Purdue Cooperative Extension Service
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In This Issue

Insects, Mites, And Nematodes

VIDEO: Western Bean Cutworm Eggs and Hatching Larvae - (*Christian Krupke and John Obermeyer*) - The following video shows three stages of the western bean cutworm egg masses, describes how to find them on corn, and where hatching larvae go and their early feeding.

Black Light Trap Catch Report - (*John Obermeyer*)

County/Cooperator	6/5/12 - 6/11/12							6/12/12 - 6/18/12						
	VC	BCW	ECB	WBC	CEW	FAW	AW	VC	BCW	ECB	WBC	CEW	FAW	AW
Dubois/SIPAC Ag Center	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Jennings/SEPAC Ag Center	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Knox/SWPAC Ag Center	0	0	0	0	0	0	2	0	1	0	0	0	0	0
LaPorte/Pinney Ag Center	0	0	0	0	0	0	3	0	0	0	0	0	0	0
Lawrence/Feldun Ag Center	0	0	0	0	0	0	0	2	0	0	0	0	0	2
Randolph/Davis Ag Center	0	0	0	0	0	0	0	1	0	0	0	1	0	12
Tippecanoe/TPAC Ag Center	7	0	1	0	0	0	2	8	1	0	0	0	0	5
Whitley/NEPAC Ag Center	0	0	0	0	0	0	0	1	0	0	0	0	0	1

VC = Variegated Cutworm, BCW = Black Cutworm, ECB = European Corn Borer, WBC = Western Bean Cutworm,
CEW = Corn Earworm, FAW = Fall Armyworm, AW = Armyworm

Western Bean Cutworm Adult Pheromone Trap Report
Week 1 = 6/7/12 - 6/13/12 Week 2 = 6/14/12 - 6/20/12

County	Cooperator	WBC Trapped	
		Week 1	Week 2
Adams	Kaminsky/New Era Ag - Monroe	0	7
Adams	Roe/Mercer Landmark - Pleasant Mills	0	0
Allen	Anderson/Garst Seed - Churubusco	2	0
Allen	Gynn/Southwind Farms - Ft. Wayne	0	5
Benton	Babcock/Ceres Solutions - Boswell	0	
Boone	Dennis Carrell - Lebanon	0	3
Clay	Bower/Ceres Solutions - Clay City	0	1
Clay	Bower/Ceres Solutions - Brazil	0	0
Clinton	Foster/Purdue Entomology - Rossville	1	9
DeKalb	Hoffman/ATA Solutions	3	3
DuBois	Eck/Purdue CES - Jasper	0	0
Elkhart	Kaufmann/Crop Tech - Elkhart	6	9
Fayette	Schelle/Falmouth Farm Supply - Falmouth	0	
Fountain	Mroczkiewicz/Syngenta - Rob Roy	5	22
Fulton	Childs/Specialty Hybrids	144	234
Fulton	Jenkins/North Central Co-op - Kewanna	27	153
Fulton	Jenkins/North Central Co-op - Rochester	26	96
Hamilton	Campbell/Beck's Hybrids - Atlanta	0	1
Hamilton	Campbell/Beck's Hybrids - Sheridan	0	0
Hendricks	Nicholson/Nicholson Consulting - Danville	1	2
Henry	Schelle/Falmouth Farm Supply - New Castle	0	
Henry	Schelle/Falmouth Farm Supply - Millville	0	
Jasper	Overstreet/Purdue CES - Wheatfield	20	100
Jasper	Parker/Purdue - Stanley		157
Jasper	Parker/Purdue - Green		58
Jasper	Parker/Purdue - Hamstra		68

