



In this issue

GMO corn: To stack, or not to stack, that is the question!	1-3
Handy Bt Trait Table	4-5
Agriculture outlook for 2013	6-7
Crop Reports	7-8
Agriculture Weather Report	8
Announcements	8-9
Upcoming Events	9
Did You Know	9
Agronomy News 2012 - Evaluation Survey	

GMO corn: To stack, or not to stack, that is the question!



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Corn and caterpillar pests

In Maryland, corn is the favorite host plant of several caterpillars that feed on the leaves, stalk and developing ear at different stages of plant growth. European corn borer (ECB) is the most yield-reducing caterpillar because it bores into the stalk and ear shank, causing physiological stress, lodging and ear drop. The corn earworm (CEW) is the most destructive pest attacking the developing ear; and the majority of their eggs are deposited on fresh corn silks from mid-July through August. Upon hatching, young caterpillars feed on the silk tissue while making their journey to the ear tip. Fall armyworm (FAW) does not overwinter here but adult moths move northward from the Gulf and usually appear around early July. These caterpillars concentrate first on corn plantings not yet in silk and later in the season, move to ear shoots and bore into developing ears. Another caterpillar pest worth mentioning is the western bean cutworm (WBCW), which has been spreading eastward from the Corn Belt and was first detected in sweet corn on the Eastern Shore in 2012. This pest invades the ear and causes kernel damage, similar to the CEW. Once inside the ear, these caterpillars cannot be controlled and their feeding damage reduces yield and increases the chances of ear rots and subsequent mycotoxin contamination of the grain. Though sap beetles are minor pests that can invade and feed on kernels of undamaged ears, kernel injury by caterpillars may further attract sap beetles. Generally, ear-damaging caterpillars have always caused yield losses in field corn; however, the narrow window of opportunity for control action during silking and ear development has made insecticide sprays impractical due to the inability to achieve good coverage with a single application.



The transgenic plant delivery of insecticidal proteins from the bacterium *Bacillus thuringiensis* (Bt) provides an effective way to control caterpillars in corn. However, selection of the most appropriate Bt hybrid or gene combination for pest protection on a given farm has become more challenging. With funding provided by the Maryland Grain Producers Utilization Board (MGPUB), we collaborated on a project to collect ear damage and associated yield data on single and stacked Bt corn hybrids that were tested in state corn hybrid trials during 2010, 2011 and 2012. Each hybrid was planted at five University of Maryland Research and Education Research facilities (Salisbury, Poplar Hill, Wye, Clarksville and Keedysville). A summary of the results of the three year study is presented in this article.

Cont. pg. 2



Do stacked hybrids provide better ear protection?

The CEW, which caused the majority of ear damage during the three years, was the major focus of the study. One corn earworm can consume 8 to 10 cm² of kernel area during its entire development within an ear. On an average-size ear, this amounts to 11 to 14 kernels consumed per ear or approximately 3.2 to 4 bushels lost per acre. However, not every ear is infested and many caterpillars are cannibalized or die due to diseases before they can complete their development. In general, CEW infestations and the resulting ear damage have been below historical levels in recent years and there is evidence of regional suppression of CEW due to Bt corn adoption. Pooled over years and sites, 28 to 36% of the ears in the conventional hybrids were damaged, showing an average 0.52 to 0.72 cm² of kernels consumed per ear. This amounted to an estimated loss of 0.21 - 0.29 bushels per acre (based on one cm² equaling 1.4 kernels removed, 26,000 plants per acre, and 90,000 medium-sized kernels per bushel). Levels of ear damage were significantly different among farm sites, with the highest levels in both years at the Eastern Shore farms. The highest average level of 1.7 cm² of kernel area consumed per ear at the Salisbury farm in 2011 equals a loss of ~ 0.69 bushels per acre.

Ear damage evaluations in 2011 and 2012 showed significant differences in the percentage of ears damaged and the amount of kernel area consumed between single and stacked Bt hybrids. Of the

stacked hybrids, Agrisure Viptera consistently provided the highest level of ear protection (88-97% reduction), followed by Genuity SmartStax and Genuity VT Pro (82-85% reduction). Of the single protein hybrids, YieldGard CB, YieldGard VT3, and Agrisure hybrids provided 60% reduction in kernel damage, followed by the Herculex hybrids which consistently provided the least protection against CEW injury (45-50% reduction). However, yield gains from ear protection between single and stacked Bt corn were relatively small if one considers that the potential savings are less than a half bushel per acre.

