

THE 4-H POTATO CLUB

4-H CLUB CIRCULAR 5

COLUMBIA, MO.

REVISED, JUNE, 1935

*1st done
March
1923*



The potatoes on the left were fertilized with a 2-12-2 fertilizer at the rate of 400 pounds per acre. Those on the right were not fertilized but received the same treatment in every other way.



COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE AND THE UNITED
STATES DEPARTMENT OF AGRICULTURE COOPERATING

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The 4-H Potato Club Project*

Object.—The object of the potato club is to organize boys and girls into groups for the purpose of instructing the members in profitable methods of potato production; for demonstrating to the community the value of these improved practices; and to train the members in leadership.

REQUIREMENTS

Work Required.—The potato project provides for the raising of early or late potatoes. Each member is required to produce economically as large a yield as possible on plots varying from one-tenth to one acre in size, using the best cultural practices. These include preferably the use of northern grown certified seed, proper seed treatment, use of fertilizer, methods of thorough cultivation, insect and disease control, grading, judging and identification of the varieties best adapted to Missouri.

Records Required.—Each club member is required to keep an accurate account of all operations, expenses and receipts, and to write a story on a report blank provided by the Extension Service of the Missouri College of Agriculture.

Ownership Required.—Each club member is required to own the crop and to be responsible for the demonstration field, and to furnish seed potatoes, fertilizer, spraying materials, materials for seed treatment, and own or secure the use of tools necessary for cultivating the crop.

Time Required.—Time for necessary labor on the crop.

Time for attendance at six or more club meetings.

Time for one-half day for a club tour.

Time for one day for a county show, if one is held.

Time for attendance at a public achievement program at the close of the year's work.

Organization.—Clubs that plant early varieties should be organized in February so that the planting can be done by the middle of March. Reports are to be made not later than September. Clubs that plant late varieties should be organized in June, so that the planting can be done by July. This work should be completed by November 1.

I. ORGANIZATION OF A STANDARD 4-H POTATO CLUB

A standard 4-H potato club is composed of a group of five or more boys or girls from the same community between the ages of ten and twenty-one years who are working upon the same club project under the direction of a local club leader.

*The original manuscript for this circular, prepared by E. M. Page, has been revised by J. W. C. Anderson, Extension Specialist in Horticulture, in collaboration with T. T. Martin, State Club Agent.

Each standard club usually is sponsored by a community organization of some kind, or by a small committee of interested persons, who are selected to speak and act for the community in cooperation with the county club leader in the conduct of 4-H club work.

Standard 4-H clubs are required to hold at least six regular meetings during the club year. These meetings may be held as often as the local club leader and members desire; however, the meetings usually are held once each month.

Below are subjects suggested for a number of club meetings. It may be necessary to devote two or more meetings to some of the subjects. It is suggested that these subjects be followed in the order named. *Local club leaders and clubs are expected to adapt these subjects to local community conditions.*

SUGGESTED MEETINGS FOR A 4-H POTATO CLUB

I. Organization of the Club

The local club leader in charge. (Reference—Club Secretary's Record Book, or the Leader's Manual.)

1. Explanation of the duties and responsibilities of club officers and members.
2. Election of club officers from the membership of the club: President, Vice-President, Secretary, Song Leader, and Reporter.
3. Selection of name for the club. (It is suggested that the name be selected so as to identify the club's community and the project.)
4. Selection of a time and place for regular club meetings.
5. *Instructions.*—The local club leader in charge.
 - (1). Distribution of the club literature and explanation of its use, including the potato club project requirements, page 3.
 - (2). Explanation of the standard 4-H club requirements.
 - (3). Adoption of the constitution and by-laws, after amending same, if necessary, to suit local conditions, (The members should sign their names in the Secretary's Record Book as a pledge to carry out the club work.)
 - (4). Setting potato club goals, such as:

To plant, tend and harvest a crop of Irish potatoes, by following the recommended practices of the College of Agriculture.
 - (5). Discussion of the main club activities of the year and setting up of a local club calendar of events for the club, including community and county-wide events in which the members will want to take part. (See blanks in Club Secretary's Record Book.)
 - (6). Stating specifically what each member should do to start the project work.
 - (7). Assignment of work for the next club meeting, as:
 - a. Assignment of the national 4-H club pledge to be learned by all members before the next meeting. (See suggested outline of Meeting II).
 - b. Bringing of report blanks for use in the club meeting.
 - c. Reference: Varieties of Potatoes, Sources of Seed, Soils and Fertilizers. (See Meeting II for detailed assignment.)
 - d. Assignment of one or more topics to be used in response to roll call at next meeting, as:
 - (a). Name a standard 4-H club requirement.
 - (b). Name the variety of potato which is most popular in Missouri.
 - (c). State one distinct advantage which the Irish Cobbler has over the Early Ohio.
 - (d). Tell why northern seed is better than locally grown seed.
 - (e). State any objection there may be to applying fresh manure to the field just preceding the potato crop.

In order to make club meetings more interesting, it is suggested that a program committee be selected in the business session at the next meeting to feature some special number on the program of each club meeting, such as: a reading, dialogue, musical

selection, story, debate, or talk by an invited guest; and possibly, a one-act home talent play for one program during the year, etc.

(8). *The Social Hour.* (Recreation, games, etc.)

II. Varieties of Potatoes, Sources of Seed, Soils and Fertilizers

1. *The Business Meeting.*—The club officers in charge. (Reference—Club Secretary's Record Book.)
 - (1). Meeting called to order by the president, who leads the club members in repeating the national 4-H club pledge, as follows: "I pledge my *head* to clearer thinking, my *heart* to greater loyalty, my *hands* to larger service, and my *health* to better living, for my club, my community and my country."
 - (2). Roll call by the secretary, the members responding by reporting upon the previously assigned topics.
 - (3). Reading of the minutes of the last club meeting by the secretary, which should be adopted as a permanent record by the club when approved.
 - (4). Unfinished business:
 - a. Unfinished business from the last meeting.
 - b.
 - (5). New Business:
 - a. Appointment of a program committee to plan for special activities at future club meetings.
 - b. Anything for the benefit of the club, such as a club picnic, or club tour as a special meeting—page 28.
 - (6). Songs, led by the song leader.
 - (7). Adjournment of the club business meeting for work.
2. *Instruction.*—The local club leader in charge.
 - (1). Discussion:
 - a. Varieties of Potatoes, page 7.
 - b. Sources of Seed, page 8.
 - c. Soils, page 9.
 - d. Fertilizers, Page 9.
 - (2). Demonstration: Individual demonstration on: Showing varieties of potatoes.
 - (3). Assignment of work for the next meeting, as:
 - a. References: Seed treatment, Seed Cutting, Preparation of Soil, Applying Fertilizer and Planting Potatoes. (See Meeting III for detailed assignment.)
 - b. Bringing of report blanks for use in the club meeting.
 - c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). State the purpose of seed treatment.
 - (c). Tell how to cut potatoes for seed.
 - (d). State the advantage of preparing a good seed bed.
 - (e). Give precautions which always should be remembered in using commercial fertilizer.
3. *The Social Hour.*—(Recreation, games, etc.)

