Producing Soybeans Profitably in Michigan
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Revised June 1975
8 pages

COOPERATIVE MSU AG FACTS EXTENSION SERVICE

NO. 41 EXTENSION BULLETIN E-362 JUNE 1975

PRODUCING SOYBEANS PROFITABLY IN MICHIGAN

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Michigan Profile

SOYBEANS ARE GROWN on about 12,000 farms in Michigan each year, involving approximately 600,000 acres of land. The average yield is roughly 24 bushels per acre. This gives an annual crop of 14 million bushels, and during the past two years its cash value has been 70 to 90 million dollars annually.

GENERAL

Soybeans will grow on a wide range of soils but do best on fertile, well-drained soils. They do not yield well on infertile, droughty soils but are more tolerant of these and of imperfectly drained soils than are field beans. They are adapted to most areas where corn will mature satisfactorily for safe ear corn storage.

Soybeans are markedly sensitive to both day length (photoperiod) and temperature. They are called "short day" plants, as most of them begin to flower soon after the day length begins to shorten. Usually, the vegetative growth period is 6 to 8 weeks after seedling emergence. With indeterminate varieties (such as those grown in northern areas) extra vegetative growth occurs during flowering and seed development. Flowering is usually spread over 3 to 4 weeks, but might cover as much as 6 weeks in some years.

The length of the daylight period during the growing season (summer) increases as one moves from southern to northern latitudes. Likewise as one moves northward, it takes a given variety of soybeans longer to reach the flowering stage, to produce seed and to mature, providing all other factors remain constant. Early maturing varieities must be used in northern latitudes if production is to stand a chance of success. Variety evaluation tests will indicate the degree of maturity required in the varieties at a given location. In general, the crop is not well adapted north of Newaygo, Isabella, Midland and Arenac counties, but because of the "lake effect" on the growing season, there are a few areas in the vicinity of Grand Traverse Bay where soybeans might be adapted.

LAND SELECTION

Soybeans can take the place of any crop in the rotation. They will respond to plowing down of a forage legume crop, but they usually follow corn in the rotation or possibly a small grain crop. Soybeans may do well following soybeans on a fertile soil. However, continuous production increases the possibility of disease and insect buildup, and the practice may result in soil compaction. To single out a few diseases, bacterial blight, pod and stem blight, and brown stem rot are of special importance. All of these diseases are soil borne and some are also seed borne.

A soybean producer must consider his herbicide program over past years, to be sure there are no herbicide residues which could damage the soybean crop.

SELECTING VARIETIES

Variety selection is an important factor which a producer can control. In making selections, consider: (1) yield, (2) maturity, (3) lodging resistance, and sometimes (4) disease resistance. Disease resistance is increasing in importance as a factor in selection, as new techniques are developed which provide for increased disease resistance in varieties. In special cases the oil and/or protein content may be a factor in varietal selection, but usually both are at a satisfactory level. In most instances one will select a variety which has the best combination of characteristics, because no one variety is likely to have all the characteristics.

Table 1 compares some of the varieties currently suggested for production. These suggestions will change from time to time as new varieties become available.

Look at the performance records of the varieties before making selections. Get all of the data available. Many, including some private varieties, have been in the Michigan soybean variety tests, and the results are reported annually in MSU Mimeo 22:17, Soybean Variety Comparisons in Michigan. Insist on some information from Michigan conditions if you expect to plant much seed of any particular variety. Otherwise, you are taking too much of a chance.

For the highest yield per acre, choose full season varieties which normally mature about the expected time of the first killing frost. If the acreage is large, consider selecting several varieties, differing 5 to 7 days in maturity. This will provide for lengthening the optimum harvest period for the entire acreage, and help to reduce harvest losses from shattering of overripe beans. If wheat is to be planted on part of the soybean acreage, an early variety might be used for that part of the acreage so the wheat could be planted at a more optimum time.

The soybean varieties best adapted for Michigan now have little disease resistance. Certain varieties, however, are resistant to one race of Phytophthora root rot. This is the most common race, but is only one of three which might be expected to occur.

