Building Strong and Vibrant New York Communities

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Capital Area Ag Report
December 2014

“There are two ways of spreading light: to be the candle or the mirror that reflects it.” — Edith Wharton

Announcements
Friday, February 6, 2015 10 am—3 pm—CCE Regional Hudson Valley Value-Added Grain Systems School—at Anthony’s Banquet Hall, 746 Rte 23B, Leeds (Greene Co.), sponsored by CCE. Also a Trade Show for networking among growers, maltsters, brewers, and bakers. Featured speaker Dr. Ken Hellevang, North Dakota State Univ. will address post-harvest management of small grains. Thor Oechsner, of Oechsner Farm, Newfield, NY, (1200 acre certified organic farm) and partner in “Farmer Ground Flour” and “Wide Awake Bakery” will discuss his rotations that help produce quality grain. Justin O’Dea, CCE Ulster Co., will explain what it takes to get into grain production for malting and human consumption. Aaron Gabriel, CCE CAAHP, will explain the growth stages and physiology of small grains. Register through CCE Ulster Co. at 845-340-3990 by Feb 2nd. $40 pre-registration and $55 at the door, but we really need a head count. Walk-ins will be taunted.

January 29, 2015 - 2015 NY Corn & Soybean Winter Expo
"So you thought you were buying the farm? Guess again!", at the Holiday Inn in Liverpool, NY Special Guest: Dr. Ron Hanson of the University of Nebraska at Lincoln. To register go to: https://www.eventbrite.com/e/2015-ny-corn-soybean-winter-expo-tickets-14727752103 For more info go to: http://www.nycornsoy.org/images/2015_expo_brochure_final.pdf

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The Ag Report is produced by: Aaron Gabriel

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Featured speakers will include: Neil Dennis, of Sunnybrae Farms, Saskatchewan, Canada and Allan Nation, Editor, Stockman Grass Farmer, based in Ridgeland, Mississippi, Thomas Kilcer, Advanced Ag Systems, Kinderhook, NY and Jim and Deborah Taylor of Sunny Acres Farm, Athens, NY.

Once again this year we will have a Friday evening banquet with local grass-fed beef, pork and lamb. Two scholarships will once again be available through the David Huse Education Scholarship Fund. Thanks to our sponsors and vendors for supporting our conference to help keep registration costs at a reasonable rate. Registration materials will be available in October 2014. Contact Gale Kohler at 518-765-3500 or gek4@cornell.edu or visit our website at www.ccealbany.com for details.

March 19, 2015 Pesticide Recertification Day from 7:30am-4:00pm at The Century House, 997 New Loudon Road, (Route 9), Latham, NY 12110. Half day registration cost $85 and full day registration is $100, lunch is included with both. Registration required. For more information contact Chuck Schmitt at cds34@cornell.edu and 518-765-3513.

Learn the latest on pesticide use, safety, and pest management for the upcoming season. This program features up to 6 NYSDEC recertification credits and 6 CNLP credits pending approval. The morning session will offer core credits and afternoon sessions offer category specific credits for 3a, 1a, 7a and private categories as well.

Milk Quality Training and other ProDairy workshops can be found at http://prodairy.cals.cornell.edu/.

Small-scale Organic Grain Production an online course offered by the Cornell Small Farms Program. Info at: http://nebeginningfarmers.org/online-courses/all-courses/small-scale-organic-grain-production-bf-140/

FYI

Online Asian Soybean Aphid Integrated Pest Management on Soybeans Course
PMEP Distance Learning Center: Partnership with the Pesticide Management Education Program and New York State Integrated Pest Management.

This course is to help you learn about integrated pest management for Asian soybean aphid on soybeans. The course will focus on correct identification, its lifecycle, how to sample and monitor for the pest, determine economic threshold and management practices that can be employed. http://moodle2.cce.cornell.edu/enrol/index.php?id=210

Successful completion of this module will earn you 1 recertification credit for New York State DEC certified pesticide applicators in categories 1a, 10, 21, and 23. Several other states in the Northeast have approved pesticide credits for this course.

