

Tutorial - Boxwood Blight Risk Mapping Tool

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Purpose

This tutorial describes how to use the [boxwood blight risk mapping tool](#) for western Oregon and Washington developed by modelers at the [Oregon IPM Center](#) at Oregon State University.

Requirements

To use the risk mapping tool, you will need an internet connection and access to a computer (desktop, laptop, tablet, or smartphone). It will run on common web browsers including Google Chrome, Mozilla Firefox, and Microsoft Edge. The user interface should automatically adjust to accommodate different screen sizes.

Description of risk maps

Types Forecasts use the current date as a “reference date.” Thus, three and four day risk maps depict the risk that susceptible hosts will become infected between the current date and three or four days in the future (Figs. 1a, b), respectively. These maps are useful for understanding whether near-term conditions may be conducive for infection, and therefore help users decide whether they should conduct close inspections or manage potential infections (e.g., apply fungicide treatments). The cumulative (total) risk map (Fig. 1c) depicts the total amount of risk that has accumulated between January 1 and four days in the future. This map may help identify areas where infection risk has been relatively high overall.

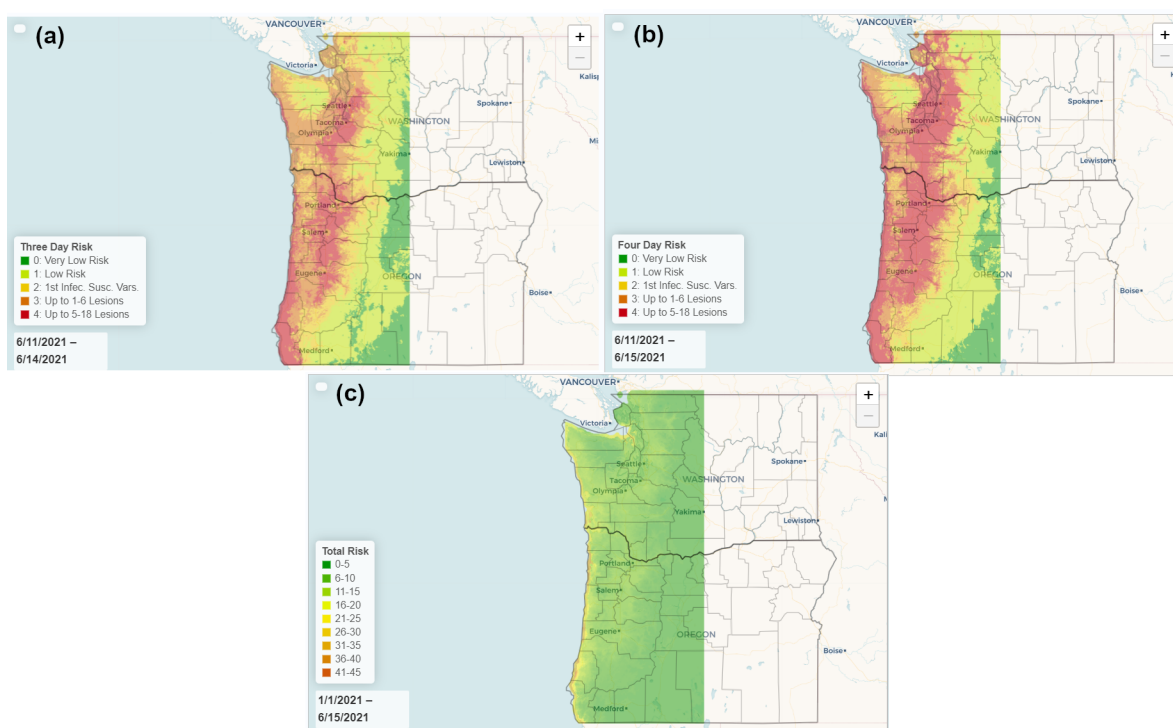


Figure 1: (a) Three day, (b) four day, and (c) cumulative (total) risk maps for western OR and WA (reference date: 6/11/2021).

Example forecasts provided in this tutorial use a historical date (6/11/2021) as the reference date. Thus, the three day risk map depicts accumulated risk between 6/11/2021 and 6/14/2021 (Fig. 1a), the four day

risk map depicts accumulated risk between 6/11/2021 and 6/15/2021 (Fig. 1b), and cumulative (total) risk depicts accumulated risk between 1/1/2021 and 6/15/2021 (Fig. 1c).

