Wheat Stem Sawfly in North Central North Dakota

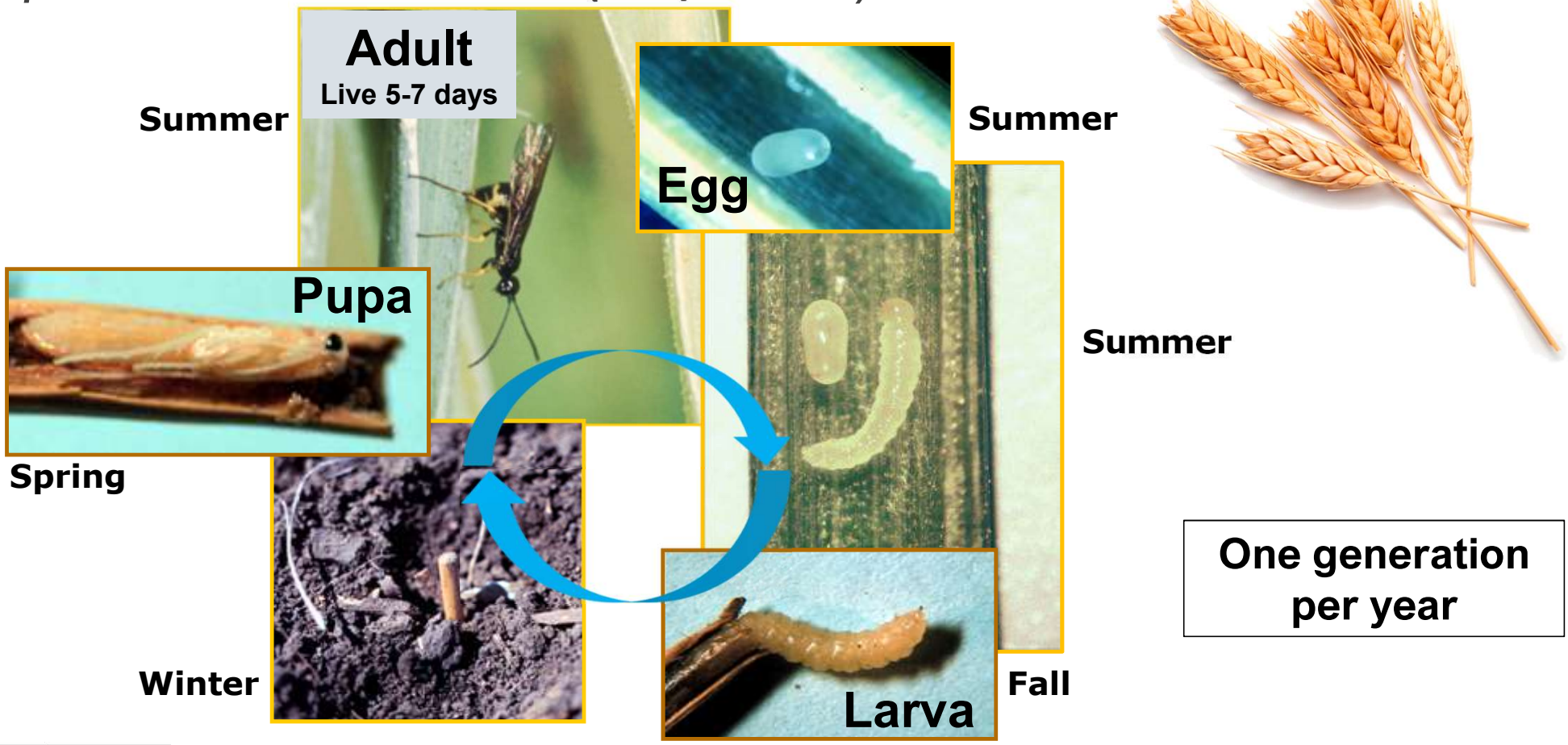
T.J. PROCHASKA, PH.D.
NDSU EXTENSION
NORTH CENTRAL REC
MINOT, ND

NDSU NORTH DAKOTA STATE UNIVERSITY

NDSU | EXTENSION

This Photo by Unknown Author is licensed under CC BY-SA-NC

Wheat Stem Sawfly
Cephus cinctus Norton (Cephidae)



