USING METEOROLOGICAL INFORMATION TO HELP MANAGE LATE BLIGHT

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Many factors have contributed to the recent late blight outbreaks in central Washington. These include abundant inoculum in early spring from overwintering sources such as culls, volunteers, and infected seed; and aggressive population of the fungus that causes late blight (Phytophthora infestans); wetter than normal weather; sprinkler irrigation; large acreage's of very susceptible potato cultivars such as Shepody, Russet Norkotah, and HiLite; and late timing and poor applications of fungicides. All of these factors are being addressed in this year's Potato Conference. This paper will focus on meteorological conditions and the microclimate within the potato canopy that affect late blight.

Meteorological conditions have a major influence on late blight development. In the Columbia Basin, late blight outbreaks since 1974 have occurred during years with a higher than normal number of rainy days in April and May. This was especially true in 1993 and 1995 when there were 20 rainy days during April and May each year (Table 1). The outbreak in 1995 continued to increase in severity as rain continued in June, July and August (Table 1).

Meteorological data of the number of rainy days in April and May, and total precipitation in May when the daily minimum temperature is greater than or equal to 41 F were used to forecast the late blight outbreak in 1995. An alert to growers was issued on 17 May, 1995 through Spud Topics. Late blight was first identified in a field of Russet Norkotah near Hermiston on 5 June. A second alert, stating "the situation appears very serious" was issued to Washington Growers on that day; late blight was first identified on the Washington side of the Columbia River on 14 June.

This is a general forecast advising growers near the beginning of the growing season of the likelihood of an outbreak. These will be available on or before 31 May. More specific forecast will also be made from disease simulation models using leaf wetness, humidity, temperature, and rainfall data collected in potato fields.

Weather forecasts from satellite information based systems are available and should be used in conjunction with disease forecasting models to schedule fungicide applications. In 1996, fungicides should be applied to the potato crop before any wet weather.

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Humidity, leaf wetness, and temperature within a potato canopy in the Columbia Basin are often favorable for late blight development when center pivot fields are irrigated (Table 2). Eight to 10 hours of relative humidity above 90% with temperatures at 60 to 72 F are needed for optimal production of sporangia (summer repeating spores). Sporangia germinate and penetrate the plant tissue as quickly as 2.5 to 5 hours at 50 to 60 F if free water from rain, irrigation or dew is present on plant foliage. Therefore, after sporangia of the late blight fungus are in a potato field from wind blown inoculum or infected seed tubers, the microclimate within the canopy of the crop is usually favorable for continued disease development when the crop is irrigated.

Therefore, it is important to implement control strategies that will keep the late blight fungus out of irrigated fields. Strict sanitation practices, and fungicides applied early in the season and before wet weather are paramount in controlling late blight in the Columbia Basin.

Table 1. Number of rainy days related to late blight outbreaks in central Washington

Years	April - May	June	July - Aug
Non-outbreak	9.0	4.6	4.5
Outbreak	13.8	4.9	6.8
1993	20.0	3.0	9.0
1995	20.0	9.0	10.0

Table 2. Environmental conditions in a potato circle near Paterson, WA when the field was irrigated or rainfall occurred in July and August 1993

Date	Free Water (in.)	Leaf Wetness (hr.)	Relative Humidity hrs. > 90%	Mean Temp (F)	Infection period[a]
July 7	.24	5.0	7.5	50	yes
10	.38	7.5	8.0	54	yes
11	.12	6.5	7.5	54	yes
13	.38	4.5	13.5	56	possibly
14	.28	8.0	8.5	55	yes
16	.30*	13.5	10.5	56	yes
17	.24*	20.0	11.0	56	yes
19	.06*	12.5	11.0	61	yes
21	.28	4.0	8.5	51	possibly
22	.02*	7.0	7.5	59	yes
23	.16	1.0	0	63	no
24	.18	6.5	7.0	54	yes
26	.16	6.0	6.0	59	yes
27	.46	10.0	6.0	58	yes
Aug. 2	.26	3.5	2.0	62	no
3	.22	7.0	---	73	yes
5	.28	8.0	5.0	61	yes
7	.40	5.0	4.5	59	yes
8	.30	2.0	3.5	59	no
10	.20	9.5	7.0	55	yes
11	.22	3.7	9.5	59	no
12	.22	16.0	8.0	60	yes
13	.22	5.0	4.5	65	yes
15	.20	3.0	5.0	67	no
16	.30*	16.5	6.5	61	yes

* includes rainfall

[a] assuming spores are present