

Prairie Crop Disease Monitoring Network (PCDMN) Ascochyta/Mycosphaerella Assessment Protocols Summer 2024

1. General

During June and July, crop scouting for the ascochyta/mycosphaerella complex in field pea is critical for assessing risk and gauging the need for and timing of an in-crop fungicide application. However, late season crop scouting is also important as it can be used to assess the prevalence, severity and impact of these disease issues. Where unsprayed check strips or areas have been left in the field, late season assessments can be used to assess the impact and benefit of spraying in relation to leaf disease management and crop productivity.

The main leaf diseases in field peas:

1. Ascochyta blight caused by the fungus *Mycosphaerella pinodes*;
2. Ascochyta leaf and pod spot caused by the fungus *Ascochyta pisi*.

2. Timing

It is critical to assess end-of-season leaf spot levels at the correct growth stage although the same scale can be used at early flowering to gauge disease development and the need to apply fungicide. Assessment of leaf diseases becomes very difficult if plants have started to ripen. Table 1 outlines the recommended stage to assess mid-season and end-of-season field pea mycosphaerella levels. For early assessments to gauge risk and the need for fungicide the early flowering stage is ideal. For end-of-season assessments the ideal timing is at the full pod stage and before the crop has started to senesce.

Table 1. Growth stage information for assessment of mycosphaerella/ascochyta complex.

| Growth stage for collection/assessment | Description of growth stage |
|---|--|
| <p>Early flowering stage: Depending on the seeding date this stage will typically occur from mid-June to early July depending on seeding date and year.</p> <p>End of season: Depending on the seeding date this stage will typically occur towards late July or in early August.</p> | <p>Early flowering stage: This is typically at growth stage R2 when at least one node or more has the first flowers that are open.</p> <p>End of season: This is typically at the R4 stage or full pod stage, but before R5 when leaves start to turn colour and pods in the lower canopy range in colour from yellowish to brown.</p> |

3. Plant assessment

When assessing mid or late season field pea leaf disease levels, one should look at a representative sample of plants throughout the field. For example, **a minimum of 4-6 sites** should be looked at in a quarter section field; with 20-25 plants assessed at each site. Half or full section fields will require more sites. If the field is quite variable then separate assessments in specific areas may be needed, e.g. lodged versus non-lodged. Assessments can also be made in sprayed versus unsprayed areas to determine the usefulness and benefit of in-crop fungicide applications. Leaving unsprayed checks, even small areas, can be quite useful to assess the impact of in-crop fungicide applications.

There are a variety of recommended patterns that one can follow for the assessment of field pea leaf spot diseases. One of the most common ones to follow is a “w-shaped” pattern in a field starting from one side and moving towards the opposite side of the field (Figure 1a). Along this “w-shaped” pattern one can collect and/or assess plants at several points along the path. Ideally you should avoid the headlands of the field as these areas may have somewhat different crop development due to double seeding and fertilization, compaction, or impacts due to tree lines along field edges. Individual sites along the “w-shaped path can be spaced according to the purposes of the assessments. If it is just to get a general idea of leaf disease levels, then the total length of the path should be at least 400-500 feet long with approximately 50-100 feet between sampling points (Figure 1a). In contrast, if one is interested in a more thorough assessment over the entire field, then more sampling points and time may be needed. Here the “w-shaped” pattern should cover most of the field going north to south and east to west (Figure 1b). If your field has an unusual shape due to water courses and/or bodies, etc. then modify your sampling pattern accordingly (Figure 1c). At each sampling point, randomly assess or collect 20-50 leaves for leaf disease level.

An alternative pattern that can be used to get a general idea of leaf disease levels is to follow a “diamond-shaped” path starting past the field head lands (Figure 2). The main reason for a “diamond-shaped” path is ensure that you exit the field at the same location where you entered the field. This will help to shorten the time it takes to sample a field and avoid any unnecessary walking. Along the “diamond-shaped” path randomly assess 20-25 plants at a minimum of 4-6 locations. Make sure the total sampling path is at least 400-500 feet in length. If you are interested in a more thorough assessment for the entire field, the size of the “diamond-shaped” pattern can be increased to cover a larger area.

