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Cooperating Departments: Agricultural Economics, Biosystems and Agricultural Engineering, Entomology, Plant Pathology , and Plant and Soil Sciences

Editor: Chad Lee

In this issue

1. Non-Traditional Fertilizer Products

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If you attended the Farm Machinery Show in Louisville recently, you probably saw many products advertised to improve soil conditions, maximize fertilizer efficiency, or increase crop yield in some other miraculous way. In fact after attending, one farmer observed that it should be easy to grow 500 bushels of corn to the acre. He justified this statement by saying that there were at least 50 products claiming to increase yield by 5 bushels per acre and he could already produce 250 bushel corn. While this may be stretching the truth, farmers are always challenged by salesmen to separate fact from fiction. To help you decide if a product is truly worth the investment, agronomists from the north central region of the US have developed a database of “Non-traditional Materials for Crop Production.” This database contains valid replicated research results conducted on hundreds of such products, is completely searchable, and is available to anyone with web access. Simply search for “Compendium of Non-traditional Ag Products” in your favorite search engine and you will be directed to the site.

A problem for agronomists is that the sheer number of such products makes it impossible to test the claims of every single one. So, what are some other indicators that products may not live up to their sales hype? First, carefully examine the brochure. Effective products rely on University research results to demonstrate effectiveness. These studies should be replicated and should be conducted over several growing seasons. Therefore, they should use some statistical analysis to show that their product was better than the control (doing nothing) and equal to, better, or more cost effective than competing products. Additionally, studies should be conducted reasonably close to your farming operation. Products can be highly effective in one area of the country and completely worthless in other areas.

Secondly, be extremely skeptical if sales literature only shows testimonial evidence of usefulness. For example, “Farmer Brown used this product last year and had the best corn crop ever.” There are too many confounding factors like weather and changes in other production factors that could have caused Farmer Brown’s record yields. Companies often use testimonials to sell their product when University research studies have either not been conducted, or have shown little benefit.

Lastly, seek the advice of your county Extension agent. Educational fact sheets are available at the county offices for those products that truly work. These fact sheets will explain when and under what conditions a response

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is likely. In this time of slim margins, it doesn't make sense or cents to use a product that has little chance to increase profitability.

2. Are Large Plants Required for High Soybean Yields? A Question with Two Answers.

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At first thought it seems completely logical that large soybean plants would produce high yields. In many situations they do. But, as many farmers found when harvesting a field of huge soybeans plants with disappointing yields, sometimes there is no relationship between plant size and yield - as strange as that may seem.

Soybean yield is, in large part, determined by how fast plants grow. Variety, weather, row spacing, plant population, nutrients, soil conditions, weeds, diseases and insects all play a role in determining growth rates in the field. If your soybeans are growing in an environment with few limitations, they will grow rapidly, producing large plants and high yields. If there is stress (for example, it's dry, there is not enough P or K or you have soybean cyst nematode), the plants will grow more slowly, they will be smaller and yield will be reduced. So, here larger soybeans produce higher yields.

Soybean plants can also be large because they grow for a long time. A full-season variety takes longer to mature and it will produce a larger plant than an early variety, but they may well grow at the same rate. In this case, the larger plant will not produce higher yield. Maturity group IV varieties produced larger plants with more nodes and vegetative weight than group II varieties in our research at Lexington (see Table 1) but they all had the same yield. Larger plants did not produce higher yield, so here larger soybeans provided no advantage.

In the old days when soybeans were grown in 36-inch rows, large plants were needed to produce enough leaves to get complete ground cover. Complete ground cover insures that all of the sunlight is intercepted by the leaves to produce maximum growth rates. You are wasting sunshine and reducing yield if you can see the soil between your soybean rows after flowering. Today, we grow soybeans in narrow rows where even small plants provide complete ground cover and the maximum growth rates needed for high yields.

Early plantings are sometimes recommended as a way to increase plant size and the number of nodes by lengthening the vegetative growth period. These large plants, large because they grow for a long time, will not necessarily produce higher yield.

