50	101	6.90	8.05	6.53	5.74	91	7.10	102	R	H
525	7.70	104	6.53	7.61	5.99	6.26	99	7.07	102	R	H
Superstan	7.58	102	5.89	7.82	6.57	5.69	90	6.96	100	R	MH
Vernal	7.41	100	6.28	7.60	6.19	6.33	100	6.95	100	R	H
Thor	7.84	106	6.06	7.02	6.09	5.83	92	6.93	100	VR	MH
Saranac	7.83	106	5.89	7.18	5.69	5.92	94	6.88	99	R	MH
Dominor	7.29	99	6.30	7.35	6.13	6.19	98	6.84	98	MR	MH
WL306	7.21	97	6.24	7.46	6.65	5.63	89	6.80	98	MR-S	MH
Rancher	7.87	106	5.95	6.65	5.83	4.87	77	6.70	96	MR	MH
WL210	7.13	96	5.75	7.25	6.06	5.71	90	6.60	95	MR	MH
123, DeKalb	7.04	95	5.91	7.15	5.68	6.01	95	6.55	94	R	H
N102	8.10	109	4.59	6.59	5.20	4.83	76	6.50	94	S-MR	MH
Promor	7.71	104	5.60	6.23	5.37	4.71	74	6.44	93	R	MH
Warrior	7.55	102	5.16	6.19	4.85	4.65	73	6.22	89	MR	MH
Ladak	7.28	98	4.94	6.57	5.32	5.05	80	6.16	89	S-MR	H
Scout	7.33	99	5.93	5.46	4.66	4.83	76	6.12	88	S-MR	H
Iowa 1038	6.58	89	5.38	6.60	5.79	4.85	77	6.05	87	R	H
Tempo	7.20	97	4.72	4.83	4.22	4.23	67	5.65	81	MR	MH
Flandria	7.60	103	5.35	4.83	3.93	1.89	30	5.55	80	S	MH
Norsemen	6.29	85	4.31	5.46	4.86	4.86	77	5.48	79	R	VH
153, DeKalb	6.98	94	5.12	4.74	3.60	3.76	59	5.45	78	S	H
TX-2	7.30	99	4.13	5.66	3.34	3.00	47	5.43	78	S	MH
Apex	7.11	96	3.84	4.40	3.64	2.86	45	5.16	74	S	MH
TX-1	7.03	96	3.19	3.81	2.99	2.00	32	4.74	68	S	MH
Team	7.07	95	2.67	3.43	2.82	2.04	32	4.59	66	S	MH
TX-202	7.07	95	3.68	2.75	2.04	1.97	32	4.52	65	S	MH
DuPuits	7.34	99	2.87	1.61	1.12	0.75	12	4.05	58	S	MH
Stride	7.08	96	2.87	1.85	1.12	0.94	15	4.00	58	S	MH
L.S.D.	.40		1.12	1.00	1.02	0.70		0.31			
CV%			12.6	9.8	8.1	8.8					
Mean	7.79		5.44	6.29	5.17	4.87		6.29			

<sup>1</sup>Bacterial wilt resistance: VR = Very resistant, R = Resistant, MR = Moderately resistant, S = Susceptible  
<sup>2</sup>Winterhardness: H = Hardy, MH = Moderately hardy

1965-76 tests, has proven winterhardiness, and has given excellent performance on farms throughout Michigan since 1955. Seed of Vernal is readily available at most seed stores. **IF SEED OF OTHER BETTER VARIETIES IS NOT AVAILABLE, VERNAL IS A SAFE, SOUND CHOICE FOR PASTURE OR LONG-TERM STANDS.**

Glacier, Stride, Team, Apex, and Tempo had low yields in these long-term tests (Tables 2 and 3) primarily because of wilt susceptibility. They are also less winterhardy than varieties like 520 and Vernal. These varieties and others listed in Table 1 as susceptible, or only moderately wilt resistant, or moderately hardy are *NOT* recommended for long term stands.

