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Field Crop Recommendations for Michigan
Michigan State University Extension Service
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FIELD CROP Recommendations For Michigan



*Cooperative
Extension
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Michigan State University*



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FIELD CROP RECOMMENDATIONS FOR MICHIGAN

By S. C. HILDEBRAND, R. W. CHASE, M. H. ERDMANN, L. V. NELSON AND D. H. SMITH, JR.
Extension Specialists in Crop Science

CROP VARIETIES recommended for Michigan and some important cropping practices used in their production are discussed in this bulletin.

Choosing crop varieties is the first step in efficient farm crop production. The proper choice can make the difference between a profitable and unprofitable crop in both quantity and quality.

Each variety reacts slightly differently to a set of soil, moisture and temperature conditions. Each farm has its own specific set of conditions which must be met. Therefore, choosing the best varieties is an important decision every farmer must make.

A crop variety may be recommended for one section of the state or for one type of soil. Varieties from other states may or may not be suitable for Michigan. Promising ones are tested along with those from Michigan. Yield per acre, lodging resistance, quality, maturity and disease resistance are considered. Test weight of grain and winter hardiness are considered where pertinent. Sometimes the processing quality of a crop is very important. As varieties differ in all of their characteristics, you need to weigh the good against the poor and choose those varieties with the best combination of desirable characteristics. Two examples of varieties not recommended for Michigan are pointed out under the discussion of wheat and field bean varieties.

Any crop variety will show all of its characteristics only when the grower plants high-quality seed and follows good cultural practices in production. The best seed of a specific variety is *certified seed*. Certified seed of a variety produced in Michigan is starred (*) in the lists.

Recommendations are based on field trials conducted at Michigan State University and at several locations throughout the state. Extension bulletins and folders referred to are available at County Ex-

tension offices or from the Michigan State University Bulletin Office, P.O. Box 231, East Lansing, Michigan.

WINTER WHEAT

Michigan is a soft winter wheat area. Hard winter wheat is not adapted to Michigan climatic conditions. About 83 percent of the wheat acreage is planted to soft white wheat; soft red wheat is usually grown in the southern tier of counties. In any area, it is better to produce either white or red wheat since mixtures of the two types may be worth less than either type alone.

STORAGE

Improper harvest and storage can ruin a good crop of wheat. Do not harvest wheat until the moisture content is below 14 percent, unless artificial drying is employed.

Any local elevator will check the moisture content of grain upon request.

Adjust and operate the combine carefully to reduce cracking and improve quality. Clean the storage bins and treat them for insects before binning the grain. See Extension Folder F-134, "Prevent Damage to Stored Wheat."

CHARACTERISTICS AND TESTING

All of the varieties listed are winter-hardy, normally have good test weight and are acceptable for milling. All are beardless. All are susceptible to bunt (stinking smut) and scab and most are susceptible to stem rust.

Replicated trials of wheat varieties have been conducted at East Lansing and at locations in Gratiot, Lenawee, Monroe and Tuscola counties. A summary of the results is given in Table 1. In

general, the white wheat varieties have been superior to the red wheats in Gratiot and Tuscola counties. Characteristics of the recommended varieties of wheat are listed in Table 2.

ADAPTATION

An example of a variety not adapted to Michigan conditions is Gaines white winter wheat. In Washington State and the Pacific Northwest this variety is outstanding. In tests there, it has yielded well over 100 bushels per acre and the milling industry has found it satisfactory. In Michigan this variety performs quite differently. An average of reports received from farmers for two years indicates a yield of 10 to 20 percent less than that of Genesee and Avon, the recommended varieties. In 1964 the percentage of shrunken seed was much higher than that of the recommended varieties. It has shown to be especially susceptible to Michigan diseases, particularly mildew. Stem rust may be a problem. Michigan millers have found the protein content of Gaines too high for the type of flour made from

Michigan white wheat. In addition, they found that the cookie spread was lower and there was poor bran cleanup.

For information on raising wheat, refer to Extension Bulletin E-178 (revised), "Winter Wheat Culture in Michigan."

SPRING WHEAT

Of the 1-million acre Michigan wheat crop, about 10,000 acres are planted to spring wheat. Michigan-produced spring wheat is not suitable for milling purposes, except under special conditions, because of the climatic conditions under which it is grown. Variety trials have been conducted from time to time and at this time recommendations are:

Russell — a bearded, hard red spring wheat, mid-season in maturity, and resistant to Hessian fly, mildew, and loose smut. It is moderately resistant to stem rust and moderately susceptible to leaf rust. Recommended for feed production in both Lower and Upper Michigan.

Selkirk — a beardless hard red spring wheat, mid-season in maturity, with fair resistance to lodging. It is resistant to current races of rust and loose smut. Recommended for Upper Michigan.

Table 1. — Average yield of wheat varieties in bushels per acre at 5 locations in Michigan

Variety		5-year average 1960-64	2-year average 1963-64
*Genesee	(W)†	53.3	48.9
*Avon	(W)	53.9	49.1
(2) Talbot‡	(W)	—	50.5
*Dual	(R)	53.1	49.1
*Monon	(R)	51.3	49.5
Reed‡	(R)	—	48.3
Redcoat	(R)	54.0	—

†(W) = white grained wheat, (R) = red grained wheat

‡(2) Included in trials only 2 years

RYE

Rye is mainly used for late fall and early spring pasture, as a winter cover crop, and as a green manure crop.