It's true that plants that grow fast will be larger and will usually produce higher yields. It's also true that plants that grow for a long time will be large, but they will probably not produce more yield. It's that simple.

Table 1. Variety, plant size and yield, Lexington, KY (1996-1998).

Variety	Planting to Maturity[2]	Nodes	Vegetative Weight	Yield
Maturity Group[1]	Days	Number/ft2	pounds/acre	bushels/acre
I	96	77	5054	51
II	106	79	4778	60
III	114	99	7332	61
IV	125	146	7279	60

[1] Two varieties per maturity group, averaged over three years. All plots were irrigated to minimize water stress. Adapted from Egli and Bruening. 2000. Agronomy Journal 92: 532-537. [2] Based on physiology maturity which is maximum seed dry weight and occurs at 55% seed moisture. [3] Maximum vegetative weight at the beginning of seed filling, growth stage R5.0.

3. Corn Cobs and Soil Quality

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The discussion about using corn residues as an alternative energy source often hinges on the issue of soil quality. We all know that the soil benefits from residue return, but we all suspect (hope) that there might be some level of residue that might be removed without harm to the soil. Research on this question is ongoing, both in Kentucky and other states. Alternatively, the "better safe than sorry" folks have suggested that growers remove, in addition to corn grain, the cobs. All other stover would be returned to the land. A number of harvest strategies for doing this have been proposed, and several of these harvest engineering schemes are under active development. As of yet, however, there is no data on the merits of this practice, relative to any other residue removal practice. However, we can ask the following question: What proportion of corn residue is made up of cobs, and what is the nutrient value of my cobs, left in the field?

To help answer this question, grain, cobs and stover were harvested, separately, in the fall of 2008 from an on-going no-till corn-nitrogen (N) rate experiment on the research farm at Lexington. All three components were analyzed for their N, phosphorus (P) and potassium (K) concentrations. The season was initially cool and wet, but later turned hot and dry, substantially lowering grain yields.

The impact of the dry season is evident in Table 1, where 90 lb N/acre was enough to maximize yield at just over 100 bu/acre. This N rate also maximized dry matter production as grain, cob and stover (5000, 1000 and 5600 lb dry matter/acre, respectively). Grain was about 38% of total dry matter at 0 lb N/acre and 43% with N fertilization. Cobs were 16 to 17% of ear (grain plus cob) dry matter, regardless of N rate. However, as a proportion of all residue dry matter, cobs rose from 12% to 15% with N fertilization.

Grain N and P concentrations were higher, and K concentrations lower, than those found in the two residue fractions (Table 1). Assuming all crop dry matter would be removed, the grain contained most of the N and P, especially when N fertilized. The stover contained large amounts of N and P, and most of the K. Cob K concentrations were about as high as those found in the stover, but otherwise were generally the lowest of all three fractions. Because the weight of cobs is low, and cob nutrient levels are generally low, the fraction of crop nutrients removed with cob harvest never exceeded 10%.

These results are from one year of work, at one location. Nonetheless, this data supports previous observations. Cobs tend to be nutrient poor, especially for N and P. Cob removal leaves substantial amounts of corn stover (stalk and leaf) residues remaining on the land to sustain soil quality. Cob removal will not quickly deplete the soil of nutrients that would have been used by subsequent crops. The economic impact of the nutrient loss depends on the yield, the efficiency of cob recovery, cob nutrient concentrations, and the anticipated replacement prices for those nutrients.

Table 1. Grain yield and grain, cob and stover dry matter, nutrient concentrations and nutrient removal at three rates of fertilizer N for no-till corn in 2008.