When evaluating leaf disease levels, it is important to ensure that plants are assessed at random. Unfortunately, there is a natural tendency to gravitate and focus on leaves with symptoms. Try to avoid this by assessing plants at random along the sampling path. One way to do this is when you reach a sampling point you can pick a plant at random and then assess the plant for leaf disease severity. Assessments can be done in the field and data recorded using a small notepad and pencil or alternatively recorded onto a smart phone using a note app or a mini spreadsheet

app. Make sure to label the assessments according to date, growth stage, field, and sampling point. Moreover, it may be a good idea to draw a small map to show the approximate areas where the sampling was performed. One can also use a GPS mapping app to identify sampling points, and these GPS values can be noted or copied and recorded electronically.

4. Assessment of field pea leaf disease severity

Overall, the concern is in relation to the total amount of leaf disease on the whole plant. Harding et al. (2019) used a modification of a scale reported by Schoeny et al. (2018). Leaf disease assessments in field peas should focus on the severity of leaf disease, which is the extent or area of the leaf that is covered by disease symptoms. For some disease issues assessment of the incidence of disease is sufficient, whereby one counts the number of plants or plant parts that have symptoms and then calculates a percentage infection. For example, counting 100 plants, noting the number that are infected and then calculating a percentage of infected plants. However, the utility of assessing incidence for field pea leaf disease is limited and instead the focus should be on severity, i.e. the leaf/canopy area that is affected by leaf disease.

Fortunately, there are also diagrammatic keys that can help to illustrate different leaf disease severities. Some of these are reported by Schoeny et al. (2023) and can be accessed at <https://quantipest.hub.inrae.fr/content/download/3493/38179?version=1>, while Harding et al. (2019) utilize this scale for surveying. In addition, Figure 3 provides indications of what 5, 10, 25, 50, 75, and 95% leaf area diseased looks like. These diagrammatic leaves provide examples of low to moderate to severe levels that can be used to along with the Figure from Schoeny et al. (2018) to determine leaf area affected.

Once all plants have been assigned a severity rating one can calculate an average value for the area of the field sampled or for the entire field, or for sprayed versus non-sprayed areas. It is anticipated that yield losses for rating categories 1 and 2 will be minimal, while category 3 will be low, category 4 will be moderate, while categories 5 and 6 would likely result in moderate to severe yield losses.

Links to information to assist in the identification of mycosphaerella/ascochyta symptoms and differentiating those from other plant symptoms due to various biotic and abiotic factors or healthy field pea plants.

1. PCDMN mycosphaerella/ascochyta disease info card, 2024:
<https://prairiecropdisease.com/wp-content/uploads/2024/08/Field-Pea-Ascochyta-PCDMN-Phase-2-V1.pdf>;
2. PCDMN mycosphaerella/ascochyta scouting guide, 2024:
<https://prairiecropdisease.com/wp-content/uploads/2024/08/PCDMN-mycosphaerella-ascochyta-of-field-pea-assessment-Info-2024-V1.pdf>;
3. Gossen, B. D., Hwang, S. F., Conner, R. L. and Chang, K. F. Managing the ascochyta blight complex on field pea in western Canada. *Prairie Soils and Crops* 4:135-141. Available online: <https://prairiecca.ca/articles/volume-4-15-screen.pdf>;
4. Klippenstein, S., Manitoba Pulse and Soybean Growers, 2019, managing the mycosphaerella/ascochyta blight: <https://www.manitobapulse.ca/category/field-peas/field-pea-diseases/>;
5. Markell, S., Pasche, J., and Porter, L. 2022, North Dakota State University, field pea diagnostic guide (PP1790 Reviewed Oct. 2022), NDSU Pea Disease Diagnostic series. Available online: <https://www.ndsu.edu/agriculture/extension/publications/pea-disease-diagnostic-series>, <https://www.ndsu.edu/agriculture/sites/default/files/2022-11/pp1790.pdf>;
6. Saskatchewan Pulse Growers and Alberta. 2023. Pea disease and insect identification guide. Saskatchewan Pulse Growers. Available online: <https://saskpulse.com/resources/pea-disease-insect-identification-guide/>, <https://saskpulse.com/resources/pea-disease-insect-identification-guide/?download-pdf>.
7. Saskatchewan Pulse Growers and Alberta Pulse Growers. 2020. Disease and insect identification guide: field peas. Available online: <https://albertapulse.com/wp-content/uploads/2020/05/Field-Pea-Disease-and-Insect-Scouting-Guide.pdf>;
8. Phelps, S., and Zeisman, B., 2023. Bacterial blight in field peas. Saskatchewan Pulse Growers. Available online: <https://saskpulse.com/resources/bacterial-blight-in-peas/>, <https://saskpulse.com/resources/bacterial-blight-in-peas/?download-pdf>.

