Fall Fertilizer Nitrogen or No Fall Fertilizer Nitrogen for Wheat?

Dr. Bob Kratochvil, Extension Agronomist

Many Maryland farmers plant wheat following either corn or soybean. University of Maryland Extension’s recommendation for fall fertilizer nitrogen (N) use at wheat planting is 0 - 30 lb/acre. The need for fall fertilizer N is dependent on the amount of residual soil nitrate that is present following harvest of corn or soybean. This article describes a wheat fall nitrate-N soil test (WFNT) that can be used as a decision-making tool for determining the need for wheat fall fertilizer N.

Wheat after corn

A study was conducted to assess the response of wheat to fall fertilizer N across representative Maryland locations and soil types using production practices commonly used by Maryland farmers. To avoid causing unnecessary variability, management practices were kept similar across the locations. Wheat production on a total of 21 non-irrigated sites was studied over a period of 5 years. For all 21 sites, corn was the previous crop. Each corn main plot was divided into 4 corn N rate sub-plots, 0, 120, 180, and 240 lb N/acre to establish varying amounts of soil residual nitrate following corn harvest. After corn harvest, soil samples were collected for soil nitrate analysis to a 2 ft. depth from all sub-plots. Wheat was planted into each of the corn N rate sub-plots. Wheat for all studies was planted using a seeding rate of 1.5 million seeds/acre within a three-week window after the Hessian fly-free date for the area. Each wheat plot was divided into two parts; one part received no fall nitrogen and the other part received 30 lb N/acre. In the spring, a total of 100 lb fertilizer N/acre was applied to the entire plot area in split applications with the first application (50 lb N/acre) March 1 (or ASAP after that date), and the second application (50 lb N/acre) at jointing.

Wheat yield response to fall N was associated with the amount of soil nitrate present following corn. Even though soil samples were collected to a 2 ft. depth, the soil nitrate concentration in the surface 6 inches adequately determined the level needed to make the decision about fall fertilizer N use. At 16-21 sites, the average amount of residual soil nitrate following corn harvest was less than 15 ppm at the 0-6 inch depth. Across those 16 sites, the average yield increase was 3.5 bu/acre when 30 lb fertilizer N/acre was used. For the sites where the residual soil nitrate concentration was 15 ppm or greater, the average wheat yield response was less than 3.5 bu/acre. Most importantly, as the residual soil nitrate concentration decreased from 15 ppm to 10 ppm or less, the probability of a significant wheat yield response improved considerably (Fig. 1).
Figure 1. Wheat yield response to 30 lb acre⁻¹ fall fertilizer nitrogen at different residual soil nitrate concentrations (x-axis) following corn harvest. Each diamond represents the yield difference observed for two adjacent plots that either received 30 lb fertilizer N/acre or no fall fertilizer N. The heavy black line represents the average agronomic yield response as soil nitrate concentration increases. The red line represents the economic breakeven point for use of 30 lb fertilizer N/acre. The green line intersects the soil nitrate concentration at 10 ppm, the point where the probability for a positive economic return for fertilizer N use was 50:50.

Of course, simply getting a positive yield response is not the most important goal when using fall fertilizer N. The goal should be a positive economic return for the fertilizer N. Consideration needs to be given to the cost of the N, the cost to apply it, and the anticipated price you will receive for the wheat. Over the five years of this study, the average yield improvement necessary for a positive economic return to the use of 30 lb N/acre was 3.5 bu/acre; the same as the average agronomic response. The agronomic yield response exceeded the level needed to pay for the N approximately 33% of the time (points above the red line, Fig. 1). At soil nitrate concentrations 10 ppm or less, the frequency of a positive economic response (points above the red line and to the left of the green line) increased. At soil nitrate concentrations of 10 ppm or less, the odds for a positive economic return were approximately 50:50. **This 50% positive economic response is the basis for the recommendation that use of fall fertilizer N is warranted when soil residual nitrate N in the surface 6-inches is 10 ppm or less.** However, this does not mean there will always be a positive economic return.

