

tor until a space fifty feet wide has been watered. The distributor is made of tin or sheet iron.

"Where there is a long, gentle slope, the lower end of the land is often more moist than the upper end, although rows of potatoes 500 feet long have been successfully irrigated by starting the water at the upper end of the row and allowing it to flow the entire distance.

"In connection with furrow irrigation, the question naturally arises, 'How far does the water soak laterally?' When potatoes are ridged and the water runs between the rows, there will be lateral soakage enough in sandy soil to make the soil under the potato row quite moist.

#### FLOODING SMALL BEDS

"Small beds of plants often need careful and thorough watering. It is quite commonly supposed that sprinkling is the only available method in this case. Two methods of flooding were tried on beds of cabbage plants. In one case, the bed was plowed so as to slope towards the dead furrow in the middle. Small furrows were then made along the two edges of the bed with a hand plow. Water was run down the two small furrows, and made to overflow by damming with a board at short intervals. Water was also run down the centre furrow and allowed to overflow, but this was not very effective.

"In another case the bed was plowed so as to leave the whole a slight ridge. A furrow was made with the hand plow down the centre of this ridge, and water ran down and was allowed to overflow on one side only (at a time). Both of these methods were found to be very satisfactory. When the plants were of considerable size, the ground was thoroughly wet without wetting the leaves. It worked better after the first irrigation, or after the freshly plowed ground had been rained on. One irrigation was performed on the freshly made bed, and although it was successful, considerable trouble was caused by the washing away of the bank of the small ditch.

"Mr. John Repp, of Glassboro, N. J., irrigates three acres of field lettuce when small by means of movable sprinklers attached to rubber hose. When the lettuce is large he floods the ground by letting the water flow out of the open ends of hose, moving the hose from place to place. He considers the method very satisfactory." Another method is to have overhead sprinklers.

#### TIME TO APPLY WATER

The time to apply water will of course depend on the weather, but the judgment of the grower is also an important factor. In the dry districts, the plan is to thoroughly soak the ground at fairly long intervals, then follow with good cultivation. In Ontario, where

there is usually a fair supply of rain during the growing season, it will probably be found better to irrigate oftener and not quite so thoroughly, as, if a heavy rain followed a soaking from irrigation, more harm than good might be done. The judgment of each individ-

ual grower will have to be used also as to the amount of extra water it is desirable to apply, the character of the soil and subsoil and the slope of the ground being important factors in determining the amount of water that the land requires to give the best results.

## Foes of Vegetable Crops\*

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THE annual losses due to insect and fungus attacks on vegetable crops is estimated at thirty-three per cent. It is important, therefore, that the progressive vegetable grower be well equipped with a knowledge of insects and fungous diseases. "Insects Injurious to Vegetables," by F. H. Chittenden, Sc. D., United States Department of Agriculture; "Insect Life," by J. H. Comstock, of Cornell University; and "Plant Diseases," by George Massee, are recommended for the vegetable grower.

The more general observance of certain farming methods, such as involve no extra outlay for machinery or insecticides but require modification of ordinary farm practices will greatly lessen the losses from this source. They are the most advisable methods of dealing with crops of low value, such as turnips, cabbage and other vegetables which would not justify greater expense. Clean culture includes the destruction of weeds, especially those of same natural family with crop, for example, lamb's quarters, spinach and beets.

#### DESTRUCTION OF RUBBISH

Many insects hibernate under trash, boards, chips, and so forth. Cutworms, army worms, squash-bugs and other pests pass the winter in such places. Fence corners harbor many like insects and also grasshoppers in young stages. The cleaning out of such places, burning trash, and so forth, during winter will aid. Even the whitewashing of board fences is an aid in sealing up the corners and cracks where flea-beetles, and some others, hide.

#### DESTRUCTION OF REMNANTS

Remnants should be destroyed, preferably by burning, as soon as the crop is gathered. Many insects multiply or pass the winter on or in the remnants of crops, as worms and aphids on cabbage and cauliflower remnants, cutworms and flea-beetles on tobacco, stalk weevils on potato vines, squash borers in squash vines, and so forth. All these may be checked by promptly burning or putting in compost heaps all such remnants as soon as the crop is gathered.

Rotations are good for the land, for

crops, and deter insects. Crops of same nature should not follow each other when attacked by insects or fungous diseases; for instance, when crops like potatoes, tomatoes and tobacco, follow one another, flea-beetles, tomato worms, potato beetles and various blight diseases thrive, but if the land is rotated with corn, onions, and so on, alternating with other crops, much injury will be averted.

Plowing at certain times often checks insects, especially underground species, by exposing to cold and weather, or by starving through destruction of natural food. Wireworms, cutworms and white grubs may be checked in this way. Fall plowing is usually best for this purpose.

Fertilizers stimulate the plant to resist insect and fungus attack.

#### SPRAYING

Vegetable growers should be provided with a complete outfit for spraying operations and should keep on hand or know where to obtain at short distance a good supply of necessary insecticides. Arsenate of lead is coming into use in place of Paris green. It may be had in paste or powder form and used in water or Bordeaux mixture at from two to four pounds to fifty gallons. It adheres to leaves well and is not likely to burn. The mixture is said to remain in suspension fifteen times as long as Paris green. It may be purchased from the St. Catharines Cold Storage and Forwarding Company, from the Spramotor Company, London, or the chemicals may be obtained from druggists and the preparation made at home.

The chemical department at the Ontario Agricultural College, recommends for home use: Arsenate of soda, ten ounces; acetate of lead, twenty-four ounces; water, 150 to 200 gallons. The arsenate of soda and the acetate of lead (sugar of lead) should be dissolved separately and then poured into a tank containing the required amount of water. A white precipitate of lead arsenate is immediately formed and, when thoroughly stirred, is ready for spraying.

In a recent bulletin published by the experiment station at Cornell University, a formula is given for an adhesive fungicide which is not washed off by rains: Resin, two pounds; sal-soda crystals,

\*A paper read at the last convention of the Ontario Vegetable Growers' Association. It will be concluded in next issue.