The Green Cloverworm: A Serial Defoliator

Dr. Cerruti R. Hooks and Lauren G. Hunt, University of Maryland

The Green Cloverworm (GCW), *Hypena scabra* Fabricius (≡ *Plathypena scabra*) is a noctuid moth species native to the US. Unlike fictional characters seen on TV and movie screens, the GCW is a real life super-villain. It is one of the most common leaf-feeding villainous arthropod found in soybean fields stretching from eastern United States, where they are most commonly found, westward into the Great Plains and northward into southeastern Canada. Referred to by the media as the “Serial Defoliator”, the GCW is known as one of the oldest and most persistent soybean defoliator. However, soybean is not the only plant victimized by GCWs. Green cloverworm caterpillars attack common weeds and several innocent low-growing legumes, including alfalfa, bean, clover and pea as well as other domesticated plants such as strawberry and raspberry.

How can I identify the GCW?

Similar to the superman shield, adult GCW moths (aka snout-moths) are triangular in appearance when sitting with a distinctive elongated snout like head. Males are charcoal gray and female moths are charcoal with patches of brown and silver (Fig. 1).

![Fig. 1. Adult GCW moth (Wikimedia)]
Green cloverworm caterpillars are often mistaken for looper caterpillars because of their green color. However, GCWs contain four abdominal prolegs (one pair at the end of their abdomen and three additional pairs near the middle of their body, Fig. 2).

Species of caterpillar loopers contain two pairs of leg near the center of their bodies. Newly emerged GCW caterpillars are pale yellow before eventually turning a light green color. The GCW is a big eater but maintains a slender body. Older caterpillars are tatted up with narrow white longitudinal stripes down the length of each side of their body (Fig. 2). The full-grown caterpillar is about one inch long. A unique characteristic and often unknown fact of immature GCWs is that they are the baddest twerkers around. If touched, disturbed or held they start violently twerking (i.e., shaking, twisting and jerking). This twerking is not to show off their street dancing skills but a defensive mechanisms against predators. Not because predators find their behavior distasteful or unacceptable and walk away, but predators find it more difficult to successfully subdue a twerking GCW. Smaller caterpillars that have not yet master twerking, may escape their enemies by dropping from a leaf while hanging on a silken thread similar to spiders. Symptoms of young GCW caterpillar feeding include leaves that are skeletonized on the undersurface. Caterpillars mainly consume tissue in the inter-veinal leaf area and defoliation is usually concentrated in the upper half of the plant canopy (Fig. 3).

**Fig. 2.** GCW larvae (courtesy of K-state entomology). Arrows note uneaten large veins.

Leaves under attack by older larvae can be completely eaten with the exception of large veins which they leave behind as their signature (Fig. 2).

**What's their MO?**

Though, commonly found in soybean fields throughout the season, these twerking villains hardly ever reach damaging levels mainly because of the soybean plant’s ability to compensate for foliage losses and the activity of natural enemies. The GCW is known more as a sporadic foliage-feeding pest. Excessive feeding by high populations and associated defoliation can indirectly lower yield by limiting the amount of photosynthates produced by leaves for seed development. Two or more generations may occur each year, and they are typically most destructive from late June through September. During this time period, they are most likely to hang out with other defoliating soybean pests such as soybean loopers, silver spotted skippers, and woollybear caterpillars and cause economic damage. These latter mentioned caterpillars are easily noticeable because of their unique appearances but do little damage other than contributing to overall defoliation. Interestingly enough, many entomologists consider the GCW a “self sacrificer” because it serves as a valuable food source for beneficial insects and diseases. This reservoir of beneficials that are amplified during the early soybean growth cycle, in part by feeding on GCW, often control pests of more economical importance later in the season.

**Life history of GCW**

Green cloverworms typically overwinter near the Gulf Coast or in warmer states and migrate northward each spring. They overwinter either as pupae or adults. In the spring, after mating, female moths lay eggs singly on the undersurface of soybean leaves. GCW eggs generally hatch within a week and after stuffing themselves for about four weeks, these caterpillars crawl to the ground, burrow their way underneath leaf litter or just below the soil surface where they spin a cocoon and pupate. The pupae are brown and surrounded by a lightly wrapped silken cocoon. Adult moths emerge in ~ 2.5 weeks. It takes ~ 30 days for an individual GCW to develop from egg to adolescence.