**Table 3. Alfalfa variety trial, seven harvest years, MSU, W. K. Kellogg Farm, Hickory Corners near Battle Creek, seeded 1969, Kalamazoo sandy loam, weed free. Four cuts in 1971, 1972, 1973, and 1975; 3 cuts in 1970, 1974; dry in 1974 & 1976. 0 + 40 + 180/yr.**

VARIETY OR STRAIN	YIELD, TONS/ACRE, 12% MOISTURE											
	3 Yr. Avg.					7 Yr. Avg.					WR <sup>1</sup>	WH <sup>2</sup>
	1970-72		1976			1970-76		1976				
	Yield	% Vernal	1973	1974	1975	Yield	% Vernal	Yield	% Vernal	Yield	% Vernal	
Iroquois	5.76	113	4.96	3.44	5.18	5.08	115	5.14	115	VR	H	
Saranac	5.82	114	4.33	3.00	4.91	4.47	101	4.88	109	R	MH	
Weevichek	5.47	107	4.52	3.04	4.18	3.85	87	4.57	102	VR	H	
Vernal	5.09	100	4.40	2.81	4.44	4.42	100	4.48	100	R	H	
525	5.23	103	4.63	2.86	3.44	3.49	79	4.30	96	R	H	
Promor	5.31	104	3.34	2.14	3.54	4.07	92	4.15	93	R	MH	
A-59	5.13	101	4.15	2.17	2.35	3.25	74	3.90	87	MR	MH	
TX-2	5.10	100	1.76	.75	.23	.17	24	2.62	58	S	MH	
Team	5.30	104	1.16	.76	.16	.09	21	2.59	58	S	MH	
A-24	4.92	97	.81	.85	.30	.05	32	2.39	54	S	MH	
PAT 30	5.03	99	.76	.58	.14	.09	26	2.39	54	S	MH	
TX-1	5.18	102	.67	.55	.16	.09	18	2.42	54	S	MH	
Glacier	5.14	101	.92	.52	.03	.65	15	2.40	54	S	MH	
DuPuits	4.84	95	.42	.28	.02	.05	11	2.20	49	S	MH	
L.S.D.	.25		.56	.44	.47	.53	.25					
CV%			17.0	21.0	15.8	18.1						
Mean	4.85		2.31	1.49	2.09	2.13	3.46					

<sup>1</sup>Bacterial wilt resistance; VR = Very resistant, R = Resistant, MR = Moderately resistant, S = Susceptible  
<sup>2</sup>Winterhardness; H = Hardy, MH = Moderately hardy

### VARIETIES FOR PASTURE

Varieties classified "long term" and having a very high degree of winterhardness are preferred for pasture. Pasturing alfalfa, even when rotational grazing is practiced, generally results in shorter stand life than if cut for hay or silage.

### INSECT CONTROL

The alfalfa weevil (*Hypera postica*), Michigan's most serious insect pest, can generally be controlled when infestation will likely reduce yields by spraying with ap-



**Figure 2.** Wilt resistant Iroquois (right) has an excellent stand in the fifth year at the Kellogg Farm near Battle Creek but wilt susceptible DuPuits (left) is nearly 100% invaded by dandelions.

**Table 4. Alfalfa variety trial, seeded 1973, MSU Experimental Farm, East Lansing, Michigan. Three harvest years, weed free.**