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References

- Harding, MW., Chatterton, S., Bowness, R., Burke, D.A., Vicurevich, C., Dubitz, T., and Daniels, G.C. 2019. A province-wide survey for diseases of field pea in Alberta in 2018. Canadian Plant Disease Survey 2019 Volume 99: Disease Highlights 2018. (2019). Canadian Journal of Plant Pathology, 41(sup1), 134-136, <https://doi.org/10.1080/07060661.2019.1619270>.
- MPSG. 2018. Field pea staging guide. October 2018. Manitoba Pulse and Soybean Growers (MPSG). Available online: <https://www.manitobapulse.ca/wp-content/uploads/2018/10/Field-Pea-GROWTH-STAGING-GUIDE- WR.pdf>.
- Schoeny A., Jumel S., Rouault F., Tivoli B. 2023. Assessment of ascochyta blight (*Mycosphaerella pinodes*) on pea. Institut National de la Recherche Agronomique (INRA)/Institut national de recherche pour l’agriculture, l’alimentation et l’environnement (INRAE), QuantiPest Hub. Available online: <https://quantipest.hub.inrae.fr/content/download/3493/38179?version=1>.

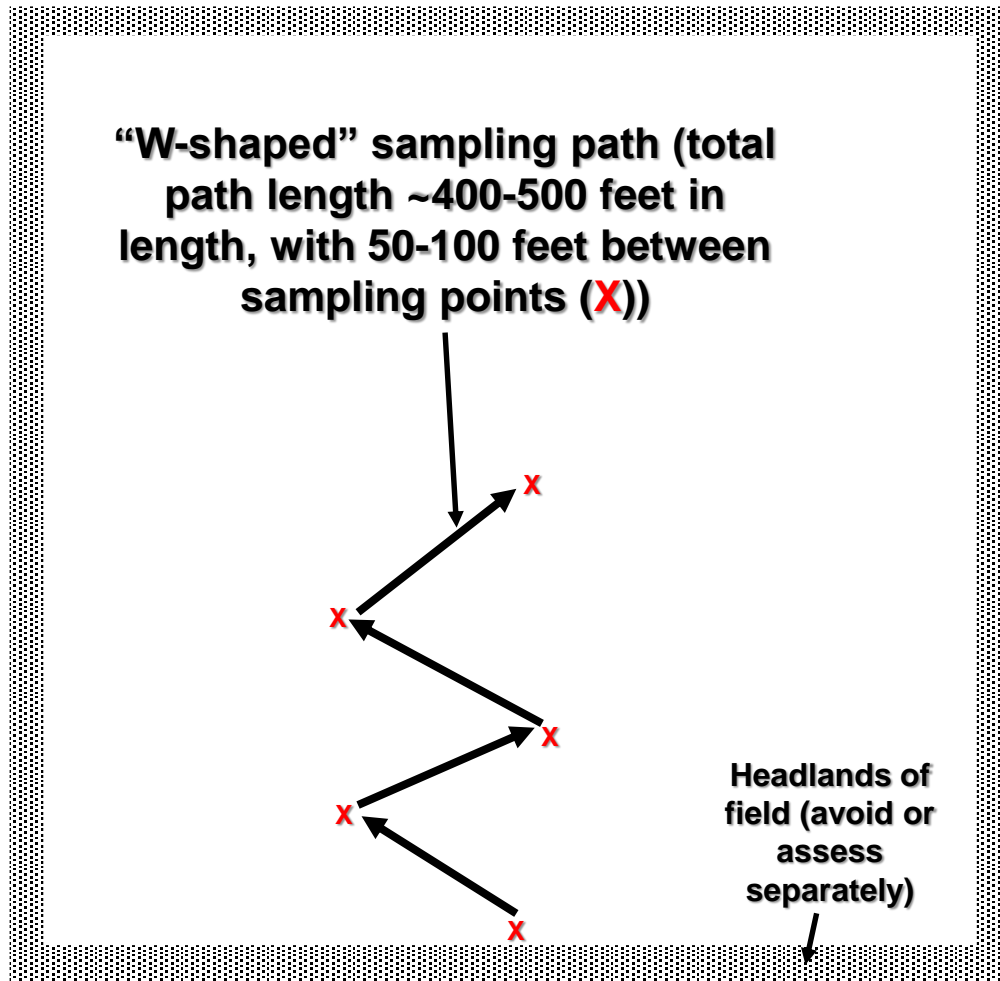


Figure 1a. Suggested “W-shaped” sampling pattern for a quick general pea leaf assessment.

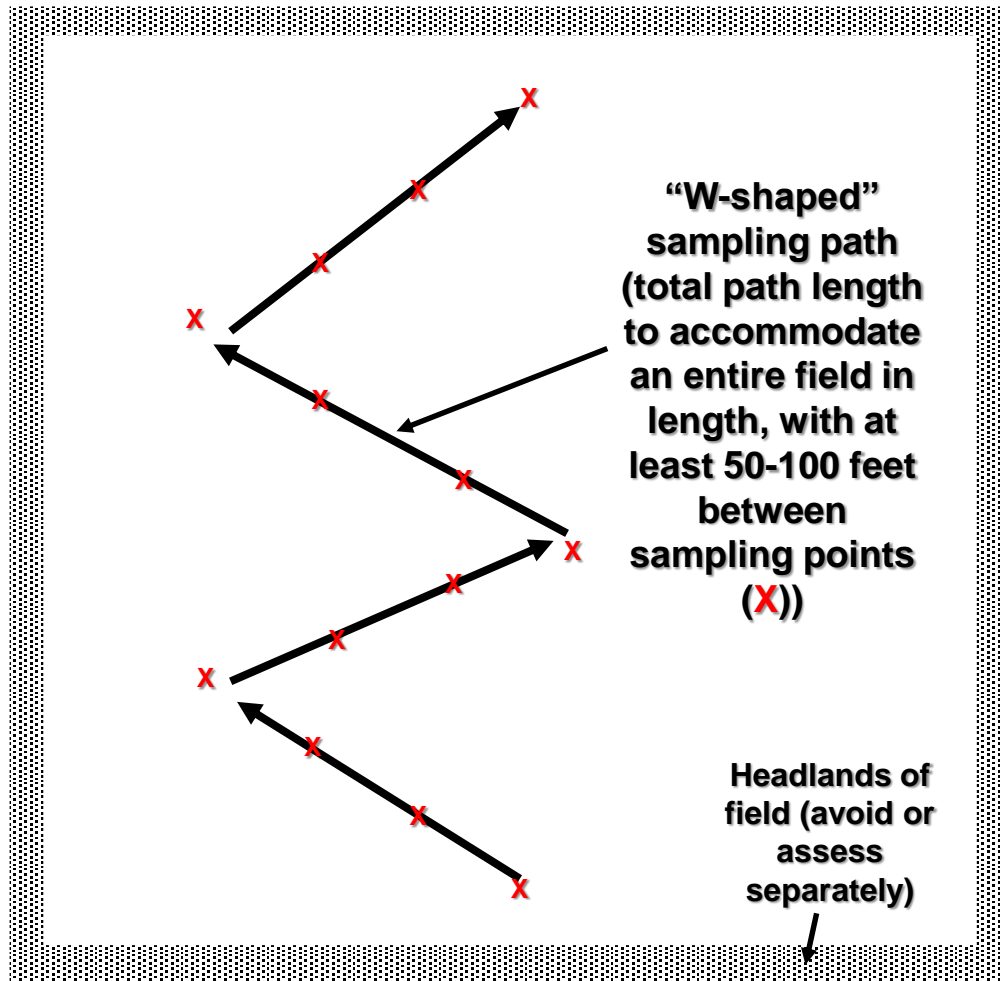


Figure 1b. Suggested “W-shaped” sampling pattern for a more thorough entire field assessment of pea leaves.