Stalk Nitrate Test Results for New York Corn Fields from 2007 through 2014 is the latest article posted on “What’s Cropping Up”. Find it at http://blogs.cornell.edu/whatscroppingup/.
Here is the Cornell 2014 Forage Variety Trial Report. You will be able to find this report and others on our website: [http://plbrgen.cals.cornell.edu/research-extension/forage-project/ny-forage-yield-results](http://plbrgen.cals.cornell.edu/research-extension/forage-project/ny-forage-yield-results).

Recent articles from the Cornell Nutrient Management Spear Program:

If you are not familiar with Mass Nutrient Balances for farms, you should read the first article above. Everyone should evaluate the nutrient (nitrogen, phosphorus, potassium) flow on their farm and determine how they can improve economic efficiency and environmental protection.

**Winter Wild Turkey Flock Survey**
The NYS Dept. of Environmental is looking for information on wild turkeys as part of an ongoing study. Please see below for two ways how you can help.


Completed survey forms should be sent to: Winter Turkey Survey, NYSDEC, 625 Broadway, Albany, NY 12233-4754

Cornell Small Variety Trial Results are available at: [http://plbrgen.cals.cornell.edu/research-extension/small-grains/cultivar-testing](http://plbrgen.cals.cornell.edu/research-extension/small-grains/cultivar-testing).
A Checklist For Managing Crops When Prices Are Low

Aaron Gabriel
Capital Area Agriculture and Horticulture Program

With the recent tumbling of crop prices we get the notion that we have to manage crops differently to stay profitable. Really, we should always manage crops as if the prices were heading down. In years of high prices, you cannot squander income, since it will be needed when times get tough. So, I actually have two lists. One is a foundation for profitable crop production. The other is a list of management decisions necessary to be profitable. The non-agronomic management decisions are also key to profitability (landowner relations, communication).

The Foundation of Profitable Crop Production

- Build soil health – nutritional, physical, and biological aspects of soil health.
- Manage Meticulously – pay attention to all the details of crop production, so that every dollar & hour spent will provide a short or long-term return.
- Know your strengths and get help or hire out for your weaknesses.
- Keep records to make future decisions. “A short pencil is better than a long memory.”
- Do on-farm trials to tailor practices to you and your farm.

Managing Crops Profitably (not in any order of importance, except maybe soil health)

- Build soil health - It’s your best insurance for extreme environmental conditions and to stabilize crop yields. FEED ORGANIC MATTER TO YOUR SOIL with manure, crop residues, cover crops, etc.
- Develop an annual crop plan by late-winter/early spring.
- Soil test every 3 years. Sample in the fall. Use the info to maintain reasonable soil nutrient levels, not very high levels. Fertilize to feed the plant what it needs to give good yields. Feed the soil with organic matter to build a foundation of soil fertility.
- Soil test and keep track of minor nutrients (boron, zinc, sulfur).
- Maintain soil pH within 0.5 points of what is needed for the most sensitive crop. Then it will take only a little lime before planting the most sensitive crop in the rotation.
- Use manure wisely. Do a cost analysis to determine how far it can be transported to distant fields.
- Make wise purchases and take advantages of discounts.
- Invest in lime before investing in fertilizer.
- Be patient and wait for the soil to dry out properly for tillage, planting, and harvest.
- Use seed technology wisely - Do not pay for traits that are unnecessary (ie. corn rootworm resistance in corn seed for first year corn).
- Pay custom operators promptly so they are glad to provide you timely service.
- Tune up machinery and replace parts as needed. Break-downs and poor performance are very costly.
- Evaluate each field and set reasonable yield goals. Prioritize which fields will use inputs the most efficiently and profitably. Do not plant fields that will not yield, until you can improve them so that they are profitable.
- Rotate crops. ROTATE, ROTATE, ROTATE!!! It is a time proven principle and it is profitable.
• Manage pesticides and genetic seed traits wisely so that you do not get pest resistance.
• Do not skimp on critical management points: use inoculant when necessary; do not skimp on baleage wrap; etc
• Do a thorough job to reduce the cost of poor performance. With good seedbed preparation and a good planter, you only need 12 – 15 lbs/ac of alfalfa seed.
• Evaluate the potential return on each input and decide if it is reasonable. Record results for future decisions.
• Scrutinize crop varieties. Ask questions and get data from your seed rep.
• Know which diseases are prevalent on your farm and pick resistant varieties.
• Know which fields are prone to particular insect pests (leafhopper, armyworm) and then choose appropriate varieties and scout fields.
• Map weeds in each field to manage with appropriate rotations, tillage, planting dates, and herbicide selection.
• Scout your fields so that you do not get surprises and to make better decisions next year. You cannot always blame missing corn plants on rocks.
• Keep a record of fuel usage and become more efficient.
• Do not manage more acres than you are able. Farm intensively rather than extensively.
• Develop good landlord relations: communicate; use written contracts; respect their wishes; explain your operations; make necessary notifications.
• Communicate well with others working with you on crops to avoid mistakes.
• Stop the machinery and check its performance – is the corn planted at the correct depth (was the planter properly switched from conventional to no-till mode?)
• For custom work, have a plan B in place in case things go wrong for whatever reason.
• Repair and prepare crop storage structures and then store crops properly so that you do not waste the harvest.