One generation per year

Damage caused by Wheat Stem Sawfly

- **Reduced yield**
- **Stunted head with fewer kernels & lower kernel weight**
- **Reduced protein content**
- **Lodging**
  - **Harvest problems**

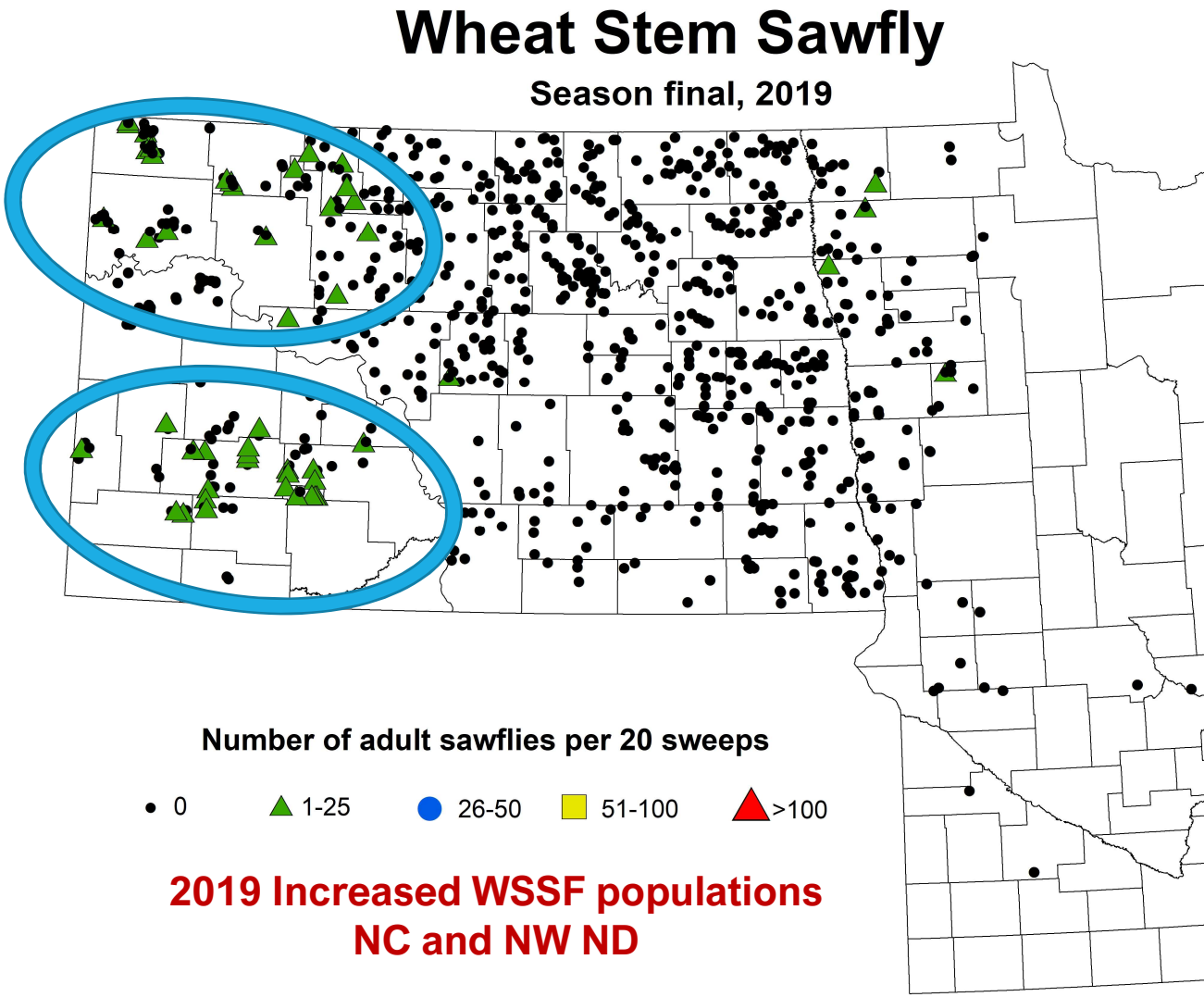
2019 Wheat Stem Sawfly Observations

Observations provided by NDSU Extension IPM Scouting Teams

North Central Region Scouts:
Caleb Cross
Riley Racine

Lead IPM Coordinators:
Janet Knodel
Patrick Beauzay
Andrew Friskop
Sam Markell

NDSU | EXTENSION



Acknowledgements for 2019

NDSU IPM Scouts:

- **Allison Fugle**, Carrington REC with Greg Endres
- **Kia Ward**, Dickinson REC with Ryan Buetow
- **Caleb Cross and Riley Racine**, North Central REC with T.J. Prochaska
- **Scott Roseth and Nicole Stanhope**, Williston REC with Audrey Kalil
- **Tyler Lux**, NDSU campus, Fargo with Jan Knodel, Andrew Friskop and Sam Markell.
- **Nancy Feil and Traci Murphy**, Langdon REC with Leslie Lubenow and Benson County Extension Office with Scott Knoke

- Data compliation: Darla Bakko, NDSU Dept. of Plant Pathology
  ArcMap programming: Honggang Bu, NDSU Dept. of Soil Science

Supported by the Crop Protection and Pest Management Program [grant no. 2017-70006-27144/accession 1013592] from the USDA National Institute of Food and Agriculture and the North Dakota Department of Agriculture CAPS Program.