Do Bt corn hybrids always result in higher yield?

A total of 103 and 99 corn hybrids were tested in 2011 and 2012, respectively. Though we did not directly compare non-Bt isolines with every Bt hybrid, the large pool of entries tested in each Bt trait group represented the average performance of the many single gene and stacked hybrids that producers are growing in Maryland. By comparing yields among different Bt trait groups, the aim was to provide producers with information on the productivity gains, irrespective of whether due to insect protection traits, genetic backgrounds or combination of both. For the most part, seed companies have done well at introducing genes into hybrids while keeping yield and other key agronomic characteristics intact. There is some concern that the multiple genes inserted in the "super stacked" corn hybrids may cause a "yield drag". SmartStax hybrids which are considered high yielders performed poorly

in 2011 but this may have been largely contributable to the drought conditions that occurred at three of the five farm sites. In 2012, SmartStax yields were more comparable to other stacked hybrids.

As a group, yields of conventional hybrids tested in 2011 were significantly lower by 6 to 18 bushels/acre than yields of Bt hybrid groups. This may be due to the lack of stalk protection but also some seed companies have not incorporated their best germplasm into conventional hybrids. Interestingly, conventional yields in 2012 were not significantly different from yields of Bt hybrids, except for Genuity VT3 Pro and SmartStax hybrids. In fact, many conventional hybrids out-performed single trait Bt hybrids, which had 50% less ear damage and no stalk damage. Among Bt group comparisons, most hybrids expressing single Bt proteins yielded similar to stacked hybrids with two or three Bt proteins. Considering the low levels of kernel injury in conventional hybrids, yield differences among Bt hybrids were probably the result of their genetic background and agronomic performance, rather than their insect protection Bt traits.

Overall, the yield results suggest that stacked Bt hybrids do not necessarily perform significantly better than the older single gene Bt hybrids or even better than some high yielding conventional hybrids. If only ear protection is considered at the current level of corn earworm activity, it would appear that the higher seed cost of stacked hybrids is not a practicable investment. However, higher pest pressure from CEW, along with fall armyworm and

western bean cutworm, would likely result in more positive gains from the broader spectrum of protection provided by stacked hybrids.

Do any conventional hybrids express natural resistant to ECB?

All hybrids with single or stacked Bt traits provided 100% control of ECB feeding injury to stalks and ears. Clearly, if ECBs are the only pest of concern, any Bt hybrid will work. Corn borers were only found in the non-Bt conventional hybrids, and infestations were much lower than levels experienced in corn prior to Bt corn adoption. The presence of corn borer injury was found in 60-70% of the stalks of all conventional hybrids but the extent of tunneling per stalk was relatively low. Results showed little evidence of any one conventional hybrid exhibiting consistent levels of tolerance to ECB stalk injury.

Do rootworm Bt traits have value in Maryland corn production?

Most single gene and stacked hybrids tested during the three years expressed Bt proteins for corn rootworm control, particularly the Genuity VT3Pro and SmartStax hybrids. These rootworm genes presumably come with an added monetary cost. They may provide a positive yield gain from rootworm protection but only in continuous corn production systems. The majority of corn acreage in Maryland is rotated with soybeans or other crops, and this cultural practice effectively controls rootworms. Moreover, the hot, sandy soils on the Eastern Shore are unfavorable for rootworm development. Thus, for most corn plantings, there is simply no value to the stacked genes for rootworm control. Alternatively, producers can use Bt



hybrids without the rootworm traits, including YieldGard CB, Herculex I, VT Double Pro and Agrisure Viptera 3110.