III. Seed Treatment, Seed Cutting, Preparation of Soil, Applying Fertilizer and Planting Potatoes

1. *The Business Meeting.*—The club officers in charge. (Follow order of business as suggested for Meeting II.)
2. *Instructions.*—The local club leader in charge.
 - (1). Discussion:
 - a. Seed Treatment, page 10.
 - b. Seed Cutting, page 11.
 - c. Preparation of Soil, page 12.
 - d. Applying Fertilizer and Planting Potatoes, page 12.
 - (2). Demonstrations: Individual demonstrations on:
 - a. Seed treatment.
 - b. Seed cutting.
 - c. Field application of fertilizers.
 - (3). Assignment of work for the next club meeting, as:
 - a. References: Cultivation, Hoeing, Spraying and Dusting Potatoes. (See Meeting IV for detailed assignment.)
 - b. Bringing of report blanks for use in the club meeting.

- c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). State the chief purpose of cultivation.
 - (c). Give the relation between roots and depth of cultivation.
 - (d). State why potatoes should be sprayed or dusted.
- 3. *The Social Hour*.—(Recreation, games, etc.)

IV. Cultivation, Hoeing, Spraying and Dusting Potatoes

- 1. *The Business Meeting*.—The club officers in charge. (Follow order of business as suggested for meeting II.)
- 2. *Instructions*.—The local club leader in charge.
 - (1). Discussion:
 - a. Cultivation, page 15.
 - b. Hoeing, page 15.
 - c. Spraying and dusting, page 16.
 - (2). Demonstration: Individual demonstrations on:
 - Spraying or dusting potatoes.
 - (3). Assignment of work for the next club meeting, as:
 - a. References: Late Cultivation, Harvesting, Grading, Early Marketing and Storage of Potatoes. (See Meeting V for detailed assignment.)
 - b. Bringing of report blanks for use in the club meeting.
 - c. Assignment of one or more topics for roll call, as:
 - (a). Name a standard club requirement.
 - (b). Explain when potatoes are ready for harvest.
 - (c). State some rules you would follow in harvesting.
 - (d). Give reason for grading.
 - (e). State main advantages of early marketing.
- 3. *The Social Hour*.—(Recreation, games, etc.)

V. Late Cultivation, Harvesting, Grading, Early Marketing and Storage of Potatoes

- 1. *The Business Meeting*.—The club officers in charge. (Follow the order of business as suggested for Meeting II.)
- 2. *Instruction*.—The local club leader in charge.
 - (1). Discussion:
 - a. Late cultivation, page 20.
 - b. Harvesting, page 20.
 - c. Grading, page 21.
 - d. Early marketing and storage of potatoes, page 22.
 - (2). Demonstration: Individual demonstrations on:
 - Grading Potatoes.
 - (3). Assignment of work for the next club meeting, as:
 - a. Reference: Plans for the Local Exhibit, Demonstration and Judging Contest. (See Meeting VI for detailed assignment.)
 - b. Bringing of report blanks for use in the club meeting.
 - c. Assignment of one or more topics for roll call, as:
 - (a). Name some important points to consider in judging potatoes.
 - (b). State some important points about a good demonstration.
- 3. *Social Hour*. (Recreation, games, etc.)

VI. Plans for the Local Exhibit, Demonstration and Judging Work

- 1. *The Business Meeting*.—The club officers in charge. (Follow order of business suggested for Meeting II.)
- 2. *Instruction*.—The local club leader in charge.
 - (1). Discussion:
 - a. Plans for the Local Exhibit, page 22.
 - b. Demonstrations, page 24.
 - c. Judging, page 23.
 - (2). Demonstration: Each member should give an individual demonstration as a try-out to be on the club demonstration team.
 - (3). Judging: Probably instruction in judging should be given at a special meeting while on the club tour, page 28.

- (4). Assignment of work for the next club meeting, as:
 - a. Reference: The 4-H Potato Club Achievement Program.
 - b. Bringing of completed report blanks to give to the leader at the achievement program.
 - c. Appointment of committees to help prepare for the achievement club program, as
 - (1). Committee on arrangements, place, equipment, etc.
 - (b). Committee on decorations, if desired.
 - (c). Courtesy committee to welcome the visitors and to act as ushers.
3. *The Social Hour.* (Recreation, games, etc.)

VII. The 4-H Potato Club Achievement Program

1. A regular club meeting with the club president in charge.
2. Exhibits of 32 potatoes, grown by each club member.
3. A team demonstration of an approved potato practice.
4. A potato judging contest.
5. Talk by the local club leader, a representative of the sponsoring organization or parent on the value of 4-H potato club work.
6. Plans for next year.
7. Presentation of achievement club pins, if awarded, by the extension agent or sponsoring organization.
8. Adjournment.

Suggestions.—Only club members who make a complete report, or have their records up-to-date, should be eligible to take part in county or state contests, club camps, etc.

II. VARIETIES OF POTATOES, SOURCES OF SEED, SOILS AND FERTILIZERS

Varieties of Potatoes

After the business part of the program is conducted the club leader should discuss the varieties of potatoes adapted to Missouri conditions. The club members should decide which variety they wish to grow and where to get the seed. Samples of desirable seed of the best varieties should be provided for the club members to examine. Soils and fertilizers should also be discussed so that both seed and fertilizer can be obtained in time for planting. If the members decide to order together, a committee might be appointed to do the buying.

Early Varieties.—It is recommended for the 4-H clubs of Missouri growing early potatoes that one of two varieties be grown: (a) Irish Cobblers; (b) Early Ohio.

These should be planted as soon as weather and soil conditions will permit in the spring. The date will depend largely upon the section of the state in which the members live. In the extreme southeastern part, potatoes can be planted by the middle of February. In the central part of the state, the planting date will be around March 20. In the extreme northern part, the usual planting time is the last of March.