### Wheat after soybean

Wheat yield response to fall fertilizer N following soybean was evaluated at five sites during 2008-2010. At each site, wheat was planted into plots where six soybean varieties representing six maturity groups (MG 2.0 to MG 4.5) had been grown. Prior to planting wheat, soil samples (0-6 inch depth) were collected to measure residual soil nitrate-N. Each wheat plot was split with half receiving 30 lb fall fertilizer N and the other half receiving no fertilizer N. Spring fertilizer nitrogen (80 lb N acre⁻¹) was applied to the entire plot area in a split application with the first application (40 lb N acre⁻¹) as close to March 1 as possible and the second application (40 lb N acre⁻¹) at jointing.

Fall residual soil nitrate-N following soybean averaged less than 10 ppm (6.6 ppm) over the five sites. Averaged over the five sites, there was no yield difference.
between 30 lb/acre fall fertilizer N and no fall fertilizer N (74 bu/acre compared to 73.5 bu/acre, respectively). Soybean maturity did not affect the outcome for fall fertilizer N use. Based on this work, the likelihood of a significant yield response to fall fertilizer N for wheat planted after soybean is low. The UM Extension recommendation is to not use any fall fertilizer N for wheat following a soybean crop.

Is a quick soil test available?

One of the disadvantages of a soil test is the time required for the results to be returned from the laboratory. However, there are some labs that will provide very quick turn-around. Since time is limited between harvest and planting wheat, quickly knowing what the soil nitrate concentration is advantageous.

A component of the research behind the FWNT recommendation was an accuracy comparison of the soil NO$_3$-N results obtained when testing the soil samples using a Nitracheck test kit (same kit that is used to conduct the Pre-Sidedress Nitrate Test [PSNT] for corn in the spring) with the results obtained using the standard laboratory analysis. The use of the Nitracheck test kit would be considered a quick test since these kits are available in every UME office.

The Nitracheck kit used for this research provided very good results. The coefficient of determination (R$^2$) value for the samples analyzed with both the quick Nitracheck field kit and the standard laboratory analysis method was 0.988. A value of 1.000 would have indicated that the NO$_3$-N measurements were exactly the same for every comparison. However, since it is known that there is some variability in the nitrate concentration results obtained for the same sample when using different Nitracheck kits and/or different operators, additional test kits and operators were used to analyze the same samples. Twenty-four samples of soil with known nitrate concentration (samples ranged between 2 and 64 ppm) as measured by standard laboratory analysis were divided among 10 University of Maryland Extension Nutrient Management Consultants. Each consultant tested the samples using their Nitracheck kit. The results for these comparisons determined that the Nitracheck measurements were within +/-2 ppm of the stringent laboratory measurements, 81% of the time. When the measurements obtained by the nutrient management consultants were used to test the yes/no fall nitrogen fertilizer application question, a correct choice occurred 90% of the time.

Interpreting the fall wheat nitrate test results.

Farmers have two options for testing fall soil nitrate concentration. Soil samples can be sent to a commercial laboratory where standard analysis procedure will be used. For commercial laboratory results, if the residual soil nitrate concentration is 10 ppm or less, an application of 30 lb fall N fertilizer/acre is recommended. If the soil test result is greater than 10 ppm nitrate, no fall fertilizer N is required. For results obtained using a Nitracheck test kit, when a soil nitrate concentration of 12 ppm or less is found, use 30 lb fall fertilizer N acre$^{-1}$. The advantage to the second option is possibly a quicker result because there is a Nitracheck test kit located in every University of Maryland Extension office.

How to conduct the quick fall wheat nitrate soil test.

