

Overhead Irrigation Encourages Wet-Weather Plant Diseases

W. C. SNYDER • R. G. GROGAN • R. BARDIN • M. N. SCHROTH

This report confirms previous research showing that such wet-warm-weather diseases as halo blight, anthracnose, black rot, downy mildew, leaf spot, early blight, bacterial spot, and other similar diseases, will disappear from warm-season, sprinkler-irrigated crops in California's coastal and interior valleys when the water is applied by furrow irrigation.

WARM-SEASON CROPS grown in California during the summer-dry period, under furrow irrigation, are generally free from wet-weather diseases. This has been affirmed frequently by research in the past several years, and is reaffirmed and emphasized in this report. Diseases such as halo blight and anthracnose of beans, scab, anthracnose and black rot of melons, downy mildew and blights of lima bean, angular leaf spot of cotton, bacterial blight of strawberry, bacterial speck and bacterial spot of tomato, early blight, and black rot of crucifers, and other similarly behaving diseases disappear in successive plantings maintained in the warm dry climate of the coastal and interior valleys of California under these conditions. This is true even when the host crops were grown from infected seed.

In recent years some seed crops, as well as the market crops, of these commodities have been grown in the summer under sprinkler irrigation. In effect, such crops are no longer being produced in an arid climate. The humid conditions and free-water provided by overhead sprinkling convert these fields into humid, "rain-fall islands" well suited to the infection, spread and development of these wet-weather diseases. Disastrous losses have occurred under sprinkler irrigation where infected seed from outside sources has been used. For example, striking contrasts in the field development of halo-blight have been observed where the same lot of infected seed was sown in two

nearby fields with one under furrow irrigation and the other overhead sprinkling. Before pod development was completed, the field under sprinkler irrigation was a total loss from blight. The other field showed no evidence of blight at harvest.

The appearance of wet-weather bacterial and fungal diseases is of no lasting importance to the California culture of these crops, since they disappear when overhead irrigation is not employed. Infected seed has been brought to California for decades, and still is, without consequence. However, growers and those contracting for these crops may lose the benefit of an arid climate and sustain crop damage, or even crop failure, when infected seed is grown under sprinkler irrigation. Furthermore, seed produced from contaminated seed lots under sprinkler irrigation is likely to be infected or contaminated with the wet-weather organisms, thus nullifying the benefits normally derived from seed production under arid conditions. Sprinkler-irrigated fields, planted with disease-free California-grown seeds, however, have remained healthy.

Infected seed of bean and other crops may be freed from infection merely by growing it in a truly arid region—if the planting is not subjected to overhead irrigation or other local wet-foliage condi-

tions. For safety, however, and because of the danger of chance contamination, two or more successive seasons are recommended in cleaning up seed-borne infections incurred in other less-arid areas.

The appearance of such diseases requires the simultaneous involvement of a susceptible plant, its particular bacterial or fungus pathogen, and the proper environment—in this case, free moisture. The removal of any one or more of these three factors prevents disease, and the easiest one to control is moisture—by simply avoiding sprinkler irrigation.

Crops and seeds, therefore, that are free from these wet-weather diseases can be produced as has been done for many years in the warm summer-dry areas in California. Seed stocks maintained free from these diseases in California may be grown here or elsewhere under sprinkler irrigation, or in a rain-fall area, if not reinfected.

William C. Snyder is Professor of Plant Pathology, University of California, Berkeley; R. G. Grogan is Professor of Plant Pathology, U.C., Davis; Roy Bardin is Plant Pathologist, Office of the Agricultural Commissioner, Monterey County; and M. N. Schroth is Assistant Professor, Plant Pathology, U.C., Berkeley.

Bacterial halo blight on snap bean pods, as produced under wet weather conditions.

