Boxwood Blight Risk Mapping Tool for Western OR and WA

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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.

Risk map menu

The menu has three options: "Select risk map", "Locate an address" and "Compare to last year" (Fig. 1). These options are described in more detail below.

Description of risk maps

Forecasts are available for each day between tomorrow and four days from today (Fig. 1). Thus, there are maps for tomorrow (one day risk map), the day after tomorrow (two day risk map), and three and four days from the current date (three and four day risk maps, respectively). Each map depicts the risk that susceptible hosts will become infected over the specified time frame. The current date is also referred to as the "reference date." Example forecasts provided in this tutorial use a historical date (6/8/2023) as the reference date. Thus, the one day risk map depicts accumulated risk between 6/8/2023 and 6/9/2023 (Fig. 2a), the two day risk map depicts accumulated risk between 6/8/23 and 6/10/23 (Fig. 2b), and so on.

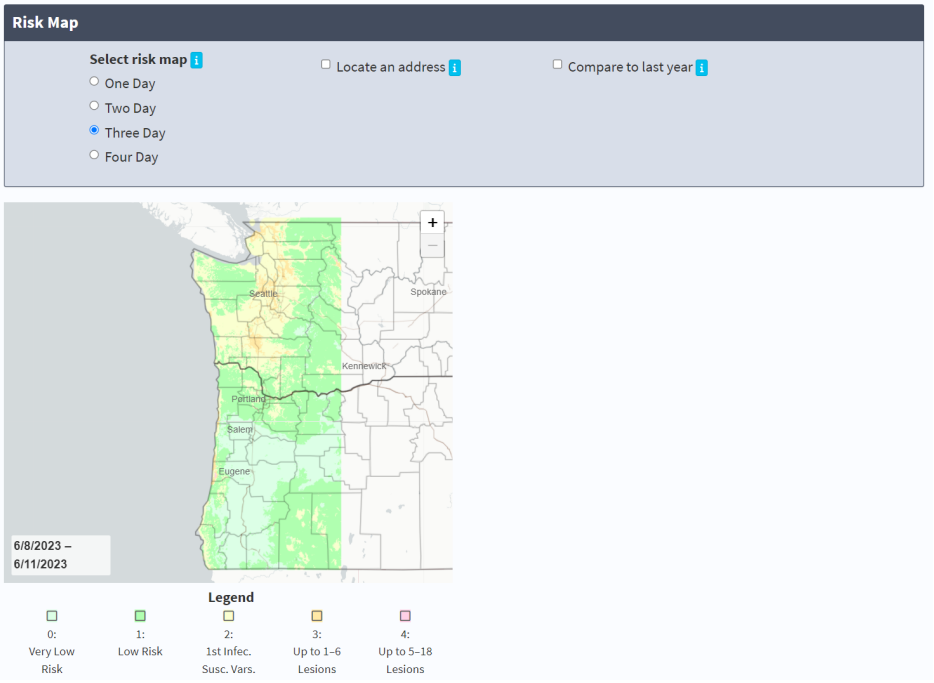

Figure 1: The "Risk Map" menu and the default risk map, which is a three day risk map for all of western OR and WA (reference date: 6/8/2023).