Closing remarks

The Bt technology has revolutionized the way caterpillars and other insect pests are managed in corn. Over 70% of the corn in Maryland was planted in Bt transgenic hybrids in 2012. This technology is here to stay and there is no turning back, so it is important that corn producers understand the technology and its benefits. Several things are clear. First, seed corn companies will continue to develop and introduce new Bt hybrids with genes expressing multiple proteins for insect control. Recently, the refuge-in-the-bag (RIB) technology has been approved for several stacked hybrids which will allow producers to reduce refuge size and more easily comply with refuge requirements. Second, the spectrum of insect protection and cost of the new Bt hybrids have increased significantly with the addition of multiple traits. Thirdly, though all Bt hybrids effectively control ECB, different Bt events and combinations of genes vary widely in their efficacy against CEW, FAW and other caterpillar pests.

Based on the study findings, one might conclude that yield and ear protection benefits of the stacked Bt hybrids may not justify the higher seed cost, assuming that CEW remains the major ear-invading pest and at its current level of activity. In general, yield differences among the single and stacked Bt hybrid groups were not significant and largely the result of genetic backgrounds and agronomic characteristics of hybrids, rather than yield gains due to increased insect suppression. Thus, use of the stacked hybrids can be viewed as a preventative pest management strategy, which may not conform to the IPM principle. However, stacked hybrids have broader spectrums of activity that allow them to effectively control other caterpillar pests (e.g.,

armyworms and cutworms) and thus should help reduce ear rots. Furthermore, they have several other advantages over single protein hybrids, including a 5% refuge requirement for certain stacks, more convenient deployment of the refuge by using the refuge-in-the bag technology, dual herbicide tolerance traits, and enhanced trait durability due to multiple modes of action. Obviously, many producers are willing to overlook the cost issue for the peace of mind and additional convenience and advantages afforded by these multiple trait hybrids.

Clearly, there are a lot of corn seed choices out there, and selection of the most appropriate gene combination for pest protection on a given farm has become more challenging. There are some true lemons (e.g., high priced hybrids with limited yield potential) and real deals (e.g., low priced hybrids with great yield prospective). Indeed, this study uncovered some conventional and single Bt traited hybrids that performed as well as the higher priced stacked corn hybrids. Thus, time spent studying the state corn hybrid trial data collected in your area is time well spent. Do not assume that the newest and most expensive corn hybrids are more likely to produce the highest yields. The important thing is to choose a proven corn hybrid with traits that match your soil, climate, production system and targeted pest complex. Once you have considered these factors, the decision to stack or not to stack may be an easier one to make.

Acknowledgements

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Handy Bt Trait Table

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More corn hybrids contain multiple transgenic traits, and cost of this seed is steadily rising - \$300 or more per bag is not uncommon. Meanwhile, refuge requirements are changing for multi-trait corn. Some refuges remain 20% and 'structured', planted in a block or series of rows. Others are reduced to 5% or 10%, in a block or 'in the bag' mixed with the Bt seed itself.

Different products from different seed companies now have different refuges. Purchasing the right transgenic hybrid for the right pest, and planting it with the correct refuge in the proper location, is critical to maximizing profitability and delaying resistance. But this process is increasingly confusing. The table on this article summarizes, to the best of our ability,

the currently available Bt traits and their spectrum of control. The table also gives refuge percentages and locations. We make every attempt to provide the correct information for each Bt option and update the table promptly as changes occur.

However, it is still important for you to take the following steps:

- * Understand the *terminology* used by your seed company.
- * Understand the *biology* of each trait, the expected level of control, and refuge requirements.
- * *Confirm that the seed ordered* in late fall is the seed shipped the following spring.
- * Keep good *planting records*.
- * For herbicide applications, *Ask Twice-Spray Once*, especially if you hire a

custom applicator.

- * Save a representative sample of *bag tags* = the first thing to check if something goes wrong.
- * Most important, if you see unexpected damage or poor performance of a trait during the field season, contact your seed dealer or county extension educator promptly so that the field can be visited while the problem is still visible and fresh sampled can be taken.



