



AgriEnergy Resources

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Agricultural Research Service researchers with a great cause: Natural, high-quality foods

Renewable Farming enthusiasts are familiar with William A. Albrecht, the courageous University of Missouri scientist who pioneered many of the biological principles used today for high-quality food.

We recently found two other researchers in the public sector who are demonstrating the effectiveness of biologically sound crop systems.

We invited Joe Bradford and Larry Zibilske to tell our seminar participants of their innovative work on natural resources and integrated farming systems. It's the *only* organic research program funded by the Agricultural Research Service.

Joe told us: "Two years ago, ARS told us we couldn't use the term 'organic.' We had to say 'sustainable.' By next year, we hope to get \$600,000 to \$1 million from the ARS research budget of \$1 billion."

Joe observes that because biologically based farming systems are so interdependent, it's difficult to design experiments to statistically test a single variable. Thus, testing biological systems in trials is more complex and costly than varying the rate of an applied chemical. Though some of the Weslaco organic team's tests may not be statistically publishable, results are convincing.

Example: In two nearly identical 400-tree pecan orchards near Hamilton, TX, they compared 15 variations of organic fertilization with conventional NPK treatment.



Dr. Joe M. Bradford (left) is Supervisory Soil Scientist at the Kiki De La Garza Subtropical Ag Research Center, Weslaco, TX. His colleague in natural and organic crop research is Dr. Larry Zibilske, Soil Scientist, who is researching interactions of soil microbes and organic matter.

"After just one year, it's clear that biological systems are controlling yields here," said Joe. Within the 15 organic fertility variations, pecan weight varied 100%. The highest quality and yield came from a blend of poultry litter and compost. But now, the grower wants to go organic on the conventional orchard, which would deprive these researchers of an experimental control!

Another of their objectives: Improve corn fertility organically to eliminate the high level of aflatoxins in white corn. "All the white corn in our valley is contaminated with aflatoxins," said Joe. Much of this corn is eaten directly by people — in tortillas and other corn flour products.

A third project is fertilizing large-scale olive production. Conventional wisdom says olives can't be grown here, but two orchards are thriving on

organic foliar sprays, fish oils, humates and other biologicals. One orchard has 3,000 trees.

Joe's colleague, Larry Zibilske, is tackling the challenges of maintaining soil health in this subtropical climate, which intensifies crop carbon conversion to carbon dioxide.

He's studying cover crops, which stabilize microbial habitat in the soil and help maintain its structural integrity. Larry noted: "A healthy rhizosphere is hard for a pathogen to penetrate. A half-ounce of healthy root will have 20 times its own weight of soil surrounding it. This is a kind of biological armor."

His research includes a promising new winter cover crop: Black Oats (*Avena Strigosa*), a release from Brazil. "It's allelopathic to broadleaf weeds the following spring, and produces a lot of vegetation."

AgriEnergy Resources is following Larry's work closely — as we also encourage use of cover crops.

His research has measured a surprise benefit: "A cover crop enriches the nutrient content of the residue of the following crop. For instance, the nitrogen level in the residue of the corn crop following the cover crop rises about 1.17%. Other nutrients are also higher in the crop residue."

Quality of the grain is also improved, said Larry. "After a legume cover crop, corn has an iron level 229 parts per million higher than without the cover crop."

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Seed a cover crop this fall, harvest benefits next year

Kathleen Draper, microbiologist with AgriEnergy Resources, shared with our summer seminar participants the microbial test results of the rhizosphere soil of a 2003 rye cover crop.

Not only was the soil extremely high in all types of microbial species, but this high level of activity tripled the overall size of the root due to the soil particles adhering to the root.

The microbes in the rhizosphere are very important for cycling nutrients, making them available to the plant and immobilizing the excess in their cell bodies to prevent leaching.

A cover crop, along with the high level of microbial activity, is a great way to prevent nitrogen loss in the fall and spring.

Cover crops, both legumes and grasses, are great soil builders and every producer is encouraged to find a way to incorporate this management practice into some of their acreage to help correct some of the many crop production problems.

The photo at right shows rye interseeded in corn.

A fall cover crop is one of the most cost-effective ways you can:

- ☐ Encourage high populations of diverse microbial activity in soil;
- ☐ Help restore soils from the season's stress and nutrient removal;
- ☐ Add organic matter for long-term buildup of stable humus.



Produce from living soil wins top bids in Lancaster County

Reuben Stoltzfus, CEO of Lancaster Ag Products and Bio Farm Resources in Lancaster County, PA, told our summer seminar participants that auction buyers quickly learned which farms deliver the tastiest, highest-quality produce.

They are growers who are building soil life with a biological fertility program. First, dry fertilizers and high-calcium lime to balance calcium, phosphorus, potassium and magnesium in correct ratios. Then, liquid microbial products such as SP-1, fish and minerals from AgriEnergy Resources. Said Reuben: "Calcium and dry nutrients are the fuel. Liquid biologicals are the lighter."

At first, only growers with high-value crops on a few acres were willing to invest in the full package of nutrients which soil tests called for. Larger growers across the Northeast saw the results, and are now adopting similar programs on big acreages of hay, grains and soybeans.

"Once they compare the results of our total program with what they had been doing, including pesticide costs, they won't go back," Reuben said.

