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Andrew Jensen, Editor. Submit articles and comments to: ajensen@potatoes.com
108 Interlake Rd., Moses Lake, WA 98837; Fax: 509-765-4853; Phone: 509-765-8845.

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# Early Blight (*Alternaria solani*) and Brown Spot *(Alternaria alternata*) in the Columbia Basin

**Dennis A. Johnson[1], Phillip B. Hamm[2] and Thomas Cummings[1]**

**[1] Department of Plant Pathology, WSU, Pullman; and [2] Hermiston Research and Extension Center, Department of Botany and Plant Pathology, OSU, Hermiston, OR.**

Three foliar diseases with similar symptoms can be found on potato foliage after row closure in the Columbia Basin. These are **early blight** caused by *Alternaria solani*, **brown spot** caused by *Alternaria alternata* and **black dot** caused by *Colletotrichum coccodes*. A survey was conducted to determine the prevalence of these three foliar diseases in the Columbia Basin in 2008. Lesions (necrotic areas on leaves) typical of early blight were collected form 77 potato fields and 321 fungal isolates were obtained. *Alternaria alternata* (brown spot) was the most frequently isolated at 52%, *Alternaria solani* (early blight) was second at 42% and *Colletotrichum coccodes* (black dot) was isolated from 6% of the leaf lesions. Incidence of the black dot fungus would have been higher if isolations would have been made from potato stems since this fungus is commonly found within stem tissue.

Symptoms of **early blight** and **brown spot** first appear on older leaves as oval or angular-shaped spots (spots are angular because they do not readily cross veins) that are dark brown to black in color. A narrow chlorotic zone usually appears around the spots and the disease is readily identified by small close concentric rings within each spot. These spots resemble a target. The spots may coalesce and kill large areas of leaf tissue. Lower senescent leaves are infected first and with conditions favorable for disease development the disease may move onto leaves on the upper portion of the plant. Symptoms of **black dot** on leaves are similar to those of early blight, except concentric rings are not formed. Lower leaves may be shed due to any of the three fungi.

Tubers can be infected by all three of these fungi. The *Alternaria* species cause dark circular to irregular lesions that are frequently sunken and contain corky tissue. *Alternaria* generally causes little damage on tubers in the Columbia Basin. *Colletotrichum* causes a dark to grayish blemish on tubers that is similar in appearance to silver scurf. This fungus can cause substantial infection on tubers in our region.

*Alternaria solani* and *Alternaria alternata* are fungi that over winter in soil and infected potato debris. Fungus spores are formed on the debris in the spring and summer and are spread to potato foliage by wind, splashing rain, and irrigation water. Alternating wet and dry conditions favor spore formation and dispersal. Spores germinate when moisture is available and infect leaves and stems. Tubers become infected when spores from lesions on foliage or in soil come into contact with wounds made during harvest. *Colletotrichum coccodes* persists in the soil as microsclerotia and is also spread similarly to *Alternaria*. When and how infection of daughter tubers occurs is not well understood at this time.

CULTURAL CONTROL

Control of **early blight** and **brown spot** consists of crop rotation (not growing back-to-back potato crops), avoiding irrigation during cool, cloudy weather, maintaining a high soil fertility program, and reducing plant stress. Healthy green potato foliage will help resist infection. Plant stress can be reduced by planting high-quality seed pieces and by providing timely irrigation and plant nutrients that meet the needs of the crop. A storage environment that permits rapid suberization and wound healing immediately after harvest will reduce tuber infection.

Tactics to management **black dot** are not well defined but include reducing plant stress through proper soil fertility, avoiding water saturated soils for long time periods, avoiding compacted soil, and avoiding short rotations (1-3 years) between potato crops. The root and belowground stem rotting phase is more of a concern than foliar lesions for black dot.

CHEMICAL CONTROL

**Early blight** is primarily a problem due to poor fertility, and since fertility levels are usually maintained until mid to late season, chemical control is generally not recommended or needed. Research in replicated trials in the Columbia Basin has not demonstrated a significant benefit in yield when fungicides are applied for early blight. However, if a reduced fertility program is used, particularly in Russet Norkotah, fungicide use might be justified. An average of two fungicide applications is applied to some potato fields in the Columbia Basin for control of early blight.