N Rate	yield	dry matter produced	nutrient concentrations N	P_2O_5	K_2O	nutrient removal N	P_2O_5	K_2O	nutrient removal N	P_2O_5	K_2O
lb N/A	bu/A	lb/A	lb/ton dry matter			lb/A			fraction of total (%)		
						grain					
0	58	2740	18.7	13.0	7.8	25.6	17.8	10.7	61.8	40.0	12.3
90	104	4910	23.4	12.9	7.5	57.1	31.7	18.4	67.7	62.0	15.0
180	108	5100	27.8	11.8	7.0	70.2	30.4	18.0	62.8	58.9	15.7
						cobs					
0		534	10.6	4.7	24.1	2.8	1.2	6.3	6.7	2.8	7.3
90		976	10.2	4.5	20.5	5.0	2.2	10.0	6.0	4.4	8.2
180		1010	9.0	4.1	14.9	4.6	2.0	7.5	4.1	3.9	6.5
						stover					
0		3990	5.7	11.3	31.0	13.0	25.5	69.6	31.5	57.2	80.3
90		5580	6.6	5.2	29.2	22.2	17.2	93.9	26.3	33.7	76.8
180		5610	11.0	5.6	27.6	37.0	19.2	89.0	33.1	37.2	77.8

4. Average Crop Revenue Election (ACRE) Program Description and an Example

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Agricultural Economics, University of Kentucky

Caution is warranted when reviewing this document. Final rules and regulations have not been released at the time of this document.

In the 2008 Farm Bill the United States Department of Agriculture (USDA) released a new provision called Average Crop Revenue Election (ACRE) program. Beginning with the 2009 crop year producers will have the choice, before or on June 1, whether or not to enroll in the ACRE program. Selecting to participate is made for each farm number. Participating in the ACRE program will result in dropping the current counter-cyclical payment program and not participating will result in continuing with the counter-cyclical program. Participating in ACRE will result in reducing direct payments by 20 percent and marketing loan rates by 30 percent. When a farm elects to participate in ACRE that farm will be required to have it over the life of the 2008 Farm Bill. Additionally, any farm not involved in ACRE can elect to participate for the following crop year at any time over the life of the 2008 Farm Bill.

Table 1 provides the 2008 Farm Bill direct payment for both the counter-cyclical and ACRE program.

Table 1, 2008 Farm Bill Direct Payments, Per Bushel

	Program	
	Counter-Cyclical	ACRE*
Corn	$0.28	$0.224
Soybeans	$0.44	$0.352
Wheat	$0.52	$0.416

* Calculated as 80 percent of counter-cyclical direct payments.

Table 2 provides 2008 Farm Bill loan rates for both the counter-cyclical and ACRE program.

Table 2, 2008 Farm Bill National Loan Rates, Per Bushel

	Program	
	Counter-Cyclical	ACRE*
Corn	$1.95	$1.365
Soybeans	$5.00	$3.500
Wheat	$2.75	$1.925

* Calculated as 70 percent of counter-cyclical loan rates.

The new ACRE program guarantees state-based revenue. This guarantee called the ACRE program guarantee and its calculation is provided in table 3.

Table 3, Calculation of ACRE Program Guarantee

Five-year ACRE benchmark state yield
Multiplied by
Two-year ACRE program guarantee price
Multiplied by
0.9*

*ACRE program guarantee provides protection at 90 percent of average state revenue.

The five most recent state yields will be used to calculate the five-year ACRE benchmark state yield while dropping the high and low yield, called an Olympic average. The two most recent crop year national average prices received by farmers will be used to calculate the two-year ACRE program guarantee price. The ACRE program guarantee cannot fluctuate by more than 10 percent from the previous year's ACRE program guarantee.

For an ACRE payment to be available, state revenue must be LESS than ACRE program guarantee. State revenue is calculated by taking actual commodity state yield per planted acre and multiplying it by ACRE national average market price, which is calculated by the USDA.

To receive a possible state revenue payment, producers must also have a farm level loss. A farm level loss occurs if actual farm revenue is LESS than the ACRE benchmark farm revenue. Actual farm revenue is calculated by taking actual commodity farm yield per planted acre and multiplying it by the ACRE national average market price. ACRE's benchmark farm revenue calculation is provided in table 4.

