

# AgriEnergy Resources

**“Residue made a dramatic difference in the tilth in my soils** after just one application in fall 2005,” says Rod Potts, Calhoun County, Iowa. The 75-acre test field is heavy black soil — similar to Clarion and Webster — in continuous corn.

In the 2006 season following the Residue program applied in November 2005, corn on the treated field yielded 150 bu. even though it had only 3 in. of rain the entire growing season until September.

When he para-plowed the field last fall, “that soil had a crumb structure. The para-plow pulled so easy I could have used a smaller tractor. It was like night and day compared with the 500 acres around it, which plowed up in ribbons.”

In fall 2006, Potts applied a second application of Residue with accompanying nutrients.

We’ll follow ongoing results of his program to watch for improvements in yield consistency, weed pressure and other benefits.

**You can push fertility more this spring, to capture higher grain prices.** AgriEnergy’s Ken Musselman offers some yield-boosting ideas:

☐ **Spring Residue application** will help capture cornstalk nutrients if you’re planting corn on corn and didn’t fall-apply Residue.

☐ **Use Myco Seed Treat** in the planter box for healthier emergence.

☐ **Band liquid starter** close to the row early; side-dress more nutrients later if spring soil tests show a need.

☐ **Ask us about foliar fertilizer** as the season progresses.

*See page 7 to see some of our leading 2007 products! We’ve improved and simplified many of our long-proven products, and added new ones.*

**We’ll help make your fertility program easier to manage!**

Based on nearly two decades of experience, we’ve learned how to formulate fertility programs custom-blended for your soil with as few as two products. That saves you time while simplifying storage tank and mixing needs. One key to this is AgriEnergy’s *Foundation*, a standardized blend of nutrients and biologicals. Starting with *Foundation*, we can add SP-1, trace minerals, nitrogen, Potassium Sulfate Solution and other ingredients indicated by your soil tests. *Foundation* is NOP compliant for organic growers.

**Research reveals a reason for the carbon-capture paradox.**

For years, we’ve seen Residue crop-digestion programs improve recapture of carbon and crop nutrients in crop residue. But National Soil Tilth Laboratory research shows that only about 10% of *raw* corn stalks, leaves and cobs are recaptured as active humus if they’re left on the surface or turned under *without* a biological breakdown inoculant. Thus the conventional wisdom is that most recovery of crop organic matter comes from roots, not above-ground residue. Dr. Walter Goldstein, Research Director of the Michael Fields Agricultural Institute in Wisconsin, says: “It’s not uncommon to see research results that 40% or more of the carbon from aerobically composted manure may be retained in young organic matter. Ruminant manure, especially, has been stabilized against the usual oxidation which ‘weathers away’ raw residue. I think the big losses have to do with the composition of the residues and the way they are decomposed.”

From our field experience, crop residue treated with Residue organisms, plus accompanying nutrients, behaves more like manure than like raw stalks: More of it is digested into active humus; less oxidizes away. Four tons of corn residue contains 80 lbs. of nitrogen, 30 lbs. of phosphate and 190 lbs. of potash. Those nutrients are worth capturing as best you can.

**Organic farms help build families and communities.**

For a living example, look at Randy and Louise Willrett’s farm near Malta, IL. They’ve certified 1,450 acres as organic, starting a decade ago. Their rotation of soybeans, oats/clover and corn has a three-year average of 45-bu. beans, 107-bu. oats and 155-bu. corn. They typically contract crops early in the year.

Randy uses several AgriEnergy biological products including Myco Seed Treat, SP-1 and Dramm fish. “Weed pressure has receded over the years as soil life has built up,” he says. He rotary hoes twice and cultivates twice, but also hires local teens and Hispanic workers each summer to bale hay and “walk beans” for escaped weeds (remember that)? The Willretts and four other local organic farmers share ideas, network market prices and pool crop inputs as a cohesive community. Louise says, “We’ve been blessed with six children. Through the years they’ve all worked the ‘glamorous’ jobs of picking up rocks, pulling weeds and baling hay and straw.”

The family also has a non-organic enterprise: Custom-feeding 1,800 head of beef cattle annually on slatted floors over manure pits, using local corn. The manure is injected on oats ground which will rotate into corn. Sometimes they harvest clover hay after oats, but usually the clover serves as green manure.