IPM: Cultural Strategies

Crop Rotation

- **Plant immune or resistant crops**
  - **Oats immune**
  - **Barley – sawfly do not thrive**
  - **Durum – less cutting due to tougher outer stems tissues and increased pith**
  - **Broadleaf crops = non-hosts**
- **Wheat on wheat favors increases in sawfly populations**

IPM: Cultural Strategies

Early harvest before sawfly-infested wheat lodges

- **If more than 15 percent of stems are infested by sawflies, producers should swath early**
- **Swathing as soon as kernel moisture drops <40%**

Solid-Stemmed Wheat Cultivars with Resistance to WSS

Table 1. Released wheat cultivars with resistance to wheat stem sawfly.

Wheat cultivar	Type[1]	Year Released	Releasing Agency[2]
Choteau	HRS	2003	MAES
AC Lillian	HRS	2005	AC
Corbin	HRS	2006	WB
Mott	HRS	2009	NDAES
Duclair	HRS	2011	MAES
SY Tyra	HRS	2011	AP
WB Gunnison	HRS	2011	WB
WB 9879 CLP	HRS	2012	WB
WB 9377	HRS	2014	WB
WB9653	HRS	2015	WB
Genou	HRW	2004	MAES
Bearpaw	HRW	2011	MAES
Judee	HRW	2011	MAES
WB Quake	HRW	2011	WB
Warhorse	HRW	2013	MAES
Explorer	HWS	2002	MAES
Agawam	HWS	2005	WB
WB Prestea	HWS	2012	WB

[1] HRS = hard red spring wheat, HRW = hard red winter wheat, HWS = hard white spring wheat.

[2] AC = Agriculture Canada; AP = AgriPro; MAES = Montana Agricultural Experiment Station; NDAES = North Dakota Agricultural Experiment Station; WB = WestBred LLC.