Table 4, Calculation of ACRE Benchmark Farm Revenue

Five-year average farm crop yield per planted acre
Multiplied by
Two-year ACRE program guarantee price
Plus
Crop insurance premium per acre

An ACRE payment can be triggered by either a decrease in state yield and/or national average market price. To be eligible for an ACRE payment producers need 1) ACRE actual state revenue to be LESS than ACRE program guarantee AND 2) ACRE actual farm yield to be LESS than ACRE benchmark farm revenue, table 5.

Table 5, Requirements to be Eligible for an ACRE Payment

• ACRE state revenue	to be LESS than	ACRE program guarantee
AND		
• ACRE actual farm yield	To be LESS than	ACRE benchmark farm revenue

ACRE payments will be the lesser of 1) ACRE program guarantee minus actual state revenue or 2) 25 percent of ACRE program guarantee. ACRE payments will be based upon 83.3 percent of acreage planted; however, acreage planted cannot exceed TOTAL base acres for ALL covered commodities. Then the final payment will be adjusted by a farm-specific productivity ratio, table 6.

Table 6, ACRE Payment Calculations

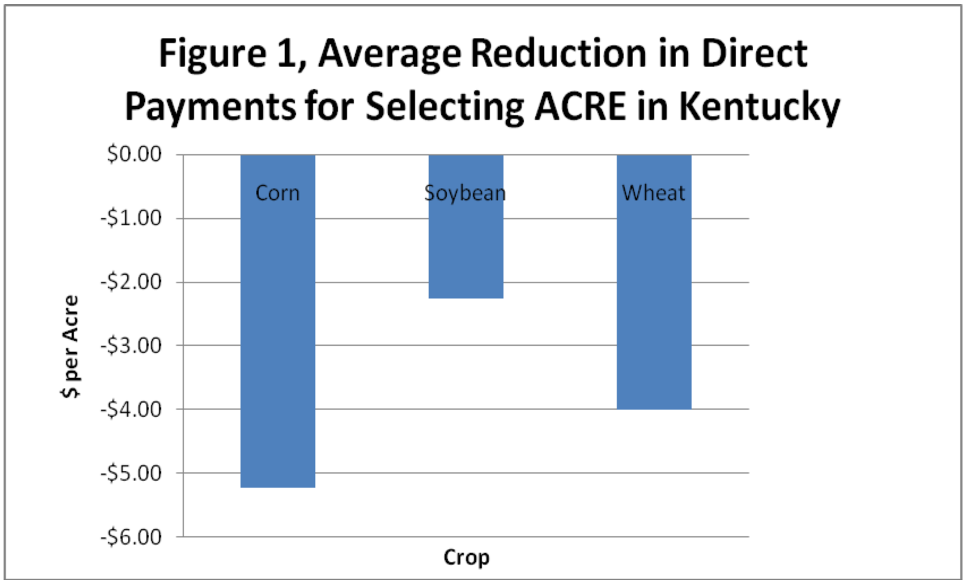
• Lesser of:	ACRE program guarantee minus state revenue	or	25% of ACRE program guarantee
Multiplied by			
• Planted crop acres times 83.3 percent but not to exceed TOTAL base acres			
Multiplied by			
• Farm-specific productivity ratio			

Farm-specific productivity ratio is calculated as taking the five year Olympic farm crop yield per planted acre and dividing it by ACRE benchmark state yield. A ratio greater than one provides a larger ACRE payment and a ratio less than one provides a smaller ACRE payment. The timing of ACRE payments will be made beginning October 1 or as soon as possible after end of marketing year.

An Example

As shown ACRE payments will depend upon both state and farm level factors, leading to many different possible outcomes. I will present one scenario for corn in Kentucky that is based upon both current price and yield information. The outcome of this scenario will change as price and yield information is updated.

