Minnesota Small Grains Pest Survey

Madeleine Smith, Dept. of Plant Pathology, NWROC

Research Questions

Spring wheat is a major crop for producers in Northwest Minnesota and small grains have had increasing interest from producers across the rest of the state for the past eight years. Diseases, along with insect pests, have long been detrimental to the quantity and quality of the crop. One of the key elements to successful production centers is the timely and correct identification of these diseases and insect problems followed by implementation of appropriate management strategies.

Results

Two disease scouts were hired and one based at the Northwest Research and Outreach Center Crookston and one located near Fergus Falls, MN. With the support of a grant from the Minnesota Soybean Research and Promotion council, a third scout was placed in Southern MN.

Scout training on disease and insect identification and scouting methods was conducted at the Northwest Research and Outreach Center in early May for all three scouts. Scouts were trained in disease and insect identification, methods of assessing disease incidence and severity, and insect sampling. Scouts then proceeded to scout weekly from late May approximately 20 -30 fields per week in their area monitoring disease incidence and severity and the presence of insect pests.

In late May, early June wheat was generally at the Zadocks 20-30 growth stage (GS) (the beginning of tillering to pseudo stem erection). Rye scouted in Anoka and Isanti counties was far more advanced at Zadocks GS 69 (flowering complete). Tan spot was prevalent in Swift and Grant counties with incidence ranging between 15 and 26% per field with one field as high as 44%. However, severity was generally low (10-15%) at this stage of the season. Leaf rust was detected at low incidence and severity in a few fields in Wright, Norman and Clay counties. Low incidences of Septoria spot blotch were reported in Ottertail County and low incidences (2-8%) Barley yellow dwarf were reported in Pope, Swift and Ottertail Counties. Stripe rust was noted in winter wheat trials at the University of Minnesota Southwest Research and Outreach Center at Lamberton.

In southern counties, low incidences of Army worm were also reported. Cereal aphids were abundant in the southern part of the state in winter cereals, but also were starting to be reported in low number in hard red spring wheat varieties. Molecular testing of aphids for detection of Barley yellow dwarf virus in the Smith lab, suggested that although some of these aphids were viruliferous (carrying virus), the proportion of the early influx of aphids carrying BYDV was low.

As the month of June progressed, leaf rust continued to be detected in some wheat fields in southern MN and as the disease developed, a few fields had high incidences in Anoka and Isanti counties (90-96%0, the disease severity was around 20-30%. Tan spot, Septoria spot blotch and Barley yellow dwarf remained the prevalent diseases present in central Minnesota. Wheat had progressed to Zadocks GS 65 in northern counties, rye in the southern part of the state ranged from Zadocks GS 70-85. The first scouting report of Fusarium head blight was made in a field in Wilkin county in spring wheat which had already completed flowering, incidence and severity were both recorded 20% in this field. By the end of June, cereal aphids had moved in to northern counties in reasonable numbers in Kittson and Marshal counties. Stripe rust was still being sporadically reported but conditions had become much less favorable for stripe rust with warmer temperatures, and development had greatly slowed or halted. In many areas development of leaf rust also halted due to drier conditions. Incidence of Fusarium head blight was starting to increase in southern Minnesota as conditions during and post flowering in many areas had seen periods of high relative humidity. Tan spot continued to be prevalent at 20-30% incidence in central Minnesota, with severities in a similar range.

By mid-July the wheat (and other small grains such as oats and rye) in the southern part of the state (Stearns, Hennepin and Shurburn counties) was well in to ripening and so scouting more or less ceased in these areas. In central and Northern Minnesota wheat was in the early milk stages of grain ripening. At this time growers were noting discolored awns indicative of Fusarium head blight infection under conditions of high relative humidity. In areas which had received large precipitation events, the evidence of Fusarium head blight infection was more marked. This varied greatly by field indicative of the interaction of varietal resistance, maturity date and weather conditions in certain areas, influencing correct timing of fungicide applications.

Scouting continued until early August in the northern part of the state where symptoms of infection by Bacterial leaf streak (BLS) were reported. It is typical for BLS to become apparent after heading and this was certainly the case this year.

continued on pages 36 - 37

From the scouting effort in 2016 it is clear that the major leaf diseases early in the season were tan spot and Septoria spot blotch. Although there was evidence of both stripe and leaf rust in the southern part of the state, these diseases did not become prevalent as in previous years, largely due to environmental conditions not being conducive for either disease to take hold. Cereal aphids did move up from the southern part of the state and did carry Barley yellow dwarf throughout the state although incidences appeared to be low and molecular testing showed that this year the early influx of aphids from the southern US did not have a large proportion of viruliferous individuals. Fusarium head blight was again an issue in the state, helped by high relative humidity (RH) days (frequently reaching 100% RH) from consistent and frequent rainfall in many parts of the state. BLS in the latter part of the season was prevalent although in many cases the disease was not largely visible until after heading had occurred. Oat crown rust was prevalent in oats although not necessarily reaching high levels of disease severity, especially where fields had been sprayed with fungicide for control.