**Scouting**

Field visitation along with sweep net sampling can be used to estimate GCW populations. The most important consideration for any field scouting program is getting a representative sample. The more locations sampled within a field, the more accurately the population can be assessed. It is suggested that a minimum of 10 sweeps be taken at 5 to 8 locations within a field. Sweep forcefully with a back-and-forth motion as you walk through the field. After each 10 sweeps, count the number of insects in the net. When sweeping the bottom of the net should be angled up so dislodged insects will drop inside. The upper edge of the net should stay even with or be slightly below the top of the soybean canopy as you sweep. Each pass of the net through the canopy counts as one sweep. For defoliation assessment, a minimum of 20 to 25 plants should be arbitrarily selected and pulled from the soil. Generally, defoliation with be greater in the upper than lower canopy. Thus, care should be taken to estimate percent defoliation over the entire plant. Looking at the upper or lower soybean canopy can over- and under- estimate defoliation,

**Fig. 3.** Economically damaging levels of GCW (Courtesy of IA state extension)

Leaves under attack by older larvae can be completely eaten with the exception of large veins which they leave behind as their signature (Fig. 2).
respectively. While scouting for GCW, one should take notice of beneficial insects and diseases as evidence that GCW populations are under attack.

**Are these villains controlled naturally?**

In most instances, humans are not needed to help manage GCWs. Parasitoids (wasps), predators and entomopathogens (organisms that cause disease in insects) all work together to assault GCW populations and keep them well below damaging levels. Parasitized GCW caterpillars may appear mummified and cigar shaped (Fig. 4).

Viral and fungal pathogens are known to control populations of GCW. The beneficial fungal pathogen, *Nomuraea rileyi* is always present at low levels beneath the soil, but works best when precipitation is present and field conditions are somewhat damp or wet. High humidity coupled with warm temperatures is favorable for fungal development which may be sufficient to suppress high GCW populations. Diseased GCW caterpillars may appear limp, greenish white and sluggish (virus disease) or covered in green or white powder and maintaining a body posture that appears as though they are reaching for the sky (fungus disease, Fig. 5).

**When should I decide to fight back GCW?**

Human intervention may be needed when soybean defoliation reaches 40% before the blooming period or at 15% during bloom (Fig. 6) and pod fill (stages R1-R6) and 35% after pod-fill to plant yellowing.

**Wheat Scab Management**

*Dr. Jarrod Miller, Agent – AGNR, University of Maryland Extension*

We have made it through another season of winter wheat, but concerns about scab should not diminish. The effects of fusarium head blight (FHB) include bleached, shriveled and lightweight kernels, often identified as "tombstones" in wheat. These tombstones can contain a mycotoxin called DON, and is restricted for both animal and human consumption.

A combination of resistance to FHB and correctly timed fungicide application is recommended to reduce DON in wheat. If you still have the presence of tombstones in your fields, there are harvesting methods to reduce infected wheat from entering the storage bin. Nathan Kleczewski (Delaware Extension Plant Pathologist) recommends increasing combine fan speeds to help blow out diseased wheat. In a recent study from Ohio State, **increasing the combine**
shutter opening from 70 to 90mm (with a 1,375 rpm fan speed) increased test weights in wheat. Diseased kernels can lower test weights, also causing price discounts. Combined with the presence of DON (>2%), these price discounts could considerably lower profitability. If infected kernels do make it into storage bins, Purdue University recommends drying grains to 18% moisture to stop DON production. Further drying to 13% moisture should also prevent spoilage by fungi. Lighter kernels tend to accumulate in the center of grain bins and all attempts should be made to keep infected grains from mixing in.

Following harvest, planning for the next season should begin. Since no one solution is effective by itself, integrated management is the best method to limit FHB damage. Reduced and no-till systems are great for soil health, but corn and wheat residue provide a home to FHB over the winter. To reduce the economic impacts of FHB, it is recommended to couple moderately resistant varieties of wheat with proper fungicide application and harvesting techniques. It has also been observed that FHB can travel up to 2500 feet from the source, so adjacent fields could be infected the following spring, no matter what your rotation is.

When choosing resistant varieties of wheat to plant this upcoming fall you can refer to the University of Maryland small grain trials on FHB resistance. They can be found on the Plant Science and Landscape Architecture page under the extension tab. Contact your local extension office for more help with managing FHB. http://www.psla.umd.edu/extension/md-crops

Assessing Soybean Emergence

Assessing soybean emergence will help producers detect problems early enough to make timely management decisions and take corrective measures if warranted.