Final Decisions of 2014

How Tax Planning and Strategic Business Prep helps Businesses Thrive

By Sandy Buxton, CCE CAAHP

Ok – that is my title and subheading. Jason Karszes, of PRO-Dairy, presented this info recently but it had a better title: “Profit! Management Decisions During High Cycles?”

No matter how you label it – the message is still the same. A business needs to be taking action at all times to help it survive and thrive, especially if it rides a rollercoaster of price swings.

During high cycles, the strategic decisions should help to improve efficiencies in main production areas, build financial reserves and prepare for long term investments. During the low cycles, the business needs to operate as leanly as possible, taking needed money from reserves or low interest borrowing and taking advantage of any opportunities that may come along.

Remember – a key question to ask – just because you can cashflow or pay for a change, is it a good business decision? Likewise, if an investment is a “good deal”, is it a good business deal?
Making business decisions solely for tax liability issues or because it can be paid for is usually a mistake for the long term success of the business. Owners need to position their business for the future.

What can I do today to impact the future?
What opportunities may come available?
What threats need to be addressed?
What things need to be done to improve the flexibility of the business to jump on opportunities?
What can be done to continue to grow profits?
What can be done to position business for the next low cycle?

Most people don’t understand the goal in the production of profit is to have something that can be used to:
  Maintain the business;
  build the business;
  start another business;
  fund retirement;
  provide for investment outside the business;
  spend it;
  pay taxes; or
  position the business for the future.

Knowing where the business is going – what the 5 to 10 year vision or goal looks like helps to direct this conversation. But creating a list of critical needs for the business and directions to take to achieve the view may be improved through the use of an advisory team which can provide a wider view of strengths/weaknesses and opportunities that exist in the area.

The ultimate goal of the business and your decision making process should be to reduce the rollercoaster ride of price swings to more of a float with gentle ocean swells, some movement but nothing very uncomfortable.

If you would like more info or to see Jason’s presentation, please feel free to contact Sandy at sab22@cornell.edu or 518-380-1498.
ROUNDUP-READY, LOW LIGNIN AND OTHER NEW TRAITS ALFALFA’S FUTURE

Dan Undersander

Abstract

The benefits of using new breeding techniques for alfalfa improvement are just being developed. These GMO alfalfa varieties will revolutionize the using and management of alfalfa. This paper presents information on the development of two GMO alfalfa traits (Roundup Ready and Low Lignin Alfalfa) that will provide new tools for many farmers. It will mention some other research/development being conducted.

Roundup Ready Alfalfa

Forage Genetics International began developing Roundup Ready alfalfa in 1994. The inserted gene produced the same protein as found in other roundup ready crops on the market. In conventional plants, glyphosate binds to an enzyme, blocking the biosynthesis of aromatic amino acids and depriving the plant of essential components (Haslam, 1993; Steinbrueck and Amrhein, 1980). The RR plants are similar to non GMO plants but has a greatly reduced affinity for glyphosate (Padgette et al., 1995).

Commercialized RR alfalfa varieties use two independent events (J101 and J163) combined through a commercial breeding process (Samac et al., 2004). Alfalfa varieties are heterogeneous populations with individual plants being phenotypically and genotypically unique. The populations of alfalfa plants in commercial Roundup Ready varieties consist of individual plants with zero to eight copies of the \textit{cp4 epsps} gene insert, contributed by either event J101 or J163. The Roundup Ready phenotype is exhibited if one or more copies of the RR gene are present in the plant.