Due to the generally lower numbers of barley acres planted verses wheat, the number of barley fields scouted was relatively lower. The main disease identified in fields was net blotch.

Map images generated in collaboration with North Dakota State University showing the results of the combined Integrated Pest Management (IPM) program scouting efforts throughout the season can be viewed at https://www.ag.ndsu.edu/ndipm. Figures included in this report show final end of season data for the main diseases noted in Minnesota. Fig. 1 shows the locations scouted throughout the season in Minnesota and North Dakota as well as the final growth stages at the end of the season.

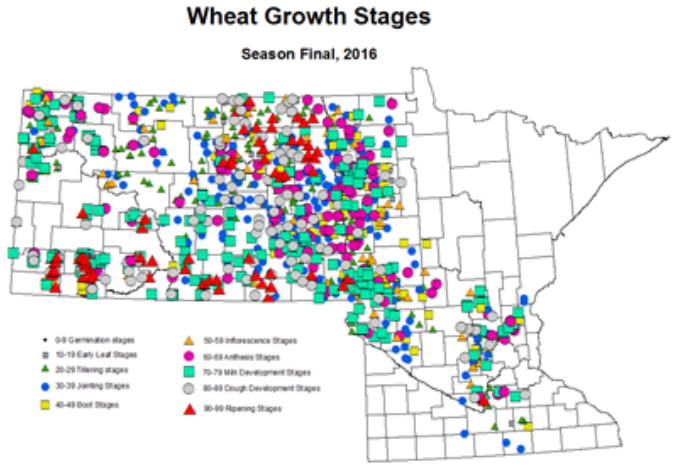

Fig. 1. Final wheat growth stages and locations scouted for the 2016 growing season in North Dakota and Minnesota

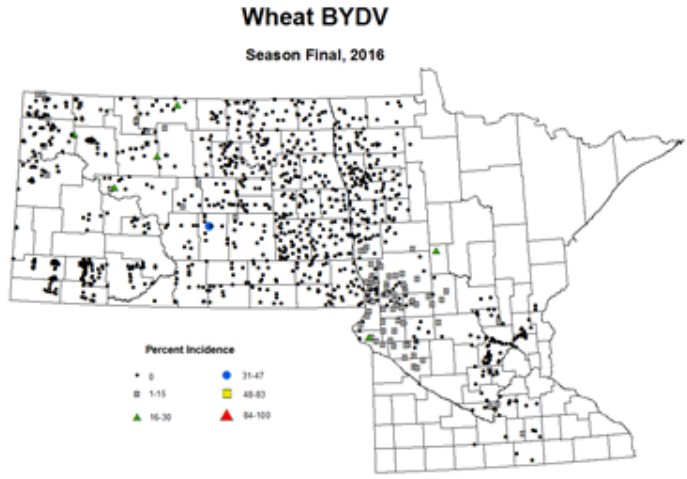

Fig. 2. Incidence of BYDV during the 2016 growing season in North Dakota and Minnesota.

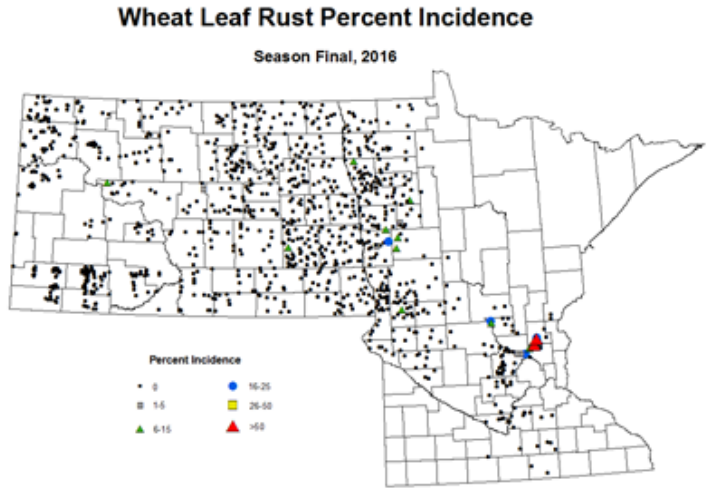

Fig. 3. Incidence of Leaf rust in % as the final number of instances from the 2016 growing season in North Dakota and Minnesota.

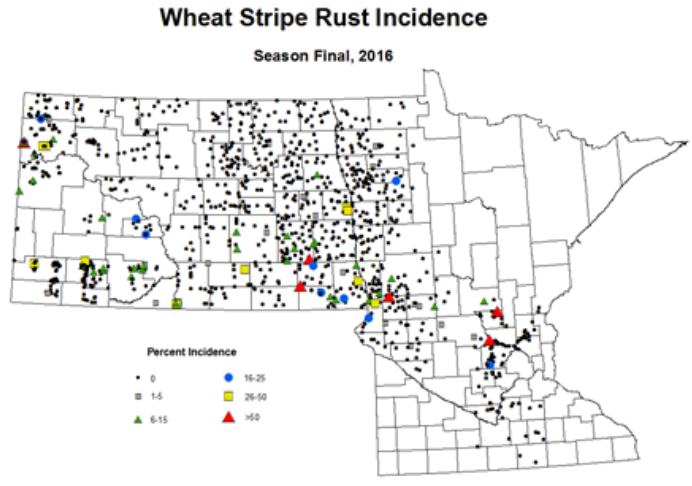

Fig. 4. Incidence of Stripe rust during the 2016 growing season North Dakota and Minnesota.