Fieldwork plus cattle feeding and manure hauling creates job opportunities for two full-time employees, plus many part-time summer helpers. *That helps support families in the community, instead of exporting dollars for chemicals.*

# The next major breakthrough for high-quality crops: **Managing Microbes**

For about 50 years, virtually all gains in crop yields have been based on genetic and chemical technology.

Now a few dynamic scientists are working toward a new breakthrough: Learning to “manage microbes” to improve yields, enhance crop quality, fight diseases, and ward off plant pests.

One of those innovators is Dr. Jerzy Nowak, professor and head of the Department of Horticulture at Virginia Tech, Blacksburg, Virginia.

He told our Winter 2007 seminar participants that until recent years, “Few scientists thought about microbes and their impact on plant production. Now, we’re seeing clearly that there’s a multi-dimensional aspect to plant-microbe interaction with the soil. Think of soil as a living tissue. And think of building a ‘microbial consortium’ in your soil to promote healthy crops.”

Nowak and a growing network of scientists around the world are verifying this “living tissue” technology which our firm has explored and encouraged for two decades. Our very first newsletter (in December 1989) said: “Our approach is to care for the soil’s living organisms, which in turn generate the nutrients and energy to raise high-yielding, high-quality crops.”

It’s now exciting, even exhilarating, to see the scientific community energized to develop this technology.

Nowak told our seminar participants that major agribusiness firms are also quietly exploring how to build and market such microbial technology as an alternative to simply more toxic chemicals.

“The ultimate customers of these big firms are consumers, who are demanding that chemical inputs must be reduced,” said Nowak. “Consumers want to know the operational philosophy behind how you produce their food. This new frontier of the soil food web demands understanding interactions between microbes and plants, and their impact on the nutritional quality of food.”



**Dr. Jerzy Nowak**

Nowak has pioneered some of the most promising microorganism research we’ve seen outside of our own microbiological laboratory.

We’ve long known that bacteria and fungi in the rhizosphere — the soil closest to crop roots — create what Nowak calls a “biofilm” around younger parts of the

roots that exude nutrients, such as sugars and other energy sources that facilitate growth of

bacteria and fungi. The organisms respond by converting soil minerals and compounds into soluble nutrients available to the crop. The microbes also produce regulatory substances which promote plant growth and induce the crop’s resistance to stresses, including diseases, insects, drought and temperature variations.

When an AgriEnergy rep visits your farm, one of the first things he or she does is dig crop roots to evaluate the abundance of microlife around roots.

Nowak told us that in a normal soil, about a third of these microorganisms are beneficial for plant growth, a third are neutral, and a third can be harmful. Our soil-life strategy has been to multiply the beneficial bacteria, fungi and mycorrhizae. This is immensely complex, and we’re looking to Nowak and his colleagues for new, fundamental information on how to achieve healthier soils.

Nowak says, “Even though disease-causing organisms may be present in the soil, we’ve seen that they typically remain dormant until stimulated. “So, research is underway to learn how to keep them sequestered.”

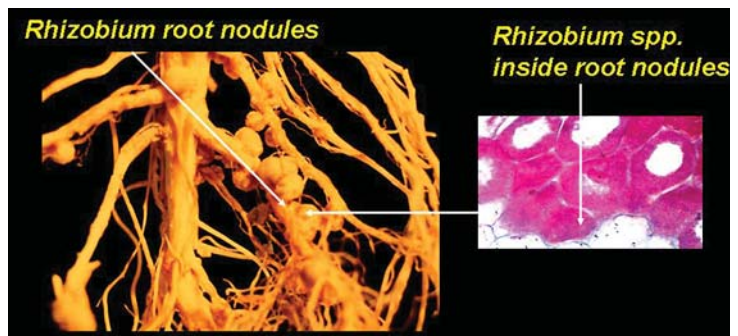
For example, one of his research teams learned how to use mycorrhizae to induce disease protection in potato tubers. This friendly fungus is just one of the many beneficial microbes that can be found in a healthy soil environment. Mycorrhizae, along with other soil fungi and actinomycetes, create a network of filaments throughout the soil profile. When digging in the soil or examining crop residue, some of these, especially the actinomycetes, can be seen without the aid of a microscope.