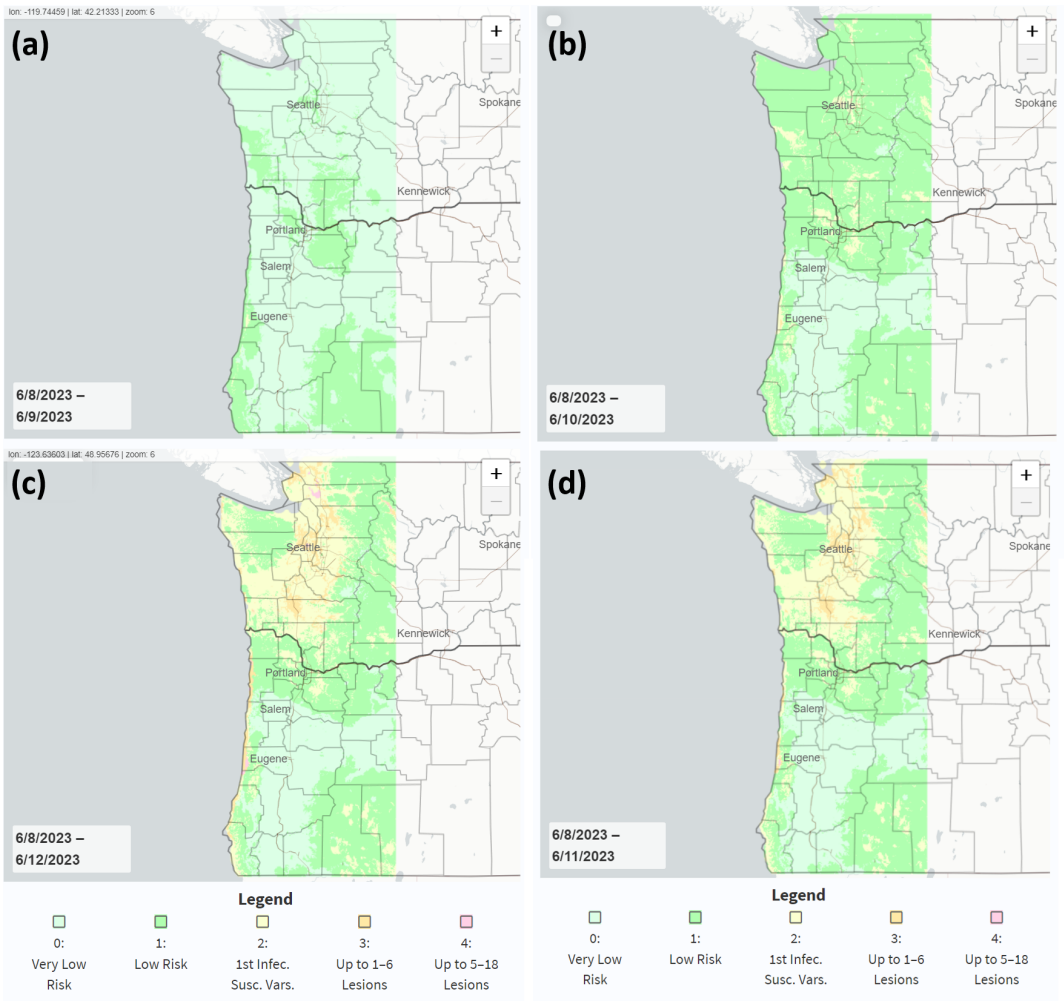

Figure 2: (a) One day, (b) two day, (c) three day, and (b) four day risk maps for western OR and WA (reference date: 6/8/2023).

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). Values range from 0 to 4 and are categorized into five possible risk levels: "0: Very Low Risk," "1: Low Risk," "2: 1st Infection of Susceptible Varieties," "3: Up to 1-6 Lesions," and "4: Up to 5-18 Lesions." These levels are similar to those used for the site-based version of the boxwood blight risk model at USPest.org (Coop, 2023). However, the spatial model differs from the site-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 site-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.

Interacting with risk maps All risk maps have zoom controls in the top right corner. Clicking on the + and − symbols will zoom in and out, respectively. On a touchscreen device (tablet or phone), the map can be zoomed 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 a finger on a touchscreen device. Hovering over a location with the cursor (computer) or a 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 1 shown in Fig. 3 corresponds to a risk level of "Low Risk."