VARIETY OR STRAIN	TONS/ACRE, 12% HAY							3 Yr. Avg.		
	1976							1976 % Vernal	1974-76 % Vernal	
	1974	1975	6-4	7-7	8-7	10-28	Total	Yield	Yield	
	Yield	% Vernal	Yield	% Vernal	Yield	% Vernal	Yield	% Vernal	Yield	
T4X 201	8.74	9.47	3.13	2.67	2.31	.97	9.08	100	9.10	116
T3X 251	8.88	8.69	3.13	2.41	2.27	.86	8.66	105	8.74	112
520	8.49	8.75	3.11	2.48	2.33	.99	8.90	108	8.71	111
Americana	8.94	9.33	2.79	2.38	1.85	.79	7.81	95	8.69	111
Citation	8.43	8.76	3.06	2.63	2.13	.88	8.70	105	8.63	110
Honeoye	8.64	8.67	2.85	2.41	2.33	.93	8.52	103	8.61	110
530	8.74	8.54	2.71	2.42	2.39	.99	8.51	103	8.60	110
Saranac AR	8.60	9.02	2.75	2.43	2.18	.78	8.13	99	8.58	110
521	8.42	8.48	2.91	2.53	2.43	.91	8.77	106	8.56	109
WL 309	8.45	8.56	2.83	2.40	2.33	.97	8.52	103	8.51	109
KS 30	7.94	8.16	3.17	2.52	2.43	.98	9.11	110	8.40	107
Anchor	8.10	8.47	2.89	2.47	2.33	.89	8.57	104	8.38	107
Nugget	8.40	8.19	3.01	2.39	2.20	.84	8.42	102	8.34	107
Saranac	8.62	8.24	2.85	2.28	2.18	.86	8.17	99	8.34	107
Gladiator	8.35	8.19	3.04	2.30	2.22	.79	8.35	101	8.30	106
Haylage Maker	8.18	8.23	2.76	2.40	2.26	.89	8.31	101	8.24	105
Polar I	8.27	8.86	2.43	2.27	2.09	.81	7.60	92	8.24	105
Marathon	8.03	8.50	2.90	2.42	2.10	.70	8.11	98	8.21	105
Funk G-777	8.30	8.02	2.83	2.37	2.18	.82	8.20	99	8.17	104
Conquest	8.08	7.91	3.04	2.37	2.21	.84	8.45	102	8.15	104
Wisc. 70-46	7.78	7.82	3.18	2.45	2.37	.86	8.85	107	8.15	104
131 DeKalb	8.00	7.82	2.95	2.40	2.26	.94	8.55	104	8.12	104
Ind. Syn. C	8.15	7.90	2.93	2.26	2.25	.86	8.30	101	8.12	104
Iroquois	7.61	8.10	3.16	2.43	2.21	.66	8.46	103	8.06	103
Titan	8.15	7.72	3.12	2.32	2.13	.75	8.31	101	8.06	103
Agate	7.97	7.83	2.87	2.30	2.26	.93	8.36	101	8.05	103
WL 307	8.05	7.94	2.84	2.28	2.04	.81	7.97	97	7.99	102
WL 311	7.76	8.10	2.84	2.29	2.09	.86	8.08	98	7.98	102
Dawson 72	7.72	7.99	3.01	2.39	2.01	.77	8.18	99	7.96	102
K1-II	7.75	8.22	2.85	2.27	1.95	.68	7.74	94	7.90	101
Vernal	7.75	7.50	3.02	2.30	2.19	.74	8.25	100	7.83	100
NS 68	7.37	7.63	3.18	2.24	2.15	.76	8.32	101	7.77	99
S.D. 70-4-1 II	7.45	7.69	3.06	2.40	1.97	.56	7.99	97	7.71	98
Kanza 72	7.32	7.59	2.63	2.22	2.11	.82	7.78	94	7.56	97
Iowa 72-1	7.13	7.06	3.19	2.31	2.09	.78	8.37	101	7.52	96
Ramsey	7.04	7.46	2.78	2.25	2.06	.71	7.80	95	7.43	95
S.D. LFC II	6.67	7.34	3.11	2.11	1.86	.43	7.50	91	7.17	92
S.D. Brook. I	7.02	6.90	3.28	2.05	1.83	.53	7.69	93	7.20	92
Teton	6.18	6.58	2.83	2.04	1.76	.50	7.11	86	6.62	85
Travois	6.41	6.29	2.98	1.84	1.71	.35	6.88	83	6.53	83
L.S.D.	.66	.66	.37	.29	.35	.18	.78		.41	
CV%	6.7	5.8	8.8	6.9	11.6	16.1	6.7			
Mean	7.00	8.06	2.95	2.34	2.14	.79	8.23		8.08	

Soil Type: Conover loam; pH 6.8; P = 75 lb.; K = 129 lb.  
 Seeded: Banded over broadcast fertilizer, August 7, 1973  
 Fertilizer: 0 + 150 + 150 broadcast fertilizer prior to seeding  
 Topdressing: 0 + 98 + 294/yr except 0 + 98 + 592 in 1976

appropriate insecticides immediately after the first cutting. The first cutting may need to be sprayed about May 20-25 in southern Michigan if weevil damage is appreciable and the alfalfa is not to be cut for 7 to 10 days. (See Extension Bulletin E-739, Management for Alfalfa Weevil Control). If alfalfa is not pastured until mid-June (as when grazed rotationally), spraying will likely be necessary to prevent excessive loss. This spraying is usually done in late May.

