Volume 12 Issue 1

DAIRY, LIVESTOCK AND FIELD CROPS NEWS

INSIDE THIS ISSUE:

Preparing for Asian Soybean Rust	1
Update on Rumensin	3
Dealing with Higher Fertilizer Prices	3
EPA Air Quality Compliance Agreement and Final Order for Animal Feeding Operations: A Dairy Industry Executive Summary	4
Management of Corn Rootworm in 2005	6

Preparing For Asian Soybean Rust

Gary C. Bergstrom Department of Plant Pathology Cornell University

New York soybean, snap bean, and dry bean growers must be prepared to deal with Asian soybean rust, an invasive and damaging plant pathogen that arrived in North America in 2004 and will be a factor in U.S. crop production for the foreseeable future. Soybean rust is caused by two species of fungi, the most threatening of which is *Phakopsora pachyrhizi,* the so-called Asian soybean rust. This rust fungus has been documented in Asian countries for over 50 years. The wind-borne fungus has been spreading by air currents throughout African countries since 1998 and through South American countries since 2001. In August 2004, Asian soybean rust was found north of the equator in Colombia, greatly increasing the chances that spores of the fungus would be moved north by air currents into the continental U.S. Indeed, Asian soybean rust was confirmed in infected soybean plants in November 2004 in nine southern U.S. states (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Missouri, South Carolina, and Tennessee). It is believed that rust spores were transported directly to the U.S. from South America by the winds of hurricane Ivan in September 2004.

The rust fungus is expected to survive long-term on living host plants (more than 30 species of legumes including dry and snap beans, English pea, and the widely-distributed, weedy vine, kudzu), in frost-free areas of the southern U.S., Caribbean islands, and Mexico. In mild winters, it may survive even further north. Spores may be blown northward from these over-wintering sites each growing season and initiate annual epidemics in U.S. soybean fields, weather conditions permitting. The fungus has a repeating spore cycle such that every 10-15 days a new generation of spores is produced on infected plants, and these spores can be spread both locally and long distances. Asian soybean rust has the potential to dramatically reduce the yield and profitability of soybean and other beans, including those grown in New York. I expect to see damaging epidemics in New York in some years, but not every year. This is similar to what we see in New York with other wind-borne pathogens such as wheat leaf rust and corn common rust.

Figure 1
Rust pustules on a soybean leaf. Courtesy of Dr. Glen Hartman, North Dakota State University

When rust spores land on soybean plants at any stage of development, infection is favored by leaf wetness, mild temperatures (64-82° F), and high relative humidity (75-80%). Symptoms appear 5-10 days after the spores germinate and invade the plants. All current commercial soybean cultivars in the U.S. are susceptible to Asian soybean rust. Our adapted cultivars of snap beans, dry beans, and peas are also expected to be susceptible. When rust attacks soybean during pod filling or earlier stages, yield losses can be as high as 80%. Rust causes premature defoliation and decreases the number of pods and seeds per plant, and the weight of seeds. Seeds from infected plants also show decreased germination and vigor.

The long-term solution to endemic soybean rust will be the planting of cultivars with partial resistance or tolerance to rust. Both the USDA and commercial seed companies are expediting programs to identify sources of resistance and to breed that resistance into adapted, high yielding soybean cultivars. But most experts agree that it could take 5-10 years for resistant cultivars to become available to farmers.

Protection of soybeans and other legumes from rust in the several years ahead will involve timely applications of foliar fungicides based on forecast of potential rust epidemics in our region. Currently two fungicides, azoxystrobin (Quadris) and chlorothalonil (Bravo, Echo), are registered nationally for soybean rust control. These fungicides will protect against soybean rust only if they are applied in advance of rust infection. A quarantine exemption (http://pmep.cce.cornell.edu/profiles/index.html/) has been issued by the EPA to New York State for the emergency use of four additional fungicides, pyraclostrobin (Headline), myclobutanil (Laredo), propiconazole (Tilt, PropiMax, and Bumper), and tebuconazole (Folicur). The latter three fungicides are triazoles that have some curative activity to control rust after spores have germinated and infected soybean leaves. Emergency use labels for additional fungicide products are still pending EPA review. To optimize disease control and prevent selection for rust isolates that are resistant to certain classes of fungicide, fungicides with differing modes of action should be applied in combination or in alternating sequence. A single fungicide spray by ground rig is expected to add approximately $15 per acre to soybean production cost. Sometimes, a second spray may be warranted. While registered and effective fungicide products should be available to Northeastern farmers, we have additional concerns in the Northeastern u.S. about a limited capacity for custom applicators to spray extensive acreages in the region during a potentially brief window for action in July and August.