Electing to participate in ACRE will reduce direct payments by 20 percent. For the average Kentucky producer this will cost them around $5 per acre for Corn, $2 per acre for soybeans, and about $4 dollars per acre for wheat, Figure 1. The cost will increase for producers with higher than average direct payment yields and decrease for producers with lower than average direct payment yields.



ACRE is available as an option for the 2009 crop year. The corn and soybeans crop year starts September 1 and ends August 31. For wheat the crop year starts June 1 and ends May 31. To begin our example we need to determine the ACRE revenue guarantee or the five-year ACRE benchmark state yield and two-year ACRE program guarantee price. Yield and price information for years after 2007 are available from the National Agricultural Statistics Service (NASS). Because the 2008 crop year is not complete we need to predict the 2008 average Kentucky corn yield and 2008 U.S. national price. Currently, the USDA predicts a corn yield in Kentucky of 133 bushels per acre with an average national price of $3.90 per bushel. However, the price information is a month old. To account for the current decrease in corn price the USDA price was reduced by ten percent to $3.51 per bushel. For the 2009 corn price I used the current Dec 2009 futures price less 20 cents per bushel for basis, which results in an average 2009 price of $3.64 per bushel. Note that the 2009 average price will come from the average of the 12 month crop year, not the 2009 Dec futures contract I am using to represent it. The same logic was used to calculate soybean and wheat prices with appropriate basis for each crop. Corn prices used in the example are provided in table 7.

Table 7, Example of Prices and Yields Used in Calculating ACRE Parameters for Corn

	Corn
2009 futures price^	$3.64*
2008 USDA price^^	$3.51**
2008 USDA Kentucky state average yield^^^	133

*Used a -20 cent corn basis. ** Indicates that prices were reduced by ten percent.
^ Used December 2009 Chicago Board of Trade futures price.
^^ Found in Jan WASDE report.
^^^ Data found in November Crop Production report.

Using both past and current corn price and yield information we can calculate the ACRE program guarantee, table 8. In this example ACRE state revenue is LESS than ACRE program guarantee by $12.86 (464.22-451.36). An ACRE payment would be made for corn at $12.86 per acre, however, this is not the final payment, it will be calculated in table 10. Following the same steps used in the corn example for soybeans and wheat would result in ACRE payments of $14.07 per acre for soybeans, and $34.10 per acre for wheat. Taking out the cost of enrolling in ACRE (i.e., 20 percent reduction in direct payments) would result in a payment of $7.62 per acre for corn, $11.80 per acre for soybeans, and $30.09 per acre for wheat. These payments are conditional on whether the farm had a loss (table 5). Table 9 provides the calculations to determine whether a farm level loss occurred.

Because actual farm revenue is LESS than ACRE benchmark farm revenue ($582.40 is less than $585.50), the farm is eligible for the ACRE payment, and if no loss occurred at the farm level then the farm would not be eligible for the ACRE payment. As seen from table 9, the farm level loss was triggered by a drop in price, even with an increase of ten bushels per acre over the five-year average farm crop yield.

Table 8, Example of Calculation of ACRE Program Guarantee and ACRE State Revenue for Corn
Five-year ACRE benchmark state yield = 137*
Multiplied by
Two-year ACRE program guarantee price = $3.77*
Multiplied by
.9
Equals $464.22 per acre - ACRE program guarantee
2009 actual commodity state yield = 124**
Multiplied by
2009 ACRE national average market price = $3.64
Equals $451.36 per acre – ACRE state revenue

*historical yields and prices were found in the National Agricultural Statistics Service (NASS) website.
** Selected based upon no prior information.