This Photo by Unknown Author is licensed under CC BY-NC-ND

Dr. Andrew Green
NDSU Wheat Breeder

Dr. Green's Research & Future Efforts

Collaborative project with Harris and Knodel

- Screen and characterize wheat stem sawfly varieties at a site near Powers Lake
- Still collecting data for larvae counts, stem solidity, and parasitism
- Not much data to share yet
- Initial conversations say most varieties had larvae present in stem

Small breeding effort underway

- Develop varieties resistant to wheat stem sawfly
- Testing a line in the Uniform Regional Nursery this year
- Performing very well for sawfly resistance, even under heavy pressure
- Objective: replace variety Mott with something more resistant to Fusarium Head Blight and with higher milling and baking quality

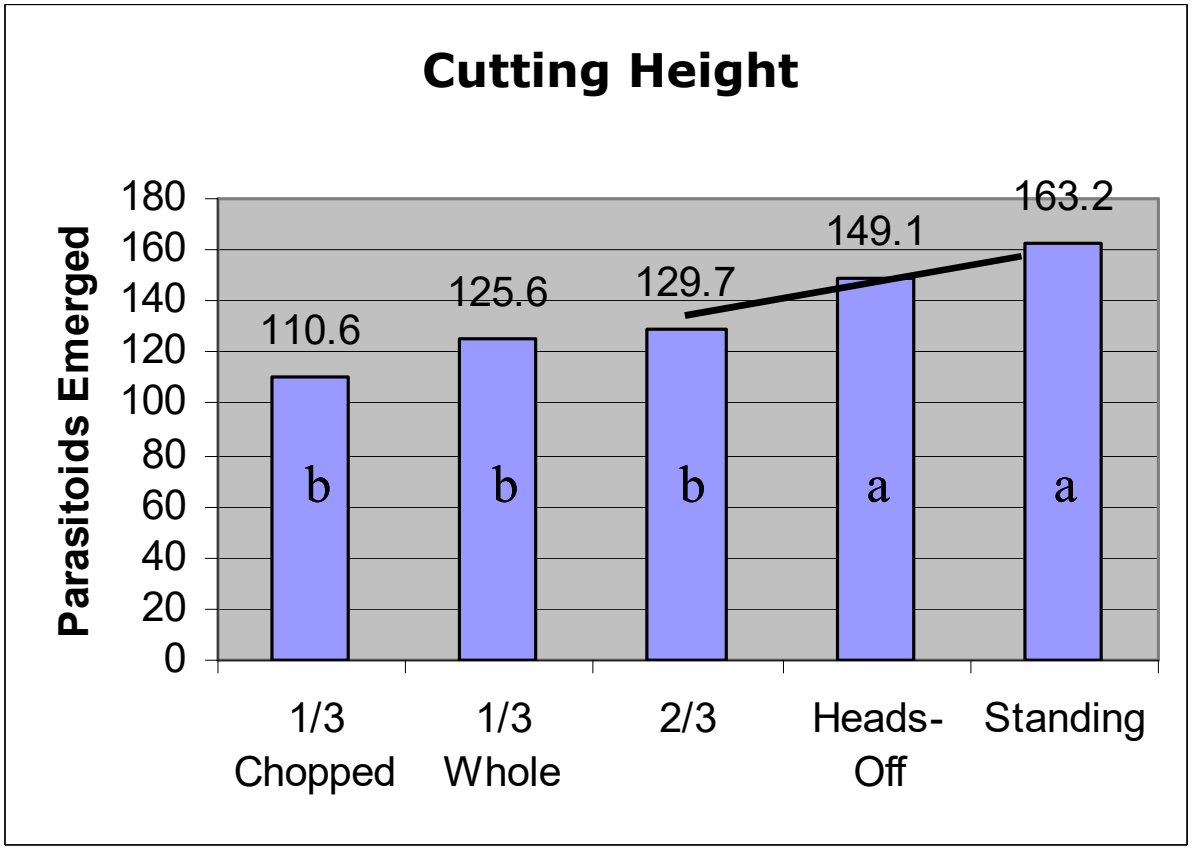
IPM: Biological Control

- **Parasitic Wasps**
- ***Bracon cephi* (Gahan)**
  - ✓ **Wheat**
  - ✓ **Effective in solid-stemmed wheat varieties**
- ***Bracon lissogaster Muesebeck***
  - ✓ **Native grasses**
  - ✓ **Stems are NOT cut**
  - ✓ **Parasitoids reduce sawfly survival and head damage**

