Wisconsin Crop Manager

Volume 16 Number 22 - - - University of Wisconsin Crop Manager - - - July 30, 2009

Managing your combine

Matthew Digman, Biological Systems Engineering, University of Wisconsin - Madison

If this is your first wheat harvest or if you are a veteran farmer, you'll find it profitable to take a closer look at how you are managing your combine. There are five basic functions of your combine: cutting and feeding, threshing, separating, cleaning, and handling. Let's see how to optimize settings for each of these systems to minimize grain loss and damage while maximizing productivity.

The first system, cutting and feeding, necessitates a look at your grain header. The goal should be to harvest just enough straw in each pass, cutting the plant a little below the head, so the grain feeds evenly into the combine. This will maximize capacity and, therefore, the harvesting efficiency of the combine, ensuring timely harvest of the crop. The primary reason for minimizing straw in the combine is to maximize the machine's capacity to collect grain rather than straw. By cutting less straw, you allow your machine to cover more acres in less time. Your combine, however, may have plenty of capacity, and you might benefit from harvesting grain and windrowing straw in a single pass if you plan to bale straw afterwards. In this case, the suggestions here are still valid, but managing your grain losses will be more challenging.

Let's get back to the header. The reel's job is to position the head of the wheat just behind the cutterbar so that when the plant is cut it falls gently onto the platform. To obtain this goal, the outside tip of the reel must be moving slightly faster than the ground speed of the combine. Check in your operator's manual for suggested ground and reel speeds. Dull sickle knives and improper clearance between the sickle and guard not only cause greater shatter losses but also reduce capacity. So, checking the condition of the sickle and replacing it, if necessary, will minimize shatter loss without limiting ground speed.

Now the grain and straw are moving along the feeder-house to either the cylinder or rotor and concave. The rotor/cylinder adjustment is the next line of defense against grain loss. Proper clearance and speed will ensure maximum threshing while minimizing grain damage. Your operator's manual will outline specific settings for your machine for wheat. On conventional machines, be sure to check concave clearance on either side of the cylinder to ensure adjustment is even across the cylinder. It is also prudent to physically measure this clearance, as wear and maladjustment can lead to erroneous indicator readouts. In general, your goal will be to operate the machine with minimal rotor/cylinder speed and maximum concave clearance while still threshing the grain. Under-threshing will mean trouble for downstream separation and cleaning processes while over-threshing will lead to grain damage. A good indicator of over-threshing is excess size-reduction of the straw. Be sure to also look for damaged grain on the ground rather than in the grain tank as the grain's small size will cause it to be blown over the cleaning shoe.

Now that the grain has been threshed, we need to separate it from the straw. In a conventional combine this is accomplished through the straw walker while rotary combines rely on the centrifugal force generated by the rotor. Over loading either machine limits its ability to separate the grain. Conventional combines are particularly sensitive to overloading as the straw walkers become overwhelmed with straw.

Next, we are on to cleaning. The cleaning system consists of the fan, the top chaffer sieve where the gross cleaning occurs, and the shoe sieve where final cleaning is done. Losses in the cleaning shoe can occur from several factors, one of which is the over-threshing mentioned in the previous section. Small pieces of over-threshed straw can fall onto the chaffer sieve and overload it, preventing grain from falling onto the shoe sieve and consequently blocking air flow.

Another loss factor involves the chaffer openings and the airflow that ensure straw is passed over while grain falls to the shoe sieve. Once again, your operator's manual should specify both fan and opening settings for wheat. It is important to note that openings for both the chaffer and shoe sieve are measured perpendicular to the louvers. Airflow that is too high and/or openings that are too small can cause a lot of material to end up

in tailings, which limits combine capacity, or can cause grain to be ejected from the rear of the combine and be lost. Airflow that is too low and/or chaffer openings that are too large can overwhelm the shoe sieve, resulting in grain loss. Airflow is affected by changing chaffer openings, so the two should be adjusted together.