Other studies directed by Nowak and his worldwide scientific colleagues have shown that certain bacteria do much more than colonize plant roots: They migrate throughout plant structures, even embedding themselves in seeds and tubers.

Nowak told us, “In wheat seeds, we could not get rid of all microbes by sterilizing the seed coat. The microbes are all through the seed.”

This raises a new possibility, said Nowak: “Can we develop beneficial populations to inoculate within the seed, so the seed is protected by beneficial ‘super elite’ organisms?”

**Rhizobium root nodules** nurture a wide variety of helpful bacteria, not just the nitrogen-fixing kinds. Just as we once regularly inoculated legumes with rhizobium, we may add inoculants of other microbes in the future.





Examples of creatures, from earthworms to bacteria, which populate the soil ecosystem. Images with this article are courtesy of Dr. Jerzey Nowak.

Some nitrogen-fixing microbes are capable of fixing 50 to 100 lbs. of nitrogen per crop acre. What if effective “nitrobacter” types of microbes could be sequestered in seed corn, ready to start converting nitrogen to plant-available form as soon as the corn germinates? Finding and establishing nitrogen-fixing free-living bacteria that colonize grasses like corn just might be possible.

Nowak’s teams have found that red clover root nodules contain not only nitrogen-fixing rhizobia, but many other bacterial species. At least 16 other kinds of organisms colonizing inside the nodules have been identified. Also, 75% of the benefits from rhizobia come from activities in the nodule other than fixing nitrogen. For example, the nodules release hydrogen gas (H<sub>2</sub>). Many other organisms can use this hydrogen as energy, and in turn increase their populations and exude plant growth regulators.

In effect, seed-delivered beneficials would do for crops what “probiotics” do for livestock: Shift the battle in favor of beneficials and against pathogens.

**By managing microbes, producers might also improve flavor, quality and shelf life** of fruit and vegetables: “Some of the 250 compounds within a strawberry are produced by microorganisms within the berry,” said Nowak.

These compounds have a major impact on flavor and stimulate production of antioxidants, which are critical components of a healthy diet.

Other bacteria living within plants exude growth stimulators. A study of microbe species thriving in the interior of carrots showed 83% were growth-promoters, 10% were neutral and 7% growth inhibitors. As you might expect, carrots growing on soils high in organic matter also contained more internal organisms.

Nowak has also documented how some microbes colonize leaf stomata. Embedded in the leaf, they influence the plant’s immune system and provide some nutrients as the leaf absorbs carbon dioxide and emits oxygen.

Knowing how to inoculate and translocate beneficial

organisms through the plants and into reproductive organs could lead to new, inexpensive techniques for plant protection. For example, we anticipate that foliar feeding will be more widely used across America. This could provide a delivery system for beneficial organisms as well as nutrients during the high-stress growing season.

**There is a mutual adaptation of bacteria and plant**, Nowak said. Example: A young potato plant which had abundant internal beneficial bacteria contained five times as much chlorogenic acid in its leaves. This is a phenolic compound long known as an inhibitor of some fungal diseases.

“In crop disease management, the well-bacterized plants responded faster to prevent pathogens from dominating,” said Nowak.

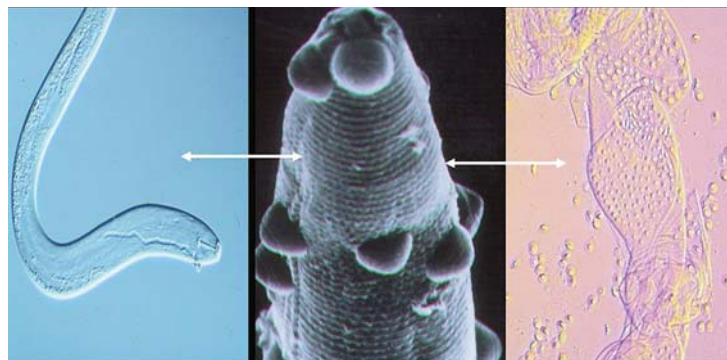
Nowak says “When a crop encounters airborne diseases, we’ve found that bacteria must be *internal to the plant* for its protection. For instance, studies of verticillium wilt in tomatoes showed that there must be a critical density of bacteria inside the tomato plant tissue before the organisms begin producing enough antibiotics to block invasion of pathogens.”