*Alternaria solani* **(early blight)** populations in several areas of North America have developed resistance to some strobilurin fungicides. The narrow mode of action against fungal metabolism increases the chance for resistance to develop. Strobilurin fungicides include azoxystrobin (Quadris) and pyraclostrobin (Headline) (see Group 11 fungicides in Table 14.5 on page 128 in the book, Potato Health Management, second edition). *Alternaria alternata* **(brown spot)** has not been consistently controlled with some strobilurin fungicides, such as Quadris and Headline and since these two products have been commonly used in the Columbia Basin, this may be one reason for a high level of recovery of this fungus during the survey last year. Because of the potential of fungicide resistance, fungicides should be alternated for managing early bight and brown spot. No more than one application of a strobilurin should be made to potato foliage in the Columbia Basin.

Efficacious fungicides for both **early blight** and **brown spot** include maneb, mancozeb, chlorothalonil, famoxadone (Tanos), difenoconazole (Revus Top), pyrimethanil (Scala) and boscalid (Endura). Mixing a strobilurin with chlorothalonil is effective as well as mixing Super Tin with an EBDC (ethylene bis-dithiocarbamate) fungicides such as metiram (Polyram), mancozeb (Dithane 75 DF, Manzate 75 DF, and Penncozeb), and Maneb (Manex). Chlorothalonil, EBDC fungicides and Super Tin have a broad mode of action and the chance for development of fungicide resistance is low.

Applications of Quadris and Headline between closure within rows and closure between rows (45 - 60 days after planting) have reduced severity of **black dot** in the Columbia Basin. Quadris, Headline, Tanos and Revus Top have shown activity against black dot in fungicide tests. However, yields have not been consistently benefitted in the Columbia Basin. Chlorothalonil has not shown good activity against black dot in the Columbia Basin. How to reduce black dot infections on tubers is unknown at this time.

# Potato Late Blight

See also: http://www.potatoes.com/research.cfm

## Foliar Late Blight



Leaf infections show areas of dead or dying tissue surrounded by a pale halo. Lesions are not delimited by leaf veins. Also, note the whitish sporulation of the pathogen around the dead tissue.



Stems are also infected, and show typical sporulation at high humidity and moderate temperature.


Field infections can start from infected seed or sprouts from volunteer plants.

## Management

1. Prevention is key
2. Manage volunteer potatoes and cull piles
3. Plant healthy seed
4. Use a seed treatment containing mancozeb or other preventive fungicide
5. Treat with foliar fungicides according to recommendations of WSU
   (for eastern Washington, access the lateblight information line at: 800-984-7400)
6. Monitor fields carefully for late blight infections, especially early in season
7. Avoid planting potatoes in ground that is expected to be excessively wet,
   such as pivot centers and pivot overlaps

**Washington State Potato Commission (Phone: 509-765-8845)**

# New IPM Tool Available for Washington Growers: Beating Sheet

The potato commission has an ongoing commitment to helping Washington's potato growers adopt and expand integrated pest management (IPM) practices. In 2008 we began offering leafhopper and tuberworm trapping supplies to Washington potato growers free of charge. This July we are beginning a trial run with a new IPM tool, a small hand-held beating sheet for insect sampling (Figure 1). The sheet is mounted on a metal frame, and comes in black only – if this tool is popular in 2009, we may make it available in white for 2010.

The beating sheet is used by slipping it under the potato canopy between the rows (or next to the base of plants to be sampled), and then striking the plants from above to dislodge insects onto the sheet where they can be counted. Recommendations for specific sampling intensities and treatment thresholds are in development, and we hope to have more information on monitoring with tools like this in the coming few years. In the meantime, if you would like to start learning how to use this tool in your pest management work, please contact the WSPC office at 509-765-8845 or ajensen@potatoes.com for your free beating sheet.


Figure 1. The new WSPC beating sheet, to be used for scouting for insects. The sheet is the right width to fit between the rows.