Figure 2 Soybean rust damage that appears on upper leaves of soybean plants when advanced. Courtesy Reid Frederick, USDA, ARS, Ft. Detrick, MD

Early detection of soybean rust is the key to successful management of this disease with fungicides. New York growers and crop advisors are urged to cooperate with Cornell Cooperative Extension educators in planting sentinel soybean plots (small plots planted 2 to 3 weeks earlier than other soybeans in the area) and regularly monitoring these plants for the first symptoms and signs of soybean rust. Soybean rust symptoms first appear as small yellow or tan areas on the leaves that turn brown to reddish brown. These lesions may be confused with Septoria brown spot, bacterial pustule, and other diseases. South Dakota State University has a web site with excellent photos that help discriminate soybean rust from other soybean diseases: Tiny bumps develop within the rust lesions, especially on lower leaf surfaces, and these are the spore-producing structures that eventually release masses of tan-colored spores.

If you observe symptoms you think may be soybean rust in New York in summer 2005, contact your Cornell Cooperative Extension fields crops educator or the Plant Disease Diagnostic Clinic at Cornell University (http://PlantClinic.cornell.edu , phone: 607- 255-7850) as soon as possible.

More infonnation on Asian soybean rust may be found at these websites:

USDA-APHIS Soybean Rust Alert (http://www.aphis.usda.gov/ppq/ep/soybean_rust) APSnet Feature Article (http://www.apsnet.org/online/feature/rust)

United Soybean Board Rust Guide (http://www.unitedsoybean.org/f_producers.htm) USDA-CSREES North Central Pest Management Center Soy Rust Alert (http://www.ncpmc.org/soybeanrust/index.html)

USDA National Agricultural Library Soybean Rust Reference Guide (http://www.nal.usda.gov/ref/soyrust.html)

Update on Rumensin

Dr. Larry Chase from Cornell's Dairy Science Department has just got an update from FDA in regard to the use of Rumensin in lactating dairy rations. They (FDA) are interpreting the Rumensin label very strictly in terms of use. They are indicating that the only legal use of Rumensin is in herds which feed a total mixed ration. There are efforts underway to see if the label wording could be changed. However, in the mean time we need to stick with the FDA guideline. If your lactating cow ration is not a TMR the use of Rumensin with those animals is technically illegal.

Dealing With Higher Fertilizer Prices

Fertilizer prices have certainly spiked up over the winter and are a cause for concern. And although there maybe some price moderation towards spring, potash stocks are just plain low. China and Brazil have doubled their potash imports in the past 8 years. Brazil in particular should continue this trend as it has vast agricultural lands that can be productive with higher fertility. If the price of natural gas, a component in the formation of ammonia, stays high and the demand for potash continues nutrient management planning will be more important than ever. Here are a few thoughts to help you make the most of your plant nutrient inputs:

Table 1. Average and range of nutrient composition—dairy manure

	"Solid System"		"Liquid System"	
Component	lbs/ton	Rang	lbs/1000 gal	Rang
Nitrogen (N)	11	6-17	32	8-63
Ammonia Nitrogen	4	1-7	15	8-32
Organic Nitrogen	7	4-11	17	1-32
Phosphate Equivalent	5	3-12	13	2-29
Potash Equivalent (K2O)	9	2-15	29	3-56

- Soil test for an accurate picture of the phosphorous and potassium status of your soils. There may be no reason to apply fertilizer P and K if you soil has sufficient levels of these nutrients already.
- Account for nutrients in manure and test manure. Table 1 is a good starting point to understand the amount of N, P and K in manure but notice the range of values. Manure should be tested because it is not all the same. A couple of key points when using manure:
  1. Given the cost increase in potash note the large amount of potassium available in manure. This potassium should be considered equal to fertilizer potash in value.
  2. Not all of the nitrogen shown is available. Consider 35% of the organic nitrogen available the year of application and 12% of that is available the 2nd year.
  3. For ammonium nitrogen 65% is available the day of manure application and decreases by 12 percentage points.