Jasper	Parker/Purdue - Kkkert		166
Jasper	Parker/Purdue - Fair Oaks		576
Jasper	Parker/Purdue - Rodibaugh		50
Jay	Shrack/Ran Del Agri Svc - Dunkirk	0	
Jennings	Bauerle/SEPAC - North Vernon	0	0
Knox	Bowers/Ceres Solutions/Frichton	0	
Knox	Bowers/Ceres Solutions/Vincennes	0	0
Knox	Hoke/SWPAC - Vincennes N	0	0
Lake	Kleine/Kleine Farms - Cedar Lake	4	34
Lake	Moyer - Schneider	45	185
Lake	Moyer - Shelby	11	63
LaPorte	Barry/Kingsbury Elevator		12
LaPorte	Rocke/Agri Mgmt Solutions - Wanatah SE	17	140
LaPorte	Rocke/Agri Mgmt Solutions/LaCrosse E	25	108
Miami	Early/Pioneer	2	11
Montgomery	Stine - Wingate	3	2
Montgomery	Stine - Wingate	0	1
Newton	Childs/Specialty Hybrids	6	
Newton	Childs/Specialty Hybrids	8	19
Newton	Childs/Specialty Hybrids	0	5
Newton	Moyer - Lake Village	15	123
Porter	Leuck/PPAC - Wanatah N	4	18
Porter	Rocke/Agri Mgmt Solutions - Francesville	20	73
Pulaski	Childs/Specialty Hybrids	35	122
Pulaski	Childs/Specialty Hybrids	71	110
Pulaski	Childs/Specialty Hybrids	50	71
Pulaski	Childs/Specialty Hybrids	9	52
Pulaski	Childs/Specialty Hybrids	8	28
Pulaski	Childs/Specialty Hybrids	4	48
Putnam	Nicholson/Nicholson Consulting - Greencastle	1	1
Randolph	Boyer/DPAC - Farmland	0	0
Rush	Schelle/Falmouth Farm Supply - Carthage	0	
Starke	Childs/Specialty Hybrids	69	150
Starke	Childs/Specialty Hybrids	48	74
Starke	Childs/Specialty Hybrids	70	95
Starke	Wickert/Wickert Agronomy Services - N. Judson	2	11
Sullivan	Bower/Ceres Solutions - Sullivan E	0	0
Tippecanoe	Bower/Ceres Solutions - Sullivan W	0	0
Tippecanoe	Bower/Ceres Solutions - New Lebanon	0	
Tippecanoe	Bower/Ceres Solutions - Farmersburg	3	3
Tippecanoe	Bower/Ceres Solutions	4	39
Tippecanoe	Nagel/Ceres Solutions - Otterbein	0	5
Tippecanoe	Obermeyer/Purdue Entomology - Agry Farm	1	2
Tippecanoe	Westerfeld/Monsanto	9	9
White	Childs/Specialty Hybrids	0	7
White	Childs/Specialty Hybrids	8	32
Whitley	Walker/NEPAC - Columbia City	0	4

Weeds

Herbicide Applications in Dry Conditions – (*Travis Legleiter and Bill Johnson*)

The lack of precipitation in Indiana is dominating the thoughts and conversations of agriculture producers in the state. We have received a few calls and request for our thoughts on how the dry conditions can affect post emergence herbicide efficacy. Simply put, tough to control weeds will become even tougher to control in the dry conditions. Species such as lambsquarter, fall panicum, yellow nutsedge, and morningglory among other hard to control weeds will become tougher to control with the dry conditions.

The majority of postemerge herbicides are systemic in activity and are more effective on actively growing plants. In the currently dry conditions producers need to increase herbicide rates and make applications at the most favorable time for increased efficacy. These favorable times include applying to smaller weeds, waiting a few days for potential rain, and making applications in the morning when weeds are most active and before leaves begin to curl and roll. The post grass herbicides (Assure, Select, Fusion, ect.) are most susceptible to decreased efficacy in dry conditions. Postemerge contact herbicides are less effected by drought stress, but should be applied at higher carrier volumes and in the morning when leaf surface exposure is most favorable for contact.

Lastly producers should maximize adjuvant loads to increase the amount of herbicide crossing the thick cuticles of drought stressed weeds. Non-ionic surfactants can be increased form 0.25% to 0.5% v/v or replaced with COC or MSO to increase herbicide efficacy. Rates of MSO and COC can also be increased from 0.5% to 1% v/v.

All in all the mentality of herbicide applications in dry conditions should not be much different than what we are already promoting on tough to control weeds. That is to make applications to small actively growing weeds using full-labeled herbicide rates and applying early in the day when plants are most active. Increases in herbicide rates, adjuvants, and adjuvant types should be considered when applying in the dry conditions. If all else fails, looking at the weather forecast and praying the 40% chance of rain in three days increases to 100% can never hurt.