	Bt protein(s)	Insects controlled (bold) or suppressed (italics) <i>Above-ground ----- In soil</i>	Herbicide tolerance	Refuge %, location in the MIDWEST	
Agrisure Trait Family					
AgrisureCB/LL	Cry1Ab	ECB <i>CEW FAW SB</i>	-	LL	20% within ½ mile
AgrisureGT/CB/LL	Cry1Ab	ECB <i>CEW FAW SB</i>	-	GT LL	20% within ½ mile
Agrisure RW	mCry3A	---	CRW	--	20% in field/adjacent
AgrisureGT/RW	mCry3A	---	CRW	GT	20% in field/adjacent
AgrisureCB/LL/RW	Cry1Ab mCry3A	ECB <i>CEW FAW SB</i>	CRW	LL	20% in field/adjacent
Agrisure3000GT	Cry1Ab mCry3A	ECB <i>CEW FAW SB</i>	CRW	GT LL	20% in field/adjacent
AgrisureArtesian 4011	Cry1Ab mCry3A	ECB <i>CEW FAW SB</i>	CRW	GT LL	20% in field/adjacent
Agrisure Viptera 3110	Cry1Ab Vip3A	BCW CEW ECB FAW WBC SB	- -	GT LL	20% within ½ mile
Agrisure Viptera 3111	Cry1Ab mCry3A Vip3A	BCW CEW ECB FAW WBC SB	CRW	GT LL	20% in field/adjacent
Agrisure 3122 E-Z Refuge	Cry1Ab Cry1F mCry3A Cry34/35Ab1	BCW ECB FAW WBC <i>CEW SB</i>	CRW	GT	5% in the bag
Agrisure Viptera 3220 E-Z Refuge	Cry1Ab Cry1F Vip3A	BCW CEW ECB FAW WBC SB	- -	GT	5% in the bag
AgrisureDuracade 5122	Cry1Ab Cry1F mCry3A eCry3.1Ab	BCW ECB FAW WBC <i>CEW SB</i>	CRW	GT LL	Approved for planting in 2014
AgrisureDuracade 5222	Cry1Ab Cry1F Vip3A mCry3A eCry3.1Ab	BCW CEW ECB FAW WBC SB	CRW	GT LL	Approved for planting in 2014
Herculex Trait Family					
Herculex I (HX1)	Cry1F	BCW ECB FAW WBC <i>CEW SB</i>	- -	LL	20% within ½ mile
Herculex RW (HXRW)	Cry34/35Ab1	---	CRW	RR2 (most)	20% in field/adjacent
Herculex XTRA (HXX)	Cry1F Cry34/35Ab1	BCW ECB FAW WBC <i>CEW SB</i>	CRW		20% in field/adjacent
Optimum Trait Family					
Optimum AcreMax (AM-R)	Cry1F Cry1Ab	BCW ECB FAW WBC <i>CEW SB</i>	- -	RR2	5% in the bag
Optimum AcreMax1 (AM1)	Cry1F Cry34/35Ab1	BCW ECB FAW WBC <i>CEW</i>	CRW	LL RR2	10% in the bag (CRW) & 20% - ½ mile (ECB)
Optimum AcreMax Rootworm (AMRW-R)	Cry34/35Ab1	---	CRW	RR2	10% in the bag
Optimum (AMX) AcreMax Xtra	Cry1F Cry1Ab Cry34/35Ab1	BCW ECB FAW WBC <i>CEW SB</i>	CRW	RR2	10% in the bag
Optimum (AMXT) AcreMax XTreme	Cry1F Cry1Ab mCry3A Cry34/35Ab1	BCW ECB FAW WBC <i>CEW SB</i>	CRW	RR2	5% in the bag
Optimum Intrasect	Cry1F Cry1Ab	BCW ECB FAW WBC <i>CEW SB</i>	- -	LL RR2	5% within ½ mile
Optimum Intrasect Xtra	Cry1F Cry1Ab Cry34/35Ab1	BCW ECB FAW WBC <i>CEW SB</i>	CRW	LL RR2	20% in field/adjacent
Optimum Intrasect XTreme	Cry1F Cry1Ab mCry3A Cry34/35Ab1	BCW ECB FAW WBC <i>CEW SB</i>	CRW	LL RR2	5% in field/adjacent
Optimum TRIssect	Cry1F mCry3A	BCW ECB FAW WBC <i>CEW SB</i>	CRW	LL RR2	20% in field/adjacent
YieldGard / Genuity Trait Family					
YieldGard VT Triple	Cry1Ab Cry3Bb1	ECB <i>CEW FAW SB</i>	CRW	RR2	20% in field/adjacent
Genuity VT Double PRO RIB Complete	Cry1A.105Cry2Ab2	CEW ECB FAW	-	RR2	5% in the bag
Genuity VT Triple PRO RIB Complete	Cry1A.105 Cry2Ab2 Cry3Bb1	CEW ECB FAW	CRW	RR2	10% in the bag
GenuitySmartStax RIB Complete	Cry1A.105 Cry2Ab2 Cry1F Cry3Bb1 Cry34/35Ab1	BCW CEW ECB FAW SB WBC	CRW	LL RR2	5% in the bag
Refuge Advanced Trait Family					
Refuge Advanced Powered by SmartStax	Cry1A.105 Cry2Ab2 Cry1F Cry3Bb1 Cry34/35Ab1	BCW CEW ECB FAW SB WBC	CRW	LL RR2	5% in the bag