Soybean field eight days after planting. Still too early to evaluate the stand due to uneven emergence. Wait a few more warm days and assess the stand at that time.

Many factors can adversely affect soybean germination and emergence. Detecting and identifying emergence problems early will enable producers to make timely management decisions and implement management strategies as needed. Because of this, soybean producers should check emergence in each of their fields. Under ideal conditions, soybean emergence will occur in six days, but can take more than 15 days under more challenging conditions.

There are two methods for taking soybean emergence and stand counts:

The first is counting the emerged seedlings in a length of row equal to 1/1,000 of an acre. The second is counting the emerged seedlings within a well-defined sampling area (Hula Hoop method).

The Hula Hoop method is recommended for a row spacing of 10 inches or less and the 1/1,000 of an acre method is recommended for the row spacing equaling or exceeding 14 inches. Regardless of which method you use, take 10 random samples from different areas of each field and calculate the average. This will ensure that the sampled areas and your emergence counts represent the field. Only plants that have lifted their cotyledons out of the soil should be considered as emerged.

To use the information in Table 1 to estimate the number of soybean plants per acre in 30-inch rows, count the number of plants in 17 feet 5 inches of row at 10
random locations in the field. Simply multiply the average count for the 10 locations by 1,000 to get plants per acre. For example, if the average count in the sampled rows was 108, the population would be 108,000 emerged plants per acre.

To use the Hula Hoop method, toss the hoop in 10 random locations in the field and record the number of emerged plants within the hoop at each location. Calculate the average and multiply it by the appropriate conversion factor for the diameter of the hoop you are using. For example, if the diameter of the hoop is 30 inches and the average number of emerged plants is 16, the population is 143,984 emerged plants per acre (16 x 8,874). If the diameter of your hula hoop is not listed in Table 2, you can calculate the conversion factor with the following equation:

Conversion Factor = 43,560 ÷ [3.14 x (the inside hoop diameter in inches ÷ 2)^2 ÷ 144]

If you count more than 100,000 plants per acre and the stand is relatively uniform, the field has the potential to produce high yields. If your emergence counts are lower than 100,000 plants per acre, you should determine the cause of the problem so that you can make informed and timely management decisions.

### Table 1. Length of row required to equal 1/1,000 of an acre

<table>
<thead>
<tr>
<th>Row Width</th>
<th>Length of a single row to equal 1/1000 of an acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>15&quot;</td>
<td>34 feet and 10 inches</td>
</tr>
<tr>
<td>20&quot;</td>
<td>26 feet and 2 inches</td>
</tr>
<tr>
<td>22&quot;</td>
<td>23 feet and 8 inches</td>
</tr>
<tr>
<td>28&quot;</td>
<td>18 feet and 8 inches</td>
</tr>
<tr>
<td>30&quot;</td>
<td>17 feet and 5 inches</td>
</tr>
</tbody>
</table>

### Table 2. Converting hula hoop plant counts to plants per acre

<table>
<thead>
<tr>
<th>Inside diameter of hula hoop</th>
<th>Conversion Factor (multiply the number of plants within the hoop by the appropriate factor to calculate plants per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36&quot;</td>
<td>6,616</td>
</tr>
<tr>
<td>33&quot;</td>
<td>7,334</td>
</tr>
<tr>
<td>30&quot;</td>
<td>8,874</td>
</tr>
</tbody>
</table>

**MD Grain Marketing Site Updated for 2014: Crop Budgets, Custom Rates and Fact Sheets**

Shannon Dill, Agent-AGNR, University of Maryland Extension

The University of Maryland Extension has updated the [www.extension.umd.edu/grainmarketing](http://www.extension.umd.edu/grainmarketing) website with new input data for 2014 crop budgets. Also posted is the most recent MD custom rate survey, sample lease agreements, crop insurance information and eight grain marketing fact sheets.

**Crop Budgets**
Cost of production is very important when making farm enterprise management and grain marketing decisions. Enterprise budgets provide valuable information regarding individual enterprises on the farm. This tool aids farm managers with decisions regarding enterprises and with planning for the coming production year. An enterprise budget uses farm revenue, variable costs, fixed costs and net income to provide a clear picture of the financial health of each farm enterprise.

The 2014 Maryland enterprise budgets were developed using average yields and estimated input costs based upon producer and farm supplier data. The figures presented are averages and vary greatly from farm to farm. Therefore, it is crucial to input actual farm data when completing enterprise budgets for your farm.

