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*In Idaho Bean Seed Production Fields*

# Spread of Halo Blight With Sprinkler Irrigation

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There is a constant need to expand the bean seed production area in southern Idaho. The most readily available lands for expanded bean production of all kinds are along the Snake River in western Twin Falls county and in Elmore and Owyhee counties. These areas have large farm units with sprinkler irrigation systems designed to produce the principle crop of potatoes followed by sugarbeets and cereals. They can readily fit another cash crop such as beans into their crop rotation. In addition, many of the farms in the older bean-producing areas of southcentral and southwestern Idaho are converting to sprinkler irrigation.

The Idaho State Department of Agriculture and the Idaho Crop Improvement Association have placed some restrictions on bean seed production under sprinkler irrigation. This restriction serves to prevent possible spread of bacterial diseases, such as halo blight, by the splashing action of water during sprinkler irrigation. To compare the effect of irrigation methods on the spread of the halo blight organism in the field, the University of Idaho conducted a two-year study using three different methods of irrigation (Table 1).

Bean plots were established at the Aberdeen Research-Extension Center using the following irrigation methods, each replicated three times:

1. A solid-set sprinkler, applying water daily to maintain 50 to 60% available soil moisture
2. A solid-set sprinkler, applying water as needed to keep the soil moisture above 50 to 60% available.
3. A corrugate system of irrigation, applying water as needed to keep the soil moisture above 50 to 60% available.

The first method caused the bean leaves to be wetted for a short time each day. The second method is the normal sprinkler irrigation system used where the bean leaves are wetted for 10 to 12 hours every 7 to 10 days. The third method is the normal surface or gravity irrigation system where applied water does not wet the leaves of the plant.

A bacterial infection site was established in the center of each 40 x 40-foot bean plot. This was done by spraying a nutrient broth solution of the organism on an 18-inch section of the row during the early morning hours. The spray was applied August 1, when the plants had reached maximum size and were well podded (stage R-5). Disease readings were taken on September 1 and the spread of the halo blight organism (*Pseudomonas phaseolicola*) was determined by counting rows away from the initial infection site showing symptoms of the disease. With the use of appropriate weed control chemicals and solid-set sprinklers, personnel movement within the plots was eliminated so personnel were not vectors in the spread of the disease.

**Table 1. Rating of Halo Blight Spread, Aberdeen Research and Extension Center.**

| | 1974 | | | 1975 | | |
|---|---|---|---|---|---|---|
| | Disease severity | Plant vigor | Spread rows | Disease severity | Plant vigor | Spread rows |
| Daily sprinkle | 1.8 | 2.3 | 9 | 3.0 | 2.3 | 13.3 |
| Standard sprinkle | 2.3 | 2.6 | 11.6 | 2.6 | 2.6 | 12.3 |
| Surface irrigation | 1.0 | 1.3 | 0 | 1.6 | 2.3 | 6.0 |

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The bean variety used was Dark Red Kidney (Charlevoix) known to be free of seed-borne bacterial pathogens. The rows were spaced 24 inches apart and plants were 3 inches within the row.

The plots were rated by numbers as follows:

**Severity of infection (1 to 3)** — Number 1 ranged from no infection to a small amount of blighted tissue on the inoculated plants. Number 3 had many dead plants as well as plants with water soaked lesions.

**Plant Vigor (1 to 3)** — Plant vigor ratings refer to the general condition of all plants in the plot. Number 1 indicates small plants not closing the row and in this case the plants were usually yellow and leathery. Number 3 indicates plants that were still green and usually touching across the row.

**Spread of infection** — Denoted by the number of rows beyond the inoculated row. These are rows to the west or to the east of the infection sites, which are the directions of the generally prevailing winds.

## RESULTS

The severity of infection was about equal for both methods of sprinkler irrigation but greater in sprinkler plots than in surface irrigated plots in both 1974 and 1975. In both years, the disease spread in all plots except in the surface irrigated plot in 1974 where only the originally inoculated plants developed disease symptoms.

The disease spread sporadically in 1974, but in 1975 the spread was uniform within a treatment and the infection did spread with all methods of irrigation. The vigor of the plants differed in these two years. Plants in 1974 were stunted, yellow and leathery, not closing the rows; in 1975 the growth was vigorous, succulent and did close the rows, thus allowing leaf contact from row to row.

## CONCLUSION

The greatest amount of disease spread resulted from the sprinkler method of irrigation but halo blight still spread under surface irrigation in the 1975 plots, where conditions were conducive to bacterial growth. The trials definitely show that if the blight organism is present, it may spread regardless of irrigation method. The evidence would suggest that the only way to maintain the present high quality of bean seed produced is through a continued zero tolerance program of the halo blight organism. The bean industry must assure itself of seed free of *Pseudomonas phaseolicola* for production under sprinkler irrigation in Idaho.

## The Authors

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