Potato leafhoppers (*Empoasca fabae*) cause yellowish to reddish leaves in the second and third cuttings about five weeks after cutting and reduce yields and stop further growth. If the alfalfa is cut at 5- to 6-week inter-

**Table 5. Alfalfa variety trial, seeded 1973, Forage-Beef Experimental Farm, Lake City, Michigan; Three harvest years; Weed free; Only 2 cuts in 1976, dry in August and September.**

VARIETY OR STRAIN	YIELD, TONS/ACRE, 12% MOISTURE								
								3 Yr. Avg.	
	1976					1974-76			
	1974	1975	6-22	8-2	Total	% Vernal	Yield	% Vernal	
Honeoye	5.54	6.55	2.67	1.12	3.79	103	5.29	112	
520	5.01	6.40	2.86	1.10	3.96	108	5.12	108	
T4X-201	5.09	6.26	2.58	1.14	3.73	102	5.03	106	
Iroquois	4.82	6.23	2.65	1.09	3.74	102	4.93	104	
Citation	5.06	6.22	2.51	1.01	3.52	96	4.93	104	
Funk G-777	4.96	6.30	2.39	1.07	3.46	94	4.91	104	
T3X 251	5.02	6.26	2.27	1.08	3.35	91	4.88	103	
Americana	4.95	6.22	2.37	1.07	3.44	94	4.87	103	
Saranac AR	4.95	6.08	2.52	0.95	3.47	95	4.83	102	
K1-11	4.86	6.12	2.43	1.03	3.46	94	4.81	101	
WL 311	4.69	6.01	2.52	1.16	3.69	101	4.80	101	
131	4.48	6.16	2.57	1.16	3.73	102	4.79	101	
Conquest	4.53	6.23	2.52	1.02	3.54	97	4.77	101	
Gladiator	4.70	6.06	2.47	1.02	3.49	95	4.75	100	
Iowa 72-1	4.77	5.62	2.83	1.04	3.87	105	4.75	100	
<b>Vernal</b>	<b>4.82</b>	<b>5.72</b>	<b>2.62</b>	<b>1.05</b>	<b>3.67</b>	<b>100</b>	<b>4.74</b>	<b>100</b>	
WL 307	4.63	6.22	2.36	0.94	3.30	90	4.72	100	
Anchor	4.70	5.91	2.46	1.01	3.48	95	4.70	99	
Titan	4.75	5.80	2.52	1.04	3.55	97	4.70	99	
Haylage Maker	4.52	6.06	2.40	1.10	3.49	95	4.69	99	
Polar I	4.47	5.94	2.31	1.07	3.38	92	4.69	99	
Saranac	4.79	6.03	2.29	0.93	3.22	88	4.68	99	
530	4.61	6.06	2.28	0.96	3.24	88	4.64	98	
Marathon	4.83	5.66	2.37	1.02	3.39	92	4.63	98	
Ramsey	4.33	5.85	2.59	1.01	3.60	98	4.59	97	
521	4.31	5.79	2.54	1.10	3.64	99	4.58	97	
Nugget	4.67	5.66	2.48	0.94	3.41	93	4.58	97	
WL 309	4.53	5.70	2.23	0.97	3.20	87	4.48	95	
Travois	4.41	5.10	2.88	0.97	3.84	105	4.45	94	
Agate	4.41	5.47	2.51	0.92	3.43	94	4.44	94	
Teton	4.20	5.31	2.69	0.96	3.65	99	4.39	93	
Ind. Syn. C	3.53	4.64	1.92	0.75	2.67	73	3.61	76	
L.S.D. 5%	.44	.53			.62		.31		
CV %	6.4	6.1			8.1				
Mean	4.70	5.93			3.52		4.71		

Soil Type: Kent silt loam; Ph 6.9; P = 130 lb; K = 391 lb/A  
 Location: Lake City, Michigan (130 miles N. Lansing)  
 Seeded: Banded over broadcast fertilizer, August 8, 1973  
 Fertilizer: 0 + 150 + 150 broadcast fertilizer prior to seeding.  
 Lime: 3 tons lime prior seeding; pH 7.0  
 Topdressing: 700 lb. 0-14-42/yr. (0 + 98 + 294)

vals as recommended in 3- or 4-cut systems, leafhoppers will not generally be serious enough to warrant spraying (See Extension Bulletin E-672, Insect Control). Weevlchek, a highly recommended variety, has the most leafhopper resistance of all varieties tested.