The annual variety report furnishes information on yield per acre, maturity in days from planting until ready for harvest, lodging resistance and disease resistance. Single year data are not reliable because of weather and other outside factors, which may tend to favor or not favor certain varieties. As second or third year data are added, the information assumes more creditability. Superior single-year performance of a variety does indicate potential.

Table 1. Comparison of Some Suggested Soybean Varieties Produced in Michigan.

Variety	Seed Size	Plant Ht. inches	Lodging resist	Approx. days to maturity	Disease resistance and remarks
Evans	Sm-medium	33-35	v. good	115	Some resistance to Phytophthora rootrot
Swift	Medium	34-36	good	115	----------
Hodgson	Medium	33-35	v. good	117	Similar in maturity to Chippewa 64
Steele	Medium	33-35	good	120	Some resistance to Phytophthora rootrot
SRF 150	Small	33-36	v. good	122	Has lanceolate or narrow leaves
Hark	Sm-medium	33-36	v. good	123	Thin line variety (narrow canopy)
Teweles XK125	Medium	34-37	fair-gd	124	----------
Harosoy 63	Med-large	37-39	fair	128	Some resistance to Phytophthora rootrot
Corsoy	Medium	36-38	fair	128	----------
Amsoy 71	Medium	37-39	good	132	Some resistance to Phytophthora rootrot
SRF 200	Sm-medium	37-39	good	132	Some resistance to Phytophthora rootrot
Beeson	Large	35-37	good	134	Some resistance to Phytophthora rootrot

NOTE: "Approx. days to maturity" equal the number of days from planting until the day the crop is ready to harvest, at East Lansing, MI, plus or minus 5 days.

SOIL MANAGEMENT

Soil Preparation

Soil serves as an anchoring medium and as a source of plant nutrients, water and oxygen. Soil preparation provides a loose, well-aerated soil which allows excellent penetration of air, water and plant roots. For most Michigan soils, a good job of moldboard plowing is the first step in soil preparation. This covers vegetation, manure and crop residues; it loosens and crumbles the soil; it increases total soil pore space, and it kills weeds. It may also help to control insects and diseases. However, it does these things best only if the plow is properly adjusted and used at the optimum soil moisture level.

After plowing, additional tillage may not be necessary. The least amount required to obtain an excellent job of planting is all that is necessary or desirable. Excessive tillage results in (1) crust formations, (2) slow water drainage, and (3) possible oxygen deficiency. Additional tillage tends to return a soil to its original compacted state, except for trash coverage.

Fertilizing and Liming

Soybeans grow best on soils that are neither greatly acid nor alkaline. A soil pH of 6.2 to 6.5 seems most desirable under Michigan conditions, and the essential plant nutrients are readily available to the soybean plant at this pH level. In a liming program, this is the pH level to aim at, unless alfalfa or a similar crop is included in the rotation.

Soybeans have not responded greatly to the direct use of commercial fertilizer, although for good yields, they require high soil fertility. The high average yields in the top counties in Michigan reflect not only the desirable pH conditions, but also the fact that many soils are naturally fertile. Soybeans have responded to high-fertility conditions in the form of carryover fertilizer from the previous crop, which in most cases, is corn.

Soil testing is the basis for determining the best and most economical way to fertilizer the soybean crop. Refer to MSU Extension Bulletin E-550, Fertilizer Recommendations for Michigan Vegetables and Field Crops, for specific information. The latest information indicates that if phosphorus and potassium are present in high amounts it is difficult to justify the application of fertilizer at planting time. This represents a change since 1972, when it was indicated that soybeans should not be planted without the benefit of at least 25 pounds per acre of phosphate.

In previous years, nitrogen up to 40 pounds per acre has been recommended where soybeans follow corn or a small grain, and where no manure was applied. Latest studies would limit this recommendation to counties in the third tier and northward. Field tests in states south of Michigan have shown no yield response to nitrogen.