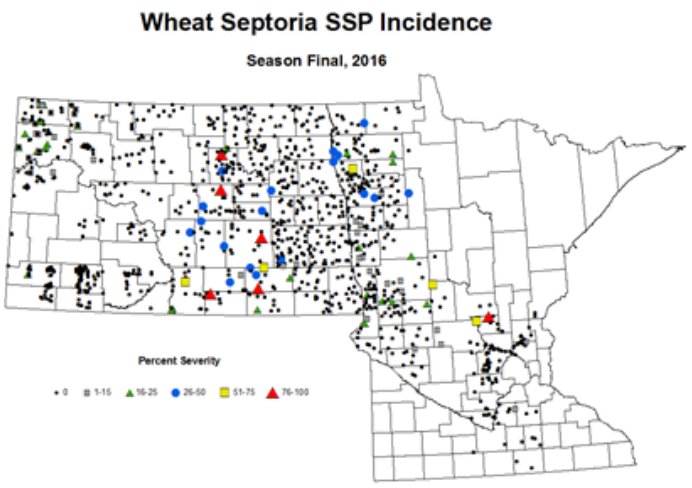

Fig. 5. Incidence of Septoria spot blotch duringthe 2016 growing season in Norht dakota and Minneosta.

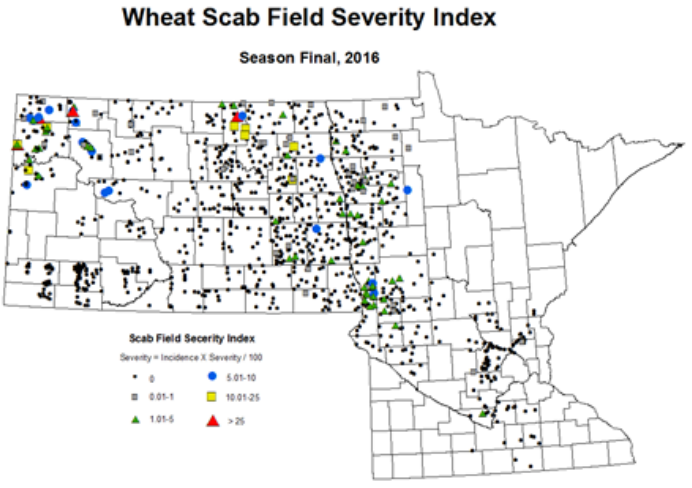

Fig. 6. Scab severity Index at locations scouted in the 2016 growing season in North Dakota and Minnesota.

Application and Use

The application of the disease scouting is to provide timely information to growers to raise awareness of disease issues in their areas. Growers can then make informed decision about whether to spray pesticides for disease and insect control and what products are best to use given the current scouting reports on disease. This can save the grower both application costs by not spraying when there is not threat of disease or insect problems and not wasting application and product costs on products that may not be appropriate to the current pest. Over a period of several growing seasons, growers are able to discern how frequently diseases occur in their area.

Materials and Methods

The MN survey was conducted according to the same protocol followed by the NDSU IPM survey so the output could be merged and reflect a regional effort.

Each scout surveyed 7-10 fields per day for a total of 20-30 per week throughout the growing season starting in mid/late May and extending into mid-August.

Scouts were trained at the Northwest Research and Outreach Center in disease and insect identification for all common small grains pests.

Disease incidence and severity, as well as the extent of any insect pests, were assessed as scouts walked a large ‘W’ pattern through each field, observing incidence and severity at the five points of the ‘W’. Disease incidence was recorded as the presence or absence of a disease or insect per total number of plants examined per field and expressed as %. Severity of disease was assessed by % leaf area affected by the disease and averaged per field.

Field cards indicating general growth stage, crop and field condition and general notes as well as disease severity and incidence as well as the frequency if insect pests were recorded for each filed surveyed. Where identification needed to be confirmed, plant samples were collected and sent back to the smith lab for further laboratory testing.

Data was collated each week and sent to NDSU for inclusion in the weekly regional distribution maps including North Dakota and Minnesota.

Notifications were sent out via scabsmart, Minnesota Association of wheat growers disease forecasting site as well as at grower meetings held throughout the summer in locations around MN.

Related Research

This project continues the highly successful Minnesota program which has been conducted over the last three years previously funded by the MWRPC. Data collected from this project dovetails with the NDSU IPM survey program to create a regional picture of disease incidence and distribution.

In addition, this project also feeds in to the Upper Great Plains Wheat Pathology Collaboration (UGPWP) recently funded by MWRPC by both providing current information on pathogen and insect distribution and population structures, but also by providing an insight in to upcoming disease issues in the state that inform future research aims and objectives of this interdisciplinary plant pathology team.