The steps for collecting the soil samples and conducting the quick test using the Nitracheck meter are:

1. Call your local University of Maryland Extension office and alert the nutrient management consultant that you want to have the fall nitrate test for small grain conducted. Let them know how many samples you will be testing.
2. Randomly collect soil cores (1 per acre) to a depth of 6-inches from across the field.
3. Avoid sampling in areas of the field that either have been managed differently or have different soil properties. In other words, try to make the sampling sites representative of the field.
4. Mix your composite sample thoroughly and then place approximately 1-2 cup of soil into either a plastic bag or a soil test bag.
5. Store samples in a refrigerator until you either deliver them to the soil testing laboratory of your choice or can deliver them to the University of Maryland Extension office for testing with the Nitracheck kit.
6. Use the fall nitrate test results and the decision-making flow chart (Figure 2) to determine the need for fall fertilizer nitrogen.

Cont. pg. 4
A key issue framing the 2012 Farm Bill debate is the interaction among farm safety net programs. Attention has focused mostly on the interaction between crop insurance and the shallow loss programs, such as ACRE in the 2008 Farm Bill, ARC in the 2012 Senate Farm Bill, and RLC in the 2012 House Agriculture Committee Farm Bill. In contrast, this article examines the interaction between insurance and the counter-cyclical and marketing loan price support programs.

Counter-cyclical and marketing loan programs make payments when the price of a crop drops below the program's benchmark price. The benchmarks are set by Congress, and are called the target price for the counter-cyclical program and the loan rate for the marketing loan program. Counter-cyclical payments are based on historical acres and yields while marketing loans are available for all current production. The target price is higher than the loan rate, but counter-cyclical payments are not received for prices lower than the marketing loan rate. In essence, the two programs work together to provide a floor on price that approximately equals the target price.

There are no fees or charges associated with the programs, although enrolled farms must meet conservation compliance and payment limits exist for the counter-cyclical program.

Interaction with Crop Insurance

The marketing loan and counter-cyclical programs provide protection against low prices, but not low yields. In contrast, yield insurance provides protection against low yields, but not low prices. Thus, the price support programs and yield insurance complement one another in that they cover different components of revenue. Moreover, protection against low revenue can be created by combining the price support programs and yield insurance. The amount of revenue protected by combining price support programs and yield insurance is a complex calculation. It depends upon the crop's target price, the price used for yield insurance, the farm's counter-cyclical and insurance yields, and the relationship between planted and base acres, among many factors. Because of this complex calculation, revenue protection is likely to be less effective when combining price support programs and crop insurance than when buying a revenue insurance contract. Nevertheless, because the price support programs have little cost associated with them, combining them with yield insurance will be cheaper and potentially cost effective revenue protection, especially when market price is near or below the target price.

As market price increases above the target price, the revenue protection offered by combining fixed price support programs and crop insurance declines relative to market revenue. Thus, even though revenue insurance comes with a higher premium cost than yield insurance, the higher revenue protection offered by revenue insurance as market prices increase above the target price creates an incentive to switch to revenue insurance from yield insurance. Consistent with this observation, the share of acres insured using yield insurance (APH, GRP, and YP) has declined from 54% in 2002, the initial year for the counter-cyclical program, to 17% in 2012 (see Figure 1). During this period, market prices rose above, then stayed above the target prices.

Interaction between Crop Insurance and Price Support Programs

Dr. Carl Zulauf, Professor - The Ohio State University

A key issue framing the 2012 Farm Bill debate is the interaction among farm safety net programs. Attention has focused mostly on the interaction between crop insurance and the shallow loss programs, such as ACRE in the 2008 Farm Bill, ARC in the 2012 Senate Farm Bill, and RLC in the 2012 House Agriculture Committee Farm Bill. In contrast, this article examines the interaction between insurance and the counter-cyclical and marketing loan price support programs.
A correlation coefficient was calculated between the share of acres enrolled in yield insurance and the ratio of the insurance plant price to target price for corn, upland cotton, soybeans, and wheat over the 2002-2011 crop years. The correlation is -0.65 and is statistically significant. The negative sign implies that, the higher market price is relative to the target price, the smaller is the share of insured acres enrolled in yield insurance. Correlation coefficients range from -1 to +1. The closer a correlation is to these so-called perfect correlations, the more the two variables move together. The insurance plan price used for wheat was for the Chicago futures market or soft red winter wheat.