Irish Cobbler.—This is an excellent variety of early potatoes for Missouri conditions and is grown most extensively in this state. The tubers are short and blocky, with rather deep eyes. When grown in heavy or tight soil, they have a tendency to be somewhat rough in shape with the eyes deepened. The skin is smooth and white. The best shaped Irish Cobblers are about as wide as they are long and slightly flattened with fairly square corners.

In the fields, the vines are inclined to spread out more and although they make slightly more growth, the vines do not stand up as high as the Early Ohio. The leaves are slightly larger and darker green and the flowers have pale lilac or purplish colored petals.

This variety grows smooth potatoes, even if the seasonal conditions do stop its growth temporarily and later conditions cause growth to be resumed. The table quality of this variety is very good.

Early Ohio.—This is a good early variety and is grown to considerable extent throughout the state. The best shaped tubers are rather long, slightly wider than they are thick and carry their width well out to the ends, leaving each end rather blunt. They are smooth in appearance with shallow eyes and the color of the skin is light pink. When rain follows a very dry period during the growing season, second growth “knobs” may be formed on Early Ohio potatoes. The color is brighter in potatoes that are not mature, but any of them lose some of their color after they have been dug a few weeks. The vines of the Early Ohio grow erect and attain an average height of 15 to 16 inches. The blossoms have white petals.

Late Varieties.—In some sections of the state, late potatoes are grown as a commercial crop, and in these sections late potato clubs have been quite successful. The same general plan is used for these clubs as for the early potato club, but the planting is not done until about July 1.

The variety of potato selected should be one of a good, late sort grown in the community. Some good late varieties are: (a) Green Mountain, (b) Rural New Yorker and (c) Peachblow.

It is best to obtain the seed early in the spring and put it in cold storage until about two weeks before planting time. If cold storage is not available, the seed potatoes may be spread out on a barn floor or in a loft to prevent too much sprouting.

Sources of Seed

The potato is a cool season plant. The most ideal growing season temperatures are those ranging from 60° to 75° F. The crop raised under hot temperatures not only produces very low yields, but is so devitalized that the tubers are inferior as seed. It is largely because of this fact that seed potatoes obtained from northern sections usually give the best yields. Most northern states are now producing "certified" seed potatoes of standard varieties which are true to name, of good type and practically free from serious disease. Such seed is far more valuable to the potato grower than ordinary seed potatoes found on the market.

Soils

The quantity or yield of potatoes is influenced largely by the soil in which they are grown. A soil rich in decaying vegetable matter and which does not bake or run together is most desirable. A sandy loam on which a rotation including legume crops has been followed, is ideal.

Fertilizers

The heavy feeding requirements of potatoes and the large returns from the crop make the use of a heavy application of fertilizer profitable. Well-rotted manure is one of the best fertilizers for potatoes. Since fresh manure, containing large amounts of ammonia applied directly to the potato crop, tends to promote the activity of the potato scab organism, the best results from the use of large quantities of fresh manure are obtained by applying it to the crop which is grown on the land the year previous to the potato crop. If well rotted manure is available, it should be applied in the fall and the ground fall plowed. This gives the organic matter a chance to become incorporated in the soil during the winter, and the field will be in a better condition for planting in the spring than if it is spring plowed. Also, soybeans, cowpeas or vetch are sometimes grown in the fall and turned under for potatoes. The yield of

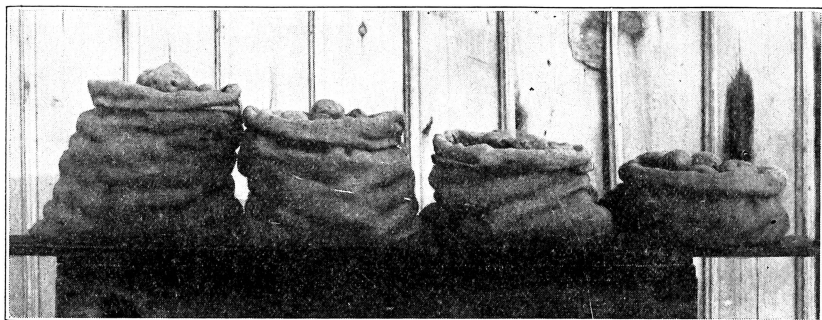


Fig. 2.—Yield from 100 hills of early potatoes from use of each of following amounts of 2-12-2 complete fertilizer:

400 lbs.

200 lbs.

100 lbs.

no fertilizer

potatoes usually will be still further increased by the use of commercial fertilizer at the rate of 250 to 400 pounds per acre.

If no green manure or stable manure was plowed under, then the commercial fertilizer used should be a complete fertilizer containing nitrogen, phosphorus and potassium and should be applied at the rate of about 400 to 600 pounds per acre. A4-12-4 fertilizer, which is one containing 4 per cent nitrogen, 12 per cent phosphorus and 4 per cent potash, is a good one for potatoes. Any fertilizer with a similar analysis may be used, if it is more readily obtainable. In using any commercial fertilizer, it should be remembered that it must be mixed well with the soil thus avoiding the possibility of its coming into direct contact with the seed. For further details regarding the use of commercial fertilizer, see Missouri Circular 185, "Fertilizers for Vegetable Crops."

III. SEED TREATMENT, SEED CUTTING, PREPARATION OF SOIL, APPLYING FERTILIZER AND PLANTING POTATOES

The meeting which deals with these subjects should not be later than March 15 for the early potato clubs, nor June 25 for the late potato clubs, as the potatoes should be planted as soon after these dates as possible. This is the time to ask any questions that will help you to understand the work better or that will explain anything you are in doubt about.

Seed Treatment

Seed treatment is for the purpose of killing disease germs that are carried on the surface of the potatoes. The most common ones carried there are Common Scab and Black Scab (*Rhizoctonia*). Two methods of treatment are given below:

Corrosive Sublimate Method.—The best method of seed treatment for small quantities of potatoes is the corrosive sublimate treatment. Dissolve 1 ounce of corrosive sublimate (bichloride of mercury) in a pint of warm water in a glass jar (break the glass jar and destroy it afterwards) and pour it into eight gallons of water in a **wooden** barrel or a **wooden** tub. (CAUTION.—Corrosive sublimate is deadly **poison**.)

Wood is used because the solution will ruin a metal tub and at the same time the solution would be weakened and worthless. Do not afterwards use the tub or barrel for watering stock.