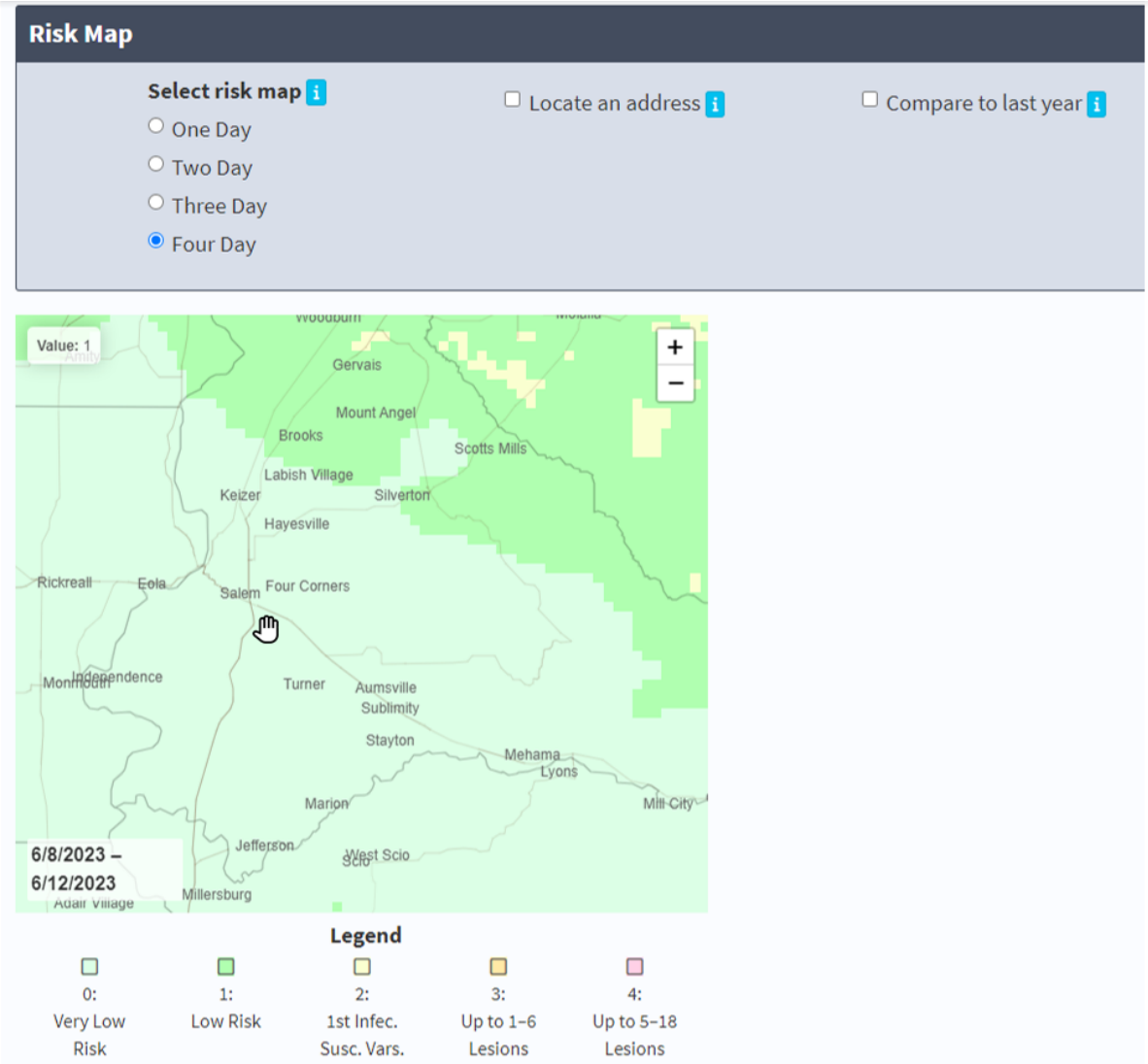

Figure 3: A four day risk map that is zoomed in to Salem, OR (reference date: 6/8/2023). The location underneath the grabbing hand icon has a risk value of 1, which corresponds to a risk level of "Low risk" in the legend.

Options in risk map menu

I. Select risk map Click on a radio button to select of map of interest. By default, the risk mapping tool is set to the three day risk map and is zoomed out to western OR and WA.

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. 4). 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. Fig. 4 shows the three day risk map produced after submitting Portland, OR, as a location (reference date: 6/8/2023).