RECOMMENDED

*Balbo — an early, high yielding rye which makes excellent and rapid fall and early spring growth and

Table 2. — Characteristics of Recommended Winter Wheat Varieties

Variety	Grain color	Lodging resistance	Maturity	Plant height	Remarks
Avon	White	Good	Medium	Medium	Wide adaptation. Highest yielding variety in most trials
Genesee	White	Fair to Good	Medium	Medium	Wide adaptation. Occasionally yields more than Avon
Dual	Red	Good	Medium	Medium	Highest yielding red wheat. Resistant to Hessian fly
Monon	Red	Fair to Good	Early	Medium short	Resistant to Hessian fly. Yields similar to Dual. Resistant to leaf rust.

OTHER VARIETIES. Other varieties of white and red wheat are lower yielding than those recommended or they have not been in sufficient trials to warrant a recommendation.

is preferred over other varieties for pasture, winter cover, and green manure.

OTHER VARIETIES

Tetra Petkus — a large-seeded variety introduced from Germany about 1951. The straw is coarser than that of Balbo and it has more lodging resistance. It does not mature as early or rapid growth as Balbo and the test weight of the grain is slightly lower. The yield of grain is slightly higher than that of Balbo. Distillers are reluctant to buy grain of Tetra Petkus.

BARLEY

Winter barley is grown successfully in southwestern Michigan and with moderate success in some other areas of Lower Michigan. Winter barley is used for feed. All of the varieties are susceptible to loose smut.

Table 3. — Winter Barley Variety Trials at East Lansing — 1961-64

Variety	Lodging resistance	% Winter survival	Yield Bushels per acre	Test weight Pounds per bu.
*Harrison	Good to Very good	73	70	50.8
*Hudson	Good to Very good	80	63	50.4
Wong	Very good	54	41	46.7

Spring barley is produced for both malting and feed. If a variety is acceptable for malting, this will be shown after its name in Tables 3, 4, and 5. Larker is a recent addition to the malting barley varieties.

OATS

Field tests have shown that there is no perfect variety of oats; each has its strong and weak points. The recommended varieties are those which have the best combination of desirable characteristics such as good yield, lodging resistance, test weight, and disease resistance.

A relatively new factor which is being used to determine the adaptability and use of oat varieties is "reaction to temperature." All oat varieties perform better in cool weather. However, the way varieties differ in their response to high and low temperatures is important. The night temperatures

Table 4. — Spring Barley Variety Trials at Two Locations — 1959-64

Variety	Yield — Bushels per acre		Test weight — Pounds per bu.	
	Ingham Co.	Tuscola Co.	Ingham Co.	Tuscola Co.
Kindred	59	54	46.4	48.4
Larker	62	63	49.1	50.1
*Moore	70	66	48.8	49.6
*Traill	70	62	48.0	49.4

Table 5. — Characteristics of Barley Varieties

Variety	Type	Maturity	Lodging resistance	Use	Remarks
RECOMMENDED					
*Moore	Spring	Medium to late	Good	Feed	Windrowing advisable but not necessary.
*Traill	Spring	Medium	Good	Malting or feed	
Larker	Spring	Medium	Fair to Good	Malting	Larker has a higher percentage of plump kernels than Traill.
*Harrison	Winter	Medium	Good	Feed	Very similar to Hudson but with slightly higher yield.
*Hudson	Winter	Medium	Good	Feed	Most winterhardy variety. Awns cause difficulty in threshing.
ACCEPTABLE					
Wong	Winter	Late	good	Feed	Does not have awns but yields less than Harrison or Hudson.

during June and early July seem to be especially critical. For this reason, varieties are classified according to their temperature reaction as follows: "cold temperature" — especially sensitive to hot weather during the critical period; "intermediate" — slightly sensitive; and "warm temperature" — the least sensitive.

Some varieties are good at one location and only average at the other locations or under different conditions. The late maturing varieties must be planted early to do well. Varieties must be tested at different locations to determine their adaptation. How a variety performs in another state is not a good indication of its performance in Michigan. The recommended oat varieties are listed in Table 6.

Two new varieties, AuSable and Coachman, developed by the Michigan Agricultural Experiment Station, were added to the recommended list in 1963. Yield data on these and standard recommended varieties are given in Table 7.

CORN HYBRIDS

Information on corn hybrids is available in detail in Extension Bulletin 431, Corn Hybrids Compared, which is revised each year with the performance

records of all Michigan certified corn hybrids and many of the commercial hybrids.