**How to Use Enterprise Budgets:**

The enterprise budgets can be used as a baseline for your operation. To personalize these budgets, include your
production techniques, inputs and management practices. The budgets are available online in either PDF format or as Excel worksheets at [www.extension.umd.edu/grainmarketing](http://www.extension.umd.edu/grainmarketing). You can use these documents to assess what making changes to your operation will do and to find ways to lower production costs. If you have problems downloading any of these budgets, contact information is located on the website.
Western
Growing conditions are very good. We have had more than adequate rainfall and good heat units. Corn and early soybeans are looking good. Barley has been harvested and wheat harvest is in full swing. Double-crop soybeans are being planted as soon as the straw is baled. Alfalfa second cutting is complete and tonnage is slightly above average. Grass hay was made more mature than desirable due to sporadic rain storms. There has been scattered flooding in various parts of the county and crops have been affected to what extent will be known after small grain harvest is completed and how well the corn and soybeans recover. Peaches and apples are doing well with no hail damage so far.

Central
Weather conditions continue to improve with warmer temperatures and moderation in moisture in this reporting period. Barley harvest is wrapping up and wheat harvest has begun. Hay harvest has been aided by dryer conditions, nice air movement and low humidity. Corn and soybean growth has been excellent. Well-managed pastures are in excellent condition, but growth has slowed with the hotter July temperatures. Cherry crop was light. Blueberries are now being picked, and brambles will be ready soon.

Northeast
Corn planting is completed and emergence is good; crop progress lags by about 10 days and many fields are showing moisture stress with the hot dry weather over the past 10 days. Full season soybean planting is completed and emergence is average; however, crop progress is significantly delayed. There have been a few windows of good weather to make hay and first cutting of grass hay is nearing completion. Barley harvest is essentially completed with overall quality above average and the yields ranging from below average to very good; overall yields are average at best. Severe thunderstorms of June 18 lodged noticeable areas in many barley and wheat fields. Wheat harvest is getting started and the overall yields are about average and the quality is good with only a few reports of VOM. In addition, the vegetable operations are in full swing with the first sweet corn nearing harvest.

Southern
The main story continues to be moisture in Southern Maryland. The area has received sporadic and isolated rains, but most field crops were showing signs of moisture stress. More widespread rains were received yesterday and last night (July 2). The much needed moisture came just in time for much of the corn crop. Tasselling started last week and is continuing with about 40-50% of corn in tassel now. Barley harvest is now complete. Wheat harvest has progressed well with reports of good yields and test weight. Double crop soybean planting has also progressed well. There is still enough moisture for beans to germinate. Continued rainfall will be needed soon.

Upper Eastern Shore
The entire region is dry as I write this on July 2nd. I hope by the time it is being read, either the front coming across the Mid-Atlantic or the tropical storm has provided some moisture to the area. Wheat harvest is finishing up with yields being 60-90 bu/acre, good test weights, and low aflatoxin levels. Fungicide applications at heading this year, proved successful. Corn is beginning to tassel with minimal disease / insect pressure. Full season beans have reached full canopy. Barley beans are up and off to a good start. Wheat beans have sufficient moisture for germination. The recent dry weather has been conducive for quality hay harvest. Downy mildew on cucumber have been found. Fungicides or bio-fungicides are recommended at this time for commercial cucumber production.

Lower Eastern Shore
Corn is currently suffering from dry conditions and only a few fields are starting to tassel. Full season soybean planting has been completed and are looking good. Double cropped beans are following the current wheat harvest, which showed very little scab this year. Record setting wheat yields are reported in lower shore counties. Lima bean planting is progressing well. High number of cucumber beetles can be found in cucumbers, cantaloupe and watermelon. Processing potato harvest will begin this week.
Generally near to slightly above normal temperatures and near normal precipitation highlighted June across Maryland. The exception was southeast Maryland, including the Maryland Eastern Shore, which received below normal precipitation. After a dry and relatively cool end to June, the heat is expected to return through the first couple of weeks of July. However, there will be a brief reprieve from the heat during the first weekend of the month following a cold front and tropical system. Above normal temperatures and near normal precipitation is expected through mid-July with more uncertainty thereafter. The latest Climate Prediction Center July Outlook calls for a slightly increased probability for above normal temperatures in June with equal chances for below, near normal, or above chances for precipitation. Anticipate most of the precipitation to be tied to typical summer-time afternoon showers and thunderstorms, but an occasional cold front will bring slightly cooler conditions with an increased chance for precipitation. Normal precipitation for Baltimore in July is 4.07 inches. Salisbury’s normal is 4.38 inches. Although Arthur impacted the region early this month, the tropics are not expected to be active during July.
**Announcements**