Researchers timed the migration of soil-inoculated organisms: It takes about 12 hours to colonize the root surface. Then, some of the microbes secrete enzymes which open cell walls and allow them to penetrate into the root interior. This takes about 36 hours. Once into the flow of the plant’s circulatory system, organisms migrate to the stem and leaf stomata during the next 72 hours.

**Nowak described a theoretical “delivery system” which might someday carry beneficials into plants.** Certain species of nematodes which do little harm to crops could be “fed” healthy beneficial bacteria, then sprayed onto crops.

As the nematodes burrow through plants, their digestive systems would leave a living trail of these useful microbes. Such bacteria-eating nematodes digest only weak and dying bacteria, as they are nature’s “clean-up crew.” Healthy bacteria survive

**When a harmful nematode** (left image) is colonized by certain bacteria (center image), these bacteria can disintegrate the nematode’s tissue (right image). That’s how a healthy microbe population can fight plant-infesting nematodes. However, other types of nematodes aren’t harmful to plants, and they could be used to inoculate plants with helpful bacteria — if we get more skilled at managing microbes.



## Mycorrhizal stimulation of onion growth



**Inoculating onions** with a beneficial mycorrhiza improved early development, as Dr. Nowak's photo shows on the six onions on the left. Control onions on the right received no treatment. We consistently see similar benefits on such crops with Myco Seed Treat.

the trip through the nematodes' digestive tracts. Nowak and research teams he has led in Germany, Africa, England and Canada have also identified what he calls "a new world of undiscovered viruses" which can either attack or assist bacteria. By impacting bacteria, these viruses can influence the entire food web. The generic term for these tiny organisms is bacteriophages. It could be a major step in controlling plant health.

**We see researchers in the scientific community as allies** in our efforts to advance the science of managing microlife, our "littlest livestock." We're eager to see research and development flourish in this area for another reason: Solid science can give government regulatory agencies the information they need for sound decisions.

**One major research effort among Nowak's colleagues now** is the "smart field" concept, which involves quickly sensing plant-microbe interactions and applying corrective or crop-enhancing measures. Field sensors would detect emissions from plant and microbe respiration, such as hydrogen and ethylene. Irrigation tubes buried about 8 inches below the soil surface could emit nutrients or other products to modify microbe and root responses.

Ironically, the mega-millions of dollars pouring into anti-bioterrorism could yield very helpful sensing and diagnostic tools for crop microbial analysis. Federal agencies need the ability to detect the presence of specific organisms quickly, without several days of delay required by culturing samples.

**Nowak envisions a "laboratory on a chip"** which could enable field technicians to get a soil or crop microbial profile in real time, much as you can analyze soil conductivity or pH now with hand-held meters.

When that day comes, AgriEnergy Resources expects to be first in line. Then we'll take digging roots to a whole new level. We might be able to flash the microbial profile of the rhizosphere on a laptop computer screen — right in the field.

Obviously this technology has a long way to go, but it's sure to be an exciting trip!

# Renewing the Countryside

*"I wish I were 30 years younger, because I'd love to be farming. I've never seen more opportunity in agriculture than right now!"*

**T**hat quote comes from Dr. Jerry DeWitt, Director of the Leopold Center for Sustainable Agriculture based at Iowa State University.

DeWitt keynoted our winter Renewable Farming Seminar, focusing on opportunities he sees for farmers who have what he called "the spirit of sustainability."

He told us, "I've been on this journey of sustainable ag since the 1980s."

His leadership has channeled public resources into ecologically friendly farming. For example, he convinced Iowa State to establish the nation's first tenured faculty position for organic agriculture. Here, we highlight some of DeWitt's examples of why you can be excited about your own Renewable Farming system.

## 1. Consumers care more than ever about food quality and how it's produced.

"We will have more opportunities to supply a product people want," said DeWitt. Consumers are quickly becoming more concerned about what's in their food and how it impacts their health. This is a global megatrend.