Risk levels The spatial model for boxwood blight produces numerical “risk unit” values that are computed based on degree-hours during periods of leaf wetness (Coop et al., in prep). For three and four day risk maps, risk units are categorized into five possible risk levels: “Very Low Risk,” “Low Risk,” “1st Infection of Susceptible Varieties,” “Up to 1-6 Lesions,” and “Up to 5-18 Lesions.” These levels are similar to those used for the [station-based](#) version of the boxwood blight risk model at USPest.org (Coop, 2023). However, the spatial model differs from the station-based model in its use of daily gridded climate data instead of hourly climate data from single weather stations. Additionally, the spatial model is newer and has not been validated and calibrated to the extent of the station-based model. Thus, risk level categories may need to be adjusted as we gain more information on the relationship between modeled risk units and observed infection levels in the field. The cumulative (total) risk map does not categorize risk units; however, higher values correspond to higher relative risk of infection over the year.

Interacting with risk maps All risk maps have zoom controls in the top right corner (Fig. 2). Clicking on the + and – symbols will zoom in and out, respectively. On a touchscreen device (tablet or phone), you may also zoom by touching the map with one or two fingers. Individual grid cells (i.e., pixels) will appear as the zoom level increases because forecasts have a spatial resolution of 800 meters. Panning the map to a location of interest is accomplished with the grabbing hand cursor on a computer vs. with your finger on a touchscreen device. Hovering over a location with the cursor (computer) or your finger (handheld device) will extract the risk value for that location, which is shown in the top left corner. The numerical risk value can be compared to risk categories in the legend to interpret its meaning. For example, the risk value of 4 shown in Figure 2 corresponds to a risk level of “Up to 5-18 lesions.”