Summary Observations

Many factors are likely involved in the shift from yield insurance to revenue insurance since 2002. For example, insurance premium subsidies have increased. Nevertheless, it is likely that the increase in market price relative to target price is a factor in this shift.

Thus, it is important to consider and analyze the interactions between crop insurance and the increased target prices contained in the House Agriculture Committee Farm Bill. Table 1 contains the current target prices and the target prices proposed in the House Bill. The proposed target prices range from a -4% decrease for upland cotton and 8% increase for peanuts to a 50% increase for sorghum and an 88% increase for barley. The increases bring the target prices closer to current market prices. To illustrate, the proposed House bill target prices are 5% higher for peanuts, 2% lower for rice, 3% lower for barley, and 4% lower for upland cotton than the Olympic average price for the 2008 through 2012 crop years (see Table 1). Although the increase in target price is sizable for corn and soybeans, the proposed target prices are 25% lower for soybeans and 28% lower for corn than the 2008-2012 Olympic average prices.

Table 1. Comparison of Current and House Agriculture Committee Farm Bill Target Prices and Recent Average Market Prices, U.S., September 27, 2012

<table>
<thead>
<tr>
<th>Crop</th>
<th>Unit</th>
<th>Current Target Price</th>
<th>House Committee Target Price</th>
<th>Olympic Average Price 2008-12</th>
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<tr>
<td>Barley</td>
<td>Bushel</td>
<td>$2.63</td>
<td>$4.95</td>
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<td>Bushel</td>
<td>$2.63</td>
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<td>Cotton, Upl</td>
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<td>$0.6667</td>
<td>$0.71</td>
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<td>$1.79</td>
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<td>Peanuts</td>
<td>Pound</td>
<td>$0.26</td>
<td>$0.27</td>
<td>$0.26</td>
</tr>
<tr>
<td>Rice</td>
<td>Hundredweight</td>
<td>$10.50</td>
<td>$14.00</td>
<td>$14.30</td>
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<tr>
<td>Sorghum</td>
<td>Bushel</td>
<td>$2.63</td>
<td>$3.95</td>
<td>$4.78</td>
</tr>
<tr>
<td>Soybean</td>
<td>Bushel</td>
<td>$6.00</td>
<td>$8.40</td>
<td>$11.24</td>
</tr>
<tr>
<td>Wheat</td>
<td>Bushel</td>
<td>$4.17</td>
<td>$5.50</td>
<td>$6.57</td>
</tr>
</tbody>
</table>

NOTES: (A) Program is the Price Loss Coverage (PLC). (B) This calculation uses the midpoint of the price range in the September World Agricultural Supply and Demand Estimates for the 2012 crop year price for all crops except peanuts. For peanuts, no information is available for the 2012 crop year price. It is assumed to be the high price and thus excluded in the calculation. (C) This price is the minimum price in the upland cotton STAX program.
At least two interactions between crop insurance and the proposed higher target prices are important to consider. First, if market price for a crop declines below the target price, some, maybe many, farms will likely shift from revenue insurance to yield insurance for the crop. In regard to this observation, revenue insurance does not currently exist for oats and peanuts, although development of a revenue insurance product for peanuts is required in both the Senate and House Agriculture Committee Farm Bills.

Second, if market prices decline below the increased target prices, then farms can potentially receive payments from crop insurance as price declines between planting and harvest and from the price counter-cyclical program as price also declines below the target price. One way to eliminate this double payment is to incorporate insurance prices into the determination of counter-cyclical payments.

In conclusion, the formation of good policy rests upon assessing as many potential interactions among policy programs as possible in order to reduce the likelihood of unforeseen impacts upon both farms and the cost of farm programs.