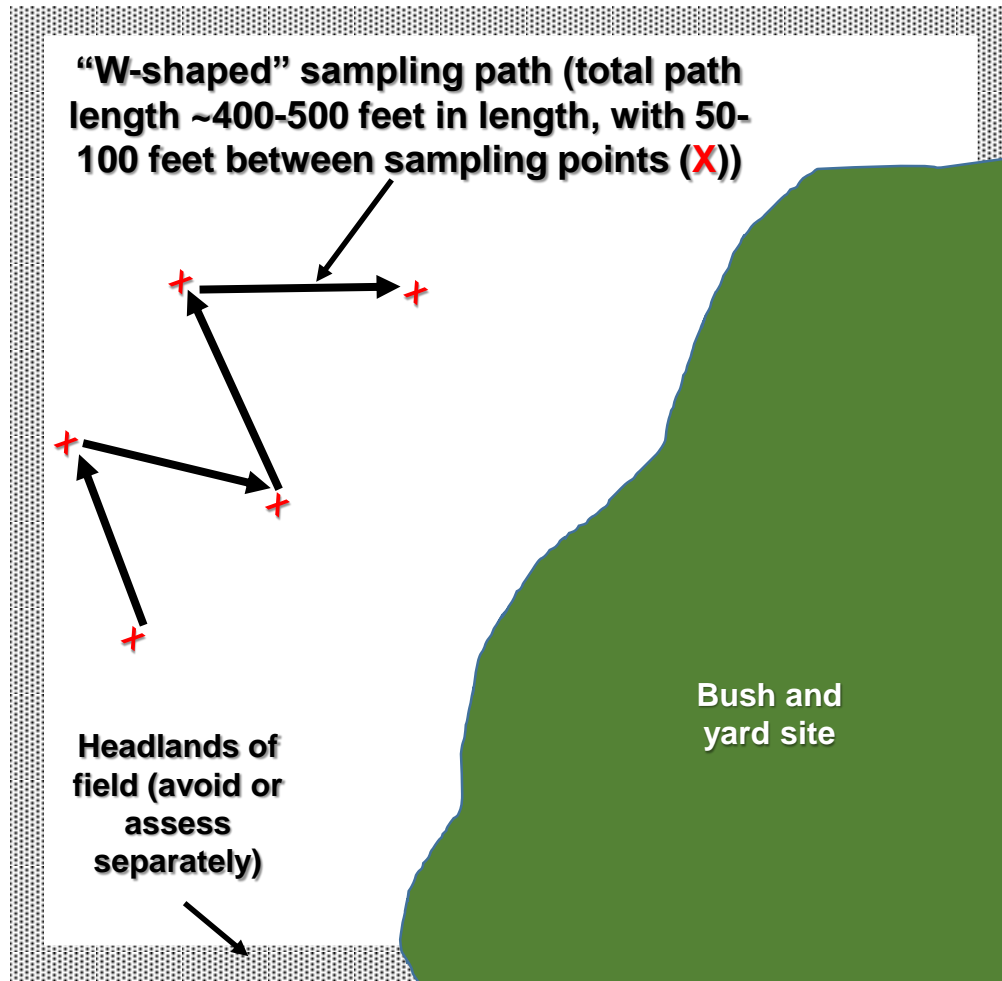


Figure 1c. Suggested “W-shaped” sampling pattern for a quick general pea leaf assessment. Pattern modified to accommodate an irregularly shaped field.