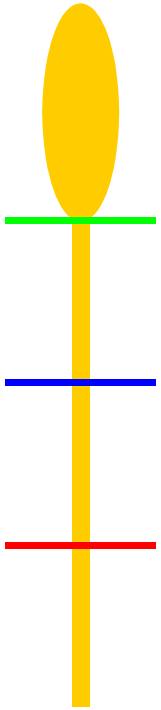
Source: D. Weaver, Montana State Univ.

RKD Peterson

Parasitoid Conservation



Taller residue is better

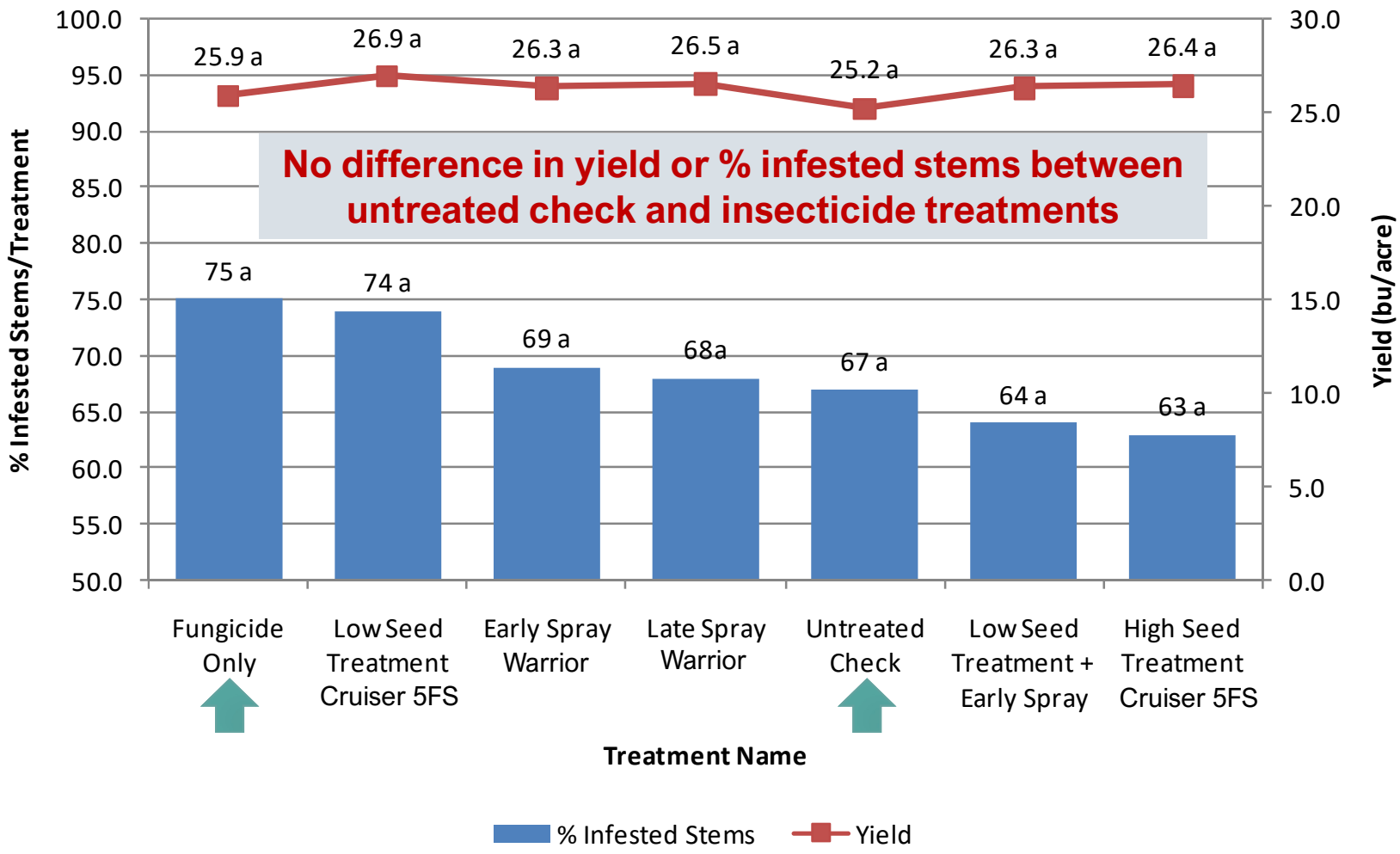