Manganese

Manganese is the only micronutrient of any importance to soybean production in Michigan. Soybeans frequently need manganese when grown on organic soils, on dark-colored sandy soils with pH higher than 5.8, and on depressional soils or on lakebed soils having a gray subsoil with pH above 6.5. To prevent a deficiency, use 5 to 8 pounds of manganese per acre on mineral soils. For organic soils use 5 pounds per acre between pH 5.8 and 6.4, and 10 pounds between pH 6.5 and 7.5. Manganese is usually mixed with 0-20-0 or 0-20-20 and is placed in a band near the seed. For more details refer to the MSU Extension Bulletin E-550.

Another method of supplying the desired manganese is by applying it as a spray onto the growing plants at about the time they begin to show deficiency symptoms. Rates are 1 to 2 pounds of manganese per acre depending on the size of the plant. Spray-grade manganese sulfate is a good material for foliar application. As growers tend to use less planting-time fertilizer with the soybean crop, it will be necessary to supply the manganese by the spray method. With limitations on the manufacture of certain grades of fertilizers, growers may find it increasingly difficult to obtain the fertilizer with the necessary amount of mixed-in manganese. For additional information refer to MSU Extension Bulletin E-486, Secondary and Micro-Nutrients for Vegetables and Field Crops.

SOYBEAN SEED

Seed Quality

A soybean grower has almost complete control over seed selection. Other investments in the crop are so high that the grower must use this advantage to the greatest degree possible, and plant the highest quality seed. Selecting seed by sight is not good enough. One cannot accurately tell whether good looking seeds will produce healthy, vigorous plants. Guessing can be costly. High quality seed should have these qualities:

1. High varietal purity (unless it is a blend).

High crop purity (pure seed) (soybeans).

3. Low foreign material (opposite of pure seed) (anything other than soybeans and less than one-half soybeans).

4. Relatively free from cracked and split seeds, stems and dirt.

5. Free from weeds and other crop seeds such as corn.

6. Fairly uniform seed size.

Fig. 1 — Seed quality: Left, sound seed; Right, seed with cracked seed coats.

7. High laboratory germination (85% and above).

Certified seed is the seed source which meets these requirements most often. Obviously bin-run seed cannot meet them, as it is neither selected nor prepared. If bin-run seed is used, it should be well screened, and a germination test run to determine viability.

Regardless of the seed used, pay special attention to its mechanical condition. Select sound seed. Seed having a moderate to high percentage of cracked seedcoats will seldom produce a good stand of normal, healthy plants. Many plants from such seed are stunted, develop slowly, or may fail completely.

Severe mechanical injury can usually be detected visually, but must be verified by laboratory germination tests. See Figure 1. No seed treatment will improve the germination of a seedlot which has been damaged mechanically. Be sure the seed purchased carries an analysis tag or label to show seed germination and other seed quality factors. This tag or label is required by Michigan Seed Law.

Seed Inoculation

Soybeans use a lot of nitrogen in making a 50-bushel per acre crop, and the most economical program is to have the soybean plants manufacture their own. For good nodulation on the roots with efficient nitrogen-manufacturing bacteria, inoculate the soybean seed with the proper strain each year. The cost is quite low and seed is easy to inoculate in the drill box. However, late research on inoculation has shown that if a field has been planted to soybeans within the past two years and the plant roots on that crop were well nodulated, new seed inoculation is not justified on the basis of yield comparisons. In applying inoculants, follow the directions of the manufacturer.

Soybean Seed Treatment

Seed treatment with a fungicide and/or insecticide may be effective in preventing seed decay, damping-off of seedlings and maggot injury. The first two problems occur most frequently when cold and wet weather prevail at planting time, and these conditions delay sprouting and emergence of seedlings. In recent years, using high-quality seed, tests have shown little advantage for seed treatment in field tests. In certain cases the germination of certain seedlots might be improved by a fungicide treatment, provided the injury was not mechanical. Thiram and Captan are two of the common fungicides used but are not the only ones used for this purpose.