Finally, we are ready to adjust the shoe sieve. Sieve openings should be such that grain can fall through, but the straw cannot. If you see straw in the grain tank, the sieve is open too far, or if you recall from above, you may have an over-threshing situation. On the other hand, it is important to make sure the openings are large enough so that grain can fall through and isn't being recycled as tailings.

Crop conditions change throughout the day and from field to field, so it's important to periodically check combine performance. Grain losses can occur from the shattering of standing grain and the shattering at the header, in addition to the losses associated with threshing, separating and cleaning. Loss assessments can easily be made before harvest, after cutting with the header, and after threshing, separating and cleaning.

The first two losses, pre-harvest and header, can be estimated using a quick rule of thumb: twenty wheat kernels in one square foot of ground means one bushel per acre loss. So, if you can fashion a one-foot square or if you can estimate a foot with your size 13 boots, you can get a pretty good idea of your grain loss. Also, be sure to take the measurements in a few places in case you unluckily set your square in an area that's not representative of the rest of the field.

Estimating your threshing, separating, and cleaning losses is a bit more challenging. First, you have to subtract out your field and header losses (unless you are just looking for a total loss value). Second, you have to consider that your combine may be consolidating up to a 35-foot swath into a narrow area, depending on how you're managing your straw. If your machine is spreading the straw the full width of the combine then you can use the previous rule of thumb. Otherwise, a group at Kansas State provides us a correction factor. They suggest that for machines without a spreader you'd look for 80 kernels per square foot; for a set up with a bat type spreader, 65 kernels; and for a chaff spreader, 25 kernels. This assumes a header to separator width ratio of 4:1. Rotary combines may push this ratio to 5:1 or higher. Under this scenario your loss counts would increase to 100, 80 and 30 for no spreader, bat spreader and chaff spreader, respectively. When using these adjustment factors be sure to take your loss measurements in the area where the straw was spread.

Harvesting losses (remember to subtract pre-harvest or field losses) of about two percent of total grain yield are acceptable, but all loss programs must be weighed against their timeliness costs. Continual machine adjustment and slowing harvest rate to ensure every last grain ends up in the grain tank can be detrimental if test weight is decreasing. Lost test weight is only the beginning of lost revenue. The crop becoming too dry can lead to shattering while standing or at the header. Furthermore, rehydration of grain can result in grain damage. For more information or resources, please visit the University of Wisconsin Cooperative Extension Team Grain website at http://www.uwex.edu/ces/ag/teams/grains.

Wisconsin Vegetable Crop Update, 2009-7

Alvin J. Bussan, Potato and Vegetable Cropping Systems Specialist, UW-Madison, Department of Horticulture

Vegetable Crop Update newsletter issue seven is out! This marks the seventh newsletter of the 2009 year. Weekly updates should be available as disease, insect, weed, fertility, and crop progress changes.

Upcoming events include:

Thursday, August 6, 2009 – Potato Field Day, Hancock Ag Research Station

Friday, August 7, 2009 – Langlade Co. Potato Field Day, Antigo

Tue – Wed, August 11-12, 2009 – Sweet Corn Hybrid and Snap Bean Demonstration Tour, Hancock

The seventh issue has been posted on the IPCM web site on a new page titled appropriately: The Vegetable Crop Update page. Look for a new menu item under "WCM-News" to find this page, or click here >>> http://ipcm.wisc.edu/WCMNews/VegCropUpdate/tabid/115/Default.aspx

Monsanto and Dow AgroSciences Complete Regulatory Authorizations for SmartStax™ Corn Hybrids

Eileen Cullen, Extension Entomologist

Monsanto and DowAgroSciences, in a cross-licensing agreement, announced on July 20 that they have received registration approval from the U.S. Environmental Protection Agency (EPA) and a regulatory authorization from the Canadian Food Inspection Agency (CFIA) to commercialize SmartStaxTM corn hybrids in 2010. The hybrids will express the following insecticidal proteins: Cry3Bb1 (event MON88017), Cry34/35Ab1 (event DAS-59122-7), Cry1F (event TC 1507), and Cry1A.105+Cry2Ab2 (event MON89034).

