



No. 131

Recommended Alfalfa Varieties for Michigan

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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-522, 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



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.

taking the fourth cutting for silage in 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 (250 to 600 lb/acre of 0-0-60 plus 1 to 2 lb boron) and phosphorus, if necessary. (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 $\frac{3}{4}$ 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 ¹	WH ²	S ³	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.
Honeyeye	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	MR	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.
Weevichek	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.

¹Bacterial wilt resistance: VR = Very resistant; R = resistant; MR = Moderately resistant; S = susceptible

²Winterhardiness: VH = very hardy; H = hardy; MH = moderately hardy

³Source—Certification applicant or present national distributor

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

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										WR ¹	WH ²
	3 yr. Avg.					7 yr. Avg.						
	1970-72		1976			1970-76						
	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				

¹Bacterial wilt resistance: VR = Very resistant, R = Resistant, MR = Moderately resistant, S = Susceptible
²Winterhardiness: 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												WR ¹	WH ²
	3 Yr. Avg.						7 Yr. Avg.							
	1970-72		1976		1970-76		1976		1970-76		1970-76			
	Yield	% Vernal	1973	1974	1975	Yield	% Vernal	Yield	% Vernal	WR ¹	WH ²			
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			
Weevlchek	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						

¹Bacterial wilt resistance; VR = Very resistant, R = Resistant, MR = Moderately resistant, S = Susceptible
²Winterhardiness; H = Hardy, MH = Moderately hardy

VARIETIES FOR PASTURE

Varieties classified "long term" and having a very high degree of winterhardiness 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-

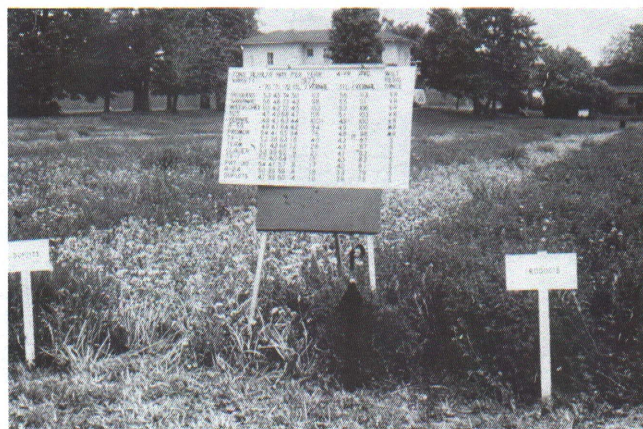


Figure 2. Wilt resistant Iroquois (right) has an excellent stand in the fifth year at the Kellogg Farm near Battle Creek but wilt susceptible DuPuits (left) is nearly 100% invaded by dandelions.

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							1974-76				
	1974	1975	6-4		7-7		8-7	10-28	Total	1976 % Vernal	1974-76 Yield	% Vernal
			6-4	7-7	6-4	7-7						
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		
Saranac AR	8.74	8.54	2.71	2.42	2.39	.99	8.51	103	8.60	110		
521	8.60	9.02	2.75	2.43	2.18	.78	8.13	99	8.58	110		
WL 309	8.42	8.48	2.91	2.53	2.43	.91	8.77	106	8.56	109		
	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	8.37	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		
KI-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

propriate 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							
	1976						3 Yr. Avg.	
	1976					1974-76		
	1974	1975	6-22	8-2	Total	% Vernal	Yield	% Vernal
Honeye	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
Vernal	4.82	5.72	2.62	1.05	3.67	100	4.74	100
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). Weevlehek, 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). Trenary loam.

VARIETY	HAY YIELDS, TONS/ACRE, 12% MOISTURE							
	1973				3 Yr. Avg.			
	1973			% Vernal	1972	1971	Yield	% Vernal
	Cut 1	Cut 2	Total	% Vernal	1972	1971	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
Weevlehek	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
Vernal	2.80	1.56	4.35	100	4.97	4.61	4.65	100
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

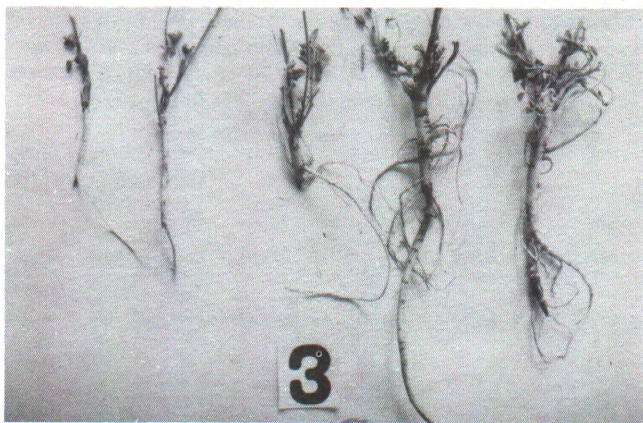


Figure 3. *Phytophthora* root rot caused root decay on a wet soil in these 5-month old alfalfa seedlings. Note new lateral roots which may develop enough for good plant survival.

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

Agate was the first root-rot-resistant variety developed in the U.S. It was developed by the Minnesota Agricultural Experiment Station and the USDA and released jointly with experiment stations in Iowa, Michigan, and Missouri in 1973. It has been tested at MSU since 1972. On a well drained upland soil with normal rainfall, Agate yielded only 3% less than Vernal. It has persisted better than Vernal under wet conditions in the seedling stage in trials established in 16 counties in Michigan in 1974. Its greater resistance to root rot was reflected in better plant color, less rotting on roots, more persistent plants, and better stands.

Several tests in the North Central region confirm these MSU results which show that Agate is about equal to Vernal on well drained soil but better on poorly drained soil.

Apollo, released by a commercial company in 1976, yielded as much as Agate in a 1976 MSU trial. Agate, Apollo, WL318 and other root rot resistant varieties soon to be released by industry should be considered for use on imperfectly drained soils where root rotting may occur during the seeding year. The Minnesota Agricultural Experiment Station has determined that Agate has 55% root rot resistant plants, Apollo has 43% and WL318 has 26%. Based on the 1975 tests in 16 counties in Michigan in 1974-76, however, **use of root rot resistant varieties will likely be of little benefit 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. Iroquois has given excellent performance and persistence in the root rot trials (compared to Vernal and Agate) in 16 counties in Michigan in 1974-76. It has also shown the best persistence of several varieties in 6-year demonstration trials in St. Clair and Lapeer Counties and in a 3-year trial with irrigation with 3 inches of sewage water per week at East Lansing.

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.