PRACTICE ABSTRACT NO.008

Testing peas for legume fatigue

Problem

Among legume crops, forage peas show the most symptoms of legume fatigue. This is due to infestation with Mycosphaerella-, Phoma-, Fusarium-, Aphanomyces- and other soil-borne pathogens as a result of over-cultivation of peas or other legumes such as lupins, field beans, vetches, red clover, or lucerne. A heavy infestation may lead to a total loss of the peas.

Solution

With the help of a simple method, the soil can be examined for legume-fatigue symptoms prior to cultivation with field peas.

Outcome

The method offers reference points regarding the soil's contamination with these pathogens, and thus indication for a possibly required cultivation break. Refraining from cultivating on contaminated soils helps avoid the situation of a high yield loss due to legume fatigue.

Applicability box

Theme
Nutrient supply, soil quality and soil fertility

Geographical coverage
Generally, and especially in clayey and shallow soils

Application time
3 months prior to cultivating the field with peas

Required time
About 4 hours (baking time not included)

Period of impact
Entire crop rotation

Equipment
Baking oven, aluminium trays, flowerpots, seed

Best in
Crop rotations with a high share of legumes; prior to cultivating peas

Practical recommendation

1. Extract 10 litres of humid soil from the field plot you wish to examine and sieve it down to a grain size of 10 mm.
2. Moisten dry samples and mix them up evenly.
3. Fill four aluminium trays with the humid soil and store the remaining soil.
4. Cover the trays filled with soil with tinfoil and place them in the baking oven. Sterilise the samples for at least 12 hours at 70-100 °C in the oven.

5. Let the aluminium trays cool for 12 hours after sterilisation.
6. Mark four flowerpots with "R" (for untreated reference) and another four with "H" (for heat-treated soil).
7. Fill the four H-flowerpots with the heat-treated soil and fill the four R-flowerpots with the untreated soil.

8. Place 5 field-pea seeds in each pot and cover them with 0, 5 cm of soil.
9. Place the pots in a tray with some water and keep them in a sheltered place with at least 18 °C and daylight.
10. Keep the pots humid during about 6 weeks by pouring water into the trays.

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Practical testing

- After about 6 weeks, the test can be evaluated. If the reference plants have germination problems and/or are growing poorly and turning yellow due to heavy infestation, the evaluation can take place earlier.
- For evaluation, cut all plants' shoots down to a height of 2 cm above the soil, and weigh the shoots' fresh weight separately according to procedure. Make a note of the shoots' weight.
- Dividing the weight of the untreated reference plants by the weight of the plants from the heat treated soil gives a ratio which can be used as an indicator for legume fatigue.
- For example, if the weight of the plants in the untreated soil is 180 g and the weight of the plants with the heat treated soil is 200 g, then; 180 g/200 g= a ratio of 0,9.

Evaluating the result:

- If the ratio is above 0,80, we would not expect any yield losses due to biologically-caused legume fatigue.
- If the ratio falls between 0,80 and 0,20, there is a risk of the peas showing symptoms of legume fatigue during or after humid and cool weather. The lower the ratio, the higher the risk of yield losses during unfavourable weather conditions. In such a case we need to determine, based on the testing results and farm-specific experience, if the risk of cultivating on the sampled land should be taken. Refraining from cultivating forage peas (and other legumes) for several years would reduce future cultivation risks.
- If the ratio falls under 0,20, we should not grow forage peas or other legumes (including the use of green manures with legumes) on the sampled land in the next 7-8 years, regardless of weather conditions, in order to restore the land.

Use the comment section on the Farmknowledge Platform to share your experiences with other farmers, advisors and scientists! If you have any questions concerning the method, please contact the author of the practice abstract by e-mail.

Further information

The Farmknowledge Tool Database offers practical follow-up information on the cultivation of legumes and the preservation of soil fertility.

About this practice abstract and OK-Net Arable

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