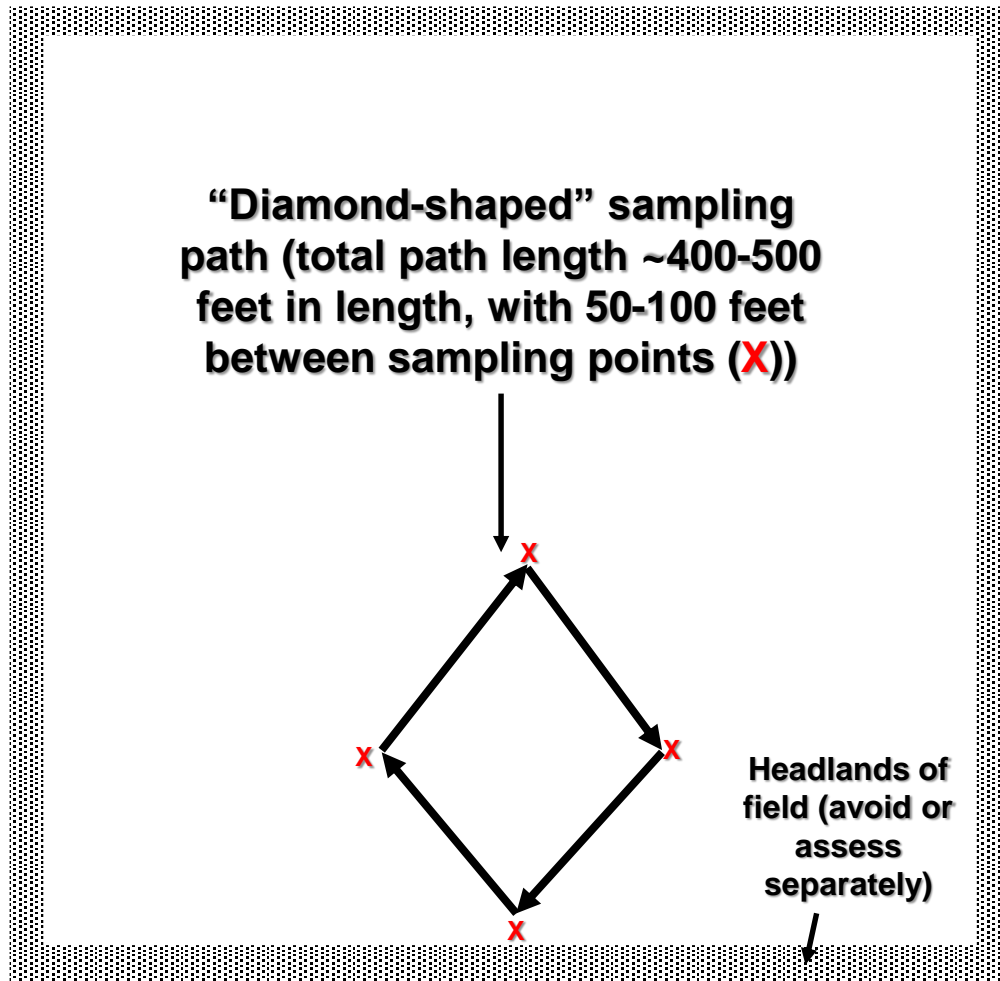


Figure 2. Suggested “diamond-shaped” sampling pattern for a quick general pea leaf assessment.

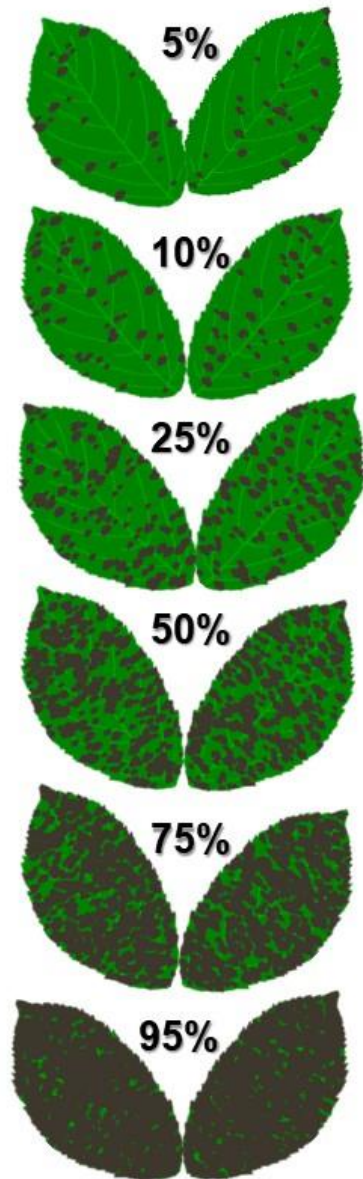


Figure 3. Standard area diagram for low to severe levels of mycosphaerella/ascochyta leaf blight of field pea. Numerical values represent the percentage of leaf area affected.