PLANTING THE CROP

Planting Time and Depth

In southern Lower Michigan, May 15 to 20 is a good date to start planting soybeans on well-drained mineral soils. As a possible aid in deciding an early planting date, listed in the adjoining table are those dates on which there is a 30 percent or less probability of 32-degree temperature occurring at several locations in Michigan. (U.S. Weather Bureau Records).

Tests have shown that with both full-season and mid-season varieties, a yield reduction of 6 to 8 bushels per acre can be expected at East Lansing when planting is delayed from May 15-20 to June 12. Data from Ohio's Northwestern Experiment Research Substation shows that a delay in planting from May 20 to May 30 resulted in a 5-bushel per acre reduction in yield (12-13 percent). The test location is about 50 miles south of the Michigan-Ohio line, and several of the varieties included are adapted to Michigan and grown by Michigan farmers. While these reductions in yield do not occur every year, they occur with a high degree of regularity.

Soybeans do not suffer as much in maturity by a delay in planting as they frequently do in yield. If planting is delayed by 10 days, maturity is normally delayed only 5 days. Height of plant growth is frequently maintained until planting is delayed into June. Even with an early June planting, good height may be attained with naturally tall varieties **on fertile soils.**

Under many conditions, planting seed 1 to 2 inches deep is satisfactory. For all conditions, plan to place the seed in moist soil, but not deeper than 3 inches on sandy soils and less on clays and loams.

Dates With Less Than 30% Probability of 32°F.

ADRIAN	May 10	COLDWATER	May 16	KALAMAZOO	May 15
MONROE	May 10	EAU CLAIRE	May 10	JACKSON	May 16
HASTINGS	May 21	MILFORD	May 16	E. LANSING	May 14
GREENVILLE	May 15	MT. PLEASANT	May 23	SAGINAW	May 11
TRAVERSE CITY	May 25	LAPEER	May 19	CARO	May 27

Row Width and Seeding Rate

A solid planting (drilled in 7- or 8-inch rows) of soybeans will return the highest yield per acre if weeds are controlled satisfactorily. All research tests in the northern soybean growing area support the above statement. There have been two problems: stands with drilled beans have been far from satisfactory; and in Michigan, at least 90 percent of the growers usually do not control weeds adequately for growing soybeans in this manner. The alternative is to plant in the narrowest row possible, which will allow a cultivation if it becomes necessary.

Row width tests in Michigan and adjoining states have shown that 36—40-inch rows are seldom justified with soybeans. Starting with 36-40 inch rows, for each 10-inch reduction in row width there is approximately a 10 percent increase in yield. In addition to the yield advantage, plants will be shading the soil earlier, thus aiding in weed control. There is a possibility that the bottom pods will be carried slightly higher from the soil line than with wider rows. See row width data from East Lansing, Michigan below:

Row Width (Inches)	Yield per acre (bushels) 3-year average
7 (drilled)	37.7
14	37.0
28	31.1
35 - 42	28.7

Unpublished data from other Michigan tests using 21- and 28-inch rows indicate that the yield of the 21-inch rows would fall about midway between that of the 14- and 18-inch rows. The data were obtained where weeds were completely controlled.

To a degree, row width and seeding rate move in an inverse ratio: as the row width decreases or moves towards a solid planting, the seeding rate per acre increases at a modest amount. Generally speaking, recent research shows that most soybean growers plant too much seed. With 30-inch rows, the highest yields were obtained with plant spacings of 3 to 6 plants per foot of row with significant differences in yield between those spacings. Yields were lower, and sometimes significantly lower, when spacings were 2 and 12 plants per foot of row. Both an early and a late maturing variety were used in these tests at East Lansing.

1. Thin stands encourage branching, with some varieties tending to be worse than others in this trait. Branching could result in a problem at harvest because of low pod set.

2. With thick planting, plants tend to be taller and spindly, resulting in an increased possibility for lodging. Lodging can reduce yield, considerably. On the other hand, with thick planting the bottom pods may be higher from the soil line, which makes combining easier and harvest losses lower. With more seeds, there is less of a problem with a soil crust because the seeds help each other emerge. A rotary hoe can also help break a crust, probably better than using extra seed for this purpose.