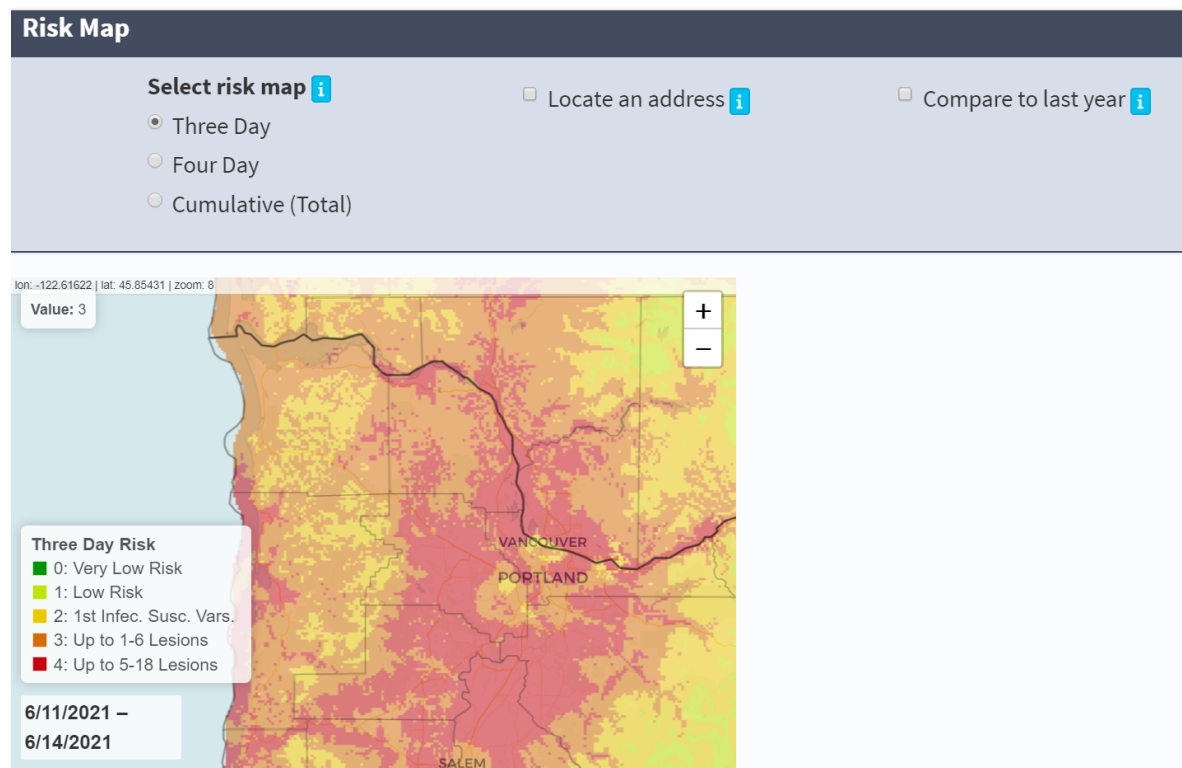


Figure 2: The three day risk map is zoomed in to the Portland area in Oregon. The location underneath the grabbing hand icon has a risk value of 3, which corresponds to a risk level of “Up to 1-6 lesions” in the legend.

Risk map menu

The menu has three options: “Select risk map”, “Locate an address” and “Compare to last year” (Fig. 2).

I. Select risk map Three risk map types are available - Three Day, Four Day, and Cumulative (Total). By default, the risk mapping tool is set to the three day risk map and is zoomed out to western OR and WA (Fig. 2).

II. Locate an address This option can be used to zoom to and extract risk information for a specific location. A text box (“Enter an address, city, or place”) will appear when the “Locate an address” box is checked (Fig. 3). The location can be a city name, street address or set of geographic coordinates (latitude and longitude). Zip codes and most business names will not be recognized as valid locations. An error message will be returned if the location cannot be geocoded or if it falls outside of western OR and WA. Deselecting the checkbox will reset the map to its original zoom level. Figure 3 shows the three day risk map produced after submitting Corvallis, Oregon, as a location (reference date: 6/11/2021).

