

CONTROL OF POTATO LEAF DISEASES

by

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The control of any plant disease first requires some observation. The grower must be able to identify the symptoms. It is most important to connect the symptom to the specific disease, the cultural practices, variety and eventual yield, in order to assess what steps to take to control the disease.

In the case of early blight of potatoes, a fungus disease spread by spores, it has been found that initial infection may take place early in the growing season. In Minnesota the fungus spores have been collected in potato fields as early as the second week of June. At this time the crop may be 5 to 6 inches high. The actual symptoms, the angular, target-shaped lesions often are not found until late July. This sequence of events was originally reported by Dr. Harrison in Colorado. The exact time of infection and symptom expression may vary from one location to another. So when making observations a grower might wish to keep a few notes as a historical reference.

Where do these fungus spores come from? In general the early blight fungus survives over winter on infected plant debris from the previous year. If this material is exposed on the soil surface then the spores may be wind or airborne from the debris to nearby potato plants. It appears that this initial inoculum may be quite important when it comes time to control the disease later in the season. Once the first infection takes place in the current season's crop, it may be some time before symptoms appear. Once the symptoms appear each spot may produce many more fungus spores that can spread the disease to other plants (secondary spread). At this point the disease may become epidemic. Now is when most growers first see the problem in their crop.

I think that it is apparent that control of a disease such as early blight should start with not having infected plant debris exposed in a potato field, which relates to cultural practices and crop rotation. "Historical" observations would suggest that a fungicide application might be needed, early in the season.

Overhead irrigation in addition to allowing the crop to be grown may be part of the problem. The wet foliage sets up an ideal condition for the infection to take place, and may not favor the use of foliar fungicide. Our experience indicates that even with overhead irrigation, we can control early blight with aerial applications of fungicide. We also have had experiences where control was not obtained when the application was improper.

Before getting into the techniques of aerial application I would like to briefly review another leaf disease of the potato - Late Blight.

Overhead irrigation can be a real factor with this disease because the fungus that causes late blight has a very specific water (relative humidity), temperature and time relationship. Overhead irrigation can create a high relative humidity in a growing potato crop, especially as the rows close.

The Late Blight fungus does not survive on infected dead debris in old potato fields. Rather it must survive on living plant material such as an infected tuber. Therefore, late blight must be brought into an area first on infected tubers (seed stock). Infected tubers may be culled at harvest time, or during storage usually ending up in large cull piles adjacent to potato fields. Quite often these potatoes do not die or freeze to death, but rather sprout and

grow, and thus may supply the initial inoculum come spring. So the first step in controlling Late Blight is to have disease free seed, followed by a sanitation program. When this is accomplished, protective fungicide applications can be used to cover the loopholes.

Now, for aerial application - can the Ag-type aircraft successfully apply fungicides to control leaf diseases? My experience is that the aircraft can!

Early experiments using Ag aircraft to apply fungicides to cereal grain crops for the control of leaf rust and Septoria were very successful. When a program of cereal leaf disease control was tried on a state-wide basis, we had some problems making the program work. The fungicides being used would control the diseases and as demonstrated would increase wheat and barley yields 28% on the average. What happened when we tried this program on a large scale? By elimination, we found that the method of application was our weak point. An aircraft pattern test program was started. After testing several aircraft we found that the spray pattern developed by the planes was not uniform. The spray swath was not as wide as most people used, and in some cases the equipment could not deliver the required gallonage. In Minnesota and North Dakota, I have been testing Ag aircraft spray patterns each spring for 15 years. There has been a noticeable improvement in the application equipment and techniques over this time.

Using a rather simple system of panels laid out perpendicular to the flight path and wind, spaced at two foot intervals, we can determine the type of spray pattern the aircraft is developing. Adjustments can be made, e. g. placement of nozzles, angle of the boom, alignment of nozzles on the boom in relation to the ground, length of boom, etc., to make a uniform spray pattern.

It has been our experience that flying at crop height (the wheels, that is), the aircraft can develop a uniform spray pattern with its swath equal to the wing span. Why so close to the crop? In the case of fungicide application, we usually apply 5 to 7 gallons of water per acre. We want the spray to penetrate the crop canopy and adhere to the plant parts. The droplets must be small to give coverage. These drops may evaporate or may drift off if they are not delivered directly into the crop. Keep in mind that the fungicides being used are protectant materials and therefore must be distributed on the plant surface.

The Ag aircraft can be "tuned-up" to do a good job of fungicide application. It requires some good observation, not just looking out over the stabilizer on the turnout.

The grower and the applicator working together with their knowledge of the crop, the disease situation, the aircraft capabilities, can control these leaf diseases.

Make observations, be able to recognize disease symptoms, know the different plant diseases, know the fungicides that may be used, apply fungicides at the proper rates, apply with aircraft that can deliver a uniform spray pattern, and make the fungicide control applications before you have a disaster in the crop and you can keep these plant diseases under control.