"Alternative marketing and the richness of diversity are booming. In Italy, 7% of all ag production is organic. It's only 1.5% in the United States, so this share of market has plenty of room to grow," he adds.

Many Midwest corn-soybean producers are starting enterprises to reach consumers directly:

- About 450 farmers and ranchers nationwide have formed the Organic Grassfed Beef Coalition to accelerate growth of this huge market. People everywhere are learning the health and taste advantages of American grassfed beef.

One rancher in the tallgrass area of Kansas, Keith Ferrell, says Midwest farming "has to be more than corn and beans." DeWitt concurs, noting that the Midwest needs to restore more livestock and rotations on the land to regain environmental protection and long-term sustainability.

- A Kentucky extension agent became a rotational grazing enthusiast and turned his county around: Out of tobacco and into grassfed beef and direct marketing.

- Fresh air pork production got its start in Iowa 10 years ago when DeWitt pushed for a conference featur-

ing use of environmentally-friendly hog raising systems — especially the big hoop structure which cost a third as much per animal as concrete and steel.

“When I proposed this to a former associate dean, he warned, ‘You better have your data,’” said DeWitt. “I told him we do have data: There has never been a lagoon spill from any of them.”

Since that conference, Iowa livestock producers have built 2,700 of these structures. Deep bedding keeps animals comfortable while composting waste. We’re seeing these built on new hog startup operations in the Midwest, as well as being added to existing setups.

## **2. Direct-marketing opportunities are multiplying.**

Even “traditional” corn-soybean growers are innovating cash sidelines based on biological production, noted DeWitt.

Iowa has about 50 “Community Supported Agriculture” groups, in which families pay an annual fee to take season-long deliveries of fresh, local garden produce. Nationally there are about 1,500 CSAs. Some farm families earn a fourth of their net annual ag income this way.

DeWitt points out that women often take the lead in alternative enterprises. That enables Mom to make money on the farm — often with the help of children — instead of being gone all day at a town job.

As an example, DeWitt showed photos of Michelle Kirkland, who raises organic grapes on three acres south of Des Moines.

“There’s a lot more gender balance in sustainable and organic agriculture,” says DeWitt. “You see this clearly when you go to a convention of these people. Women are much more involved than in the straight corn-soybean monocultures.”

Iowa now has 176 farmers markets. The average retail buyer spends about \$12 and visits the market 13 times each season. One farmers’ market in Des Moines has 250 vendors.

A University of Northern Iowa staff member, Kamyar Enshayan, has for several years spark-plugged a “buy fresh, buy local” campaign around Waterloo in north-east Iowa. That appeal resonated with Barry Eastman, owner of Rudy’s Tacos, a popular restaurant in Waterloo.

“I buy more than \$200,000 worth of local beef, pork, tomatoes and other products every year,” he says.

A farmer near Marshalltown, IA got into goat raising and discovered an untapped market for young goats among Hispanics and Muslims. No problem with federal or state inspected slaughter either: He sells all the live kids he can produce for \$75 at the farm.

The Internet can accelerate your learning curve on such new enterprises. The rising tide of sales for goat milk and cheese is nurtured by [www.goatweb.com](http://www.goatweb.com).



**Dr. Jerry DeWitt**

“The Northern Prairie Chevre group at Woodward, IA is selling a 4-ounce package of cheese for \$4.50,” noted DeWitt. Pastured poultry is another growth market, and this can grow to a hefty commercial enterprise: Several growers at Sumerall, MS, plan to finish 5,000 broiler chickens, which sell for up to \$12 per finished bird.

DeWitt said, “All you have to do to recognize the difference in taste and texture is to eat a free-range chicken.”

Some high-dollar markets are virtually untapped, right in the heart of corn-soybean country. Frontier Natural Products Co-op is based at Norway, Iowa, near Cedar Rapids.

Frontier’s website says, “As the world’s largest global supplier of organic herbs and spices, we hold a leadership position, not only in the

marketplace, but also in the effort to convert food producers to sustainable farming and production practices. Our work is driven by the belief that fostering environmental responsibility is crucial to our world’s future.”

Ironically, the firm has to buy 85% of its herbal stock from outside the United States, said DeWitt.