Crop Reports

Western
Harvest is progressing well. Corn yields vary but are at or above average. Soybean harvest is just underway so yield reports are limited. Welcome showers have been good for the cover crops planted behind corn silage. We are going into fall in pretty good shape but that can change with the weather.

Central
The September 18 storm brought timely moisture to the region. Corn harvest is progressing nicely with yields generally good, but some areas were more severely affected by the hot, dry weather during pollination resulting in reduced yields. Cover crops/small grains are germinating well. Brown Marmorated Stink Bugs (BMSB) are making themselves known. Heat and drought damaged corn is showing more BMSB damage than other corn. Some full season beans along wooded areas are showing the typical stay green symptoms even though they were sprayed earlier in the season. Double crop soybeans are seeing some damage as well from BMSB.

Northeast
We have enjoyed very good harvest weather. Corn harvest is in full swing with some reports of yields in the 140 to 150 bushels per acre range with field moistures between 17 and 22 percent; lower yielding fields are in the 100 to 120 bushels per acre range. Almost all soybeans have turned color and the majority of fields are dropping leaves with a few fields having dropped all leaves. The good weather encouraged hay making on most fields that had decent regrowth; in general yields for the season seem slightly below average to average. Cover crop and small grain seeding has begun with early plantings germinated.

Southern
Conditions are turning dry again. Hopefully the front moving through this week will bring much needed moisture. Corn harvest is nearly completed. Group III and early IV soybeans are yellowing and dropping leaves. There is a lot of variability in the stage of maturity throughout the same field in soybeans this year, including some green stem. There are some late season insect defoliators present in beans. Cover crop planting following corn is proceeding well. There has been some good hay made in the last two weeks.

Upper Eastern Shore
Corn harvest is finishing up and bean harvest is beginning. Barley planting is underway with some farmers already finished. Wheat planting will begin next week. While hay yields have been reduced due to drought, the hay that has been made is excellent quality. Both surface and subsoil moisture is still low. Ditches and ponds remain at record low levels.

Lower Eastern Shore
Excellent drying weather this past week has helped reduce moisture in crops. Conditions are ideal for harvesting. Low temperatures overnight have dropped into the 40's. Corn harvest is continuing at a good pace. Many are taking advantage of the dryer weather to cut hay. Soybean leaves are beginning to turn yellow and drop. At this time, insect and disease pressure is light.

Timeline: This crop report is for the field observations from September 6 through September 27, 2012. 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

I have more good news to report in the drought department as conditions continue to improve due to recent rainfall, especially on the Eastern Shore which was the driest. Looking ahead, there is more uncertainty than usual regarding the upper-level weather pattern, but evidence suggests that precipitation should be near to slightly above normal through the first two weeks of October. After a recent spell of cooler than normal temperatures, it looks as though temperatures should moderate to near normal over the next few weeks. This should translate into mornings in the 40s and 50s with afternoons in the low to mid 70s through the middle of October.

Announcements

Your response is requested for Maryland Custom Rate survey

University of Maryland Extension is requesting your assistance in securing up-to-date information about farm custom work rates, machinery rental rates and hired labor costs in Maryland. This information is being updated and published by the University of Maryland Extension in every two years. It is widely used by farmers across the state, so we need the best information available.

Please respond even if you know only a few rates. We want information on actual rates, either what you paid to hire work or what you charged if you perform custom work. Custom Rates should include all ownership costs of implement & tractor (if needed), operator labor, fuel and lube.

Reported rates will be summarized in the Custom Rate Survey to show a range and average for the state. NO individual names or rates will be published in the Custom Rate Survey.

The survey form is included at the last page of Agronomy News. Please return the survey by December 15, 2012 to 28577 Mary’s Court, Suite 1, Easton, MD 21668, or fax at 410-822-5627, or email at sdill@umd.edu.