Agronomy Tips

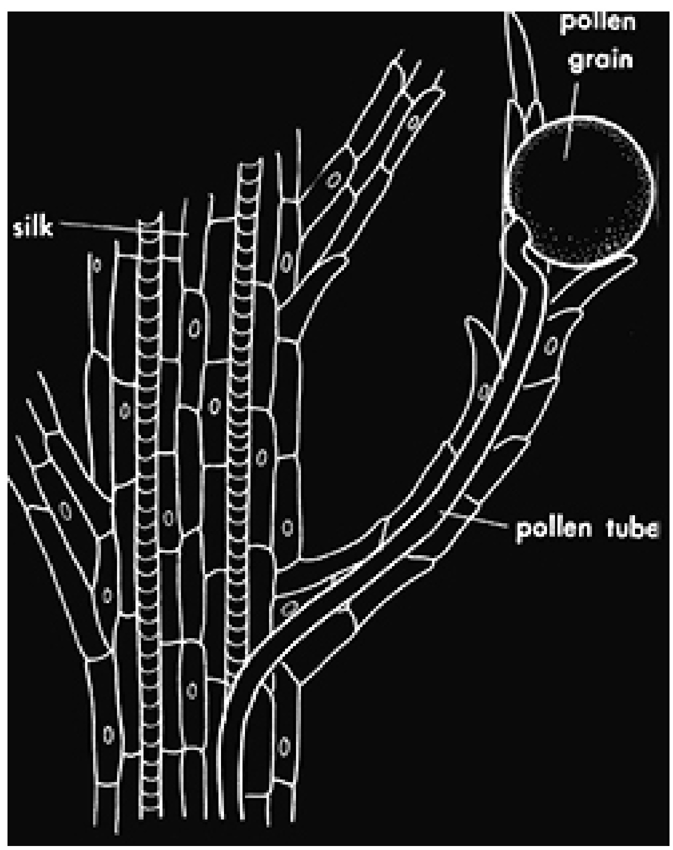
A Fast & Accurate Pregnancy Test for Corn – (*Bob Nielsen*) -

- Pollination may fail for a number of reasons, including drought stress and insect damage to silks.
- Silks normally detach from fertilized ovules within days of successful pollination and thus can be used as an early indicator of pollination progress and/or success.

Pollination in corn is the act of transferring pollen from the tassels to the emerged silks of the ear. Germination of pollen grains on receptive silks results in a pollen tube that penetrates and grows within the silk tissue down to the ovule connected at the other end. Successful fertilization of the ovule by the pollen results in a kernel of corn.

Unfortunately, pollination of the silks and/or fertilization of the ovules sometimes fail. Severe drought and/or heat stress can interfere with the synchrony between pollen availability and silk emergence or can desiccate exposed silks rendering them non-receptive to captured pollen grains. Silk clipping by corn rootworm beetles, Japanese beetles, and other obnoxious critters during pollination can be severe enough to impede pollen capture and germination.

Growers usually want an early assessment of the success of pollination, especially when a decision needs to be made whether insecticide applications are warranted



Schematic of pollen tube growth inside silk to prevent further silk clipping by insects. Obviously, one could wait impatiently until kernel development was visibly apparent. Within about 10 to 14 days after pollen shed, developing kernels will resemble white blisters on the cob (Nielsen, 2008). Luckily for us, the corn plant exhibits an earlier indicator of pollination progress.

Silk Detachment From Fertilized Ovules

Remember that each ovule (potential kernel) on the ear develops a silk (the functional “style” of the female flower) that elongates and eventually emerges through the ear’s husk leaves the tip of the ear shoot (Nielsen, 2010a). The silks represent the “pathway” for the male gametes in the pollen to fertilize the female gametes in the ovules.

Once a pollen grain is “captured” by a trichome or “hair” of a silk, the pollen grain germinates and develops a pollen tube that contains the male genetic material. The pollen tube penetrates the silk and, with adequate moisture and temperature, elongates down the length of the silk within 24 hours and fertilizes the ovule.

Within 2 to 3 days after an ovule has been successfully fertilized, the base of the silk will collapse and detach from the immature kernel. The kernel itself will usually not be recognizable to the naked eye at this stage. Silks of nonfertilized ovules remain attached, however, and will continue to lengthen and be receptive to pollen for up to 10 days after emergence from the ear shoot. Even if never fertilized, silks will remain attached to the ovules. Within days of full silk emergence, therefore, pollination progress may be estimated on individual ears by estimating percent silk detachment.

The Ear Shake Technique

For each ear, make a single lengthwise cut from the base of the ear shoot to the tip with a sharp knife, through the husk leaves to the cob. Slowly unwrap the husk leaves, taking care not to rip any silks from the ovules yourself. Then gently shake the ear. Silks of fertilized ovules will drop away; silks from unfertilized ovules will remain attached.