MATURITY

In choosing corn hybrids, maturity is very important. A lower yield of sound corn is better than a high yield of corn which cannot be safely stored. In many cases an early hybrid will yield as much or more than the late maturing hybrids. In selecting hybrids, check the information in the Bulletin 431

Table 7. — Yield of oat varieties at 4 locations in Lower Michigan in bushels per acre

Variety	Ingham Co. 5-year ave.	Tuscola Co. 4-year ave.	Lenawee Co. 5-year ave.	Kalamazoo Co. 2-year ave.
*Clintonland 60	90.7	94.1	92.9	49.6
*Coachman	98.7	102.4	107.4	59.6
*Rodney	98.3	108.2	99.0	55.0
*AuSable	105.4	111.4	100.4	51.8
*Garry	107.6	109.0	106.3	59.0
Least significant Differences	5.0	5.2	6.0	7.5

Table 6. — Characteristics of Recommended Oat Varieties

Variety	Maturity Height	Grain color; Test weight	Resistant to:	Lodging resistance	Temperature reaction	Remarks
*Clintonland 60	Mid-season Medium	Yellow Good	Leaf rust	Very good	Warm	Especially good on heavy soils in S.E. Michigan and where lodging is a problem. One of best varieties for late planting.
*Coachman	Mid-season Medium	Tan High	Leaf and common stem	Very good	Warm	Same as for Clintonland 60. Also recommended for Upper Peninsula. Has large kernel size.
*AuSable	Late Medium tall	White High	rust Leaf rust	Very good	Cold	Well adapted to central Michigan and the Thumb and Saginaw Valley. Should be planted early. May be used further south if planted very early.
*Garry	Late Tall	White Medium	Leaf and stem rusts	Very good	Cold	Good for all areas of Michigan, including the Upper Peninsula if planted early; very early in southern tier of counties. Good variety for central Michigan and Saginaw Valley.
*Rodney	Late Tall	White High		Fair	Cold	Recommended for same areas as Garry with the same early planting requirement; do not use where lodging is serious.

OTHER VARIETIES — Tiogo, Niagara, and Oneida have excellent yield but low test weight in Michigan tests. Dodge is similar in yield, maturity and test weight to Clintonland 60. Fundy has a good yield record but low test weight and weak straw. Gortland is similar to Coachman, yielded less than Coachman in Lenawee County and the same as Coachman in Kalamazoo county. Lodi appears very similar to Garry on the basis of limited tests. Russell, from Canada, is a good, mid-season white oat. It has yielded less than Garry except in the "Thumb area" where it may have a slight yield advantage.

from two or more test locations nearest your farm. *Select the high yielding hybrids which have average to below average moisture content.* Try a small acreage of new hybrids when their performance records indicate that they may be better than those you now grow.

Corn hybrids certified by the Michigan Crop Improvement Association in order of maturity, from early to late, are: AES 202, Michigan 250, Michigan 270, Michigan 300, Michigan 370, Michigan 400, Michigan 425, Michigan 430, Michigan 490, Michigan 570 and Michigan 620.

SINGLE CROSS CORN HYBRIDS

Seed of single-cross corn hybrids for farm plantings is now available in increasing amounts. Most of these hybrids are variations of the true genetic single-cross.

Single-cross hybrids have been used for many years to produce double-cross seed for use in farm planting. While availability of single-cross seed is a recent development, these hybrids do not represent a "cure-all" for corn production problems. Both single-cross and double-cross hybrids have advantages and disadvantages. It is equally important to choose the best hybrid, whichever the type. There are good, average, and below average hybrids of each type.

ADVANTAGES

- There is more "eye appeal". The plants are more uniform in maturity, ear height, plant height and type of ear.
- There is a possibility of higher yield under ideal environmental conditions.
- In a breeding program it is easier to obtain a higher level of resistance to diseases and insects because only two inbreds are involved.

DISADVANTAGES

- The seed cost is higher - 50 to 100 percent.
- Seed quality may be lower than that of double cross hybrids.
- There is a shorter period of pollination.
- There is less buffering against adverse weather conditions.

From observation and reports in 1964, farmers had some good and some poor experiences with single-cross hybrids. Where rainfall was adequate, many farmers had good pollination and yield. In some cases there was poor pollination and a low final yield. Within the same field, where rainfall was in-

adequate, one single cross did well considering the weather, while another did poorly. Both of these were considered to be good single-crosses. A difference in pollination time may be responsible for much of the difference in yield.

SOME SUGGESTIONS

If you expect to try single-cross hybrids, grow at least 2 or more rather than limiting your acreage to a single hybrid. Select hybrids having a few days' difference in pollinating time and plant 4 rows of one, then 4 rows of another across the field. This will lengthen the pollinating time for the entire field. Check the performance of the single crosses in yield tests, on neighbors' farms, and on your own farm.

CORN AS A FORAGE CROP

On productive soil, corn has proven to be a productive annual forage crop, along with sudangrass and sorghum-sudangrass hybrids.

In tests at East Lansing, corn planted in 35 inch rows at 20,000 plants per acre, harvested for silage, yielded the highest tonnage of dry matter of the 3 annual crops tested.

When planted in 7-inch rows at 100,000 plants per acre, it gave as much or more greenchop feed than the other crops when the harvest was between July 15 and August 15. At the high population, corn was not as satisfactory for silage because of low grain content.