Put the potatoes in the solution either loose or in a sack and let them soak for 1½ hours. Then take them out and let them dry before cutting. Pour the solution out where nothing can get it and rinse the barrel thoroughly.

Formaldehyde Method.—A dip which is less poisonous but not as effective against disease is made by dissolving ¼ pint of commercial formalin (40 per cent formaldehyde) in eight gallons of water. Soak the

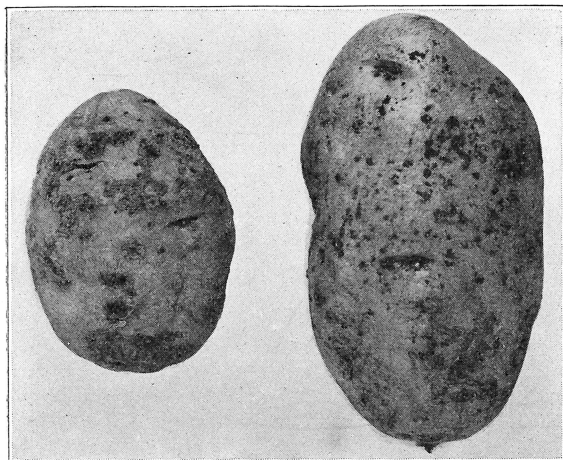


Fig. 3.—(Left) Common scab reduces the value and quality of the potato crop. (Right) Black scab (or *Rhizoctonia*). The black spots are disease spores which cause Dry Stem-Rot and Little Potato Disease in the field. Seed treatment prevents injury from both kinds of scab.



Fig. 4.—Seed treatment or dipping in corrosive sublimate solution kills all disease germs on the skin of the potatoes.

potatoes for about two hours. (For more detailed information regarding seed treatment, see Missouri Circular No. 286.)

Seed Cutting

The size of the seed piece is very important, much more so than the shape or the number of eyes it carries. Seed pieces should be about the size of a small hen egg or weigh about 2 ounces. One good eye is enough

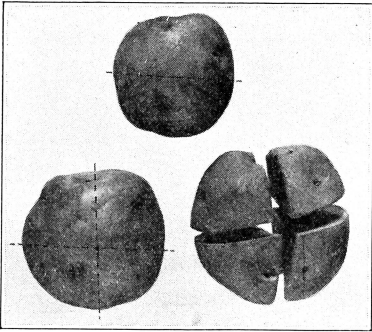


Fig. 5.—Typical Irish Cobbler potatoes. Potatoes as small as an egg should be planted whole.

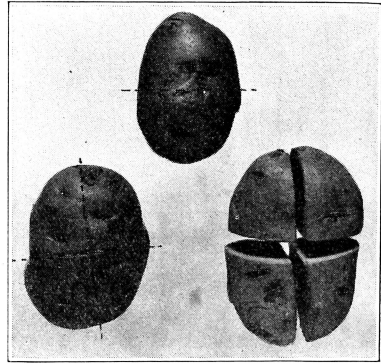


Fig. 6.—Early Ohio potatoes showing typical shape for this variety. Notice method of cutting for seed.

although more will do no harm. Large potatoes should first be split lengthwise, then the halves cut crosswise into pieces containing at least one good eye and weighing about 2 ounces. The illustrations Figs. 5 and 6 show methods of cutting large tubers.

Do not plant very small pieces, thin sections or peelings for seed purposes.

Preparation of the Soil

Thorough plowing and harrowing of the land before planting is quite important. It will make hoeing and cultivating easier and if the soil is mellow and without clods or hard ridges the potatoes have a much better chance to grow and produce good yields.

Land that does not wash badly can be plowed in the fall and left rough through the winter. The freezing and thawing will help to break up clods and leave the land loose and in fine shape to cultivate. The lighter sandy soils need not be plowed again in the spring but can be harrowed down and planted.

Fall plowing is best when clover or alfalfa sod is to be turned under. The land should be left rough through the winter and the sod will usually keep it from washing. In the spring, before planting, it should be thoroughly disked and harrowed, thus working the soil into a fine, mellow seedbed.

Fertilizing and Planting

When planting time comes shallow furrows should be opened with a one-horse plow, a single shovel or a cultivator with the teeth close together. A wheel hoe, with a turning plow attachment or even a common hoe can be used in making the furrows if it is not convenient



Fig. 7.—Three steps in preparing potato land: (Above) Spreading heavy coat of manure in fall; (Center) Breaking deeply in late fall; (Below) Disking into fine condition before planting, early spring.

to use a horse plow or cultivator. The furrows should be about 3 or 4 inches deep and 3 feet apart. If acid phosphate or other commercial fertilizer is to be used it can be drilled or scattered by hand in the open

furrows and mixed with the soil by running a cultivator through the rows. The seed pieces should be dropped or planted and covered immediately without allowing the soil in the furrow to dry out. Use fairly large seed pieces as already described, and plant only one in a place spacing them about 12 inches apart.

Covering the seed pieces is done by throwing a low ridge over them with a small plow or hoe. When the ridge is first made the seed pieces may be covered about 5 or 6 inches deep.



Fig. 8.—Straw mulch 6 or 8 inches deep on late potatoes saves moisture and keeps down weeds. For the late crops, potatoes should be planted shallow (1 or 2 inches deep) and straw put on immediately. No cultivation is necessary.

About two weeks after planting the ridges are worked down by raking or by dragging the field crosswise with a spike-tooth harrow again just before the sprouts come through, the ridges are raked or dragged lengthwise using either a hand rake or spike-tooth harrow. These two draggings or rakings leave the seed pieces at the proper depth of about 3 or 3½ inches and put the soil in fine mellow condition for young plants. Another advantage is that all weeds and grass that have started are killed by the dragging and this makes hoeing much easier.

At this meeting the Club Leader or club members should demonstrate methods of seed treatment, seed cutting, fertilizing and planting.

IV. CULTIVATION AND HOEING, SPRAYING AND DUSTING POTATOES

The third regular meeting should be held after the potatoes are up or about the time they are sprouting.