The use of the term "pounds per acre" as a seeding rate is no longer appropriate, except possibly with solid planting. In any one production area, there are at least 10 varieties of soybeans available for a farmer to choose. All of these have at least a slightly different seed size, and some differ by as much as 30 percent. In addition, each seed lot of a variety may vary in size. For these reasons, "seeds per foot of row" should be the preferred seeding rate expression for soybeans planted in rows. If you require a plant stand of 6 per foot of row using high quality seed, then you must use a slightly heavier seeding rate. Some suggestions for various row widths are shown in the table.

These rates are lower than Michigan State University has been recommending for the past number of years. Those farmers who, from experience, believe they have special emergence problems which cannot be handled with a rotary hoe or similar equipment, should increase their planting rates by 10 percent.

WEED CONTROL

Adequate weed control continues to be one of the foremost problems in soybean production. Weeds reduce soybean yields, delay crop maturity, increase lodging, shorten plants, harbor insects and diseases and create harvest problems.

Weed control is a complete rotation problem rather than for any particular crop. While not listed as weeds, volunteer corn plants are weeds in a field of soybeans and are difficult to control. Careful corn harvest can reduce the problem. Fall disking can help rot corn grain or encourage early spring germination before the soybeans are planted.

An important factor in weed control is to kill the weeds as they begin to sprout. After planting and before the soybean seedlings emerge, a rotary hoe or similar equipment may be used to break a crust and to kill small weeds, even on solid planted beans. Try to avoid using the hoe when the soybean plants are in the "crook" stage. Essential to a good rotary hoe operation is using it when the weeds are small (in the "white") and operating at a relatively high speed.

If a rotary hoe is not available, later use of a cultivator or early cultivation should be shallow and level. Ridging causes difficulty at harvest with the bottom pods. It seldom pays to cultivate unless necessary to control weeds.

In recent years a large number of herbicides and herbicide combinations have proven valuable for weed control in soybeans. For information on herbicide recommendations for weed control in soybeans, refer to MSU Extension Bulletin E-434, Weed Control in Field Crops. For success in chemical weed control it is important to know the weed species involved, and to use the most effective control methods available.

DOUBLE CROPPING

The practice of harvesting a crop of winter grain in late June or early July and planting a crop of soybeans for harvest that fall is a common practice in parts of Kentucky and Virginia, and in southern Indiana, Illinois and Ohio. Is it a suitable practice for some soybean growers in Michigan?

Double cropping involving winter barley and an early variety of soybeans has been practiced experimentally at East Lansing with the barley harvested near July 1, and the soybean crop harvested October 15. Yields over a three-year period were 22-40 bushels per acre, but one year the crop was a failure.

The following suggestions are made for those who wish to attempt to grow soybeans after harvesting wheat or winter barley:

1. Try to plant by July 1. The small grain crop could be harvested at 20-22 percent moisture and dried to allow the earlier soybean planting date. You might gain at least 5 to 7 days by doing this.

Row Width (Inches)	Plant Stand Desired Per Foot of Row	Seeds Needed Per Foot of Row-Quality Seed	Approx. Number Seed Per Acre
28-30	6	7 to 8	120,000-150,000
18-20	4-5	5 to 6	145,000-170,000
7 (solid seeding)	1 1/2	2 to 3 (60-90 lbs. per A.)	160,000-220,000

2. A no-till planter should be used, and the seed should be planted in the stubble. The straw could be removed, but if not, it should be chopped to achieve uniform distribution.

3. Plant in as narrow a row as possible.

4. There needs to be a good supply of soil moisture at planting time. If June rainfall has been low, do not plant soybeans.

5. A yield of about 12 bushels of soybeans per acre is needed to break even.

6. Make a special check with your county extension agent and herbicide dealers on the proper herbicide program to follow.