SUDANGRASS

Sudangrass has been used as an emergency pasture crop and may be used in the regular forage program for summer pasture or greenchop. If planted at corn planting time, it makes abundant growth for pasture or harvest in July and August. It is a summer annual grass and has general adaptation wherever corn is grown for grain. It remains the first choice annual grass for pasture. For production information see Extension Folder F-292, "Sudangrass in Michigan."

RECOMMENDED

Piper - A high yielding variety, with low prussic acid. It makes good regrowth in late summer and has good resistance to leaf diseases. The first choice variety for Michigan.

Sweet - Somewhat coarser and later than the

Piper variety. Acceptable for the lower tier of counties.

Tests with Trudan 1, a hybrid sudangrass, were conducted in 1964. Yields were promising but the limited data does not allow recommendation in 1965.

SORGHUM — SUDANGRASS HYBRIDS

This plant is the result of a cross between selected sorghum and sudangrass varieties. Numerous brand-name hybrids of this cross have been offered for sale and use in Michigan. It is a summer annual grass, similar to sudangrass in looks and growth habits, but has larger leaves. It has been used primarily for greenchop feed and some for pasture.

Three years of testing at East Lansing has shown that one of these hybrids will out yield Piper sudangrass by about $\frac{1}{2}$ ton of dry matter per acre under a greenchop program. The hybrid used for this test was DeKalb SF-11, Sudax, which was the first to appear on Michigan markets. Less extensive tests in Michigan and other states with numerous hybrids of the same type indicate similar yields.

Some farmers have indicated satisfactory results in pasturing these hybrids. Michigan State University has had limited successful tests with pasturing dairy heifers.

Yield is the important advantage of the hybrid over sudangrass. Limited feeding trials show no difference in feed intake and milk production with dairy cows. The hybrids have a higher potential for prussic acid poisoning than Piper sudangrass. When harvest by mowing or pasturing is delayed until the grass reaches an 18-inch height, there should be no trouble. In 1964 the hybrid was superior to sudangrass in drought tolerance.

FESCUES

Fescues are perennial grasses which reproduce by seed and tillering. They are low in palatability when compared to the best-known hay and pasture grasses in Michigan.

Red — a short, fine-stemmed plant which performs well under dry conditions and tolerates shade. It has no value for pasture. Used mainly on soils low in organic matter, for cover in orchards, on airports, and in lawn mixtures. The Pennlawn variety is recommended.

Alta or Kentucky 31 — Tall fescues, much taller and coarser than red fescue. Used mainly on airports, playgrounds, road shoulders, etc. They are too coarse for lawns and too tough and unpalatable for pasture.

SMOOTH BROMEGRASS

This is one of Michigan's most important perennial pasture and hay grasses. Often grown in combination with alfalfa, it is resistant to drought and is similar to alfalfa in palatability. Smooth bromegrass has wide adaptation in Michigan on a variety of soils including use for pasture on well-drained muck soils.

Before 1958 only the northern types of smooth bromegrass were recommended, with the best seed coming from Canada. Southern types were thought to be more competitive with alfalfa. Recent information indicates that northern and southern types are similar in their competitive ability. The Lincoln and Achenbach varieties of the southern type are recommended as well as the northern type Canadian smooth bromegrass. With comparable seed prices, Lincoln and Achenbach are preferred.

TIMOTHY

Timothy is an important forage crop for use in combination with alfalfa and red and alsike clovers. It is not as good as smooth bromegrass for pasture. It is tolerant of moist soil conditions but is not drought-resistant. Several strains have been tested, and late-maturing strains have the advantage of maturing with the legume crops. Commercial seed has been used successfully and winter hardiness has not been a problem.

REED CANARY GRASS

This is an excellent grass for permanent plantings on poorly-drained soils, especially poorly-drained organic soils. It is very tolerant of standing water and flooding. Although somewhat unpalatable, reed canary grass produces abundant pasture throughout the grazing season, especially during July and August when the need is greatest. For more information see Extension Bulletin E-220, "Reed Canary Grass."

ALFALFA

Alfalfa is the best perennial legume forage crop for well-drained soils in Michigan. In selecting a variety, yield and winter hardiness are the main factors to consider. Bacterial wilt resistance is important if the field is left for 3 or more years.

Most of the seed of varieties adapted to Michigan is produced in the western and southwestern United States. If you use seed from these areas, be sure it is *certified seed*. Uncertified seed may mean that the crop will not survive Michigan winters. See Table 8 for characteristics of alfalfa varieties.

TWO VARIETIES BETTER THAN ONE

Michigan farmers constantly face the problem of undesirable weather at hay harvest. The use of hay conditioners has reduced the time needed for field curing, resulting in improved quality.

The use of two or more alfalfa varieties on the same farm seems to offer another possibility for improving quality. Flemish type alfalfas, of which DuPuits is the best known variety, are ready for harvest before Vernal, by about 7 to 10 days. Since the proper time to cut is when the first flowers appear, it is possible to start harvest of the Flemish type; and by the time harvest is complete, Vernal will probably be ready. This allows harvest of a larger acreage at the best stage of development. Otherwise, some of the alfalfa will be in $\frac{1}{2}$ bloom or later stages of development. The larger the acreage of alfalfa, the greater the benefits from using several alfalfa varieties of different maturity.