Cultivation and Hoeing

After the plants are up, it is necessary to make several cultivations between the rows. In the field a two-horse cultivator is an excellent tool for this work. The shovels or teeth next to the row should be set to run very shallow. If the first one or two cultivations are carefully made they will save a great deal of hoeing. The soil should be worked often enough to keep it fairly loose and to prevent weeds and



Fig. 9.—Two-horse riding cultivator throwing up low ridge as it cultivates. Frequent cultivation is very important. Early cultivations should be deep and fairly close to the plants, later the teeth should run very shallow and in the middle only.

grass from starting. After a rain when the soil begins to dry out on top, it is a good plan to go through with the cultivator before the ground cracks or “bakes”. The ordinary one-horse cultivator with from five to twelve shovels is also a good tool for cultivating potatoes. The same principles must be followed; that is, cultivation close to the plants must be very shallow while the first one or two cultivations out in the middle may be fairly deep. After the first one or two times over the patch, all the cultivating should be shallow to prevent tearing up the slender white roots that feed close to the surface of the soil. At the later cultivations it is a good plan to draw the dirt toward the row to form a low ridge.

When no horse cultivator is available the work can be done by hand, using a rake before the plants are up and a wheel hoe or common

hoe to keep the weeds and grass from starting and to keep the soil loose after the plants start to grow. Late cultivation will be taken up at a later meeting.

Spraying and Dusting

Spraying for Beetles.—Some means of spraying or dusting must be provided for killing the Colorado potato beetles or “potato bugs”, as they are called. These are the most common insect pests we have



Fig. 10.—Colorado potato beetles—young and old.

on potatoes in Missouri but are fairly easy to control. The adult beetles live over winter and come out early in the spring to lay eggs on the young potato plants. In a few days the small larvae hatch out and begin feeding on the leaves. If they are very numerous and no spray is used they may soon remove all of the leaves and cause a serious setback to the plant. These beetles and the larvae are biting insects and

can therefore be killed by a stomach poison. Such a poison can be applied to the plant by spraying or by dusting.

Arsenate of lead is one of the best poisons to use and for a liquid spray should be mixed at the rate of $1\frac{1}{2}$ pounds of powdered arsenate of lead to 50 gallons of water. In small amounts $\frac{1}{2}$ ounce or one heaping tablespoonful to a gallon of water gives the same strength. A little water should first be added to the powder and stirred until it makes a thin smooth paste. This paste can then be stirred into the required amount of water and the solution is ready for use.

The first spray should be applied when the first set of the small red larvae are just hatching. If spraying is done thoroughly at this time it will kill practically all of the early hatching of bugs for the spray

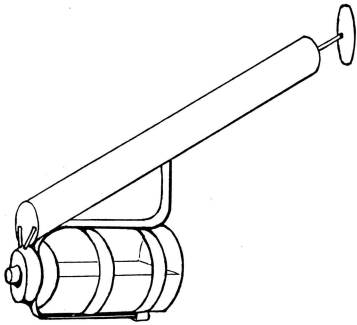


Fig. 11.—A small glass sprayer suitable for small garden.

sticks to the leaves until washed off by the rain. Most any type of sprayer can be used. The one-quart hand atomizer outfit is the smallest style for the garden. (Fig. 11). A more effective outfit is the three-gallon pressure tank sprayer. (Fig. 12). For the larger patches ranging from $\frac{1}{4}$ acre up to 4 or 5 acres the wheelbarrow sprayer is perhaps the best. (Fig. 13). A barrel spray can be used for the potatoes if it is mounted in a wagon. The larger commercial growers use special power spray outfits which spray from three to six rows at a time (Fig. 14).



Fig. 12.—Three-gallon pressure sprayer for spraying small patches of potatoes and gardens.

With a good duster or dust gun a mixture of 1 part powdered arsenate of lead or calcium arsenate and 5 parts of hydrated lime will be quite effective in killing the beetles. A mixture of 1 part of paris green to 20 parts of lime is also effective. If no duster is available the mixture can be applied by shaking it on the plants through a cheesecloth bag. The dust sticks to the plants better if applied when the dew is on.

Spraying With Bordeaux Mixture.—Quite often in all parts of the state potato plants may be affected by a condition known as tip-burn or hopper-burn. This trouble causes the edges of the leaves to curl up and turn brown. The disease is due to the presence of small,

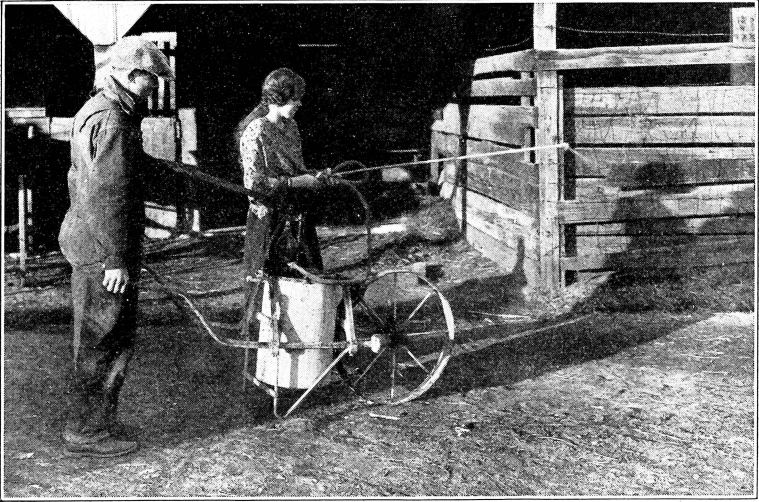


Fig. 13.—Ready for the “bugs”. The wheel-barrow sprayer is suitable for any liquid spray on fields up to 4 or 5 acres in size.

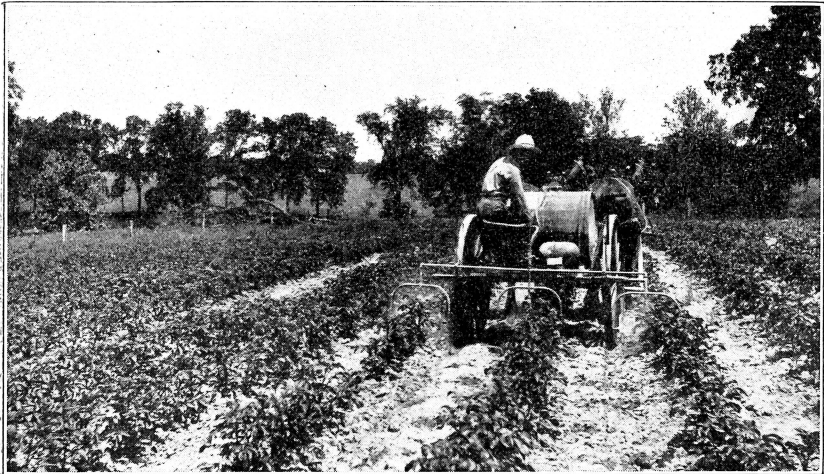


Fig 14.—Traction power sprayer, spraying three rows at once with three nozzles to each row, one from above and one starting upward from each side.

green, hopping insects known as leaf hoppers which suck the sap from the leaves. It takes only a very few of the leaf hoppers to start the disease and in hot, dry weather it is very troublesome. The leaf hoppers themselves are only about one-eighth of an inch long and have blunt heads with white eyes. The body is slender and the pale, green wings almost come to a point giving the insect a wedge-shaped appearance.