7. The seeding rate may be 10 percent higher than normal.

HARVEST AND STORAGE

For highest quality and yield, soybeans should be harvested as soon as weather conditions permit after they reach a moisture level of 14 percent. Frequently, the best harvesting conditions occur just after the first frost. This frost kills the plants and weeds, causing them to dry rapidly. Further delay in harvesting may mean lower quality and higher harvest losses due to shattering and lodging. Figure 2 shows a comparison of weather-damaged, and high-quality beans. Local elevators are equipped to run a moisture test on samples as a guide to determining the proper time to begin harvesting. Common harvesting losses are:

— Shattering before combining
— Beans missed or pods cut through by the combine cutter bar
— Failure to thresh beans from pods
— Splitting and cracking beans
— Failure to separate beans from chaff
— Beans blown over the chaffer extension with chaff.

Cylinder speeds ranging from 400 to 800 RPM are normally adequate. Cylinder-concave clearances of 5/16 to 7/8 inch usually give good results. Use only enough concave bars or teeth to thresh the beans from the pods. Considerable fan blast is necessary, and it should be directed toward the forward one-third of the cleaning shoe. The adjustable chaffer and chaffer extension should be at least two-thirds open, with the chaffer extension open slightly wider than the chaffer itself. The sieve should be about half open.

An operator's manual provided with the combine gives basic information on adjustments for that particular make and model of machine. These instructions are usually for normal conditions and cannot cover all situations. They should be used as a guide, and additional adjustments made to solve special problems. Care in threshing is particularly important when harvesting soybeans for seed.

Every 4 to 5 beans left in the field per square foot of land means a loss of about 1 bushel per acre. Cracked or split beans and beans with a cracked seedcoat will result in a high screening loss and lower quality.

Shattering losses occur before combining and increase as the soybeans lose moisture and dry out. Timely harvest helps to reduce these losses.

Cutter bar losses may be reduced by selecting taller varieties (if available) and varieties with more lodging resistance, more complete weed control and avoiding ridging of the beans with cultivating. Special "flexible" cutterbars and cutterbar attachments to float over each row individually are available as special attachments and appear to be quite helpful in harvesting low-hanging pods.

Cylinder losses may be held to a minimum by properly adjusting cylinder speed and cylinder-concave clearance. Use only enough concave bars or teeth to thresh the beans from the pod. Overthreshing at the cylinder will result in split, cracked beans and damaged seedcoat. It also tends to overload the cleaning shoe and increase harvesting losses in that area.

Straw rack losses are usually small, but may be excessive if the proper rack speed is not maintained. Overloading of the combine, caused by excessive ground speed for operating conditions, may also result in excessive losses.

Cleaning-shoe losses may be held to a minimum by proper adjustment of the chaffer, the chaffer extension and the cleaning sieve. The amount and direction of the fan blast through the cleaning shoe is also important. In general, use as much fan blast as possible without blowing beans out the back end of the machine. Always use enough fan blast to maintain a "live" chaffer.

REMEMBER: a proper combine setting at 11:00 a.m., may not be correct for 2:00 p.m., of the same day. Figure 3 shows the effect of harvest on the quality of soybeans.

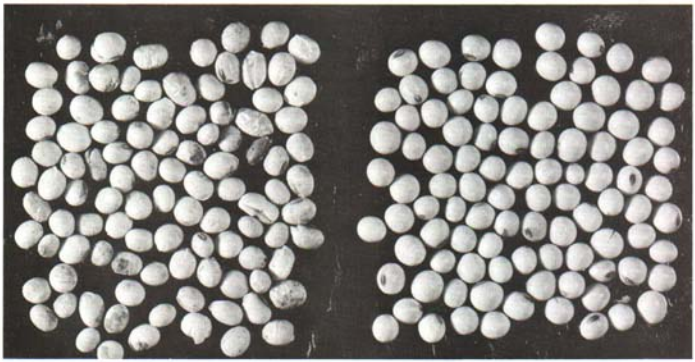

Fig. 2 — Effect of delayed harvest on quality of soybeans. Left—weathered, damaged beans. Right—good quality beans.