## **3. Energy prices and energy conservation have a widening impact on opportunities.**

DeWitt pointed to the surge in corn-based ethanol plants and resulting higher prices of corn and soybeans.

While ethanol is a huge opportunity, DeWitt cautioned that we all need to think through the range of consequences for soil and water protection and impacts on communities.

“Ethanol is the first step,” he said. Eventually, ethanol plants will shift toward cellulosic feedstocks. We at the Leopold Center are concerned about long-term health of the soil and water as this demand grows.”

For example, if corn residue is baled for cellulose, what’s the long-term impact on soil organic matter?

## **4. Protecting soil and water is gaining a higher priority.**

“As we move more toward cellulose, we have to step up and protect the soil,” emphasized DeWitt. “We are going to ask the tough questions about retaining carbon in the soil.”

On that point, we’d certainly like to see the next farm bill’s Conservation Security title contain incentives for recapturing crop-residue carbon. That will help save nitrogen and other nutrients.

What’s needed for sustainability, said DeWitt, is a return to more livestock on the land — specifically more grass and more beef and dairy cows.

We’re encouraging that trend by alerting producers to the opportunities in grass-fed beef and profitable dairy pastures. That’s part of “community development!”

# It takes healthy soil to maintain a healthy herd!

Dr. Paul Dettloff has practiced large-animal veterinary medicine since 1967, primarily serving Wisconsin dairymen. His goal is to help farmers improve the health of their soil so completely that their cows don't need a veterinarian.

As a consultant for Organic Valley, he's gradually achieving that goal. Of the 680 dairymen selling milk to Organic valley, about 500 are concentrating on soil health. Organic Valley will approach \$500 million in milk sales this year.

"When one of my farmer clients restores life in his soil, I lose about 80% of my veterinary billings with him," Dettloff quipped at our recent winter seminar.

"As a dairyman, the first 'veterinary' dollar you need to spend is on soils. You need to get your soil pH into the 6.5 to 6.8 range. You need your soil nutrient ratios correct, such as magnesium and calcium.

## "Your soil-building priorities are:

1. Mineralization.
2. Microbiology.
3. Electrical conductivity."

Dettloff quit his conventional veterinary practice in 1982 from frustration because "Dairymen forgot the rumen was made for grass. They thought they were feeding coyotes. Half my vet income came from four conventional farms, who were spending \$15,000 to \$30,000 a year with me."

Those dairymen were focused on corn silage, concentrates and setting new production records. "Our technology outran our common sense," said Dettloff.

"The bovine ruminant would like to eat 100 different plants every five days. Each plant has a different molecular profile and different phytohormones, all of which are useful to health."

A cow's health relies on 11 metabolic systems, said Dettloff. Volatile fatty acids like acetic and propionic acids provide energy for cell functions. When rumen bacteria break down grass and other forage, a primary product is acetic acid.

However, rumen breakdown of starchy seeds generates lots of butyric acid, "which has the ability to really screw things up," said Dettloff. That's why cows founder on too much grain."

He advises that a reasonable production goal with a high-forage ration should be around 18,000 lbs. per cow. And a reasonable productive lifespan for a forage-fed cow on healthy soils should be around 12 years.

"I tell my dairy producers: Your goal is to grow high-brix, solid stemmed forage. I like to see 65% to 75% high-brix forage in a dairy diet, then a little grain.

"When farmers restore their soils, and get forage re-mineralized, the quality of their cows' colostrum goes up after calving and their calves don't have scours. After several years of good soils, their animals just don't get sick."

Some producers can maintain those 18,000-lb. averages on 100% forage. "But to do that, you have to earn the right; you need to get your soils in line. I have a northern Wisconsin client who's 100% forages. His wife Kathy does the vet work with me over the phone, ordering an occasional probiotic or other natural product."

**When his dairy clients do call for veterinary help**, Dettloff relies first on alternative tools rather than hormones and antibiotics from "big pharma." Examples:

1. **Tinctures.** These are infusions of natural compounds like garlic or echenacia in a solvent like organic grain alcohol.

"Making a tincture takes three to four weeks," said Dettloff. "We tincture garlic in 5-gallon jugs. Garlic has 35 molecules that kill bacteria."