Agriculture outlook for 2013

Sudeep Mathew – Editor, Agronomy News



It is great to be with you for another growing season. As many of you already know, the state of Maryland and the Delmarva Peninsula is a uniquely positioned Garden of Eden for Agriculture. It is

blessed with very diverse and intense cropping systems. This year marks the 4th year of publication for Agronomy News. I would like to thank Maryland Grain Producers Utilization Board and the Maryland Soybean Board for their continued support for the print edition of Agronomy News. If you have a family member, friend or a co-worker who might benefit by receiving Agronomy News, please let us know and we would be glad to send them a copy. If you were a subscriber of this newsletter during last year, I would appreciate if you could complete a brief survey which can be accessed in this link <http://www.surveymonkey.com/s/3YYPJJS>. For those of you who are receiving the newsletter in paper copy, the survey is included in the last page of the newsletter. This will only take 60 seconds of your time and would be helpful for us.

On Wednesday March 20th we welcomed the spring of 2013. Yet, we are progressing slower than normal for the planting season. Due to continuous on and off showers across the state, it is estimated that only 40% of corn is planted at this writing. It is certain that this year the Delmarva Peninsula, on average, will miss the optimum planting deadline which is usually around May 10th. So what does this delayed planting mean for you? Yield losses can accelerate when planting gets delayed. According to the research done by Dr. Emerson Nafziger, Crop Sciences

Professor at the University of Illinois, we can expect about 15% lower yields by May 20 and about 25% loss by June 1. However, a crop's response to planting date is highly variable. The silver lining is that the conditions during the growing season can have far greater impact on yield than planting date.

So don't rush to the field for planting yet. It is better if you wait until it dries out because the wet soil conditions can contribute more compaction in the fields. Usually when planting dates are pushed back, yield losses will be larger for corn, but your soybeans should fare normally.

Let me give a thought to what is ahead of us in grain markets. The earlier analysis for the season predicted commodity prices were expected to fall 1-2% across the board. Then, I heard a story that some commodity analysts are predicting that if volatility related to weather events increases, there is a chance that United States might need to import soybeans this year. On the flip side, there was some decline in FAO price index in March for oil crops largely due to soybean. The reasons given were expectations of a record 2013 US crop, the cancellation of large soybean orders by China and a slowdown in US crush demand. Favorable growing conditions are reported in Brazil which will spur a yield increase in soybean there.

We saw a record drought in 2012 which will increase the likelihood of aflatoxin levels in the stored grain from last year. This can put further constraints on the corn supply. I have good reason to believe the cash crop prices can remain strong until harvest. However, Goldman Sachs Group Inc. says futures will drop to \$5.25 a bushel in six months. For corn, the

bottom line is if the exportable supplies tighten later this year from the US crop that can influence the chance for continuation of a stable price. Although wheat prices fell initially during the season on improved weather conditions in major growing regions, unseasonably cold temperatures have resulted in a sharp rebound. There is a fair chance that it will stay that way for wheat since Russia and Eastern Europe are experiencing dry conditions. To the final commentary for this fall, some analysts are predicting commodity prices as low as \$4/bu for corn and \$10/bu for soybean unless weather pushes the prices higher. Be ready so that you won't be disappointed.