Source: D. Weaver, MSU

Wheat Stem Sawfly Ward Co.

Warrior:
Early Spray
4-6 leaf

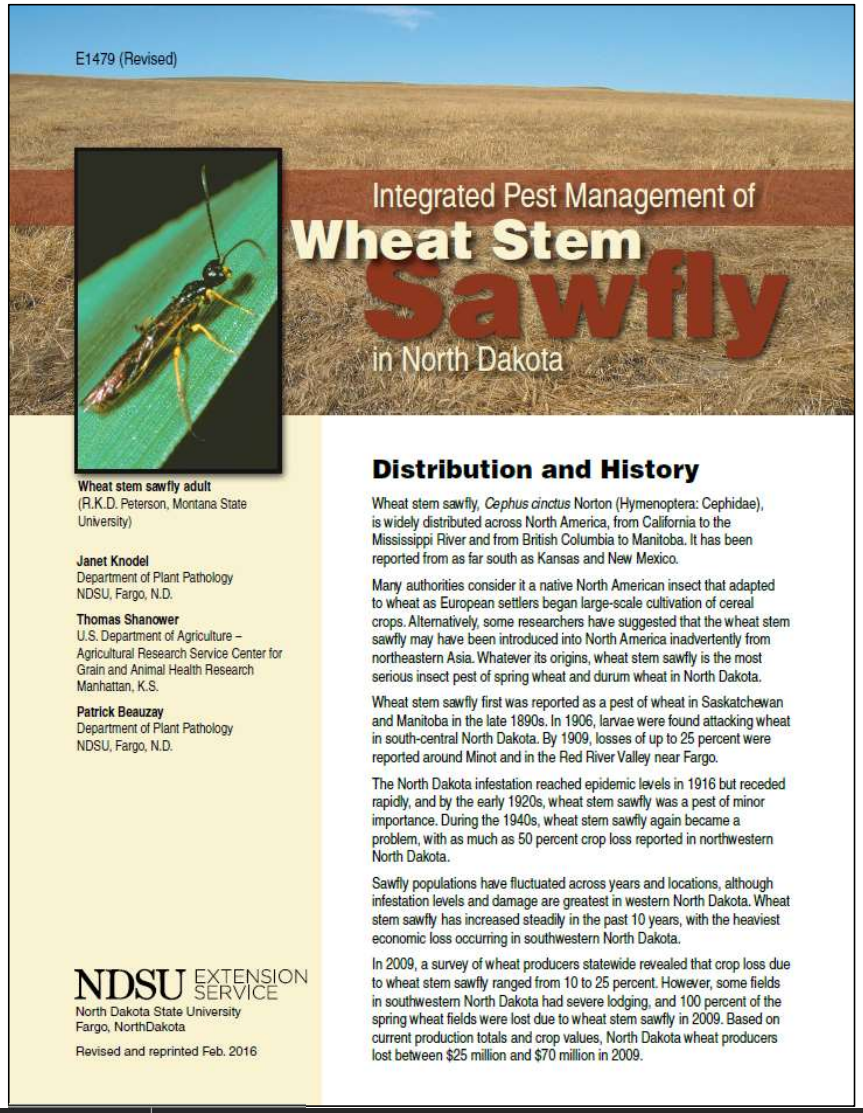
Late Spray
Flag leaf



Why Do Insecticides Not Control Wheat Stem Sawfly (WSS)?