Table 9, Example of Calculations of ACRE Benchmark Farm Revenue and Actual Farm Revenue for Corn
Five-year average farm crop yield per planted acre = 150
Multiplied by
Two-year ACRE program guarantee price = $3.77
Plus
Crop insurance premium per acre = 20
Equals $585.5 per acre – ACRE benchmark farm revenue
2009 Farm yield per planted acre = 160
Multiplied by
2009 ACRE national average price = $3.64
Equals = $582.4 - Actual farm revenue

ACRE payments are based upon the lesser of planted acres or total base acres. Let's assume the farm has 100 acres with 40 soybean base acres and 50 corn base acres. This spring the producer decides to plant the 100 acres to corn (by planting 100 percent to corn he forgoes any other potential crops' ACRE payment). His/her potential ACRE payment will be multiplied by 90 because ACRE payments are not to exceed total base acres (40 soybean base + 50 corn base) even though 100 acres were planted. The payment is also multiplied by 83.3 percent. Finally, we need to adjust the payment by the farm-specific productivity ratio. Assume the farm has an average yield of 150 bushels per acre. With a Kentucky average yield of 131.1 bushels per acre the farm-specific productivity ratio would be 150/137 or 1.09. Working through all of the payments steps the farmer would receive a payment of $1,055.6 on the farm with 100 acres, Table 10.

Table 10, Example of a Corn ACRE Payment^

	Gross	Net*
ACRE payment, per acre	$12.86	$7.62
Base Acres	90	90
Payment Cap**	0.833	0.833
Farm-specific productivity ratio	1.09	1.09
Total payment	$1,055.60	$625.48

^ Producer will still receive 80 percent of direct payments in addition to the ACRE payment.
*Payment is reduced by cost of enrolling in ACRE program – for corn, $5.24 per acre or 20 percent of average direct payments.
** 83.3 percent of planted acres but not to exceed total base acres

Payment limitations exist in the ACRE program. ACRE payments are limited $65,000 plus the 20 percent reduction in direct payments, per person. Direct payments are limited to $40,000 minus the 20 percent reduction in direct payments.

Electing to participate in ACRE provides revenue protection, but costs participants 20 percent of their direct payments and 30 percent of their marketing loan rates. ACRE revenue protection should be considered based upon yield variability at the state level and farm level as well as price variability at the national level. After analyzing the ACRE program it is evident that during years when yields and/or prices significantly drop (noting that if only one component drops the other does not significantly increase) the ACRE program will probably outperform the current counter-cyclical program. However, during periods when yields and prices remain steady the counter-cyclical program will outperform the optional ACRE program.

The author welcomes any comments or suggestions that helps improve the understanding of the optional ACRE program and any potential information that is needed to help make the decision of whether or not to participate in ACRE easier. Cory Walters can be reached by e-mail at: cgwalters@uky.edu.

5. Fungicide Labels and "Plant Health"

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A couple of weeks ago, we learned of a supplemental label for Headline® fungicide for use on several crops for "disease control and plant health". The following is a brief summary of our response to this new label. The full response was previously published in the Kentucky Pest News, Number 1187, Feb. 24, 2009.

Headline is a strobilurin fungicide and the strobilurin fungicides are very good for control of specific crop diseases (see product labels for a list). Application of a strobilurin fungicide is warranted when risk of a disease development is high. However, applying a strobilurin fungicide for "plant health" or stress tolerance reasons alone—with little or no threat from foliar diseases—doesn't make sense to us, based on our extensive study of the best available information. Land-Grant University trials, thus far, generally do not support claims of reliable improvement in crop yield under stress conditions from an application of Headline®, or any other strobilurin fungicide. Nor have fungicide manufacturers provided sufficient field evidence in support of these claims. In fact, the vast majority of industry data show yield impacts (usually in side by side comparisons) associated with specific fungicide treatments, but provide no measurements of diseases or stresses. The upshot of this is that there is absolutely no way to know what the cause of apparent yield improvement is in the vast majority of industry studies. Thus, at this time, we do not feel there is a scientifically defensible basis for assertions of improved plant health/stress tolerance in the absence of the diseases the fungicide was originally developed to control.

6. Going Paperless

The Corn and Soybean Newsletter will likely go to an <u>online only</u> version by July of 2009. If you have been receiving the hard copy, please go online to: www.uky.edu/Ag/CornSoy/ and sign up for the electronic version. We apologize for any inconveniences that this may cause you.

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