A news article recently circulated that received high interest in the markets was Japan's intention to join Trans Specific Partnership (TPP) in trading. Japan is the fourth largest U.S. ag export partner accounting for \$ 13.5 billion sales in 2012. If this intention were to happen, it can provide increased market opportunities for our agricultural exports. Fiscal years 2009 -2012 represent the strongest four years in history for agricultural trade with U.S. agricultural product exports exceeding \$478 billion over the four years. Asia, Middle East and Africa will continue to require increased imports to satisfy their growing population's food needs. I believe this is just a beginning and we are going to see more agriculture export record sales in the future.

I consider my agriculture ideologies to be neither left nor right; this I want to make clear before I share with you a few highlights from a report developed by the not-for-profit organization International Service for the Acquisition of Agri-Biotech Applications (ISAAA). This report is an excellent example of how scientific

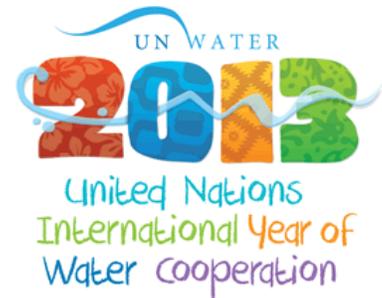
advances in the field of agriculture impact the environment positively. For this report, ISAAA calculated the effect of GM (genetically modified) crops on the environment. ISAAA says GM crops saved the equivalent of 473 million kilograms of pesticides in 2011 (because GM makes crops resistant to pests); saved 109 million hectares of new land being ploughed (GM crops are usually higher-yielding so less land is required for the same output) and reduced greenhouse-gas emissions by 23 billion kg of carbon dioxide equivalent. GM crops, in general, need fewer field tillage operations. Reducing tillage allows more crop residues to remain in the ground,

sequestering more CO₂ in the soil and reducing greenhouse gas emissions. Fewer field operations also mean lower fuel consumption and less CO₂.

You might be able to find other similar information that needs to be conveyed to our fellow Americans who otherwise would be forced to believe the contrary. So may I ask if you would be willing to share at least a single positive story this season to a non-farm person?

The United Nations General Assembly has declared 2013 as the International Year of Water Cooperation. Water of appropriate quantity and quality when

applied at the right time, can enhance the productivity of land, labor and other inputs. Let us make an extra effort to improve the user efficiency of our water resources this year. As the season progresses, if you need any help, we at University of Maryland Extension are only a call or click away. Have a great growing season everyone!



Crop Reports

Western

Peaches and apples are setting fruit and strawberries are blooming so I guess it is spring. However, it appears to be another abnormal spring. It has been a bit on the cool and dry side although we recently received 1.25 inches of welcome rain. Corn planting is creeping along. Harvest of first cutting alfalfa and grass hay is barely underway. Much of the cereal rye has been chopped as forage by our dairymen. Barley and triticale will be next. With unimpressive first cutting yields, hay prices may continue to rise. However, we will soldier on here in the west.

Central

Barley, rye and triticale not already harvested as silage is mostly in full head. Wheat is beginning to head. All small grains are shorter than usual. Corn planting is progressing as weather allows. We received a much needed soaking rain on May 7th. Soil temperatures remain somewhat cool because of the cloudy and

damp weather. Cool temperatures have slowed corn germination but emergence has begun. Cool temperatures have delayed hay and pasture growth only slightly as the moisture in early May has provided the spring flush for which we have been waiting. Alfalfa harvest is underway across the region. Fruit and vegetable production is progressing well.

Northeast

Corn is emerging and planting is progressing well, but behind the normal season average. Soybean planting is delayed at this point. Barley is heading and wheat looks good overall. Pastures are doing well and the first cuttings of hay have begun.