Here are a few thoughts for corn in particular:

- Don't waste fertilizer on crop marginal land! The same crop inputs used on wetter, heavier soils may yield 12 tons of corn silage an acre and 20 tons on better drained fields. Some of that "free land" that wasn't profitable before is now even less profitable.
- Do what it takes to get good weed control! If you are looking to trim costs or run the ragged edge, weed control is not the place to do it.
- Take advantage of the nitrogen value of sods! Table 2. gives you the nitrogen credit you receive from plowing down sod. That credit is there for you to use and this is a year to do it.
- Good weed control with a nutrient management plan that accounts for manure and sods and balances with fertilizer on well to moderately well drained soils is the key to growing a profitable corn crop.

Table 2: Expected N Credit from plowed down sods.

		Available N		
Legume in Sod %	Total N pool lbsN/acre	Year 1 Lbs N/acre	Year 2 Lbs N/acre	Year 3 Lbs N/acre
0	150	83	18	8
1-25	200	110	24	10
26-50	250	138	30	13
50 or greater	300	165	36	15

EPA Air Quality Compliance Agreement and Final Order for Animal Feeding Operations: A Dairy Industry Executive Summary[1]

by C.A. Gooch, P.E. and Karl J. Czymmek, J.D.
PRO-DAIRY Program Cornell University January 24, 2005

On January 21, 2005, the U. S. Environmental Protection Agency (EPA) announced the "Air Quality Compliance Agreement" for Animal Feeding Operations (www.epa.gov/compliance). Previous working drafts had been referred to as "Consent Agreement," "Safe Harbor Agreement," and "AFO-CAFO Agreement."

The Air Quality Compliance Agreement (Agreement) is a ***voluntary*** agreement between EPA and animal feeding operations (AFOs). The Agreement will become officially available when it is published in the Federal Register, a publication of legal notices for the Federal Government. The anticipated publication date is February 1, 2005. Following official publication, there will be a 30-day public comment period concurrent with a 90-day sign-up window for producers to voluntarily execute and return the agreement to EPA. This means that dairy producers, along with swine and poultry producers, will have until about May 1, 2005, to decide whether or not to participate and if so, to return paperwork to EPA. After the 90-day sign-up period expires, EPA will not accept any new participants.

By way of background, a 2002 report by the National Academy of Sciences indicated that more data is required to properly quantify air emissions from AFOs. The gap in data makes it difficult for EPA to enforce existing clean air laws. This also makes it difficult for dairy producers to determine if they are out of compliance and should seek the protections offered by the Agreement. Comparison of estimates from three separate sources suggests that dairy farms of medium and large CAFO size, and perhaps somewhat smaller operations, should carefully evaluate the Agreement.

The Agreement offers producers protection from EPA enforcement of air emissions violations from livestock housing and manure storages that occurred before as well as during the Agreement period. Air emissions from field application of manure are not part of the agreement. All participating dairy producers may need to contribute as much as $2,500 per farm to fund a nationwide, two-year, dairy air emissions monitoring study. The funding can come from individual producers who sign up or presumably other industry sources. EPA recommends monitoring in four U.S. regions: the Midwest, Northeast, West and South. EPA will require a minimum number of farms monitored, perhaps a total of 3 to 4 nationwide. Dairy can elect to monitor additional farms if desired.

Emissions monitoring will be performed by independent scientists, and the collected data will be forwarded to EPA for development of improved "Emissions-Estimating Methodologies" (EEMs). After the study is completed, EPA will post EEM's on its web site for producer's use to estimate daily and total annual air emissions from their farms. Posting is projected to occur in 2008. Producers can use these estimations to more clearly determine their federal clean air law compliance status.