The DuPuits-Vernal combination is mentioned as an example. Other combinations may be possible.

RED CLOVER

Red clover, is second to alfalfa as a legume forage crop for Michigan. Medium red clover (June clover) is the most important type. It is frequently used in combination with timothy for hay with a second crop being taken for seed.

Mammoth red is a one-cut red clover which matures later and makes a ranker growth than medium red. The two types are similar in other respects and you cannot tell the seeds apart. Seed of mammoth red comes from the first crop, and northern grown seed should be used. See Table 9 for yield and characteristics of red clover varieties and strains (page 8).

LADINO CLOVER

Ladino is a giant form of wild white clover, biennial to perennial, with the same growth habit as wild white clover. It grows best on moist, fertile soils, is very palatable, and is high in protein. Harvest for hay is difficult because of the stolons, and the forage is mostly leaves. Ladino is often used in alfalfa-bromegrass mixtures for pasture or silage. It can be seeded with bromegrass or timothy on heavy soils which are too poorly drained for alfalfa. Use *certified seed* produced in the western United States.

SWEET CLOVER

Sweet clover is used mainly as a green manure crop and is one of the best crops for this purpose. It has wide adaptation except on wet soils. It can be pastured and cut for hay, but it is not very palatable and is coarse when cut for hay.

White-blossom sweet clover is a biennial which

Table 8. — Alfalfa Variety Characteristics

Variety or type	Fineness of stems	Will resist	Recovery rate after cutting	Winter hardiness	Remarks
RECOMMENDED					
Vernal	fine	yes	medium	excellent	Best Variety for 3 years or more. Resistant to common leaf spot. Use for short or long term stands. Heavy growth may lodge because of fine stems. One of the highest yielding varieties.
DuPuits	coarse	no	fast	fair	For short term stands. Cut early to avoid coarse stems, 3 times per season. Winter hardiness could be a problem but there has been little difficulty. Seldom lodges. Yields 5-10% higher than Vernal when cut 3 times per season and well fertilized with potassium.
ACCEPTABLE					
Grimm types	fine to medium	no	medium to slow	excellent	Use for short term stands.
Ladak	fine to medium	field tolerance	slow	excellent	Good for northern Michigan. Usually just one cutting.

OTHER ALFALFAS — There are a number of alfalfas of the Flemish type, similar to DuPuits, such as Socheville, Alfa, FD-100, and Orchies. In general they perform similar to DuPuits but have not been tested as extensively. New varieties of the Flemish type are Cardinal, and Glazier. Brand name alfalfas are being marketed in ever-increasing numbers. Michigan State University has not tested these alfalfas. Their use would depend on the confidence farmers have in the particular seed company involved. Alfalfa blends are no better than the best variety in the blend.

Table 9. — Yield per acre of hay and characteristics of red clover varieties

Variety or Type	Disease resistance	Yield — tons per acre	Remarks
RECOMMENDED			
Lakeland	Northern anthracnose and powdery mildew	4.25	More persistent than other strains or varieties. Slightly better than Dollard in northern Michigan.
Dollard	Northern anthracnose	.....	Use north of Bay City-Muskegon line. Slightly less persistent and less productive than Lakeland.
Pennscott	.....	3.87	Use in southern Lower Peninsula.
ACCEPTABLE			
Michigan Commercial (June clover)	.....	3.84	May be mostly Pennscott type.
Michigan Mammoth	.....	3.35	

OTHER MAMMOTH CLOVERS. — Altaswede mammoth has yielded $\frac{1}{2}$ ton per acre less hay than common Michigan mammoth.

produces a large top growth and is preferred for green manure. Yellow-blossom is a biennial sweet clover which has finer stems than white-blossom but does not make as much top growth. It is better for hay than white-blossom.

BIRDSFOOT TREFOIL

Broad-leaved birdsfoot trefoil is a good perennial legume for soil too poorly drained for alfalfa. Its best use appears to be in replacing bluegrass pastures on heavy, poorly drained mineral soils. There have been no reported cases of bloat attributed to this crop. See Table 10.

Seeding establishment is more reliable if you observe the following points:

- Get rid of grass competition before seeding.
- Use twice the normal amount of birdsfoot trefoil inoculant.
- Use the band method of seeding.

FIELD BEANS

Field beans are one of Michigan's important cash crops. The navy or white pea bean is the most important class. However, a considerable acreage of dark and light red kidney, cranberry, yelloweye, and pinto beans are produced.

Extensive navy bean trials are conducted at East Lansing and in the Saginaw Valley (Griat County in 1963-64). In addition, less extensive trials are conducted in the major bean producing counties. Yield results for a 4-year period and characteristics of the recommended varieties of navy beans are given in Table 11.

White mold (*Sclerotinia*) is more serious on the vine-type than on the bush-type beans. Of the vine-type beans, Saginaw is more upright than Michelite 62 and is the preferred variety on soils known to be zinc deficient.