- **Adult WSS emergence period is long (≈1 month)**
- **Adult WSS has a short life span and spends little time feeding or imbibing water, so insecticides would only kill by 'contact' at time of application**
- **Eggs, larvae and pupae are protected inside stem**
- **Most foliar insecticides are short residual of <7-10 days**
- **Adult WSS prefer to oviposit in stems of spring wheat during stem elongation (60-70 days after planting)**
  - **Seed treatment - Thiamethoxam residual = 30-40 days**

Knodel et al. 2009. J. Agric. Urban Entomol. 26 (4): 183-197


E1479 (Revised)

Integrated Pest Management of
Wheat Stem
Sawfly
in North Dakota

Wheat stem sawfly adult
(R.K.D. Peterson, Montana State University)

Janet Knodel
Department of Plant Pathology
NDSU, Fargo, N.D.

Thomas Shanower
U.S. Department of Agriculture – Agricultural Research Service Center for Grain and Animal Health Research
Manhattan, K.S.

Patrick Beauzay
Department of Plant Pathology
NDSU, Fargo, N.D.

NDSU EXTENSION SERVICE
North Dakota State University
Fargo, NorthDakota

Revised and reprinted Feb. 2016

Distribution and History

Wheat stem sawfly, *Cephus cinctus* Norton (Hymenoptera: Cephidae), is widely distributed across North America, from California to the Mississippi River and from British Columbia to Manitoba. It has been reported from as far south as Kansas and New Mexico.

Many authorities consider it a native North American insect that adapted to wheat as European settlers began large-scale cultivation of cereal crops. Alternatively, some researchers have suggested that the wheat stem sawfly may have been introduced into North America inadvertently from northeastern Asia. Whatever its origins, wheat stem sawfly is the most serious insect pest of spring wheat and durum wheat in North Dakota.

Wheat stem sawfly first was reported as a pest of wheat in Saskatchewan and Manitoba in the late 1890s. In 1906, larvae were found attacking wheat in south-central North Dakota. By 1909, losses of up to 25 percent were reported around Minot and in the Red River Valley near Fargo.

The North Dakota infestation reached epidemic levels in 1916 but receded rapidly, and by the early 1920s, wheat stem sawfly was a pest of minor importance. During the 1940s, wheat stem sawfly again became a problem, with as much as 50 percent crop loss reported in northwestern North Dakota.

Sawfly populations have fluctuated across years and locations, although infestation levels and damage are greatest in western North Dakota. Wheat stem sawfly has increased steadily in the past 10 years, with the heaviest economic loss occurring in southwestern North Dakota.

In 2009, a survey of wheat producers statewide revealed that crop loss due to wheat stem sawfly ranged from 10 to 25 percent. However, some fields in southwestern North Dakota had severe lodging, and 100 percent of the spring wheat fields were lost due to wheat stem sawfly in 2009. Based on current production totals and crop values, North Dakota wheat producers lost between $25 million and $70 million in 2009.

Extension Outreach – Wheat Stem Sawfly

E1479 - IPM of Wheat Stem Sawfly in ND

- http://www.ag.ndsu.edu/publications

NDSU Extension YouTube Videos:

- IPM of Wheat Stem Sawfly (17.36 minutes)
  - http://www.youtube.com/watch?v=_4bhsCBj_u8
- Swath Grain with Heavy Infestation of Wheat Stem Sawfly (3 minutes)
  - http://www.youtube.com/watch?v=bFpiKCGzlWY