NORBARAG
Nordic Baltic Resistance Action Group

Minutes from the 10th NORBARAG meeting in the fungicide subgroup, Ås, Norway, March, 7th

1. Welcome and introduction

The chairperson of the fungicide subgroup, Thies Marten Heick, Denmark, welcomed participants to the meeting.

2. Country reports - Cropping season 2018 (presentations available on the NORBARAG website)

Sweden (Gunilla Berg, Jordbruksverket): cold early spring, generally even temperatures during summer, with some rain events. Sweden has had major change in available active ingredients since last years. Nearly all products (also SDHI) have been made available, with the exception epoxiconazole and chlorothalonil. Efficacy of azoles on STB continues to decline. Proline is now at 30%. Ramularia created major problems in barley 2017. Resistance is developing in the Ramularia populations to azoles (Bayer). Only low levels of SDHI mutations seen so far.

Lithuania (Roma Semaškienė, LZI): June and July were very rainy. May was dry. Low levels of STB, some attack of TB. Barley: Mildew (5-26%= and net blotch (5-12%) and Ramularia (5-20%). Seed treatment against net blotch is similar to spraying products. See major problems with control. *M. nivale* found widespread in spring and winter wheat. 0-39% infection levels in 46 different samples from 2017. Also fusarium is seen as a seed born problems. Winter wheat cultivars are ranked for susceptibility to Fusarium head blight. Also ranking in spring barley. Fusarium on none cereal crops is investigated and very diverse – and varies depending on the rotation.

Latvia (Zane Dumbre, LAAPC): rainy and cold. May was dry. Heavy rain in June and July. Winter wheat cultivar Skagen very commonly grown. Tan spot is the most dominated disease in winter and spring wheat. When beans are pre-crop, mildew is more dominant. Less YR in 2017 compared with 2016. Rust characterized by the global references center – AU Flakkebjerg. Barley: net blotch is the dominant disease – and also Ramularia came in in 2017. Seen first time in the Baltic 2004.

Estonia (Andres Mäe, EKTI): Diseases similar to other Baltic countries - Ramularia first seen in 2012, but in 2017 it was seen in many more fields. It is becoming a more serious problem.

3. Sensitivity monitoring in cereal pathogens with a focus on barley (Rosie Bryson, BASF)

- Resistance has major impact on the lifetime of an a.i.
- Regulation has a negative impact on the available products. Vicious cycle of pesticides: Decline in innovation, loss of actives, decline/loss of performances.
- Barley production in EU: 62 mill tomnes/year in 28 EU.
- Net blotch. SDHI major problem with resistance in France, Germany, a little in UK. D—D145G seen in DK.
- 2012 first SDHI mutations in France and UK. 2017 more than half the populations has developed mutations. Six difference mutations. Emergence of mutations H277Y to H134R. C-G79R has major impact on the EC50. Cross-resistance between SDHIs is recognized.

- QoI F129L mutations has stabilized. Widespread but no major. Investigating whether there is a fitness penalty between QoI and SDHI mutations- Still unclear if this is the case.
- QoI resistance with F129L. Pyraclostrobin and picozystrobin more effective better than AZ and trifloxystrobin.
- Shift to azole seen in the Net blotch populations. Data provided by Bayer – no experiences from BASF.
- Ramularia is becoming more important. SDHI monitoring shows higher frequencies in France, Germany, and UK. Syngenta data over lapping BASF – data. Some area in Germany still have sensitive populations.
- Ramuliara is very difficult to work with in the lab. Specific mutations shows different levels of impact on the sensitivity. So fare it still looks that major areas have the same haplotypes.
- Rhyncho some shifts seen to azoles but this shift has stabilized. No other problems with resistance.
- Resistance management is getting increasing difficult. For both net blotch and Ramularia. Not yet, clear if there is disruptive azole resistance in the net blotch. France had a breakdown in culitvars resistance, which has led to major fungicide use and pushed the changes seen in mutations.