Fig. 15.—Bellows type dusters for applying dust mixtures on potatoes or other garden crops.

Spraying with bordeaux mixture will control this trouble as well as the Early Blight which sometimes affects the plants. The first spray of bordeaux mixture should be put on when the plants are about 6 or 8 inches high. It can be mixed with the arsenate of lead for the second “bug” spray and both put on together. Thorough spraying is most important for this mixture. Be sure to spray the under surface of the leaves as well as the upper.

Bordeaux mixture can be purchased ready mixed or can be made as follows: Dissolve one pound of copper sulphate in six gallons of water.

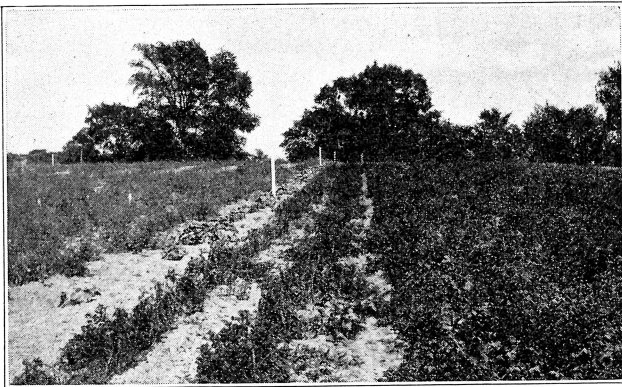


Fig. 16.—Potato vines on the right kept green and vigorous by spraying with bordeaux mixture while the unsprayed vines on the left are suffering from hopper-burn or tipburn.

Slake one pound of stone lime to a paste by adding water slowly, and stirring; or mix $1\frac{1}{2}$ pounds of hydrated lime in water, then add water up to six gallons. These two solutions should be poured together in equal amounts and stirred. This makes a 4-4-50 mixture which means it is at the rate of 4 pounds of copper sulphate, and 4 pounds of lime to 50 gallons of water. After the two solutions, copper sulphate and lime, are poured together the bordeaux mixture should be used at once. If allowed to stand a day or two it is practically worthless.

If there are any potato beetles present at the time bordeaux is to be applied the arsenate of lead should be added in the same proportion as if mixed with water; that is, add $\frac{1}{2}$ ounce of arsenate of lead to each gallon of bordeaux mixture. By doing this both sprays are applied at one operation.

Demonstration in mixing and using sprays might be given at this meeting.

V. LATE CULTIVATION, HARVESTING, GRADING, EARLY MARKETING AND STORAGE OF POTATOES

Late Cultivation

The usual cultivation is continued until about the time the potatoes bloom, when they are "laid by". At this last cultivation which must be very shallow to avoid tearing off the feeder roots as in the previous ones, the dirt is drawn toward the row and forms a low ridge. For this purpose a wing shovel attached to the back of a one-horse cultivator is very good. There are also special "sweeps" made to use on two-horse cultivators for this work. In small patches the same thing can be done by hand, using a rake or hoe to draw the earth toward the plants. Even after the crop has been "laid by" if the soil becomes very dry or starts to bake, very shallow cultivation through the middles may be beneficial.

Harvesting

The most rapid growth in the potato tubers comes after blooming and continues until the vines are practically dead. For this reason

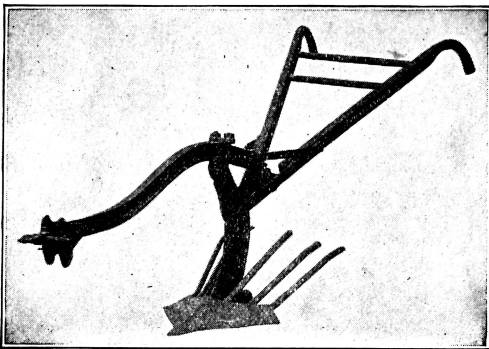


Fig. 17.—Ordinary two-horse potato digger.

the highest yield will be obtained by putting off digging until most of the vines are dead. It often happens that potatoes bring a much higher price early in the season than they do later and if the crop is to be sold at once it may pay to dig before they are fully

matured. If this is done they must be handled carefully to prevent skinning and bruising.

Digging can be done with a potato digger or an ordinary two-horse turning plow. There are several types of diggers. The large "elevator digger" is pulled by four horses or a tractor and is only practical for large fields. The ordinary two-horse potato digger is shaped something like a lister plow with iron prongs or fingers extending from each side of the short moldboards. These iron fingers help to separate the potatoes from the soil so they can be picked up more easily. For small patches a flat-tined spading fork is good. If potatoes are allowed to dry for an hour or so, after being turned out of the ground, most of the dirt will separate easily. The skin of the potatoes will be hardened some by this drying and will not peel off so badly in handling. This is especially important if the potatoes are being dug before they are fully matured. However, if the weather is extremely hot when the potatoes are harvested they should not be allowed to lie exposed to the direct rays of the hot sun because they are apt to sun scald and rot soon after harvest. Baskets, boxes or buckets can be used in picking up the potatoes. These are preferable to sacks, unless the crop is mature and the skin of the potatoes somewhat toughened.

Grading

All potatoes should be graded. This can be done in the field or they can be hauled to some convenient shed or building. The grading always should be done before the potatoes are stored or disposed of. Grading

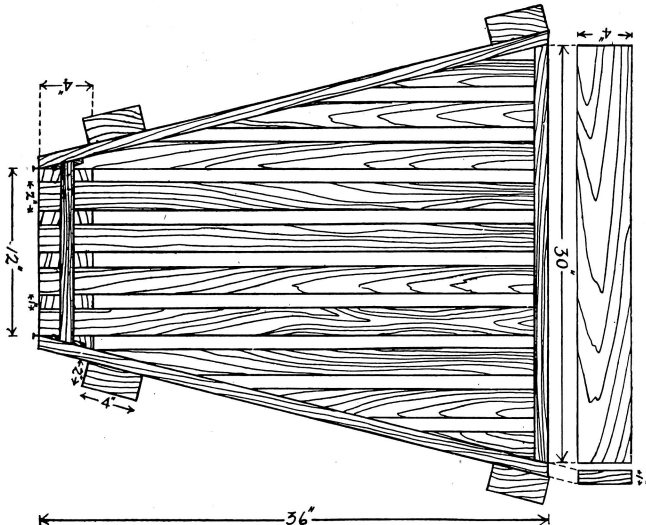


Fig. 18.—Plan for making potato sorting table.

means sorting the potatoes and throwing out all dirt and small or damaged tubers which do not meet the requirements of the grade. The United States Department of Agriculture has established grades, a copy of which may be obtained by writing to the U. S. Department of Agriculture and asking for the "Official Standards of Potatoes."