While the Agreement does not exempt producers from applicable state clean air laws, it does address civil liability for certain potential violations of federal law: Clean Air Act (CAA), Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and/or the Emergency Planning and Community Right-to-Know Act (EPCRA).

The Agreement requirements can be broken into three areas: those that must be met by EPA, by dairy producers, and by the monitoring scientists. The general obligations of EPA are:

1. To provide releases and covenants not to sue a participating dairy producer for violations of:
   A. CAA permitting and review requirements and state implementation plans arising from emissions of Volatile Organic Compounds (VOCs), Hydrogen Sulfide (H2S), Particulate Matter (TSP, PM10, and PM2.5), and Ammonia (NH3).

B. CERCLA section 103 or EPCRA section 304 for failure to notify authorities of H2S or NH3 emissions that exceed hazardous substance reporting requirements.

2. To publish EEMs within 18 months of the conclusion of the monitoring period and to publish methodologies as soon as they are developed.
3. To notify the producer if EPA has determined that EEMs cannot be developed for any emission unit identified by the producer.
4. To adhere to normal and customary biosecurity measures for dairy operations if EPA representatives visit monitored farms.

However, the Agreement allows EPA to take action in cases that may present an imminent and substantial endangerment to public health, welfare, or the environment.

The following is a partial list of the obligations a dairy producer has under the Agreement:

1. Pay a $200 penalty for each farm that has less than 700 cows or 1,000 heifers; $500 if between 700 and 7,000 cows or between 1,000 and 10,000 heifers; or $1,000 if more than 7,000 cows or 10,000 heifers, within 30 days of receipt of an executed agreement from EPA.
2. Identify and disclose to EPA the emission units (barns, manure storages, etc.) on their farm.
3. Notify the National Response Center (NRC) and relevant local and state emergency response authorities within 180 days of receiving an executed copy of the agreement from EPA that the farm may generate routine air emissions of NH3 in excess of 100 pounds in any 24-hour period. (This requirement is only for dairy farms with more than 7,000 cows or 10,000 dairy heifers).
4. Submit the appropriate payment to fund the monitoring study.
5. Allow air emissions monitoring to be performed on their farm, if selected by the independent monitoring contractor and approved by EPA, and permit EPA access to the farm to verify suitability and observe monitoring.
6. Accept the air emission study protocols and the data developed by the study.
7. Waive any right to claim any privilege with respect to the monitoring data collected.
8. Provide written certification to EPA, if applicable, within 60 days after EPA publishes the EEMs for the emission unit(s) at their farm, that no CAA requirements or CERCLA, or EPCRA notifications are required to be made.
9. Submit all CAA permit applications required, if applicable, for their farm based on results established by use of EEMs within 120 days of their publication.
10. Report all qualifying releases of H2S and NH3 in accordance with CERCLA and EPCRA, if applicable, within 120 days after EPA publishes EEMs for emission units at the producer's farm.
11. Install all emission control equipment, if use of the EEMs determines that equipment is needed, in a timely fashion and to notify EPA in writing that such installations have been made.

Producers may want to seek legal advice to better understand the terms and conditions of the Agreement. Producers who choose not to take part in the Agreement will be subject to potential enforcement by EPA for any CAA, CERCLA, or EPCRA violations, as will any producer who signs the Agreement but later drops out by not complying with the terms of the Agreement.

An unofficial version of the Air Quality Compliance Agreement can be accessed at: www.epa.gov/compliance/resources/agreements/caa/cafo-agr-0501.html. (Click on "Agreement.") The official version will be available upon its publication in the Federal Register at www.access.gpo.gov/su_docs/aces140.html. Additional information and updates on the agricultural air emission issue can be found at www.prodairyfacilities.cornell.edu. (Click on "air emissions".) In the coming weeks, information will be distributed that can be used to assist dairy producers in making their decision.