### ANTHRACNOSE DISEASE

Anthracnose (*Colletotrichum trifolii*) does not normally reduce alfalfa yields in Michigan. This disease requires high moisture conditions and high temperatures which are found in states such as Maryland and in southern Ohio. However, anthracnose did reduce yields in East Lansing, (but not at Lake City) in 1975 when a moist and hot June caused noticeable symptoms. The symptom is a shepherd's crook caused by wilting of the

**Table 6. Alfalfa variety trial, seeded July, 1970, MSU Exp. Farm, Upper Peninsula, Chatham, Michigan. Three harvest years (data by Dr. Don Reid). Tremary loam.**

VARIETY	HAY YIELDS, TONS/ACRE, 12% MOISTURE								
								3 Yr. Avg.	
	1973				1972			1971	
	Cut 1	Cut 2	Total	% Vernal	Yield	% Vernal	Yield	% Vernal	
Saranac	3.03	1.95	4.98	144	5.54	5.18	5.23	133	
Iroquois	2.64	2.07	4.72	108	5.79	5.16	5.22	122	
Thor	3.15	1.95	5.10	117	5.34	5.14	5.19	112	
WL 303	2.76	1.93	4.69	107	5.56	5.03	5.10	110	
Kodiak	2.92	1.82	4.74	109	5.29	5.35	5.08	109	
Anchor	2.29	1.92	4.83	111	5.49	4.78	5.04	108	
Apex	3.15	1.92	5.06	116	5.31	4.61	4.99	107	
Tempo	2.74	1.80	4.54	104	5.35	5.06	4.98	107	
Ladak 65	2.80	.78	4.58	105	5.04	5.26	4.96	107	
Weevlchek	2.83	1.79	4.62	106	5.22	4.92	4.92	106	
Superstan	2.82	1.89	4.71	108	5.23	4.81	4.91	106	
WL 215	2.74	1.69	4.42	101	5.23	5.03	4.89	105	
WL 202	2.90	1.80	4.70	108	5.18	4.77	4.88	105	
Ranger	2.86	1.95	4.81	110	5.12	4.66	4.87	105	
Warrior	3.08	1.78	4.86	111	5.06	4.70	4.87	105	
WL 216	2.80	1.70	4.50	103	5.13	4.95	4.86	104	
Scout	2.70	1.72	4.42	101	5.08	4.96	4.82	104	
Dominor	2.76	1.70	4.46	102	5.19	4.82	4.82	104	
520	3.04	1.56	4.61	105	5.06	4.78	4.81	103	
WL 306	2.88	1.80	4.69	107	4.98	4.78	4.81	103	
WL 210	2.64	1.72	4.37	100	5.22	4.73	4.78	103	
ATRA 55	2.70	1.57	4.28	98	5.08	4.83	4.73	102	
WL 308	2.98	1.73	4.71	108	5.02	4.33	4.69	101	
Durastan	2.59	1.73	4.32	99	4.92	4.77	4.67	100	
<b>Vernal</b>	<b>2.80</b>	<b>1.56</b>	<b>4.35</b>	<b>100</b>	<b>4.97</b>	<b>4.61</b>	<b>4.65</b>	<b>100</b>	
Titan	2.75	1.55	4.30	98	4.85	4.55	4.56	98	
A-59	2.67	1.44	4.10	94	4.49	4.78	4.46	96	
Norseman	2.59	1.41	4.00	92	4.42	4.66	4.37	94	
DeKalb 123	2.37	1.58	3.96	91	4.35	4.53	4.28	92	
Bonus	2.45	1.40	3.85	88	4.35	4.29	4.21	90	
L.S.D. 0.05			.70		.73	.63	.40		
CV %			12.7		7.7	9.9			
Mean			4.58		5.16	4.81	4.82		

tip of the plants. Severe symptoms are reflected in death of plants.