Southern

Corn emergence has been slow, with cool, wet soils limiting crop progress. Corn is in the emergence to V2 stage in most areas. Slug populations are fairly high, particularly in no-till fields with heavy crop residue. This

situation is presented in fields planted no-till to corn, following sorghum planted as a double crop last year. Small juvenile slugs may be found in the seed furrow, under residue and on plants. Slug eggs can also be found. Slow emergence of corn; cool, wet weather and the co-existence of hatching slug populations is creating a situation where corn may not be able to grow out of feeding damage. Adult cereal leaf beetles were observed laying eggs 2-3 weeks ago, and some fields do have cereal leaf beetle damage now. Barley is flowered and in grain-fill stage. Most wheat is headed out and is flowering now. Early planted wheat is now past flowering. Small grains look good overall. Soybean planting is being delayed until the wet weather passes. Spraying of burn down herbicides on cover crops continues. Hay and pasture growth is very good. Orchardgrass is heading out now, but wet weather has limited cutting opportunities. Alfalfa weevil feeding has been widespread, with most fields requiring a spray 2-3 weeks ago. Farmers began planting tobacco last week.

Upper Eastern Shore

Soil moisture is adequate in the entire region with many areas experiencing delays in corn plantings due to wet soil. Barley is completely headed and wheat is beginning to head with some already flowering. There are some areas of virus in wheat with relatively low levels of rust and powdery mildew. Most of the corn is planted with bean planting preparations beginning. The early planted corn is up, but with cool, wet weather, it lacks good color and vigor. Some hay has been cut and wrapped, but no dry hay has been made yet.

Lower Eastern Shore

Wheat and barley crops are looking great. Although nothing major, powdery mildew can be found in small grains. Aphids, cereal leaf larva and sawflies are beginning to show up on some fields. Corn planting was progressing fast until the recent rain which has delayed the momentum. Some areas received close to 2" rain. There are some field pockets so wet that they won't see any field activity at least for a week. At this reporting about 70% of corn is planted. Among the remaining acres about 60 % of cover crop has

been burned down for soybean planting.

Timeline: This crop report is for the field observations from April 25 through May 8, 2013. Crop Report Regions: Western (Garrett, Allegany and Washington), Central (Carroll, Frederick, Howard, Montgomery), Northeast (Cecil, Harford, Baltimore), Southern (Anne Arundel, Prince George's, Calvert, Charles, St. Mary's), Upper Eastern Shore (Kent, Queen Anne's, Talbot, Caroline), Lower Eastern Shore (Dorchester, Wicomico, Worcester, Somerset).

Agriculture Weather Report

Adam Caskey, Meteorologist



Unseasonably cool temperatures have been the topic of conversation this spring, and there's still no sign of a big warm-up anytime soon. In terms of rainfall, Garrett and Allegany Counties were classified as "Abnormally Dry" by the U.S. Drought Monitor, but recent rainfall has helped mitigate that with Westernport picking up 1.56 inches and Frostburg 2.39 inches over a two day span (May 6 and 7). From a soil moisture point of view, fortunately,

our dry spells have been unseasonably cool, and at times cloudy.

The extended outlook through May 24th indicates a predominant trough/dip in the upper level flow, which would favor continued cool and below average temperatures. There is good model agreement with above average confidence in this through the 17th of May, but for the following week, model agreement is poor

and uncertainty increases from May 18th to 24th. Regardless, the going evidence indicates that more significant warmth remains on hold for Maryland.

As far as precipitation goes, the anticipated upper level flow favors a near average precipitation pattern, which is what I'm expecting for the remainder of the month.

Announcements

2013 Pesticide Container Recycling Program from MDA



Maryland Department of Agriculture's Pesticide Container Recycling Program will be accepting clean, empty containers from June 4 through September 27, during normal business hours. Containers will be collected from their current owners, for

safe disposal and recycling. Containers must be cleaned (triple-rinsed or pressure-rinsed) according to label directions. Please remember to remove lids and label booklets from the containers prior to drop-off. Call 410- 841-5710 for more details and drop-off instructions. Collection dates and venues can be found at this link, <http://mda.maryland.gov/plants-pests/Documents/recycle.pdf>

Maryland 4-H, Grains for Youth

Donate Grain! Make a Difference!

By donating grain, farmers provide opportunities for youth across Maryland and can save on self-employment tax, federal income tax, and state income tax.

How Do I Donate Grain?