[1]*This summary document was written for general information purposes only and is not to be considered as engineering or legal advice, nor is endorsement of the Agreement express or implied.*

Management of Corn Rootworm in 2005

Elson Shields, Department of Entomology, Cornell University

While we are still trying to forget the struggles of farming in NY during the summer of 2004, when the sun refused to shine, the frequent rains kept the fields too wet to work and the hay crop rotted on the ground, there are some good impacts from all that wet weather. Economic damage to our corn crop from corn rootworm feeding was at a very low level during the summer of 2004. Field capacity soils during the rootworm hatching period in late May and early June reduced the larval population of rootworm by drowning them. Abundant soil moisture also allows the rootworm damaged corn plant to maintain its yield potential while the damaged plant regenerates its roots. Maximum root damage from corn rootworm occurs when the plant approaches the reproductive stage and water stresses from root damage can have a major impact on yield during this time.

Fields at Risk:
Field risk for root feeding damage from corn rootworm increases as the number of years of continuous corn increases. First year corn is never at risk from corn rootworm damage although other insects can attack the corn plants. First year corn following alfalfa sod is at risk for attack from seed corn maggot however. While insecticide is not necessary for rootworm control in 1st year corn, insecticide is required either on the seed or in the seed furrow to minimize stand losses from seed corn maggot. Second year corn fields are at low to moderate risk to damage from corn rootworm. Second year fields at particularly high risk would be corn planted into fields that were very late planted 1st year corn the previous year. Third year corn fields are at moderate to high risk to damage from corn rootworm while 4th year and greater continuous corn fields are at high rootworm risk.

Management strategies:
Rotation:
Crop rotation is still a viable and effective corn rootworm management strategy in the Northeastern US. An annual rotation of corn with an alternative non-host crop such as soybeans eliminates the need for a corn rootworm insecticide during the corn years. In addition, short rotations of corn and other crops reduces the need for rootworm control measures.

Granular Insecticides:
While old technology may not be as trendy or attractive as the newest technology on the block, NY corn farmers are still receiving good returns for their rootworm control dollar with the purchase and use of granular insecticides. Research trials conducted each year in NYS indicate a continuing high level of control of corn rootworm when registered granular rootworm materials are used by farmers. Force, Lorsban and Counter continue to give excellent levels of control in soils with the PH less than 7.5. Force and Counter continue to give excellent levels of control in soils with the PH greater than 7.5. The new hot topics of EPA mandated refuges and insecticide resistance are not applicable to granular insecticides. When granular insecticides are applied according to label in a 7 inch band, the untreated soil between the rows act as a refuge to protect against corn rootworm developing resistance to the granular insecticides. If you have granular insecticide boxes on your corn planter, check with your pesticide supplier to see if the choice of granular insecticides gives you the best return for your rootworm control dollar.

Granular insecticides are best targeted at fields with moderate to high populations of corn rootworm. Since second year corn has a low to moderate risk for rootworm feeding damage, these fields would be a good place for less than label rates of soil insecticide. If less than label rates are considered, careful calibration of the insecticide applicators is extremely important. Excellent control can often be experienced with 66% of the full label rate. Full label rates should be used in high risk fields..

Seed Treatments:
The new seed treatment technology is a great new innovation in the delivery of insecticides to the needed action site while minimizing handler exposure to the insecticide. However, since different rates are marketed, extreme care need to be taken to make sure the proper rate of insecticide is applied to the seed for the desired pest complex.

Get the rate correct !

Both Cruiser and Poncho are closely related compounds, so the same rate recommendation applies to both compounds.

- **Secondary insect pests (seed corn maggot, wireworm etc): 0.25 mg/seed (Poncho 250 or Cruiser Extreme Pak 0.25)**
- **Corn rootworm: 1.25 mg/seed (Poncho 1250 or Cruiser Extreme Pak 1.25)**

Both Poncho and Cruiser provide adequate control of low to moderate populations of corn rootworm at the rates listed above. The lower application rate targeted at the secondary insects like seed corn maggot will not provide adequate control of corn rootworm. (Table 1). Since both products are systemic in action and are very closely related chemically, the potential for corn rootworm to develop resistance to these compounds is very high. The systemic nature of these compounds removes the in-field refuge. It is the presence of the in-field refuge with granular insecticides which have prevented the development of insecticide resistance in corn rootworm for the past 40+ years usage of the granular materials.