DARK RED KIDNEY BEANS

Charlevoix — This variety was developed by the Michigan Experiment station. It is a few days earlier in maturity than the common dark red kidney. In addition, it has resistance to anthracnose. Certified seed of Charlevoix is produced under certification in northern Michigan in an attempt to keep blight to a minimum. Seed is also produced under contract and certification in blight-free areas of Idaho and California.

Common Michigan Dark Red Kidney — This is a strain of red kidney beans, seed of which has been grown in blight-free areas of California and Idaho for many years. Ordinarily, yields are similar to those of Charlevoix. Although it is a few days later

Table 10. — Characteristics of Recommended Birdsfoot Trefoil Varieties

Variety	Growth type	Winter hardiness	Hay yield	Pasture yield	Remarks
*Viking	Upright	Good	Highest by $\frac{1}{2}$ ton per acre	Good — looks better as testing proceeds.	Excellent seedling vigor as compared with Empire.
Empire	Low	Good	Good but less than Viking	Good — well suited because of growth habit.	Slow to become established. Longer-lived than Viking under heavy pasturing.

Table 11. — Characteristics of Recommended Birdsfoot Trefoil Varieties

Variety and type	East Lansing Bushels per acre	Saginaw Valley Bushels per acre	Disease resistance	Average days to maturity
*Michelite 62 (Vine)	39.5	31.4	VI	90 to 105
*Saginaw (Vine)	41.9	33.5	VI, V15, A	90 to 105
*Seaway (Bush)	36.6	31.7	VI, V15	80 to 95
*Saniloc (Bush)	40.1	35.7	VI, A	85 to 100
*Grafiot (Bush)	39.2	32.6	VI, V15, A	85 to 100

(VI = Virus 1 mosaic, V15 = Virus 15 mosaic; A = anthracnose)

than Charlevoix, it normally matures satisfactorily. Seed of this strain grown in California has been labeled Dark Red Kidney Bean.

California Dark Red Kidney — This is a variety of dark red kidney bean developed in California from a cross between the common Michigan dark red and another bean. Under Michigan conditions, it matures about 7 to 10 days later than the Michigan strain. Seed of this variety has been labeled California Dark Red Kidney. *If you use this variety avoid late planting in fields subject to early frosts.*

Other colored beans: Seeds of cranberry, light red kidney, and yelloweye beans is produced under contract and certification in the Western United States by Michigan bean shippers. There are no special varieties but they are known as Michigan type.

Special difficulties have arisen from time to time

over a late strain of cranberry beans. Seed of this strain comes from California and carried no special identifying label. It begins to flower at about normal harvest time of other beans and about time for a killing frost. It has not matured in Michigan in any season to date. Extreme care by Michigan shippers in dealing with reputable seedsmen in California should eliminate this problem.

SOYBEANS

All of the recommended varieties are yellow-seeded and high in oil. Seed should be inoculated each year as insurance for nitrogen fixation.

For characteristics of the recommended varieties, see Table 12. Special attention is called to the varieties with a number after their names, such as Harosoy 63. These varieties are the same as the

Table 12. — Characteristics of recommended soybean varieties

Variety	Days to maturity	Lodging resistance	Plant height (inches)	Remarks
Acme	100 to 115	Excellent	26	For extreme northern areas and the Upper Peninsula. A very early variety for organic soils in Central Michigan. Seed difficult to obtain.
Norchief	110 to 118	Fair to good	29	For northern areas and organic soils in southern Michigan. Has some resistance to bacterial blight.
*Chippewa	115 to 122	Very good	34	Wide adaptation and good yields for an early variety. Too late north of Isabella county.
*Chippewa 64	115 to 122	Very good	34	Same as regular Chippewa as to adaptation. Has resistance to Phytophthora root rot. Seed not available until 1966.
*Blackhawk	120 to 128	Good	35	Mid-season variety for central Michigan. Has resistance to Phytophthora root rot.
*Harosoy	123 to 130	Fair	38	For southern two tiers of counties. Slightly late for central Michigan. Lodges on heavy, fertile soils. One of the least susceptible varieties to stem canker.
*Harosoy 63	123 to 130	Fair	38	Same as regular Harosoy. Has resistance to Phytophthora root rot.
*Lindarin 63	129 to 133	Fair	39	For southern two tiers of counties. Does not lodge as easily as Harosoy. Has resistance to Phytophthora root rot.
*Hawkeye	125 to 133	Good	37	For southern tier of counties. Has some resistance to bacterial blight.

Table 13. — Average yield in bushels per acre of regular and disease-resistant varieties of soybeans

Variety	Monroe county 1960-64	Ingram county 1960-64	Berrien county 1962-63
Chippewa	31.1	32.2	—
Chippewa 64†	32.5	32.3	—
Harosoy	34.4	34.8	27.6
Harosoy 63†	34.5	35.0	26.3
Lindarin	32.9	33.5	24.4
Lindarin 63†	32.6	32.8	23.7

†Resistant to *Phytophthora* root rot.

regular varieties except that they have resistance to *Phytophthora* root rot. Harosoy 63, Lindarin 63, and Chippewa 64 are preferred to the regularly named variety because of this disease resistance.