While useful to all farmers, RR alfalfa provides great benefit to the grower where weed control has been an issue in the production of alfalfa. First, glyphosate does not injure alfalfa as the most commonly used pre- and post-planting herbicides do. Further, imazethapyr has risk of yield loss with the crop following alfalfa when flax, corn, meadow bromegrass, oriental mustard, sunflower, timothy and wheat were seeded 1 year after herbicide application to the alfalfa, canola seeded up to 2 years later, and sugarbeet and potato seeded up to 3 years later (Moyer and East, 1996). Glyphosate can be used on RR alfalfa at very high rates with no detectible crop injury. Multiple studies by the senior author have shown an average yield reduction of 0.2 t/a for the cutting following imazethapyr or imazamox application to alfalfa compared to glyphosate.

Another advantage of RR alfalfa is that glyphosate can be applied over a wider time window for effective weed control so that weather delays are less of an issue. Most other post emergent herbicides need to be applied when weeds are small, requiring greater rates and being less effective on larger weeds.

Glyphosate controls a wider range of weeds than most other herbicides for alfalfa. One of the benefits of RR alfalfa will be the ability to use glyphosate to get much better control of

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winter annuals such as chickweed, wild garlic, wild onion, perennials such as dandelion, difficult weeds such as nutsedge and dodder, and poisonous weeds such as groundsel. All have been difficult to control, in some cases, limited to dormant herbicide applications so that control was not an option when the problem was visible. Further dormant herbicides are discriminated against in northern regions because, if winterkill occurs, no crop can be planted in the field during the following growing season.

Another advantage of the RR alfalfa system is safety. Glyphosate is among the safest pesticide used on farms. It has an extremely low acute toxicity (the oral LD50 in the rat of pure glyphosate is 4,230 mg/kg, or 5,600 mg/l). In fact, some of the surfactants mixed with glyphosate are more toxic than the herbicide. Glyphosate is inactivated when it comes into contact with soil since it is adsorbed onto soil particles in the same way as inorganic phosphates. Unbound glyphosate is rapidly degraded by microbial activity to carbon dioxide. Because of its adsorption to soil, glyphosate is not easily leached and is unlikely to contaminate ground water (Giesy et al., 2000) unlike certain other herbicides used on alfalfa (e.g., Velpar).

Lastly there is a significant ease of use factor with glyphosate on RR crops since is not a restricted pesticide so growers do not need pesticide applicator certification to apply this compound. Also, many farmers growing corn or soybeans will already be using glyphosate. Therefore, they will not need separate herbicide storage or record keeping; they will not need to clean the sprayer or change nozzles when moving from one crop to another. There will also be less risk of drift onto a susceptible crop or the potential for spraying the wrong herbicide onto a susceptible crop.

Glyphosate resistance has been reported in approximately a dozen weeds (Boerboom and Owen, 2006; http://www.weedscience.org/full.asp). Some have been concerned that alfalfa as the third crop in the corn-soybean-alfalfa rotation of many dairy farmers would increase the rate of resistance development in weeds. However, including a forage crop in rotation with row crops will generally enhance weed control because some weeds cannot tolerate the frequent defoliation of a forage crop (Martin et al., 1967). It is believed that inclusion of alfalfa in corn-soybean rotations will be another tool to slow development of weed resistance to glyphosate. Thus the key to minimizing development of resistant weed populations and weed shifts will be the recommended stewardship of using multiple herbicides in rotational systems combined multiple mechanical controls such as preplant tillage and frequent mowing of alfalfa.

Low Lignin Alfalfa

Lignin provides strength to plants and allows the plant vascular system to transport water in the plant without leakage. Lignin increases with advanced maturity in alfalfa. However lignin is indigestible and reduces fiber digestibility in ruminants. Thus reducing lignin content should increase fiber digestibility at any maturity stage.
Lignin is composed of three monomers, each a carbon ring with differing methoxy group configuration and a 3-carbon tail (Fig. 1). These subunits polymerize into lignin. This lignin molecule fills the spaces between cellulose, hemi-cellulose and pectins as the plant ages and binds with the hemicellulose. Lignin coating the cellulose allows water to move up the plant stem without leakage but also reduces digestion of the cellulose in the rumen. Thus some lignin is necessary but lignin above the minimum reduced fiber digestibility without additional benefit to the plant.