Saranac AR (anthracnose resistant) outyielded Saranac in 1975 in the trial at East Lansing (Table 4). As anthracnose-resistant varieties become available, they will be recommended in the southern half of Michigan if they have other good characteristics.

### PHYTOPHTHORA ROOT ROT ON WETTER SOILS

Alfalfa requires good drainage for satisfactory yields and excellent drainage, natural or by tiling, for maximum yields. Many fields are well drained except for lower areas where stands are short lived. Phytophthora root rot (*Phytophthora megasperma*) frequently is the cause of poor stands in the lower, wet areas, or on poorly drained soils. It is most severe during the first three months of seedling growth under conditions of poor drainage or excessive rainfall (14 inches of rain in 10-day periods in September in St. Clair County and May and August 1975 in Isabella County caused complete stand losses). The primary root decays about 2 or 3 inches below the crown and the top of the

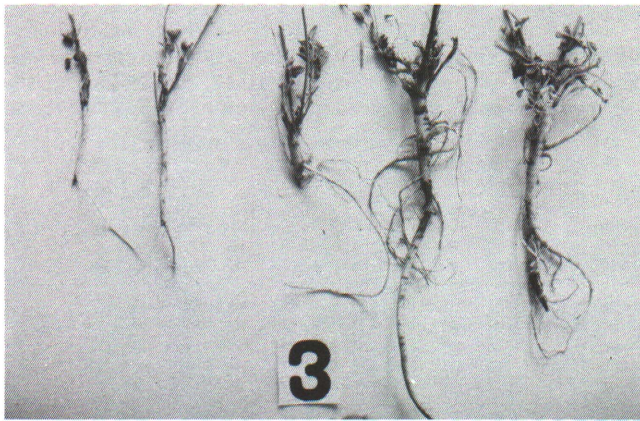


Figure 3. *Phytophthora* root rot caused root decay on a wet soil in these 5-month old alfalfa seedlings. Note new lateral roots which may develop enough for good plant survival.

plant becomes yellow-purple and stunted (see Fig. 3). The plant may die if wet conditions continue or may send out branch roots and recover if the wet conditions stop.

### VARIETIES RESISTANT TO ROOT ROT

Alfalfa varieties or experimental strains resistant to root rot were compared to Vernal, Saranac, and Iroquois varieties (none resistant to root rot) in tests at East Lansing for two years. The field was only fairly well-drained since the tile line was partially inoperative. There was no difference in the first year's (1976) results, Table 7, when rainfall was normal. In 1977, rainfall was normal and one inch of irrigation water was applied daily from August 18 to October 15 (total of 58 inches) to induce root rot. Some varieties were significantly better than Vernal or Saranac but none yielded more than Iroquois in 1977, or for the 2-year period. Yields in 1977 were only two-thirds as high as varieties on a similar, but excellently drained soil (Table 4) substantiating poor drainage in the root rot test. Root rot symptoms—yellowing and purpling leaves—were prevalent on all plots with considerable variation between varieties. Rotting of roots, however, was not noted.

The results show that high-yielding varieties resistant to root rot will likely be superior to most non-resistant varieties on imperfectly drained soils where root rot is likely to be a problem. Iroquois is one susceptible variety, however, which has yielded as well as the best resistant selections in this two-year test on an imperfectly drained soil. In 16 tests in the state established in 1974, Iroquois performed better in 1974-77 than Agate, a resistant variety, on all soils where drainage was fair to good, but was inferior where drainage was very poor. The results in Table 7 and those in the 16 tests in the state indicate that root-rot-resistant varieties with high-yield potential should be considered for use on im-

Table 7. Two-year hay yields of alfalfa, *Phytophthora*-resistant varieties, \*\* M.S.U. Experimental Farm, East Lansing, MI.