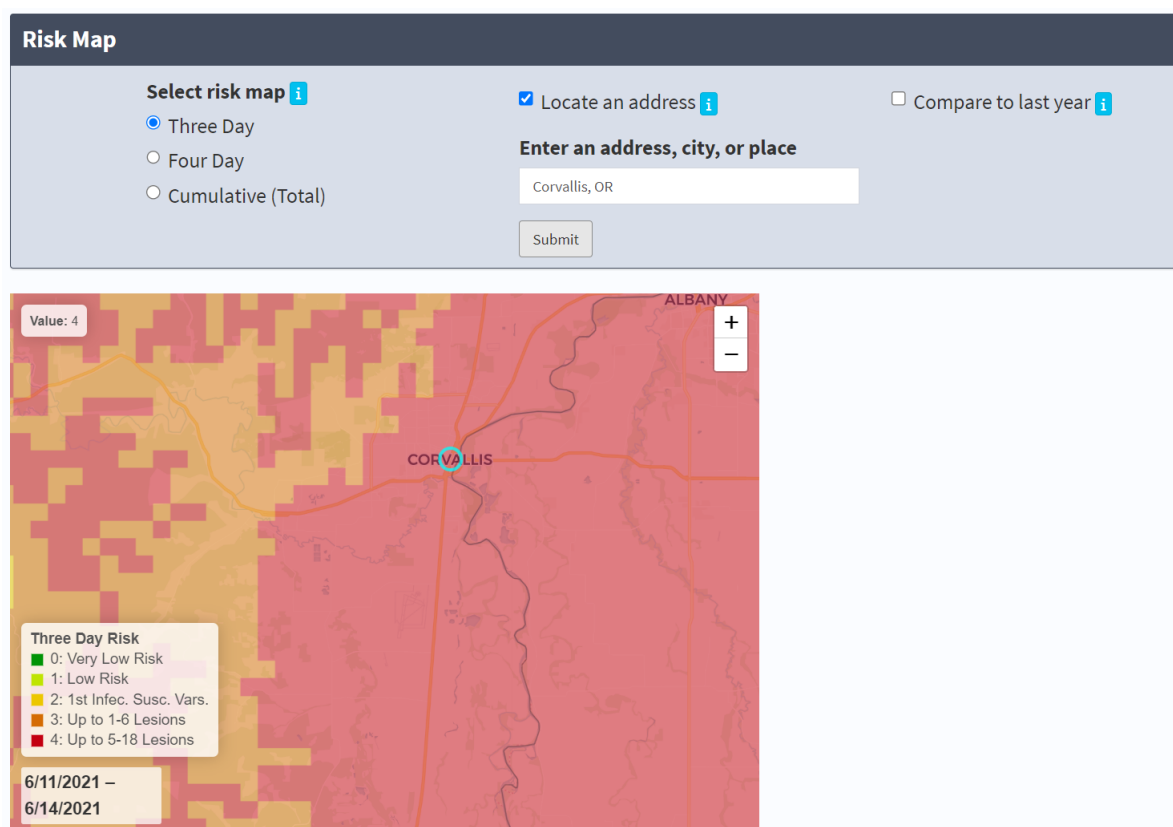


Figure 3: Three day risk map produced after submitting Corvallis, Oregon, as a location (reference date: 6/11/2021). The numerical risk value corresponding to geocoded data for Corvallis (i.e., the geographic coordinates) can be seen in the top left corner.

III. Compare to last year Checking the “Compare to last year” checkbox will produce a second map that depicts infection risk for the same time last year. Thus, a reference date of 6/11/2021 for the current year corresponds to a reference date of 6/11/2020 for last year (Fig. 4). Comparing the two maps may provide insight into how climatic differences between years affects infection risk. For example, three day infection risk on 6/11/2021 was higher throughout most of western OR and WA compared to risk on 6/11/2020 (Fig. 4), which suggests that conditions were more conducive for infection (e.g., more ideal temperatures for infection or higher leaf wetness). The two risk maps are synched, so panning and zooming one map will do the same

for the other. However, risk values for a location may be extracted separately for each map by hovering the cursor (computer) or your finger (handheld device) over the location on the desired map.

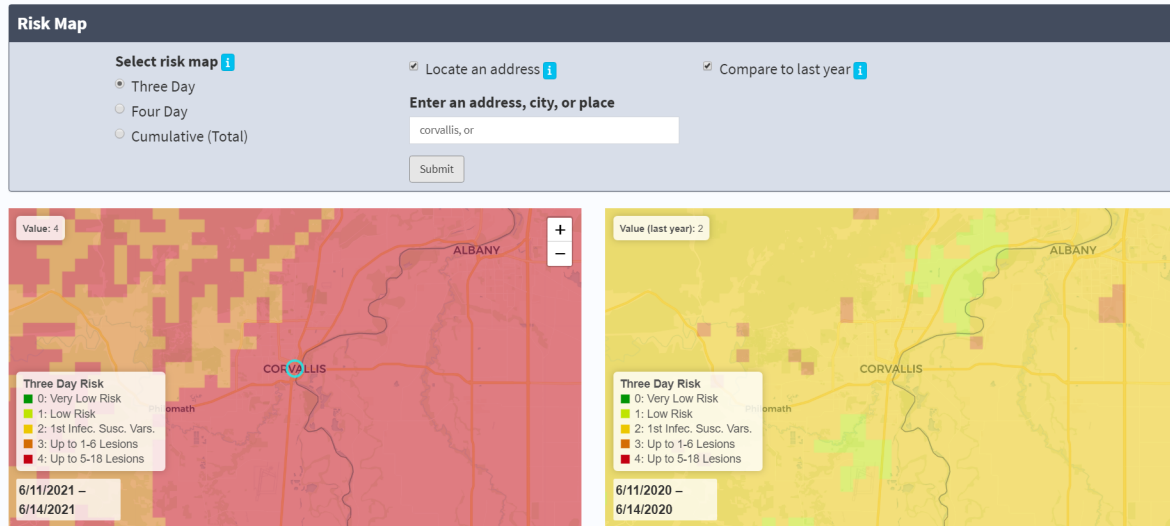


Figure 4: Three day risk maps produced after checking the “Compare to last year” checkbox. The reference date for the current year is 6/11/2021 compared to 6/11/2020 for last year. A risk value for Corvallis for each date is indicated.

Help

Please contact Brittany Barker at brittany.barker@oregonstate.edu with questions, comments, or concerns about this tutorial or the boxwood blight risk mapping tool.

References

Coop, L. 2023. Boxwood blight infection risk model. A disease caused by *Calonectria pseudonaviculata* (Fungi: Ascomycota). Infection Risk Model Documentation at USPest.org, Version 3.0 7/3/2023. Available at: https://uspest.org/wea/Boxwood_blight_risk_model_summaryV3.pdf

Coop, L., B. S. Barker, and C. X. Hong. A model combining infection and establishment risk for a pathogen causing boxwood blight. In preparation.