

 **O.18 - Control of wheat diseases – optimising control strategies**

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Abstract

Wheat is the most important cereal crop grown in the EU. The yield levels and cropping conditions vary considerably between the different EU countries. Septoria leaf blotch, brown rust, take-all and fusarium head blight are considered as the most important diseases in the main wheat growing countries in terms of yield loss and quality of grain. Yellow rust, powdery mildew, tan spot and eyespot are also regarded as important diseases however the distribution is much more regional. Use of cultivars with effective resistance genes are well known as an important measure to reduced the risk of disease development and yield losses. The genetic resources used across Europe vary to a great extent as very few cultivars are grown in more than one country. Even the most resistant cultivars often give profitable yield responses from fungicide treatment, indicating that the resistance genes rarely cover all potential diseases that can attack the crop. Several cultural measures are known to help reduce disease pressure. These include factors such as delayed sowing, ploughing rather than non-inversion tillage, crop rotations avoiding wheat and maize as previous crops, reduced nitrogen input and reduced seed rates. Several of these factors have however significant impact on the potential yield and are therefore only incorporated to a limited extent. The approach for chemical control of diseases varies significantly between countries. The frequency of chemical control varies from 0 to 4 treatments per season, depending on the region and problems. The group has collected examples of strategies which can help to reduce the dependency on fungicides. These include: constant focus on growing disease-resistant and high-yielding cultivars; adjustments of cultural factors like delaying sowing and reducing nitrogen applications; encouraging the farmers (or advisers) to use of control thresholds in combination with field scouting; apply reduced and appropriate doses when ever possible and optimize net yield rather than gross yield; support farmers' decisions during the season by including monitoring data. In order to achieve a broader acceptability of sustainable strategies, policy-makers, stakeholders and extension services should encourage the implementation of IPM strategies. At present farmers lack motivation and incentives to change their present disease control behaviour. Major changes in the way things are done today would require major changes in policy.

Wheat is the most important cereal crop grown in EU. The yield levels and cropping conditions vary considerably between the different EU countries. In the most suitable countries (Germany, UK, France, Belgium, Netherlands, Ireland, Denmark) for wheat production average yields vary between 7-8 tonnes/ha, whereas in countries with more restricted cropping conditions (Hungary, Italy, Spain, Poland, Greece) yields vary between 2-4 tonnes/ha.

Septoria leaf blotch, brown rust, take-all and fusarium head blight are considered as the most important diseases in the main wheat growing countries with respect to yield loss and quality of grain. Yellow rust, powdery mildew, tan spot and eyespot are also regarded as important diseases however the distribution is much more regional.

Use of cultivars with effective resistance genes are well known as an important measure to reduced the risk of disease development and yield losses. The genetic resources used across Europe vary to a great extent as very few cultivars are grown in more than one country. All countries have an extensive cultivar testing system but the way of ranking resistance characteristics was found to be very different across countries. The exploitation of resistance genes in different countries was also found to take

place to a different extent. Data from cultivar testing has shown that even the most resistant cultivars often give profitable yield responses from fungicide treatment, indicating that the resistance genes rarely cover all potential diseases that can attack the crop.

Several cultural measures are known to support a reduction of disease pressure. This includes factors like delayed sowing, ploughing rather than non-inversion tillage, crop rotations avoiding wheat and maize as previous crops, reduced nitrogen input and reduced seed rates. Several of these factors have however significant impact on the potential yield and are therefore only incorporated to some extent.

The approach for chemical control of diseases varies significantly between countries. The frequency of chemical control varies from 0 to 4 treatments per season, depending on the region and problems. Only relatively few groups of fungicides are available for chemical disease control of the main diseases (triazoles, strobilurins, morpholines, boscalid and chlorothalonil). This makes it difficult to implement anti-resistance strategies, which can prolong the life of the fungicides and help to avoid erosion of the effectiveness. As few active groups of fungicides are available for chemical disease control in wheat it is important to use both cultural methods and resistant cultivars as well as fungicide treatment in order to minimise selection pressure.

The group has collected examples of strategies which can help to reduce the dependency on fungicides. These include:

Constant focus on growing disease-resistant, high-yielding cultivars. Although these might still benefit from fungicide use, they will always minimise the risk from major yield losses due to severe disease attack.

Adjustments of cultural factors should be included, in particular with respect to crop rotations and minimal tillage. Minimum tillage should be avoided in combination with wheat and maize as previous crops to minimise the risk of fusarium diseases and toxins.

Delayed sowing and reduction in nitrogen applications can both reduce the risk from several diseases, but will often have a significant negative influence on the yield.

Encouraging the farmers (or advisers) to do field scouting before deciding whether or not treatments are needed. This scouting can be supported by regional monitoring data updated at weekly intervals.

Use of control thresholds in combination with field scouting can be a great help when the need for control is decided. Decision support systems are available in many countries but are rarely used by farmers as they are considered to be difficult and too time consuming to use. The potential for reduction in pesticide use if applied at the right time is however considered to be large.

For both eyespot and fusarium good risk-assessments systems have been developed, which can be used both as a strategy tool and as a tactical tool for risk assessment during the season. The main elements in the risk assessments are believed to be adoptable in most wheat growing regions in Europe.

Good experiences from using reduced and appropriate doses have been found in many countries. The focus in these strategies has been to optimise net yield rather than gross yield. The actual input of fungicides can in many situations be minimised by optimising choice of product and timing.

Results from analysis of historical trials data can be used to make general risk assessments and evaluation of expectations for achieving profit from fungicide applications. Again calculations of net profit rather than gross yield are an important element in these calculations. In all wheat growing regions analysis should be carried out in order to get the best possible estimate of the risk and actual need for control.

Experiences from the Pesticide Action Plans, which aim at reducing pesticide input, has shown that it is important to support farmers' decisions with trials data and monitoring data, to convince them that they are making the right decisions. This is particularly important if the recommendation is not to spray. Often, the economic motivation for reducing fungicide input is limited, since dose response curves have been found to be rather flat.

The risk factors associated with not spraying are high, particularly with the current high price for wheat. Most farmers and advisers are very risk-averse, aiming to protect potentially very valuable crops. This can in many cases lead to supra-optimal doses being used.

In order to achieve a broader acceptability of sustainable strategies, policymakers, stakeholders and extension services should encourage the implementation of IPM strategies. The group generally agreed that farmers currently lack motivation and incentives to change their present disease control behaviour. Limitations in the availability of pesticides for example, could change the way farmers behave. So to a great extent it became clear that any major changes in the way things are done today would require major changes in policy.

References

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