4. Sensitivity monitoring in cereal pathogens with focus on wheat

Stefano Torriani, Syngenta

- Sensitivity test of the European *Zymoseptoria tritici* population - 275 samples and 654 isolates from Europe analysed in 2017. Moderate to high disease pressure.
- *Z. tritici* monitoring has been carried out since 2004. IZM – tested . Isolates above 10 ppm appear now. No shifting in the Norbarag region. Solatanol shows the same tendency as isopyrazam. Ireland, France, Germany and the UK show higher EC50 values. Northern Germany have some shifting too.
- C-H152R give rise to the highest resistance factors. No progressing seen in C-H152R in 2017 compared with other years. T79N increase high in Ireland and the UK. DK had one isolate with T79N!
- Incomplete cross-resistance between azoles is clear. Three major shifting periods have taken place in DMI resistance. Map indicates the better of the azole actives are depending on countries. Eastern countries still have benefit from QoIs. Multisite testing. Chlorothalonil still a valid solution – no shifting.
- The *Z.tritici* populations in Ireland is different from the one in the UK, indicating that there is not so much spread from on countries to the other. Norbarag are in a better position as we have lower disease pressure and fewer applications.
- DMI resistance in TS populations. Shift occurring in the past.

Mandy Rauch, Nufarm

Azoxystrobin: No resistance to az measured *for P. hordei. P.triticina*, – air samples testing *D.teres* showed moderately adjusted resistance in Germany. Tebuconazole: *D.teres* from air samples showed moderate sensitivity.

Andrea Ficke (NIBIO)

Stagonospora nodorum isolates collected from Sweden and Norway. Test on Amistrar, Bumper and Proline. Some degree of resistance to both Amistar and Proline. Finnish isolate less sensitive to Bumper!

5. Oil seed rape and specialty crops

Jürgen Dahrmann, Bayer

- Sclerotinia: 426 mutations has impact on all SDHI. Some mutations only have impact on some SDHI.
- *Alternaria Solani*: some SDHIs are more sensitive to specific mutations than others.
- Powdery mildew on apples – all stains sensitive to SDHI.
- DMI sensitivity. Botrytis in wine – stable picture. Botrytis in strawberries. For Fenhexamid a drop is seen, but now a stable situations.
- QoI: botrytis in grape and strawberries. G143A – high levels in DK, SW, Fi, No.
- Apple scab. QoI reistance high in most countries.
- *Cercospora beticola* - high resistance levels to all actives.
- *Alternaria solani*: QoI resistance in both Germany, Netherland and DK.
- *Phytophora infestans*: no resistance seen.
- QoI resistance in Sclerotinia. Resistance not previously seen – samples from DK. With and without SHAM.
- Efficacy data indicate that QoI is less effective at this site. No target site mutations found. Ascospores germinating on no QoI medium following a later application has led to failure. Some isolates have eradicative control compromised !!!! Despite no specific target site can be measured.

Eva Edin, SLU (presentation available on the NORBARAG website)

Alternaria solani: H134R mutations found in Sweden since 2014. Population structure unique in southern Sweden. New types found in middle Sweden, with a different structure, where method does not work. Need further investigation to find out what is wrong with the method. The importance of *A. solani* or *A. alternaria* at all locations is not clear. In southern Sweden, there is a yield penalty in starch potatoes following attack of *A. solani*.

Bent J Nielsen, AU (presentation available on the NORBARAG website)

Botrytis in strawberries tested resistance to four different actives from 18 fields, three of which were organic. Widespread resistance to QoI, pyrimetanil, boscalid ----- least resistance to fludioxynil.

Katie Nielsen, NIBIO investigates resistance to botrytis particularly following that fenhexamid is expected to go out. Fitness studies will be carried out.

General activities

As in previous years, a common sampling of leaf diseases will be carried out. Those samples will be analysed at different institutes and laboratories of industrial partners. Lise Nistrup Jørgensen will send out an overview over samples 2018. Minutes of the subgroup as well as some of the presentations will be uploaded unto the new Norbarag website. It is hoped that the website will be also used to share new articles, reports and general information on resistance issues in the NORBARAG region.

Thies Marten Heick, April 17th 2018