With seed of Harosoy 63 available in quantity, the regular Harosoy will be removed from the recommended list in 1966. Similarly, Lindarin and Chippewa will be deleted from the list when seed of the numbered variety is plentiful.

Phytophthora root rot has caused difficulty in only a few fields in Michigan but substantial losses may be avoided by using resistant varieties as a preventive measure rather than a cure. Blackhawk is the only standard recommended variety which carries resistance. In the absence of the disease the resistant strains yield about the same as the regular variety. Yield data from 3 locations and given in Table 13. The disease has not been present in Michigan test plot locations. However, in Ohio tests, where the disease was present, the resistant strains show a substantial yield advantage over the regular, non-resistant varieties.

POTATOES

Choose potato varieties on the basis of their yield of marketable potatoes, maturity, disease resistance, storage characteristics and the requirements of the market. When changing to a new variety, pay careful attention to the growth characteristics of the new variety as there may be enough difference between varieties to require minor, but important, changes in production practices.

Potatoes are affected by numerous seed-borne diseases, often called "running out" diseases. The use of certified seed is the most practical method of controlling these. Certified seed of most of the varieties listed below is produced in Michigan and sources are available from the Michigan Crop Improvement Association, Crop Science Department, MSU, East Lansing.

The information in Table 14 should be helpful when making your selections.

SPECIAL CONSIDERATIONS

1. Pasturing or Greenchopping Annual Grasses After Frost

Sudangrass or sorghum-sudangrass hybrids may be grazed after a frost. They may also be greenchopped or harvested in other ways if desired. New growth which may develop after a frost is the main cause for concern. Animals may prefer the short, tender shoots to the dry, frosted material.

New growth after a frost is similar to regrowth in the summer after harvesting or pasturing off a crop. This short, new growth may be high in prussic acid. The poison is diluted as the shoots develop and by the time an 18-inch height is reached, the forage can be safely pastured or cut for feed.

If regrowth does not occur after the frost, it is safe to pasture or harvest and feed the crop. If the regrowth was about 12 inches high when the frost occurred, the forage may be high in prussic acid. Wait about 3 weeks before pasturing or mowing, provided no regrowth occurred during that period. During the 3-week period, the frosted plants dry out, and the prussic acid breaks down into non-toxic components.

2. Winter Barley — A "Hedge Crop" for Dry Areas

In some areas of southwestern Michigan on sandy loam soils, summer drought is frequently a serious problem with corn production. Conversely drought is seldom a problem in these areas during the winter barley growing season.

In these dry areas, the per-acre yield of winter barley exceeds that of corn in dry corn growing seasons and is not far below corn yields when rainfall is adequate for corn. In terms of dollar value, 1 bushel of barley is almost equal to 1 bushel of corn.

It seems reasonable to suggest that farmers in these areas are taking too much of a gamble when they grow corn alone, to the exclusion of winter barley. It is suggested that they consider planting part of the normal corn acreage to winter barley as a "hedge" against drought during the corn growing season. In addition, there is the additional advantage of reducing the harvest load in the fall.

3. Hay and Pasture Crops

Forage crops, both legumes and grasses, vary considerably in their adaptability to environmental conditions such as drought and soil drainage. Some tolerate excessive soil water and others tolerate drought. Others are best suited as annual emergency crops to use when regular hay and pasture crops fail to produce enough feed. Table 15 shows the crops and crop mixtures which investigation has shown will do best under different sets of conditions.

Table 14. — Characteristics of Recommended Potato Varieties

Variety	Skin color and texture	Resistant to	Storage quality	Use and remarks
Early maturity			RECOMMENDED	
Onaway	White — smooth	Moderate resistance to scab and late blight	Poor	Most important variety for early, fresh potato market in August and September. Low dry matter content. Poor chipper. Tubers are susceptible to early blight rot in storage. The use of certified seed is especially important.
Norland	Red — smooth	Common scab	Good	Most popular red variety in Michigan and primarily used for fresh market. A shallow eye variety with low specific gravity. Produces a high percentage of U.S. No. 1 tubers. Generally has a desirable red skin color at harvest, which may fade with longer storage.
Irish Cobbler	White — smooth		Good	Usually planted for early chip potatoes or for tablestock. Medium to high dry matter content. Deep eyes. Susceptible to deep scab.
Medium to late maturity				
Arenac	White — smooth	Scab, late blight — immune to virus X	Good	A high quality, main crop potato that matures 20 days earlier than Sebago. The high total solids make this an excellent baking and processing variety.
Cherokee	White — smooth	Scab, blight, net necrosis, mild mosaic	Fair	Earliest of recommended mid-season varieties. Matures early enough for direct marketing from field. Adapted to both mineral and organic soils. Susceptible to verticillium wilt.
Emmet	White — smooth	Scab, late blight, immune to virus X	Good	Matures earlier than Sebago, usually sets many tubers, so requires fertile soil and plenty of moisture.
Katahdin	White — smooth	Leaf roll mosaic	Good	Medium dry-matter content. Produces good type tubers under poor weather conditions. A consistently good performer. Good general purpose potato. Used for chipping.
Late maturity				
Russet Rural	Dark russet netted	Scab	Good	High dry-matter content. Makes excellent potato flakes. Good for chipping and tablestock when mature.
Russet Burbank	Light russet netted	Some scab resistance	Good	Very high dry-matter content. Good for baking and processing — not desirable for chip processing. Variety is susceptible to most common potato diseases. Produces best on a highly productive soil with irrigation.
Sebago	White — smooth	Scab, blight	Fair	Most popular variety for late fall and winter market. Medium dry matter. Very good general purpose potato and is used for chipping. Plant early — in May. Adapted to both mineral and organic soils.