Grading can be done on a sorting table which can be made on the farm. It should be set on legs of convenient height. One end of the table is higher and wider than the other. Four-inch boards can be used in making the sides. The main platform of the table where the potatoes are dumped to be sorted should be made of narrow boards placed about one inch apart to allow the dirt to fall through. The narrow end of the table should have an "end gate" which can be removed as soon as all the small and damaged potatoes are picked out, and the good ones can be rolled right off the table into sacks. The "end gate" must not be more than 10 or 12 inches long. Nails can be placed to hold the mouth of the sack open.

Early Marketing

In digging potatoes for early market remember that the yield is sure to be lower when digging is done before the vines die. Be sure you have a place to sell them at a fair price. It sometimes happens that it is desirable to clear the land for another crop, such as soybeans or cowpeas to plow under, and this may be one reason for digging early.

It is better to market "new" potatoes in baskets or boxes for the skin is so tender it will be rubbed off if sacks are used.

Storage

When potatoes are to be stored for future use they should be left in the ground as long as possible without starting to rot. If the weather is hot and damp, however, they cannot be left long. Fall crop potatoes must be dug before hard freezing. A cool outdoor cellar is an excellent place to store potatoes. The temperature should be kept between 36° and 40° if possible. This is not usually possible for the early crop of potatoes which is dug any time from July to September. For this reason the early crop may not keep through the winter and should be used as rapidly as convenient. The fall crop can be kept nicely throughout the winter in a cellar or cool basement. They must be kept in the dark and can be put in bins, boxes or sacks. If there is a furnace in the basement a storage or cold room should be partitioned off from the rest of the basement. It will be useful in storing many kinds of vegetables, fruits and canned goods.

VI. PLANS FOR LOCAL EXHIBIT, JUDGING AND DEMONSTRATION WORK

The club members should make plans now for their Achievement Day with an exhibit, judging and demonstration work.

Potatoes for Exhibition

The one who grows the best potatoes does not always rank the highest because very often he may not exhibit his best potatoes. In selecting potatoes to show, select those of medium size rather than very large ones. After looking over your potatoes decide on the best type for that variety and then select the 32 tubers of this type which are most uniform in size, shape, color, etc., and which are smooth with shallow eyes and free from cuts, scab or other blemishes. They should be carefully handled and wrapped separately. Before making the exhibit, they should be removed from the paper and the dirt carefully brushed off without scuffing the skin.

Judging

The judging work should be based on ability to identify the different varieties of potatoes and to place the exhibits of the same variety in order with the best one first and to give reasons for placing them that way.

The following score card is suggested as a guide for use in judging exhibits of potatoes. It may be used in scoring the exhibits if there is doubt as to the placing. No place is allowed for identification because the presence of one or more potatoes of another variety will entirely disqualify an exhibit.

Score Card	
General uniformity.....	20
Shape, correct for variety.....	20
Size, correct for variety.....	10
Quality of flesh.....	5
Skin, color, brightness and texture.....	10
Eyes: depth and number.....	5
Freedom from mechanical injury.....	10
Freedom from diseases.....	20
Total points.....	100

Explanation of Terms of Score Card.—General uniformity will include uniformity as to shape, size and color, brightness and texture of skin and depth and number of eyes.

Shape.—The most desirable shapes for the variety should be considered and the exhibit scored accordingly. In general, it is very desirable that potatoes present a blocky appearance carrying their width out to the ends. Pointed ends indicate weakness and running out. Second growth “knobs” are very objectionable.

Size.—Size of potatoes should be medium but will vary some with the variety.

Quality of Flesh.—Quality of flesh can only be estimated. The potatoes should be firm and, in keen competition when it is necessary to cut open a sample, should show flesh of even, white color without streaks.

Skin.—Under this item should be considered color, brightness, smoothness, the presence of enlarged breathing pores, skin “checks”, etc.

Eyes.—Eyes should be fairly shallow and few in number. Eyes that protrude may indicate weakness, however.

Mechanical Injury.—Mechanical injury includes cuts, bruises and breaks in the skin due to rough handling, etc.

Diseases.—Diseases include common scab, russet scab (caused by *Rhizoctonia*) black scab (caused by *Rhizoctonia*) and *Fusarium* wilt, (indicated by a dark ring near the outer edge when the potato is cut across). Any form of rot or decay should also be scored off here.

Judging by Comparison

After club members have learned to use the score card in judging individual potatoes, they are ready to learn to judge by comparison. At first, this may be done by comparing two potatoes. Usually, plates of five potatoes each constitute a judging class, each plate being designated by A, B, C, D or by 1, 2, 3, 4.

In judging by comparison, club members should compare the sample placed first with the one placed second, the second with the third and the third with the fourth. Reasons should be given in a similar way, which may be in writing at first and later orally to the leader or judge. There is a tendency for beginners in judging to describe potatoes rather than to give comparisons. Comparisons are made by taking up the essential points in a logical order as they appear on the score card. In contests, club members usually are judged on the combined results of both placings and reasons on basis of 50 points for correct placings and 50 points for correct reasons.

A free-for-all contest may be conducted in each club for the purpose of selecting the three highest ranking individual judges to represent the club on the judging team in the county contest, if one is held. Team work may be developed by giving the members of the team an opportunity to practice judging together and to discuss their own placings and reasons with each other and with the leader or judging specialist, until they become uniform in making placings and in giving reasons.

After the judging work has been completed but before the results of the contest have been announced, if time permits, the judge should exhibit the classes of potatoes as placed in the contest in the presence of the contestants and explain reasons for the placings made. After understanding the placings, club members will have a fact basis for

higher standards and for showing good sportsmanship when the results are announced.