1. Deliver the grain to one of the participating grain elevators.
2. Indicate how many bushels are for

- the Maryland 4-H program, making the Maryland 4-H Foundation the owner of those bushels.
3. Sign donation form, approving the grain donation and amount donated.
 4. Grain will be sold at the current day's price and credited towards Maryland 4-H Foundation account.
 5. The donating farmer will receive a tax deductible donation receipt from Maryland 4-H Foundation once payment has been received from the grain elevator.

For complete details:
www.mymaryland4hfoundation.com or call
 301-314-7835

Participating Grain Elevators
 Hostetter Grain, Inc.
 (www.hostettergrain.com) & Nagel Farm
 Service (www.nagelgrain.com)

Hostetter Grain/Mt. Pleasant
 9819 Kelly Rd
 Walkersville, MD 21793

Hostetter Grain/Oxford, PA
 481 Limestone Rd. Oxford, PA 19363

Nagel Farm Service/Wye Mills
 14209 Old Wye Mills Rd
 Wye Mills, MD 21679

Nagel Farm Service/Cordova
 11761 Cordova Rd
 Cordova, MD 21625

Nagel Farm Service/Harmony
 6202 Nagel Rd
 Preston, MD 21655

Nagel Farm Service/Preston
 3695 Maple Ave
 Preston, MD 21655

Upcoming Events

2013 AGsploration Teacher Training Programs

Teacher in-service trainings were held at five locations throughout Maryland: One training opportunity remains.



June 17, 2013: Washington County Extension Office (Boonsboro, MD)

For registration forms and more details please visit the AGsploration website at

agmr.umd.edu/agsploration/training or contact Sara BhaduriHauck at sbh@umd.edu or (410) 638-3255.

2013 Strawberry Twilight Meeting, Wednesday May 29th

The 2013 Strawberry Twilight Meeting at the Wye Research and Education Center will be held Wednesday, May 29, 2012 from 6:00-



8:00 PM, rain or shine, at UMD – Wye Research and Education Center, Farm Operations Complex, 211 Farm Lane, Queenstown, MD.

You'll hear: University of Maryland and USDA small fruit experts discuss the current season's challenges and the impact that the new fruit pest may have on the industry. For additional program information, contact Mike Newell at 410-827-7388 or mnewell@umd.edu. If you need special assistance to attend this program, please contact Debby Dant at 410-827-8056 or ddant@umd.edu.

SIGN-UP TO RECEIVE "AGRONOMY NEWS"

If you would like to receive this newsletter via email please contact Rhonda Barnhart at rbarnhar@umd.edu. The subject line should be: Subscribe Agronomy News 2013.

If you would like a hard copy please contact your local county extension office to sign-up for the mailing list. The list of local county offices can be found at www.extension.umd.edu.



Did You Know

American agriculture supports 1 in 12 jobs in the United States.

This edition of Agronomy News is brought to you by:

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Dave Martin, Ag & Natural Resources Educator, Baltimore County
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Sudeep Mathew, Editor

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Agronomy News 2012 - Evaluation Survey

Please take some time to complete this brief survey. Complete and return to us with your thoughts and comments. Use additional sheets if needed. If you need any assistance in completing this survey please give us a call at 410-228-8800. Please return the completed survey to: Agronomy News, University of Maryland Extension, 501 Court Lane, Room 208, P.O. Box 299 Cambridge, MD 21613.

What best describes you?

- A. Grain farmer
- B. Vegetable farmer
- C. Fruit farmer
- D. Dairy/Poultry/live stock
- E. Ag Industry
- F. Government
- G. Education
- H. Others

How many acres do you farm?

- A. None
- B. <50
- C. 51-100
- D. 101-200
- E. 201-500
- F. 501-1000
- G. 1001-1500
- H. 1501-2000
- I. 2001-2500
- J. 2501-3500
- K. >3501

Your overall rating of the value of the articles presented in the Agronomy News?

- A. Extremely valuable
- B. Valuable
- C. Neutral
- D. Not valuable

How much do you think Agronomy News helped increase your net income (\$/acre)?

- A. 0
- B. 1-10
- C. 11-20
- D. 21-30
- E. 31-40
- F. 41-50
- G. >51

Rate the increase of your knowledge you gained through Agronomy News?

- A. Very great
- B. Moderate
- C. Very little
- D. None