OTHER VARIETIES. — Other varieties grown and certified in Michigan but making up only a small percentage of the acreage are: Sequoia, Chippewa, Merrimack, Kennebec, Ontario and Russet Sebago, White Rural. For details contact the Department of Crop Science, Michigan State University.

Table 15. — Hay and Pasture Crops for Michigan Farms

Crop or crop mixture	Seeding rate in pounds per acre	Planting time	Remarks
FOR WELL DRAINED, HEAVY SOILS SUCH AS CLAYS AND LOAMS			
Alfalfa	6 to 8	Spring or Aug. 1 to 20	Start pasturing May 15 of year following seeding.
Alfalfa Smooth bromegrass	6 to 8 3	Spring or Aug. 1 to 20	Plant bromegrass in fall when seeding with fall sown grains.
Alfalfa Smooth bromegrass Ladino clover	6 to 8 3 ¼	Spring or Aug. 1 to 20	Use primarily for pasture.
Alfalfa Timothy	6 to 8 3	Spring or Aug. 1 to 20	Primarily for hay.
FOR WELL-DRAINED, LIGHT SOILS SUCH AS SANDS			
Alfalfa Smooth bromegrass	6 to 8 3	Spring or Aug. 1 to 20	Plant bromegrass in fall with fall sown grains.
SOILS WITH VARIABLE DRAINAGE — WELL-DRAINED TO POORLY DRAINED			
Alfalfa Red clover Timothy	6 to 8 2 3	Spring or Aug. 1 to 20	Use primarily for hay.
Birdsfoot trefoil Smooth bromegrass	5 3	April 1 to May 15	If oats are seeded with them, remove for silage before maturity.
FOR WET, FERTILE MINERAL SOILS			
Smooth bromegrass	6	Aug. 1 to 10	Topdress with nitrogen every year.
Smooth bromegrass Ladino clover	3 1	Spring or Aug. 1 to 20	Use primarily for pasture.
Birdsfoot trefoil Smooth bromegrass	5 3	April 1 to May 15	If oats are seeded with them, remove for silage before maturity.
FOR WELL DRAINED MUCK SOILS			
Smooth bromegrass (Canadian)	12	Aug. 1 to 20	Topdress with nitrogen every year.
Orchardgrass, commercial	10	Aug. 1 to 20	Topdress with nitrogen every year.
Orchardgrass, commercial		Nov. 1 to 20	Topdress with nitrogen every year. Will last longer than bromegrass, especially on wetter muck soils.
FOR POORLY DRAINED MUCK SOILS			
Reed canary grass	6	Aug. 1 to 20 Nov. 1 to 20	Primarily for pasture.
FOR SUPPLEMENTAL OR EMERGENCY CROPS			
Sudangrass	20	May 1 to June 15	Use Piper variety. Use at least 100 to 150 pounds of nitrogen. Will do best on good corn soils. For pasture or silage.
Sudangrass—sorghum hybrids	30 to 40	May 1 to June 15	Best for greenchop. Do not cut closer than 4 inches. Use 100 to 150 pounds nitrogen.
Rye	84 to 112	Aug. 10 to Oct. 1	For pasture. Balbo variety makes quickest growth.
Winter barley	96	Aug. 10 to Sept. 10	Use where winter barley is adapted for grain.

Table 15. — Hay and Pasture Crops for Michigan Farms, continued

Crop or crop mixture	Seeding rate in pounds per acre	Planting time	Remarks
Oats	48	Spring	Wide adaptation for June pasture and for silage.
Rape	2 to 6	Spring	For hog and sheep pasture on fertile soils.
Soybeans	100	May 25 to June 10	Wide adaptation in southern Lower Michigan but not on wet soils or unproductive sands. Use for hay. Hay difficult to cure.
Oats and Field Peas	100 (50-50) Mixture	Spring	Not very productive on light, sandy soils. Use for hay or silage. Best adapted to northern Michigan.

Alfalfa varieties used for hay and pasture should be winterhardy and wilt resistant.

Fall management of alfalfa is important if good stands are to be maintained for several years. Alfalfa should not be cut for hay or pastured close during the critical fall period when food is being stored in the roots for protection during the winter. In general, the most critical periods are: southern Lower Michigan, September 15 to October 15; central Lower Michigan, September 1 to October 1; and northern Lower Michigan and Upper Michigan, August 15 to September 15. Grazing to not lower than a 6-to 8-inch height during the critical period will probably not harm the stand.