In addition to targeting corn rootworms and the lepidopteran complex, SmartStaxTM hybrids will provide herbicide tolerance to glyphosate and glufosinate. The US EPA and CFIA approvals will enable producers in the US Corn Belt and Canada who use the hybrids to reduce refuge size from 20% to 5%. Cotton Belt producers will be able to reduce their refuges from 50% to 20%. In a joint news release, the companies indicated they intend to introduce SmartStaxTM hybrids across 3 to 4 million acres in 2010.

Extension entomologists learned about the new regulatory authorizations, at the time of the July 20 press release. Some take home points for now are summarized below.

- The U.S. EPA approval took into account data on the "pyramid" strategy of a transgenic crop producing 2 different Bt toxins targeting the same pest. For example, in the SmartStaxTM case, Cry3Bb1 and

Cry34/35Ab1 both target corn rootworms, while Cry1F and Cry1A.105+Cry2Ab2 both target the lepidopteran pest complex. Multiple modes of action for corn rootworm and multiple modes of action for the lepidopteran pest complex are a factor in reduced structured refuge size and long-term durability of corn Bt insect trait technologies. This "pyramid" strategy is based on the concept that selection for resistance to 1 toxin does not cause cross-resistance to the other toxin (e.g., because the Bt toxins bind to different larval midgut target sites).

- A "stacked" trait is not necessarily a "pyramided" trait. For example, currently reginstered Bt corn hybrids with a single Bt corn rootworm trait, a single Bt lepidopteran trait, and a herbicide tolerance trait are commonly referred to as "stacked trait" hybrids.
- Refuge reduction from 20% to 5% is not authorized for existing single trait Bt corn hybrids or those stacked trait hybrids that combine single traits for corn rootworms and Lepidoptera (see bullet point above).
- SmartStaxTM regulatory approval for 2010, with its reduced refuge from 20% to 5% is not "refuge in the bag" Optimum AcreMax 1 or Optimum AcreMax 2. Pioneer Hi-Bred International has sought approval for seed blends and refuge reduction, but this, to the best of my and my North Central Region Extension Entomologist colleagues' knowledge and communications with government and industry, is still pending EPA approval and has not been approved at this time.

Do Not Let Western Bean Cutworm Catch You Off-Guard

Eileen Cullen, Extension Entomologist

Wisconsin looks to be in for our highest Western Bean Cutworm pressure yet. Don't let WBC larvae in field and processing sweet corn ears catch you off guard in August and September. Scouting now is critical to determine field infestation and prevent populations from reaching economic injury level. Economic (treatment) thresholds of 8% infestation for field corn, and 4% infestation for processing sweet corn, are set to prevent densities from reaching the economic injury level.

Please refer to last week's Wisconsin Crop Manger article titled ***Western Bean Cutworm Moths Flying, Scout Field and Sweet Corn*** for full information on managing this late season corn ear pest. In addition to the article, several links are provided to the UW Entomology educational package on managing this pest (UW Extension fact sheet, pheromone trapping, economic thresholds for field and sweet corn, webinars, photo galleries, plus a primer on using insect degree days to predict emergence and egg laying for WBC). All of these resources are web based and available for free download.

Andy Barta, Agronomist with Rio Creek Feed Mill, reported 7/28, that Western Bean Cutworm (WBC) moth pheromone trap captures are high in **Northern Door County (all north of Sturgeon Bay).** Andy is hearing from three different farmers about high trap captures (one farmer stated he is catching about 40 moths per day this past week). Another large grower in that area scouted and found about 10% of plants in fields monitored with white to purplish colored egg masses. That is above the 8% treatment threshold for field corn and the grower is planning to spray next week as small larvae hatch. Areas in and around Door County had economic populations of WBC larvae in corn ears last year in 2008. Based on moth flight trap numbers and egg masses scouting thus far, I expect heavy pressure in the area again in 2009.