YieldGard – Rootworm:

Varieties containing the BT gene active on corn rootworm (YieldGard-Rootworm) continue to perform better than either granular insecticides or the insecticide seed treatments in terms of limiting rootworm feeding damage (Table 1). However, a higher level of root feeding damage was observed in the 2004 field trials than in previous years. Reports out of University trials in Illinois report incidences of severe root damage from rootworm feeding in varieties reported to contain the BT-rootworm gene. It is unclear at this point if the affected varieties had a lower level of BT than previous years or if there was a sudden appearance of BT resistance in the Illinois population of corn rootworm.

<u>Refuge requirements:</u> If a grower decides to plant a corn variety containing the BT-rootworm gene (YieldGard-Rootworm), a refuge equaling 20% of the acreage of the BT-rootworm planting must be planted. The refuge must be planted immediately adjacent to the BT-rootworm field or within the BT-Rootworm field in a block or blocks. The field continuous corn history of the refuge and the BT-rootworm field must be identical. The refuge must be controlled by the farmer of the BT-Rootworm field and a neighbor's field does not qualify for a refuge. Check with your seed-dealer for more details about the EPA required refuge.

Do Nothing Option.

A number of farmers in NYS try the "do nothing to control CRW option" every year. Moderate root damage and the associated yield losses in these fields are often missed because NYS does not have the level of wind to flatten fields of weaken corn stands like the Midwestern states. Plants with moderate root damage responsible for 0-15% silage yield losses often remain standing with little goose-necking under NYS growing conditions. In good moisture years like 2004, these plants are under limited water stress so the associated yield losses are low. However, under drought stress in dry summers, yield losses from moderate levels of root damage can approach 15% silage yield losses. If a farmer is growing 18 Ton/Acre silage and the value of the silage is $25/Ton then these losses can approach or equal $67/Acre without the farmer even suspecting the insect damage and yield loss due to the straight standing corn plants. As root damage increases in untreated fields with higher levels of corn rootworm larvae, yield losses can easily exceed 50%. Fields with yield losses exceeding 25% are often severely goose-necked and the yield losses are a combination of physiological yield losses from water stress and harvest losses from the goose-necked corn not being efficiently harvested by the chopper. With the wide variety of rootworm management options available to NYS farmers for 2005, the "Do Nothing Option" should be a practice of the past.

Table 1. Efficacy of Corn Rootworm Insecticides in 2003 and 2004.

Product	Rate	Root Rating 2003	Root Rating 2004
Force	4 oz/1000 ft row	2.15 a	2.50 ab
Poncho	250 (0.25 mg/seed)	rate not tested	3.30 ab
Poncho	1250 (1.25 mg/seed)	2.40 a	2.60 ab
Cruiser	0.25 mg/seed	rate not tested	3.50 ab
Cruiser	1.25 mg/seed	rate not tested	2.80 ab
YieldGard Rootworm		2.00 a	2.10 a
Untreated Check		5.10 b	3.60 b

Dairy, Livestock and Field Crops News

Volume 12 Issue 1

February 2005

Field Crop Management
Kevin Ganoe
(315) 866-7920
khg2@cornell.edu

Dairy Management
Dave Balbian
(518) 762-3909
drb23@cornell.edu

Cornell University Cooperative Extension

Dairy, Livestock, and Field Crops Team of Cornell Cooperative Extension In Chenango, Fulton, Herkimer, Montgomery, Otsego and Schoharie Counties

Cornell Cooperative Extension of Herkimer County
5657 State Route 5
Herkimer, NY 13350

NON PROFIT PRST STD
US POSTAGE PAID
Herkimer, NY 13350
Permit No. 25

Dairy, Livestock, and Field Crops Team of Cornell Cooperative Extension
In Chenango, Fulton, Herkimer, Montgomery, Otsego and Schoharie Counties