He said that the longer dairymen are producing organically, the more they rely on tinctures. "Most New Hampshire dairies will soon be organic," said Dettloff. "And the winds have changed around here. The University of Wisconsin and University of Minnesota have both



**Dr. Paul Dettloff**

done a 180-degree reversal in attitude toward organics."

2. **Homeopathy.** We're seeing more veterinarians effectively using homeopathic remedies.

3. **Essential oils.** These are gaining widespread use in human alternative medicine and are finding a niche among veterinarians.

"We are going to see more essential oils," said Dettloff.

4. **Aloe Vera** and other immune-system supporters which bolster the endocrine system. "Endocrine systems respond to parts per trillion of a substance," Dettloff observed.

"There will be more cutting-edge health products coming from the alternative sector than from the conventional sector," says Dettloff.

5. **Trace elements** are part of Dettloff's arsenal; they're critical for immune systems.

6. **Probiotics** strengthen natural disease resistance.

7. **Antioxidants** such as vitamin C, Vitamin E and the tincture of rose hips... "the most beautiful pink tincture," said Dettloff.

**Hearing Dettloff's report** is another clear indicator, directly from a seasoned animal health practitioner, that healthy soils are needed for healthy animals and healthy people.

# Check out these AgriEnergy products and blends for 2007

Every year, our ongoing research in field trials, greenhouse and laboratory continues to improve excellent products and develop new ones. Here's a sample of our "crop" of new and improved products for 2007.

As always, we prefer to customize each program to your soils, your application systems and your budget.

**4-21-4 starter fertilizer** has shown us excellent results. It contains a blend of ortho and polyphosphates.

The ortho phosphate is more readily available in cool soil temperatures and the poly phosphate is less prone to being tied up when it comes in contact with the soil. 4-21-4 has a pH of 5.5 making the phosphorus more readily available than neutral pH fertilizers. It also contains potassium with no chloride.

Starters containing potassium have been shown to give yield response even on soils that are high in potassium. 4-21-4 contains fulvic acid and other carbon compounds that improve nutrient uptake. It is a low salt fertilizer, making it a safe starter and a superior choice to 10-34-0. The unique formulation of 4-21-4 allows you to blend it with nitrogen, ammonium thiosulfate and trace elements. In other words, we can make a customized starter to fit your farm that will have consistent quality and results. The best news is that 4-21-4 is very economically priced. We are confident you won't find a better buy for the money.

**Forage Blend** contains clear liquid, orthophosphate and high quality potassium, nitrogen, sulfur and trace elements. It is buffered with carbons. It is a great product to boost forage fertility, applied in strip bands or as a foliar application. It works well as a row support or sidedress application for row crops, or a top dress or foliar application for small grains.

**Activator** contains our highly available Liquid Calcium and high rates of humic and fulvic acids buffered with carbons. This product has demonstrated the ability to dramatically improve soil tilth and structure of the top 2 to 4 in. of soil within one growing season. It has been especially valuable on high clay soils or soil with a cation imbalance such as high sodium or magnesium content.

**Trace Pak** is a unique combination of chelated and complexed trace elements. It provides a broad spectrum of nutrients to plants and microbes including zinc, iron, manganese, copper, boron, cobalt and molybdenum. It blends readily with other liquid fertilizers. Our research data has shown over a 7 bu. increase in corn yields when adding it to row support fertilizers.

**AgriBoost PK and AgriBoost CA** are designed to be put through the drip tape to provide macro and micro nutrients in season. The products are used alternately. Application rates should be adjusted according to petiole testing. These products could be used for foliar applications as well.

## These three products should be part of any fertility program, organic or conventional

**Myco Seed Treat**, commonly referred to as MST, is a dry planter box treatment. It is a blend of beneficial bacteria and fungi, including mycorrhizae, along with a nutrient package. MST will colonize initial roots and benefit the root system, and therefore the plant, all season long.

**SP-1** is blended to supply diversity of bacteria, fungi, algae, enzymes, carbon substrates, vitamins, minerals and nutrients. It may be used on any crop and may be applied as a tank mix with any liquid application. SP-1 is commonly blended with liquid fertilizer.

**Bio Humus** is a bio activated 6% humic acid. It should be part of any liquid fertility program. It encourages root growth and nutrient uptake.