We have tested transgenic alfalfa lines down-regulated for two lignin biosynthetic genes (COMT and CCOMT). Alfalfa populations for this study consisted of transgenic alfalfa lines down-regulated for one of two lignin biosynthetic genes, their null isogenic lines, and a check variety (LegenDairy 5.0). Replicated studies were conducted at Becker, MN; Arlington, WI; West Salem, WI and Davis, CA and Tulelake, CA. Plants were started in the greenhouse and then transplanted into the field in spring 2008 into rows spaced 30 cm apart with 30 cm between rows. Each plot consisted of three rows of 9 plants. The middle 7 plants of the middle row were harvested for yield and quality in summer 2008. Harvests were taken beginning at late vegetative stage and continued at 5 day intervals for 5 total harvests.

Forage samples were analyzed for crude protein (CP), neutral detergent fiber (NDF), acid detergent lignin (ADL), and neutral detergent fiber digestibility (NDFD) (in vitro 48 hr) and Relative Forage Quality (RFQ) was calculated.

Table 1. Digestibility of low lignin alfalfa types and controls fed to lambs, diet was 100% alfalfa hay fed ad libitum.

<table>
<thead>
<tr>
<th>Alfalfa hay type</th>
<th>aNDF % DM</th>
<th>ADL % DM</th>
<th>NDFD % NDF</th>
<th>DMD % DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMT Inactive</td>
<td>38.2</td>
<td>5.3</td>
<td>57.5*</td>
<td>67.5*</td>
</tr>
<tr>
<td>COMT Active (Control)</td>
<td>39.0</td>
<td>5.8</td>
<td>49.1</td>
<td>64.5</td>
</tr>
<tr>
<td>CCOMT Inactive</td>
<td>39.4</td>
<td>5.2</td>
<td>50.1</td>
<td>65.3</td>
</tr>
<tr>
<td>CCOMT Active (Control)</td>
<td>39.4</td>
<td>5.9</td>
<td>46.4</td>
<td>63.7</td>
</tr>
</tbody>
</table>
*Significant, P < 0.05


Table 2. Lactating cow responses to alfalfa hays with down-regulated lignin biosynthesis

<table>
<thead>
<tr>
<th>Alfalfa hay type</th>
<th>CP % DM</th>
<th>NDF % DM</th>
<th>NDFD % NDF</th>
<th>Milk lb/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMT Inactive</td>
<td>18.1</td>
<td>31.1</td>
<td>53.5**</td>
<td>84.7*</td>
</tr>
<tr>
<td>COMT Active (Control)</td>
<td>18.4</td>
<td>29.3</td>
<td>42.5</td>
<td>82.1</td>
</tr>
<tr>
<td>CCOMT Inactive</td>
<td>18.1</td>
<td>42.5</td>
<td>48.6**</td>
<td>84.5</td>
</tr>
<tr>
<td>CCOMT Active (Control)</td>
<td>18.3</td>
<td>31.1</td>
<td>44.5</td>
<td>86.7</td>
</tr>
</tbody>
</table>
*TMR diets - 50 % alfalfa hay, 10 % corn silage, 40 % concentrate
*Significant, P < 0.10; ** significant P < 0.01 (different from control)


Proof of concept trials were conducted (separately from this study) where lignin transgenic alfalfa hay fed to rapidly growing lambs (Table 1) or in total mixed diets with corn silage to lactating dairy cows measured increased fiber digestibility and (Table 2). In the lamb trial, while NDF was not significantly different, both intake and NDFD of the COMT line was increased over its null (active) control. CCOMT did not show any significant responses. In the study with dairy cattle, digestible dry matter of COMT alfalfa increased 3.5% fat corrected milk over it’s null (active) line by 2.6 lb/hd/day (Table 2).
Alfalfa stems from reduced lignin genotypes increased sugar yield which potentially could increase ethanol > 50% compared to standard alfalfa.