With practice, pollination progress can be easily determined by estimating the percentage of silks that fall away from the cob. Sampling several ears at random throughout a field will provide an indication of the progress of pollination for the whole field.

One Last Comment

While the “ear shake” technique helps you estimate pollination progress with respect to ovule fertilization, remember that pollination progress includes pollen shed progress. Check the tassels in early to mid-morning hours to determine whether anther exsertion and pollen shed are still occurring.

Remember, that anther exsertion and pollen shed typically begin on the central tassel stalk, then spreads progressively throughout the tassel branches (Nielsen, 2010b). If no further pollen shed is likely to occur, it doesn’t matter how badly those nasty insects are clipping silks. Unfertilized ovules will remain unfertilized ovules if there is no pollen left in the field. Spraying the bejeebers out of a field at that point is simply a costly form of revenge!

Related References

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Silks attached to ovules on an ear of corn

Silk detachment from fertilized ovules

Ear with few detached silks, indicating few fertilized ovules

Ear with majority of silks detached indicating nearly complete fertilization of ovules

Next Big Hurdle: Pollen Shed and Silking – (*Bob Nielsen)* -

It remains to be determined whether the 2012 drought will achieve a lofty position in the Drought Hall of Fame for Indiana corn growers alongside some of the previous «great» droughts like those of 1983, 1988, and 1991. The storms that rolled through Indiana late in the day Saturday appeared to have dropped several inches of rain in a small area of northwest Indiana, but much of the state was left without much measureable precipation.

Given the drought or near-drought status of much of the state and the poor prospects for wide-spread soaking rainfall in the near future, the pending arrival of the critical pollination period for the Indiana corn crop is of concern to many corn growers right now. That concern is well-grounded because success or failure of the important flowering period for the corn crop greatly impacts the potential for yield at harvest.

Severe drought stress can impact the pollination process in several ways. The effects are particularly likely to occur if the severe drought is accompanied by excessive heat and if corn fields have been subjected to drought stress in the days or weeks preceding the onset of the flowering period.

One of the negative consequences is the possible disruption of the synchrony between the appearance of receptive silks from the ears (Nielsen, 2010a) and the availability of pollen from the tassels (Nielsen, 2010b). Severe drought stress can delay the emergence of the silks from the tips of the husks by slowing the elongation rate of the silks. If the delay is too great, silks emerge after most or all of the available pollen has already been shed from the tassels. The result can be barren or nearly barren ears. Unfortunately, tassel development and maturation often occurs more quickly under drought stress and pollen sometimes is shed prematurely; further excaberating the problem of delayed silk emergence. Delayed silks not pollinated will continue to elongate until they deteriorate, resulting in unusually long silks (Nielsen, 2009).

Fig. 1. Failure of tassel to emerge from the upper leaves due to severe drought stress

Another consequence of severe drought stress on the pollination process, especially if accompanied by excessive heat, is that exposed silks may desiccate and become non-receptive to available pollen being shed by the tassels. Pollen "grains" cannot germinate on dried, exposed silks and, thus, will fail to fertilize the ovules connected to the silks. Again, the result can be barren or nearly barren ears.

Another consequence of severe drought stress is that tassels may not fully emerge from the final leaves of the upper whorl due to restricted elongation of the tassel or uppermost stalk internodes. Such failure to emerge completely from the whorl leads to pollen shed occurring within the whorl instead of into the open air. If too much of the pollen remains "trapped" within the whorl for too many tassels throughout a field, there may not be enough pollen left for successful pollination.

Even if pollination occurs successfully, severe drought stress that continues into the first week or two after pollination may cause newly-formed kernels to quickly abort (Nielsen, 2011a, 2011b). Moderate stress often results in barren tips of ears because those kernels are usually last to form (i.e., those ovules are last to be fertilized by pollen). Severe stress may result in scattered kernel set throughout the ear or odd patterns of kernel abortion like the so-called "zipper" pattern (Nielsen, 2011b).

Related Reading

AHPS Precipitation Analysis. 2012. National Weather Service, <http://water.weather.gov/precip/> [URL verified June 2012].

Midwest Climate Watch. 2012. <http://mcc.sws.uiuc.edu/cliwatch/watch.htm> [URL verified June 2012]

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Weather Update