Entry	YIELD, TONS/ACRE, 12% H <sub>2</sub> O							
	1977					2 Yr. Avg.		
	Total 1976	Cuttings				Total	Total	% Vernal
	6/1	7/7	8/8	10/28				
Hipby-Farm Bureau	2.71	2.50	1.32	1.13	1.21	6.17	4.45	117
**Iroquois	2.82	2.55	1.25	1.06	1.11	5.96	4.39	115
Dekalb 111	2.71	2.41	1.19	.87	1.09	5.55	4.13	109
Calwest 9	2.88	2.33	1.13	.87	1.05	5.36	4.13	108
Apollo-NAPB	2.49	2.46	1.29	.91	1.03	5.70	4.09	107
Americana 7526	2.75	2.11	1.21	.92	1.11	5.35	4.05	106
Minn. PL6 (3284)	2.49	2.43	1.13	.91	1.00	5.48	3.98	105
**Saranac	2.42	2.36	1.20	.89	1.07	5.51	3.96	104
WL220	2.75	2.05	1.15	.89	1.03	5.11	3.92	103
WL74T11	2.72	2.00	1.17	.93	.99	5.10	3.91	103
WL318	2.69	1.95	1.21	1.01	.90	5.07	3.88	102
Farm Seed Res. A52	2.37	2.09	1.16	.96	1.13	5.35	3.85	101
Farm Seed Res. A53	2.49	2.19	1.20	.87	.95	5.20	3.84	101
Calwest 2	2.63	2.04	1.16	.75	1.05	5.00	3.82	100
**Vernal	2.52	2.27	1.08	.73	1.00	5.08	3.81	100
Agate-Minn.	2.36	2.26	.99	.88	.95	5.07	3.72	98
Calwest 4	2.37	2.19	1.05	.80	.95	4.98	3.68	97
WL 7417	2.46	1.68	1.11	.99	1.00	4.78	3.63	95
Minn. PB1 (2745)	2.42	1.88	1.09	.73	1.09	4.79	3.55	93
Americana 7525	2.36	1.81	1.04	.77	1.01	4.63	3.50	92
WL 75T3	2.18	1.96	1.03	.88	.89	4.74	3.45	91
Minn-P-A3 (2592)	2.35	1.87	.96	.68	.87	4.37	3.36	88
LSD (.05)	0.72	0.36	0.23	0.27	0.18	0.76	0.60	
CV%	17.60	11.90	14.10	22.50	12.30	10.40		
Mean	2.53	2.15	1.14	.88	1.03	5.20	3.86	

Soil: Conover Loam, pH 6.8

Seeded: April 14, 1976, 8 lb./A. 2 cuts in 1976 (7/16 & 8/25), 4 in 1977.

Fertilizer: 0 + 98 + 294 in 1976 and in 1977.

Drainage: Fair to poor, broken tile line under plots

Rainfall: 1976-April-4.5; May-3.0; June-4.3; July-4.8; Aug.-0.6; Sept.-1.8; Oct.-2.8 = 21.8 total; average is 20.7 in.

1977-April-4.2; May-0.3; June 4.8; July-3.5; Aug.-2.2; Sept.-6.4; Oct.-2.1 = 23.4 total; average is 20.7 in.

Irrigation: 1 inch per day Aug. 18-Oct. 14 or 58 in. Severe PRR leaf symptoms noted on all plots.

\*\*Check varieties-not resistant to *Phytophthora*.

perfectly drained soils where root rot may occur, especially in the seeding year. **Use of root rot resistant varieties will be of little benefit, however, on poorly drained soils not suited to alfalfa.**

### IROQUOIS FOR LONG LIFE ON WETTER SOILS

Iroquois is the first choice for soils somewhat imperfectly drained but still suitable for alfalfa production because of excellent performance and persistence in the root rot trials reported above, trials in 16 counties in Michigan, and in 6-year demonstration trials in St. Clair and Lapeer Counties.

In addition to its excellent performance on wetter soils, Iroquois has also given excellent performance and persistence on well drained soils at East Lansing, the Kellogg Farm near Battle Creek, and Lake City in the Lower Peninsula and Chatham in the Upper Peninsula (Tables 2, 3, 5 and 6).

Resistance to root rot is now being added to Iroquois alfalfa. When this new variety is available (probably in 1979-80) it should be an even better variety for wet, imperfectly drained soils in Michigan.