In the current study, the null lines and the check variety (LegenDairy 5.0) had similar fiber digestibility which gradually declined as maturity advanced (later harvest date). Both low lignin lines had consistently higher fiber digestibility at each harvest date (Fig. 3). The CCOMT line averaged 12 percentage units less ADL than the null and had 10.2 percentage units more NDFD. The COMT line averaged 3.7 percentage units less ADL than the null and 14.0 percentage units more NDFD. A change in lignin composition in the COMT population is a likely explanation for the increased fiber digestibility relative to lignin content. Thus it will be possible to harvest higher quality with either of the transgenic alfalfa lines down-regulated for lignin synthesis when harvesting occurs on a similar schedule as for non-transgenic lines.

Another way to view this data is that COMT and CCOMT lines harvested 8 to 12 days later than the nulls or commercial check had the same forage quality. Later harvesting will allow for higher yield per cutting (Fig. 3). When alfalfa begins to regrow after being cut, the growth per acre is low (perhaps less than 50 lb/acre/day) but as the crop matures the growth per day increases (to 200 lb/acre/day or more at harvest). Thus, in alfalfa harvest systems where we took 3 vs 4 cuttings within the same time period, alfalfa yield was 20 to 30% greater (with the labor of one less cutting) for the 3-cut system. In the past the quality of the 3-cut system was much lower; now it may be possible to delay harvest to get the higher yield with the same forage quality as from standard alfalfa varieties cut earlier. I believe that this will be the most important aspect of this transgenic reduced lignin alfalfa, rather than higher quality forage harvested at the same date.

The CCOMT line stood (lack of lodging) as well in space plantings at the commercial alfalfa line. COMT is an artificially created mutation for the same gene as bm3 which is a naturally occurring reduced lignin gene in corn. We did see some standability issues with this line. However, further breeding efforts may be able to solve this problem.
Other Alfalfa Traits Being Tested/Developed

In addition, several other GMO traits in alfalfa are available and being evaluated some of which will be extremely beneficial to farmers:

1) Increased by pass protein of alfalfa. Alfalfa has a high protein content but most of it is soluble (degraded in the rumen), especially when alfalfa is made into silage. As such the protein may need to be supplemented with bypass protein in dairy rations, resulting in extra expense to the dairyman and increased methane loss to the atmosphere. Sullivan and Hatfield (2006) showed that red clover red clover (Trifolium pratense L.) has up to 90% less proteolysis during ensiling. They found that the combination of polyphenol oxidase (PPO) and o-diphenol PPO substrates, both abundantly present in red clover, is responsible for postharvest proteolytic inhibition in this forage crop. This gene has been transferred from red clover to reduce the bypass protein of alfalfa. It may also reduce bloat problems. Another approach has been similar attempts have been made to identify genes that regulate the expression of sulfur amino acid-rich, ruminal degradation-resistant proteins and to transfer these genes into alfalfa.

2) A GMO trait is available that enhances leaf retention through the later stages of growth and the harvesting process. Since the bulk of the nutrients are in the leaves such a trait could have significant economic benefit to farmers.

3) Several GMO traits have been identified for drought resistant in alfalfa. These traits could be of great benefit in drought or where water is limiting. Some traits may also increase the dry matter produced per unit of water used (water use efficiency).

4) A GMO trait for with delayed flowering has been identified that may allow alfalfa to be harvested later resulting in higher total season yield and possible reducing the number of cuttings taken per season.

Summary

Thus the potential for alfalfa is exciting if breeding techniques currently available to other crops can continue to be used for alfalfa development. However, the development and use of GMO alfalfa was stopped by a court decision in 2007. The court required an EIS be issued from APHIS. This has been drafted and is available for public comment. If any of the above traits are ever to be available to farmers, it is crucial that the first trait (Roundup Ready alfalfa) be approved since this contains much information on seed production and management of GMO traits that would not need to be repeated in future applications for GMO traits in alfalfa. It is crucial that you register a public comment to preserve this breeding technology for the betterment of alfalfa. Comments can be made by either of the following methods:
Federal eRulemaking Portal: Go to http://www.regulations.gov/search/Regs/home.html?documentDetail=R-090006480a6b7a1 to submit or view comments and to view supporting and related materials available electronically.

Postal Mail/Commercial Delivery: please send two copies of your comment to Docket No. APHIS-2007-0044, Regulatory Analysis and Development, PPD, APHIS, Station 3A-03.8, 4700 River Road, Unit 118, Riverdale, MD 20737-1238. Please state that your comment refers to Docket No. APHIS-2007-0044

Public comment ends Feb 16, 2010

Literature Cited