Bill Halfman, UW Extension Monroe County, reported this morning heavy WBC moth captures in his blacklight trap. Bill counted 165 moths/week on 7/23, and 73 moths/week 7/29. Neither blacklight nor pheromone trap captures tell you threshold numbers in a field (scouting will give that information, see article link above). However, these heavy moth flight detections certainly indicate we are potentially in for a heavy WBC larval population in the coming 1-2 weeks, depending on your location in the state and degree-day accumulations.

Processing company agronomists have reported to me this week from the Central Sands area higher moth flights than this time last year, and they too are finding WBC egg masses in later planted fields. Processing sweet corn WBC management should take into account sweet corn planting date, and WBC moth emergence degree days. The earliest planted sweet corn (April) will be harvested in the coming 7-10 days, while the later planted acreage is closer to pre-tassel and row tassel stages. WBC moths prefer to lay eggs on late whorl stage corn through early tassel. Many sweet corn processors and growers run a 2nd generation European Corn Borer (and Corn Earworm) trapping and insecticide management spray program. Keep in mind the degree-days (DD) for WBC and 2nd generation ECB moth emergence and egg-laying are slightly off-set from each other. WBC moths and eggs are first. Approximately 25% of WBC moths have emerged (and egg-laying has begun) after 1,320 DD (base 50F). Second generation ECB moths emerge at 1400 DD (base 50F) and first eggs at 1450 (base 50F).

Thank you to Andy Barta, Bill Halfman, and processors for your reports. All field corn and processing sweet corn growers in Wisconsin should be alert and scouting for WBC now. Foliar insecticides effectively suppress WBC small larvae, but only if applied before larvae enter the ear. If you are growing WBC protected Bt corn hybrids (currently the Herculex I or Herculex XTRA traits), remember to check non-Bt refuges.

UW-Extension/Madison Plant Disease Diagnostic Clinic (PDDC) Update

Brian Hudelson, Ann Joy, Amy Gibbs, and Brooke Weber, Plant Disease Diagnostics Clinic

The PDDC receives samples of many plant samples from around the state. The following diseases/disorders have been identified at the PDDC since July 22, 2009:

PLANT/SAMPLE TYPE	DISEASE/DISORDER	PATHOGEN	COUNTY
FIELD CROPS			
Corn (Seed)	Yellow Leaf Blight	*Phyllosticta maydis*	Dane
Corn (Unidentified)	Eyespot	*Aureobasidium zeae*	Iowas
	Yellow Leaf Blight	*Phyllosticta maydis*	Iowa
Soybean	Root Rot	*Fusarium* sp., *Phytophthora sojae*, *Rhizoctonia* sp.	Columbia, Jefferson, Trempeauleau
	Soybean Cyst Nematode	*Heterodera glycines*	Brown
Wheat	Black Stem Rust	*Puccinia graminis*	Jefferson
FRUIT CROPS			
Apple	Cedar-Apple Rust	*Gymnosporangium* sp.	Dane
Grape (Concord)	Anthracnose	*Sphaceloma ampelinum*	Brown
	Downy Mildew	*Plasmopara viticola*	Sheboygan
	Guignardia Leaf Spot/ Black Rot	*Guignardia bidwellii*	Sheboygan
Plum	Bacterial Canker	*Pseudomonas syringae*	Outagamie
Raspberry	Raspberry Leaf Spot	*Cylindrosporium rubi*	Dane
	Root/Crown Rot	*Phytophthora* sp., *Pythium* sp.	Dane
Strawberry	Root/Crown Rot	*Cylindrocarpon* sp., *Fusarium* sp., *Phomopsis* sp., *Pythium* sp., *Rhizoctonia* sp.	Brown, Clark
VEGETABLES			
Beet	Cercospora Leaf Spot	*Cercospora beticola*	Waushara
Cabbage	Growth Regulator Herbicide Damage	None	Chippewa
Onion	Purple Blotch	*Alternaria porri*	Dane
Tomato	Growth Regulator Herbicide Damage	None	Jefferson

For additional information on plant diseases and their control, visit the PDDC website at pddc.wisc.edu.