Demonstrations

In so far as possible, all club members should be instructed in regular club meetings by the demonstration method. As a usual thing, one or more members of each club can begin doing before the club useful phases of the work program soon after the processes have been demonstrated to the club by the club leader.



March 27

April 15

May 5

Fig. 19.—Effect of date of planting on yield of early potatoes; each bag shows the yield of marketable potatoes from 100 hills.

After two or three months of practical experience in handling real things, mature club members should be able to give public team demonstrations. The scope of the team demonstration usually should be limited to the essential processes of some practical phase of the club work of the current year on one subject. A team of two of the best demonstrators, should be selected from the membership of one club, either by mutual consent or by individual tryouts in competition. All teams should have an opportunity to demonstrate before the local club group and the people of the home community, and the championship team should represent the local club at the achievement program or round-up.

Suggested Problems for Team Demonstrations

Seed Selection and Seed Treatment. Marketing. Description and Identification of Standard Varieties. Treating Seed Potatoes to Prevent Disease.

Typical Outline of a Problem for a Team Demonstration: Treating Seed Potatoes to Prevent Disease

Team: Two members from one club, designated in this outline as "A" and "B".
Reference: 4-H Potato Club Circular.

Equipment and Supplies: For Field Size Demonstration.—Use 2 oz. of corrosive sublimate (Chloride of mercury), $\frac{1}{2}$ gallon of hot water, $\frac{1}{2}$ gallon glass jar, a half-barrel, 14 $\frac{1}{2}$ gallons of cold water, a bushel of potatoes, a basket to hold the potatoes, specimens of diseased potatoes, a small strip of tin and a blackboard.

Exhibit Material: Specimens of diseased potatoes should be collected early in the season and preserved in glass jars. Formula for making preservative—10 parts of 95% alcohol, 3 parts of zinc sulphate, and 87 parts water.

Time: Fifteen to thirty minutes.

Procedure

"A"	"B"
"A" leads in giving a spirited club song or in repeating the national 4-H club pledge; gives a brief history of the club; and then introduces his teammate and himself.	"B" joins in giving the club song or pledge. Stands at attention.
"A" speaks and demonstrates—	"B" assists—
1. <i>Treating Seed Potatoes to Prevent Disease.</i> —	
1. Why it is necessary to treat seed potatoes.	Puts strip of tin in solution of corrosive sublimate to use later.
(1). Names and identifies common diseases controlled by seed treatment, using exhibit specimens or by drawing characteristic features on a blackboard.	Provides "A" with demonstration materials as needed.
a. Common scab.	Makes drawings on the blackboard, if desired.
b. Black leg.	
c. Rhizoctonia.	
(a). Black Scurf.	
(b). Dry Stem Rot.	
(c). Russet Scab.	
(2). Shows some diseased potatoes and plants and then contrasts them with an exhibit of healthy potatoes and plants.	Assists "A"
(3). Calls attention to the dormant condition of potatoes, that they should be treated before sprouts appear, as treatment kills sprouts.	
(4). Explains how losses occur from diseases.	
a. Losses from thick peeling of scabby potatoes.	Prepares demonstration materials for treating seed potatoes.
b. All diseases spread to new potatoes when planted, and loss in yield is due to Rhizoctonia (dry stem rot) and Black leg.	
c. Rotation of crops is practised to prevent infected soil. Common scab and Rhizoctonia live over from one year to the next in the soil.	
d. Treating seed potatoes prevents disease from starting in soil that is free from infection.	
"----- will continue the demonstration."	

“A” assists—

Assists “B”, according to plan worked out by the leader and team-mate.

“B” speaks and demonstrates—

2. *Explains and demonstrates how to treat seed potatoes.—*

- (1). Dissolve corrosive sublimate in hot water.
- (2). Puts cold water in jar or barrel.
- (3). Pours dissolved corrosive sublimate into jar or barrel.
- (4). Puts potatoes in a sack or basket.
- (5). Lets sack or basket down into the solution to soak for 1½ hours. (The team cannot wait for 1½ hours, so should explain and continue).
- (6). Tells how the same solution can be used for three or four times by renewing the strength.
- (7). Gives caution about handling materials and vessels.
 - a. Corrosive sublimate is a deadly poison.
 - b. Do not feed treated seed to live stock.
 - c. Calls attention to the effect of corrosive sublimate on metal vessels by use of piece of tin which had been in the solution for a half hour or more.
 - d. Explains that if potatoes are to be left to soak in gunny sacks, the same sacks should be used for succeeding treatments, since the sacks chemically weaken the solution.
- (8). Tells how potatoes should be handled after treatment.
 - a. Spread out to dry.
 - b. Can be cut and planted any time after drying.

“-----” will summarize the demonstration.”

“A” speaks—

3. *Summarizes.*

- (1). Reviews briefly steps demonstrated by “B” in treating seed potatoes.
- (2). Explains that the treatment will kill all diseased parts on the surface, about 85% to 90%.
- (3). Estimates the value of seed treatment per acre, based upon field demonstration results in Missouri, of 20 bushels increase per acre.
- (4). Quotes, “An ounce of prevention is worth a pound of cure.”
- (5). Asks for questions.
- (6). Concludes by thanking the audience for its attention.

“B” assists—

“B” writes steps on blackboard.

Uses blackboard to estimate value of seed treatment.

Answers questions referred to him on methods of treating seed potatoes.
Stands at attention.

THE POTATO CLUB TOUR

It is recommended that the county extension agent and the local club leaders conduct the potato club tour at that time of the year the project work will be far enough along to show best results.

Usually, one all-day or half-day automobile tour is conducted for all the potato clubs of a county. The potato club members, their parents, local vegetable growers and other interested persons of the communities should be invited to take part in the tour. A regular club meeting should be held at noon following a picnic lunch.

The program generally consists of making a visit to one or more truck farms and to the home farms of the club members, and in giving instructions in judging of work.

Some of the things that should be looked for on this trip and pointed out by the club leader or members as they are noticed are as follows:

Take pictures of good demonstration fields when convenient to do so.

Be sure to notice all diseases and insects that are injuring potatoes.

On this tour, there should be someone who will judge the different fields. This may be done by the county agent, club leader, an impartial grower, or the truck crops extension specialist from the Agricultural Extension Service.

Points to consider in judging the fields, are the methods used in growing the crop, freedom from weeds, freedom from insects and disease and general appearance of the field.

REFERENCES

"Better Methods of Potato Production."—Missouri Extension Circular No. 286.

"Fertilizers for Vegetable Crops."—Missouri Experiment Station Circular No. 185.

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