16th Annual Maryland Commodity Classic

The 16th annual Maryland Commodity Classic, the premier event for Maryland grain farmers, will be held on Thursday, July 24. Field tours at the Wye Research and Education Center beginning at 9:30 am, will showcase the latest work in checkoff research. Commercial and checkoff-funded exhibits will open at the 4-H Center at 11:00 am. Maryland Farm & Harvest host Joanne Clendening returns to emcee the afternoon program, featuring keynote speaker Trent Loos. The event concludes with the famous chicken and pork barbecue and crab feast. Maryland Grain Producer Association members receive complimentary tickets. Contact the MGPA office for details at lynnehoot@aol.com or 410-956-5771.

Projects that will be highlighted at the Wye tour are:

**Presenter / Project**

- Mr. Dean Cowherd, Maryland Natural Resource Conservation Service: *The Effect of No-Till on Soil Stability*
- Dr. Bill Lamp, University of Maryland: *Continued Detection of the Kudzu Bug & Its Biology/Damage in Maryland Soybeans*
- Mr. James Adkins, University of Delaware: 1) *Managing Subsurface Drip Irrigation for Maximum Profitability in Corn*, and 2) *Determining the Ideal Irrigation Strategy for High Intensity Corn Production*
- Dr. Bob Kratochvil, University of Maryland: 1) *Soybean Maturity Group Response to Double Crop Planting Dates*, 2) *Full Season & Double Crop Soybean Response to Potassium Fertilizer*, 3) *Assessment of Fall Soil Nitrate Test for Wheat Production*, and 4) *Optimum Application Date for Spring Nitrogen for Wheat*

2014 Pesticide Container Recycling Program from MDA

Maryland Department of Agriculture's Pesticide Container Recycling Program will be accepting clean, empty containers through September 26, 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](http://mda.maryland.gov/plants-pests/Documents/recycle.pdf)

**Agronomy Program Manager Opening**

University of Maryland Agricultural Experiment Station, is looking for Agronomy Program Manager at Wye Research and Education Center, Queenstown, MD. Duties: Working with scientists, coordinate and implement research, demonstration and educational projects for agronomic crops. Min. Qual.: BS degree, prefer 10 years of farm-related experience including 3 years research plot design and staff supervision. Salary commensurate w/experience, with base salary $48,320. Details/Apply: [https://ejobs.umd.edu/](https://ejobs.umd.edu/ Position #103087. Best consideration /closing date: July 14, 2014. Contact: Barbara South (410) 827-6202. EEO/AA.

**Upcoming Events**

3rd Annual Eastern Shore Potato Field Workshop on July 10th.

University of Maryland Extension will conduct its Annual Eastern Shore Potato Field Day on Thursday, July 10th from 4 - 7 pm. The event will take place near North Dorchester High School on East New Market/Rhodesdale Road, Hurlock, MD. Signs will be posted on adjoining roads.

Anyone who is growing potatoes or interested in growing potatoes should attend this meeting. Participants will get to see new varieties, agronomic practices for optimizing yield and quality, pest, disease and nutrient management for potato production in Maryland and the Delmarva. Attendees will earn Maryland, Delaware & Virginia pesticide re-certification and nutrient management credits.

Register by July 4th. Contact Rhonda Barnhart at 410-228-8800 or rbarnhar@umd.edu for registration, details and directions or register online at [http://extension.umd.edu/dorchester-county/potato-field-workshop](http://extension.umd.edu/dorchester-county/potato-field-workshop)
Fourth Annual Mid-Atlantic Precision Ag Equipment Day

Mid-Atlantic Precision Ag Equipment Day will be held on Wednesday, Aug. 6, 8:30 am – 3:30 pm at Wye Research & Education Center, 124 Wye Narrows Drive, Queenstown, MD 21658.

The event will include the nation’s top experts on agricultural equipment and machinery engineering. Practical and informative advice will be given on selecting and using the right equipment for precision operations as well as how to best use the data you are already collecting to optimize your operations.