The results will be available at local Extension Offices and will be available online at www.mdgrainmarketing.umd.edu. We hope this publication will be beneficial to you as a farm operator and thank you for your cooperation with this effort. If you have any questions or comments regarding the survey please contact Shannon Dill at 410-822-1244 or sdill@umd.edu.

Upcoming Events

Food for Profit Workshop to be held October 10

"Food for Profit" is a one-day workshop designed to help you work through the maze of local and state regulations, food safety issues, and business management concepts that all must be considered in setting up a commercial food business. The course will be held at the University of Maryland Extension - Calvert County, Community Resources Building, 30 Duke Street, Conference Room 105, Prince Frederick, MD 20678 on Wednesday, October 10, 2012 from 9:00 a.m. to 4:00 p.m. This popular course designed by Penn State Extension is co-sponsored by the Maryland Rural Enterprise Development Center, University of Maryland Extension, and the Southern Maryland Agricultural Commission. Cost is $45.00 per person (includes materials and lunch)

Pre-payment and registration are required. Please register at: http://agsci.psu.edu/food-for-profit/prince-frederick or by calling 717-270-4391.

If you have any questions concerning this program, please contact Ginger S. Myers at 301-432-2767 x338 (gmsmyers@umd.edu)

Small Farm Livestock Series

Do you have livestock on a few acres or are you considering adding livestock to your current operation? The University of Maryland Extension will be holding a three part series on adding or improving
livestock enterprises on small farms. Each class will cover a different species or group of species and will include horses, small flock poultry and ruminants (cattle, sheep and goats). You can attend one or all three. The cost is only $25 per class and they will be held at Chesapeake College on the following dates:

- October 11, 2012: Equine Facilities and Pasture Considerations
- October 22, 2012: Small Farm Livestock Options—Ruminants
- October 29, 2012: Raise Poultry in Your Backyard

Classes will be held in the evenings, from 7-9 p.m. For more information on how to register, contact Marci Leach at 410-827-5833 or mleach@chesapeake.edu. or your local extension office.

9th Annual Small Farm Conference

The annual Small Farm Conference slated for November 2 and 3 on the Richard A. Henson Center on the UMES campus, Princess Anne, MD. Gary Matteson, vice president at the Farm Credit Council in Washington, D.C., will deliver the conference keynote address on Saturday.

Registration is $25 per person and $40 per couple. For youth attending with registered parents, registration is free. For youth who will not accompany a registered parent, registration is $10. All registrations must be received by Friday, October 26, and registrants who need special services or accommodations must call at least two weeks in advance to make arrangements.

For more information about the 9th annual Small Farm Conference, call 410-651-6206/6070 or send an email to mce@umes.edu. Online registration and regularly updated information is available at www.smallfarminstitute.com.

LEAD Maryland Foundation Symposium on December 12, 2012

The fellows of LEAD Maryland Class VII invite you to come to the table of the first ever symposium developed to promote the Image of Agriculture within Maryland.

The symposium will be held at the Maritime Institute Conference Center, 692 Maritime Boulevard, Linthicum Heights, MD from 8:00 am – 3:30 pm. The cost is $25 Early bird until November 21 and $35 November 21-December 5.

Jim Perdue, Chairman of Perdue Farms, will give the luncheon address. Delaware Secretary of Agriculture, Ed Kee, will conclude the program on an inspirational note. For information and registration details contact 410-827-8056 Ext 176 or visit www.leadmaryland.org/symposium

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 2012.

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

Soybeans provide 66 percent of the edible consumption of fats and oils in the United States.

A Big Thank You!!

