Risk models can help to reduce the use of fungicides against septoria

Risk models for septoria tritici blotch in wheat can help to support farmer's decisions about when fungicides are needed. In a collaboration with different Nordic and Baltic partners two risk models have been tested for their validity.

Septoria is a fungus that can cause great damage in wheat fields and in severe cases can cause great yield losses. Therefore, it is important that the farmer has a clear strategy for how to control septoria in his fields. Usually this is done by spraying the field with fungicides; in Denmark, winter wheat is usually sprayed 2-3 times per season, i.e. to fight septoria caused by the fungus *Zymoseptoria tritici*. Validations have shown that the number of sprays can be reduced if risk models are used to determine control needs.

"The need for combating septoria in wheat varies considerably from year to year and from place to place. The disease is primarily driven by so-called moisture events, i.e. rain, dew or high humidity from the elongation of the wheat to the beginning of grain filling," explains senior researcher Lise Nistrup Jørgensen from the Department of Agroecology at Aarhus University, Denmark.

A Nordic-Baltic project (SPOT-IT)

In a Nordic-Baltic project called SPOT-IT, the researchers tested two risk models for septoria in 47 field trials in wheat. A risk model is usually based on weather data, disease monitoring and control thresholds. Risk models are seen as an important element of an Integrated Pest Management (IPM) strategy. The two risk models were tested during two growing seasons in 2018 and 2019, where researchers have been able to validate whether the models provide correct recommendations for control. The experiments were performed in Denmark, Lithuania, Norway, Sweden and Finland. In Denmark, both the University and the advisory service - SEGES participated in the trials.

The two models tested were:

1. Crop Protection Online's Septoria model – which is based on days of rainfall, with 4-5 days with >1 mm triggering a recommendation for treatment with fungicides.
2. Septoria humidity model - it is based on the number of consecutive hours of moist leaves, rainfall or measured relative humidity of ≥ 85%. The tested model used 20 consecutive hours of moisture before recommending fungicidal treatment.

When the models show that fungicide treatment is needed and a spray is carried out, it is assumed that the crop is subsequently protected for 10 days. After the 10 days, the models shall be used again to assess if there is further need for control.

The two models were developed in a collaboration between Aarhus University and SEGES in previous Danish projects funded by the Danish Environmental Protection Agency. In the recently completed Nordic-Baltic project (SPOT IT), it was also examined whether the models could be used in the other Nordic and Baltic countries. The plan is also to include the two models in the platform generated in the horizon 2020 project IPM-decision.

Risk models vs. normal practice

In the SPOT-IT project, the models were compared in field trials with treatments that represented normal control practices.

“The 2018 season was extremely dry, while 2019 had a normal rainfall profile. We found that by following the recommendations of the two risk models one can achieve a good and acceptable disease control, ”says Lise Nistrup Jørgensen.

In 2018, the two risk models recommended very few treatments, saving more than 80% of the sprays compared to the standard treatments. In 2019, which was a more humid season, the models recommended approx. 30% fewer sprayings compared to standard treatments.

“We know that farmers are nuancing their input of fungicides depending on the season, and as a result of the drought in 2018, farmers also sprayed at a lower dose and frequency than usual, but the number of treatments was nevertheless on average more than twice as many as recommended by the models. If the farmers had followed the instructions from the models they could have saved one of the two sprayings in the fields,” explains Lise Nistrup Jørgensen.

The net yields obtained after the sprays were also assessed from the experiments and also here the models gave better results compared to the standard treatments.

“The two tested models performed equally well in the experiments. In the experiments, the models gave the best net- yields in 95% of the trials in 2018 and in more than 50% of the trials in 2019 when we compare them to the standard treatments with two or three sprays. We also compared the results of the two models with experiments where only a single spray was performed, and the models still gave a more accurate recommendation in 54-69% of the experiments. Overall, we conclude that the models have provided good recommendations, and especially in dry growing seasons, they have shown great potential to reduce fungicide input and prevent unnecessary spraying. We also see a positive although smaller effect in more weather-wise normal conditions. ,” says Lise Nistrup Jørgensen.

Read more: The results of the validation experiments have just been accepted for publication in "European Journal of Plant Pathology: "Validation of risk models for control of leaf blotch diseases in wheat in the Nordic and Baltic countries." It is written by: Jørgensen, LN; Matzen, M, Nielsen, GC, Jalli, M; Ronis; Djule, A; Anderson, B; Ficke, A., Djule, A (2020)

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Picture of Septoria tritici blotch caused by Zymoseptoria tritici.