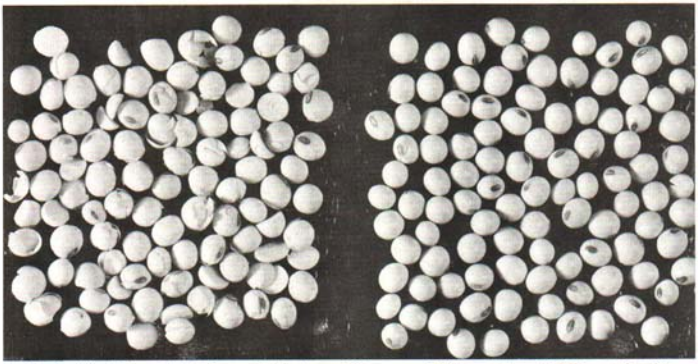

Fig. 3 — Effect of harvesting on the quality of soybeans. Left—poor quality (harvest damage). Right— good quality.

At times during the day the beans may be so dry, or the humidity so low, as to cause excessive cracking or damage. The usual solution is to stop combining during the hottest and driest part of the day.

Store soybeans in clean, tight bins at a moisture content of 14 percent or lower. Check the beans frequently for heating, and move them to other bins if heating is detected. Drying with heated air may be advisable if the moisture content is too high; however, this operation is more difficult than drying corn. Anyone interested in drying soybeans should consult the manufacturers of drying equipment and/or the Department of Agricultural Engineering, Michigan State University, for proper drying procedures and precautions.

DISEASE CONTROL

Diseases of soybeans are caused by viruses, bacteria and fungi. They have been increasing in frequency and importance in Michigan because soybean acreage has expanded and because soybeans are being planted more frequently in the crop rotation and more often continuously for several years. Extensive damage has occurred in some fields, while in others, disease apparently has not had a major effect on crop yield and/or quality.

Weather, soil conditions, cultural practices and seed have an important bearing on the severity of infection and spread of soybean diseases. Many diseases affect the above-ground parts of the plant; however, some of the most troublesome diseases affect the roots, thereby inducing water and nutrient deficiencies in the above-ground plant parts. Poor soil drainage and lack of soil aeration favor diseases that attack underground portions of the plant.

Methods of Control

Probably the best approach to controlling soybean diseases is the development of resistant varieties. However, since this is time consuming, it is necessary to use other less effective methods with some immediate effect. These include:

1. Plant high-quality, disease-free seed.
2. Use a 3- or 4-year rotation—avoid continuous cropping.
3. Plant soybeans on well-drained land.
4. Plow under all crop debris in the fall (when fall plowing is an appropriate practice).
5. Prevent weed growth in and around the edges of the field.
6. Avoid cultivating when plants are wet with dew or rain.

Among the most troublesome diseases of soybeans in Michigan are bacterial blight and bud blight: fusarium, pythium, and rhizoctonia rootrots; stem canker; pod and stem blight; Phytophthora rootrot on fine-textured, poorly drained soils; and brown spot and brown stem rot, occasionally. A new disease which has been identified in Michigan is *Thielaviopsis basicola*, a rootrot somewhat similar to, yet different from Phytophthora rootrot. It may be found under the same soil conditions as Phytophthora rootrot.

The use of high quality seed is helpful in the control of bacterial blight, stem canker and pod and stem blight. Crop rotation is a definite means of controlling brown stem rot, but red clover should not be in the rotation plan because it is a host crop plant for the disease.

Phytophthora rootrot is the only common disease in Michigan controlled by varietal resistance. Even so, in recent years, instead of one race of this rootrot to which several varieties are resistant, there are now two additional races present in the general Great Lakes production area to which resistance is lacking. Close attention to all of the methods of control listed may help keep soybean diseases at a minimum.

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8, and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Gordon E. Guyer, Director, Cooperative Extension Service, Michigan State University, East Lansing, Michigan 48824.

1P-6:75-10M-UP