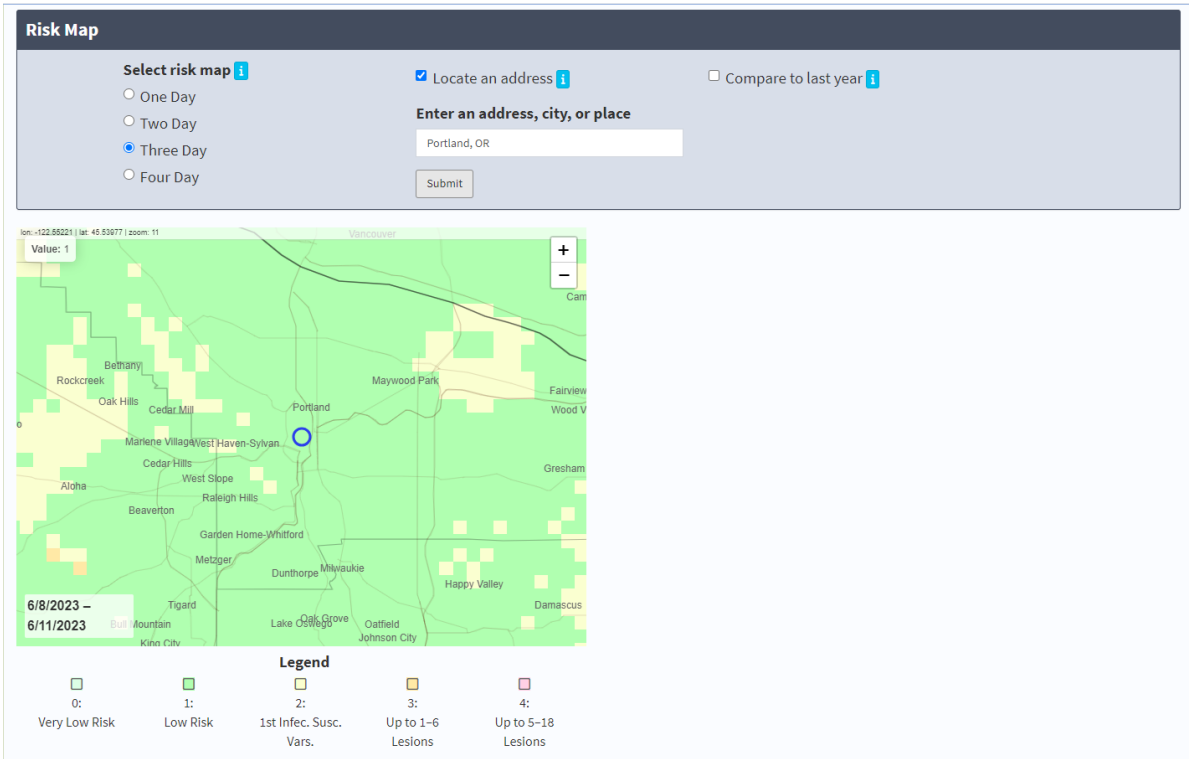

Figure 4: Three day risk map produced after submitting Portland, OR, as a location (reference date: 6/8/2023). The numerical risk value cooresponding to geocoded data for Portland (i.e., the geographic coordinates) can be seen in the top left corner.

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, if the current date is 6/8/2023, then the map for last year will be for 6/8/2022 (Fig. 5). Comparing the two maps may provide insight into how climatic differences between years affects infection risk. For example, the three day infection risk map for 6/8/2023 for the Portland, OR area indicates lower risk compared to risk on 6/8/2022 (Fig. 5), which suggests that conditions were less conducive for infection on 6/8/2023 (e.g., less ideal temperatures for infection or lower leaf wetness). Risk maps for the current year and last year are synced, 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 a finger (handheld device) over the location on the desired map.

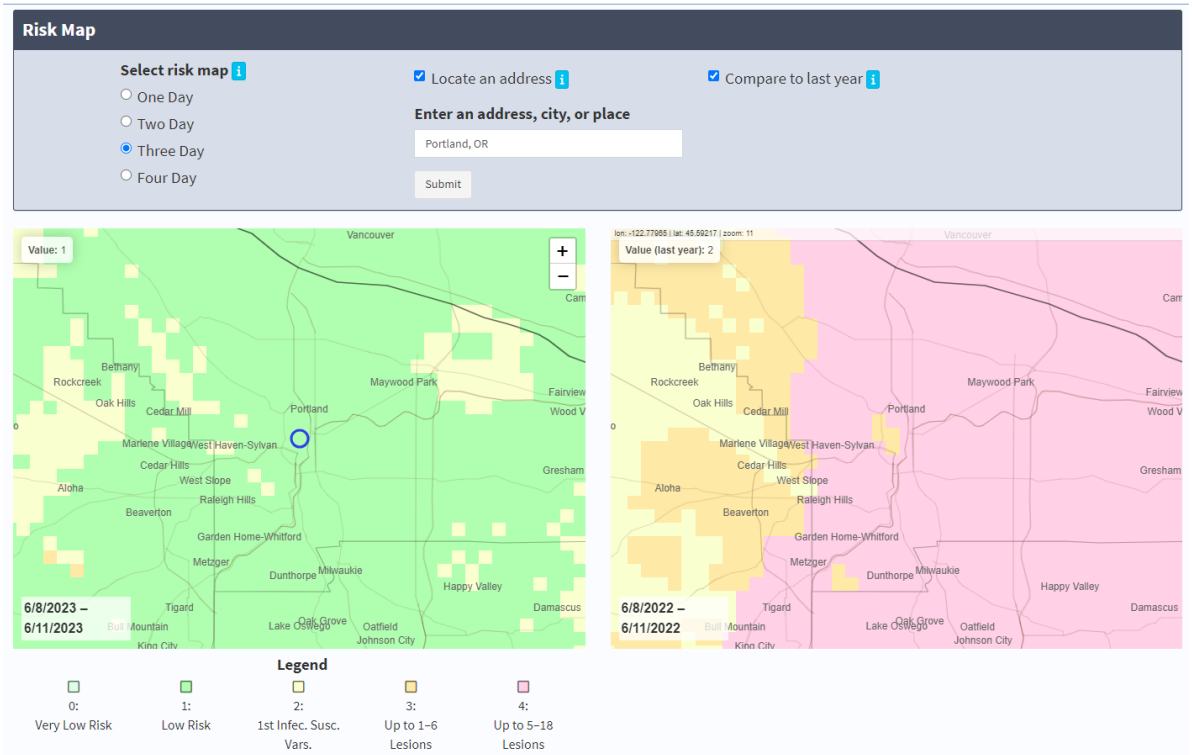

Figure 5: Three day risk maps produced after checking the "Compare to last year" checkbox. The reference date for the current year is 6/8/2023 compared to 6/8/2022 for last year. A risk value for Portland, OR for each date is indicated.

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.

Source code

The risk mapping tool was developed using Shiny, which is an open-source R package that provides a powerful framework for building web applications. To view the source code, visit the GitHub repository bbarker505/boxb.

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.