## These seven products can also be used for organic crop production

**Foundation** is the most exciting thing to happen in organic crop fertility. It is a unique blend of two nitrogen products, fish hydrolysate, potassium sulfate, trace elements, seaweed, humic acid, fulvic acid and molasses. It is easy to store and handle. Foundation is an amazing product with results to match.

**Forage Blend O** contains two sources of nitrogen, liquid fish, potassium sulfate and a trace element package. It can be used for soil or foliar application for a wide variety of crops.

**Five** is a 5% liquid nitrogen derived from Chilean Nitrate. It provides very readily available nitrogen. It's great for early season soil applications.

**Fourteen** is a 14% nitrogen product derived from aerobically made compost.

It contains naturally formed urea. It is a great product when ammoniacal nitrogen is needed.

**Potassium Sulfate Solution** is a liquid potassium you can use for soil or foliar applications. It is readily available and easy to handle. It's a great product for supplemental potassium during the growing season.

**BioLink Cal Plus 6% Liquid Calcium** is an OMRI listed product for organic production.

**Drammatic O** is a premium fish hydrolysate that is an excellent nutrient source for plants and soils. It is OMRI listed.



AgriEnergy Resources

This letter is brought to you by your  
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*Spring 2007*

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## We're gearing up to help organic growers with insect control

AgriEnergy Resources has developed a widening array of organically approved *fertility* products to help you profit from booming markets for organic crops.

Now, our staff is assembling the best technology on a wide array of organic products and techniques for *insect* control.

Many farmers see the pest-control learning curve as a barrier to their transition into organic production.

For many years, we've used Integrated Pest Management to reduce chemical pesticides. IPM starts with getting soils biologically alive and nutritionally balanced.

When that's achieved, crops are typically so healthy and high in plant sugars that the economic impact of insect and disease pressure recedes.

**However, you can't control weather.** Drought can impair nutrient uptake, stressing plants and leaving them more vulnerable to insects. Cool, cloudy weather can allow sugar content — the brix reading — to slide well below optimum, again weakening plant immune systems. And sometimes insect invasions in an area simply overwhelm all fields in their path.

Thus, there *are* times when applying organically approved pesticides makes economic sense. That's especially true for high-value crops.

Calculate the value of your organic corn this year! The good news is that you can tap into a widening array of effective, organically approved insect control products.

The difficult news is that your local co-op or chemical supplier probably doesn't handle beneficial fungi, cedar oils, garlic or other organic pesticides. And beyond that, you'll need to learn the practical aspects of knowing how to make the most timely and effective use of those products.

**With some exceptions like the natural pyrethrins,** pesticides approved for organic use typically have less immediate knockdown toxicity than chemical killers, so timing and weather are more critical.

You need to know what product works best against specific pests, why they work, and under what conditions they will perform best. Example: The active ingredient in Mycotrol O is a fungus; *Beauveria bassiana*. To achieve its full potential as a foliar, it should be sprayed when the conditions favor fungal growth. Warm, humid days with little or no wind give Mycotrol its best chance to infect insects by secreting enzymes to break down their exoskeletons.

You can add some diatomaceous earth to speed this process, but even then you need to observe whether

the insects are active on plant surfaces: Mycotrol is a contact pesticide. (Sometimes it seems like bugs hide if they hear a tractor coming!)

Then there's the question of the best sprayer tips for coverage of the product you're using.

And finally there's the question of "economic threshold" of when it pays to spray. Sometimes the decision will be easy, like spending \$50 per acre for *Entrust* on organic spuds that Colorado Potato beetles are about to defoliate.

**Because this is a high-tech area** which calls for experience, the technical staff at AgriEnergy Resources is investing substantial time and resources to learn how we can help you. We're bringing in representatives of various organic pesticide manufacturers to help train us on strengths and weaknesses of their products. We'll add to the lineup of organic pesticides we stock, helping you obtain the right product in time.

Also, we're linking into several organic and IPM resources on the Internet, so we can refer you to the best and quickest databases of knowledge when you call with a question.

Our new definition of "integrated" pest management is this: Working alongside organic growers as a team for plant *protection*, as well as plant nutrition.