Maryland Grain Producers’ Utilization Board and Maryland Soybean Board are both recognized for their financial contributions that support the publication and distribution of this newsletter. This is another example of the work that is accomplished with the checkoff dollars these two organizations manage.
This edition of Agronomy News is brought to you by:

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Sudeep Mathew, Editor

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**Maryland Farm Custom Rate Survey – 2013**

**PLEASE PRINT**

Name: ___________________________________________ Farm Name/Business: ___________________________ County: ___________________________

Phone: ___________________________ Email/Website: ___________________________________________ Address: ___________________________________________

Please respond even if you only provide a few operations. We will NOT list the rate that you charge. Rates charged will be summarized in the Custom Rate Survey to show a range and average for the state, but NO individual names or rates will be published in the Custom Rate Survey.

We would like information on actual rates, either what you paid to hire work or what you charged if you perform custom work. Custom Rates should include all ownership costs of implement & tractor (if needed), operator labor, fuel and lube.

After completing the form, return it in the self-addressed, stamped envelope provided to 28577 Mary’s Court Suite 1, Easton MD 21668, by fax to 410-822-5627 or by email to sdill@umd.edu by **December 15, 2012**. We hope these publications will be beneficial to you as a custom farm operator.

You are not a Custom Operator and would like to be removed from our survey list?  ☐ YES

<table>
<thead>
<tr>
<th>OPERATION</th>
<th>UNIT</th>
<th>RATE</th>
<th>OPERATION</th>
<th>UNIT</th>
<th>RATE</th>
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<td>Drilling – Small Grain</td>
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<tr>
<td>Soybean Planting-conventional</td>
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<td>Spraying – Pesticide Ground</td>
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<td>Spraying – Pesticide Aerial</td>
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OVER
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<thead>
<tr>
<th>OPERATION</th>
<th>UNIT</th>
<th>RATE</th>
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<th>RATE</th>
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<tbody>
<tr>
<td>Mowing Hay</td>
<td>Acre</td>
<td></td>
<td>General Farm Labor</td>
<td>Hour</td>
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<tr>
<td>Mowing and Conditioning Hay</td>
<td>Acre</td>
<td></td>
<td>Skilled Farm Labor</td>
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<tr>
<td>Raking Hay</td>
<td>Acre</td>
<td></td>
<td>Machinery Operation</td>
<td>Hour</td>
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<tr>
<td>Bailing - small squares</td>
<td>Bale</td>
<td></td>
<td>Bush hogging</td>
<td>Hour</td>
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<td>Bailing - large round bales</td>
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<td>Mowing CRP Acres</td>
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<td>Mow, Rake, Bale Hay- no haul</td>
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<td>Mowing</td>
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<tr>
<td>Field Chop, Haul &amp; Fill Silo</td>
<td>Ton</td>
<td></td>
<td>Clearing Land</td>
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<tr>
<td>Combining- corn</td>
<td>Acre</td>
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<td>Posthole Digging</td>
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<td>Combining-soybeans</td>
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<td>Post Driving</td>
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<td>Combining-small grains</td>
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<td>Snow Removal</td>
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<tr>
<td>Custom Farming – Corn</td>
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<td>Bobcat</td>
<td>Hour</td>
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<tr>
<td>Custom Farming – Soybeans</td>
<td>Acre</td>
<td></td>
<td>Trenching</td>
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<tr>
<td>Custom Farming – Small Grains</td>
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<td>Livestock Hauling w/ Trailer</td>
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<tr>
<td>Hauling grain-local</td>
<td>Bu.</td>
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<td>Bulldozer</td>
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<td>Hauling grain- long distance</td>
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<td>Honey Bee Hive Rental</td>
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<td>Storing Grains</td>
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<td>Tree Planting</td>
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<td>Drying Grains</td>
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<td>Vegetative Buffer Planting</td>
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<td>Grinding Feed</td>
<td>Cwt.</td>
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<td>Tractor Rental - &lt;80HP</td>
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<td>Mixing Feed</td>
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<td>Tractor Rental – 80-120HP</td>
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<td>Machinery Operation</td>
<td>Hour</td>
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</tbody>
</table>

Do you know any other custom applicators that should be included in this survey? If so please list name and address:______________________________

__________________________________________________________

Thank you so much for your time and effort in completing this important survey!