SPECIAL FEATURE – John Nowatzki from North Dakota State University will present data from the first ever UAS (unmanned aircraft systems) tests in agriculture that started May 2014. Unmanned aircraft systems (UAS) also known as drones have attracted much attention and Dr. Nowatzki is at the cutting edge, being one of only six sites selected to perform the first agricultural tests. Also, various drone systems will be demonstrated in the vendor midway.

You will also have the opportunity to meet with the speakers throughout the day so that you can get your questions answered in an informal setting. In addition, agricultural equipment dealers from across the region will be in our sponsor midway showing off the latest technology with live demonstrations. The event is free for attendees, but we do ask that you register to help us plan for the event. Lunch will be provided and CCA and nutrient applicator credits will be available. If you are in agri-business and would like to reserve a booth there is still space available. Please contact Jennifer Rhodes (410) 758-0166 or jrhodes@umd.edu.

Farm Bill Education Series Planned for August in Maryland

Maryland farmers will have multiple opportunities to prepare for decisions they will be making to participate in the 2014 farm bill. In August, the University of Maryland’s Department of Agricultural and Resource Economics (AREC), University of Maryland Extension, Maryland Department of Agriculture (MDA), USDA – Risk Management Agency will sponsor a series of farm bill workshops across Maryland to prepare Maryland farmers for their upcoming decisions.

“The new farm bill is complicated and Maryland grain and dairy producers will want to be aware of how to best pick their options using software aids,” said Dr. Howard Leathers, AREC associate professor. “By attending a workshop, a producer will walk away with a better understanding of the new programs in the farm bill and how these programs could potentially impact their operations,” Leathers said.

“The workshops will begin on August 12th on the Lower Shore and continue through August 21 in Garrett County. Each workshop will feature speakers from AREC, MDA, and USDA,” said Steve Connelly, Program Director – Farm and Crop Insurance for MDA.

The workshop will cost $10 to attend to cover the cost of lunch. The workshop schedule is:

1. Lower Shore – 10am to 3pm, August 12, Rockawalkin Community Center, 6772 Rockawalkin Rd, Hebron, MD 21830, commodity programs only covered;
2. Upper Shore – 11am to 2pm, August 13, Queen Anne’s County Fairgrounds, commodity programs only covered;
3. Southern Maryland – 10am to 3pm, August 15, St. Mary’s Agricultural Service Center, 26737 Radio Station Way, Leonardtown, MD 20650, commodity programs only covered;
4. Northern Maryland – 10am to 3pm, August 18, Baltimore County Ag Center, 1114 Shawnan Rd, Cockeysville, MD 21030, commodity and dairy programs covered;
5. Central Maryland - 10am to 3pm, August 19, Dutch’s Daughter Restaurant, 581 Himes Avenue, Frederick, MD 21703, dairy programs covered; and
6. Western Maryland – 10am to 3pm, August 21, location TBA, dairy programs covered.

For more information on a particular workshop contact your County University of Maryland Extension office.

Did You Know

In the early 20th century, a farmer could hand pick approximately 100 bushels of corn in a nine-hour day. Today, a modern combine can pick this amount in 7 minutes.
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 2014.

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.

This edition of Agronomy News is brought to you by:

University of Maryland Extension Field Faculty:

Ben Beale, Ag & Natural Resources Educator, St. Mary’s County
Jarrod Miller, Ag & Natural Resources Educator, Somerset County
Jeff Semler, Ag & Natural Resources Educator, Washington County
Jim Lewis, Ag & Natural Resources Educator, Caroline County
Stanley Fultz, Dairy Science Agent, Frederick County
Sudeep Mathew, Ag & Natural Resources Educator, Dorchester County

University of Maryland Extension Specialist:

Dr. Robert Kratochvil, Agronomic Crop Production
Dr. Dr. Cerruti R² Hooks Entomology

Partners:

Andrew Frankenfield, Agricultural Educator, Penn State Extension
Lauren G. Hunt, Graduate Student - Department of Entomology
Scott A. Minnick, Meteorologist, NOAA-National Weather Service

Agronomy News is published by University of Maryland Extension, Ag & Natural Resources Profitability Impact Team.

Sudeep Mathew, Editor

Agronomy News subscriptions are free on the internet at: www.extension.umd.edu

To subscribe or more information:
Agronomy News
University of Maryland Extension
501 Court Lane, Room 208
Cambridge, MD 21613
410-228-8800
Email: rbarnhar@umd.edu