The quality benefits are immediately clear on fruit and vegetables. "Our customers ask where the insects went... where the diseases went. Melons split open with the knife, instead of behaving like rubber balls. A bale of alfalfa produces more milk. Auction buyers bid up their products. One of our clients sells vegetables directly to a chef in Brooklyn. The chef knows: "Produce from this farm tastes rich and lasts longer on the salad bar." Stoltzfus employs a staff of 20 people serving several Northeastern states.

A fast-paced "farm tour" with AgriEnergy's Ray Roettger

Ray Roettger drives thousands of miles yearly to help dozens of farmers across the eastern Corn Belt. Highlights from a few of his clients:

- ☐ Topeka, IN — Dairy herd health is higher; milk production up. He has raised solid-stemmed alfalfa the past two seasons.
- ☐ Montgomery, IN — The farmer tried the AgriEnergy program on one field the first year, two the next, then three. Now he says: "AgriEnergy's biological fertility program adds some expense, but you can't afford to farm without it." His biggest problem now: "The milk tank is running over."

Ray Roettger's own challenge: "We gave the chemical firms 50 years. Now, big yields are leaving us nutritionally starved. The next 50 years are ours — to grow nutritionally high-quality crops on living soils, and restore the nation's health!"



Special alert: We're searching for another field agronomist to expand our service to clients. Hopefully we'll find someone who comes close to Ray Roettger's knowledge, enthusiasm and dedication to agriculture! If you're interested, call us at 815-872-1190.

“My greatest challenge as a physician: Finding food that’s nutritionally fit for my patients and myself.”

— Dr. Arden Andersen

Since 1988, AgriEnergy Resources has emphasized a vital need to lift the nutritional quality of American feed and food crops.

Finally, marketing opportunities are opening up for farmers to get paid well for producing fully mineralized, toxin-free grain and produce with high nutrient density.

Dr. Arden Andersen, a medical doctor and biological farming consultant, told our Summer 2004 Renewable Farming Seminar participants that thousands of leading commercial farmers in Australia and other nations are “coming to the table” to produce high-quality food with Renewable Farming principles and products.

For example, 28 Australian farmers attended our seminar as part of a three-week study trip through the U.S. and Canada to learn more about biological farming and marketing of high-quality products.

Arden Andersen hosted the tour.

“These large commercial Australian producers must export to Asian buyers who insist on high-quality foods,” said Arden. “Many of them are ahead of American farmers in efforts to upgrade the nutrition and shelf life of their grain, fruit and vegetables.”

Arden, who has been working in the area of biological farming and food quality for 20 years, notes that consumers are rapidly realizing the health benefits of beef with a high ratio of healthy Omega-3 polyunsaturated fatty acids versus Omega-6 fatty acids. Cattle fed on high-grain concentrate feeds typically have high muscular fat, but a low level of Omega-3.

Arden cited the example of one of his Australian clients who’s finding eager buyers for his beef raised on pastures which are enhanced by

Renewable Farming systems. The producer analyzed typical grain-fed beef cattle and found their meat averaged 22.5% total fat with only 1 unit of Omega-3 fatty acids for every 16 units of Omega-6, a typical ratio for grain-fed cattle.

Cattle finished on conventionally fertilized grass had 6% fat with a 1 to 6 ratio of Omega-3 to Omega-6. That’s an improvement over grain-feds. But it’s not even close to the “ideal” ratio produced by cattle on the Australian producer’s biologically-raised grasses: Only 3.8% total fat, but a nearly perfectly balanced ratio of 1 unit of Omega-3 fatty acids to 1.3 units of Omega-6.

Even though total body fat was much lower in cattle finished on biologically balanced pasture, these healthy steers and heifers produced meat with eight times as much beneficial fatty acids in excellent balance, said Arden. “Beef is a healthy food for us to consume if it has been fed properly,” he emphasized.

In just 15 years, consumers’ awareness of nutritional quality in food has risen so rapidly that demand is stimulating new retail food chains such as Whole Foods Market, with 160 big stores in the U.S. and Britain.

Whole Foods Market sums up its goals: *“We obtain our products locally and from all over the world, often from small, uniquely dedicated food artisans. We strive to offer the highest quality, least processed, most flavorful and naturally preserved foods. Why? Because food in its purest state — unadulterated by artificial additives, sweeteners, colorings and preservatives — is the best tasting, most nutritious food available.”*

Another food chain, Wild Oats, is also growing. This firm will soon install natural-foods sections in other major food supermarkets a “store within a store.”



Arden told farmers at our seminar that they can profit from solving three of the most serious problems crippling the health-giving qualities of our food supplies: low nutritional quality, mycotoxins, and genetically modified plants. Together, “They hamper the immune system, disrupt vital biochemistry and prevent healing processes,” he said. A summary:

1. **Low nutrient density** is typical of most foods raised with conventional fertility programs.

A British study showed that from 1940 to 1991, vegetables in the U.K. lost 76% of their copper, 49% of their sodium, 46% of their calcium, 27% of their iron, and similar amounts of other vital nutrients.

Arden, as a U.S. physician with a practice in Michigan, began testing U.S. foods in recent years. “We found many key minerals low or missing,” he reported. He said many chronic diseases are linked to food that looks good but is nutritionally deficient.

2. **Mycotoxins contaminate many foods and feedstuffs.** They’re produced by mold or fungi, and they pose severe health problems.

Arden briefed our seminar on several toxins coming from farms in the U.S. and overseas. Examples:

☐ **Fumonisin**s — generated by *Fusarium* fungi. These are prevalent on corn and can occur without visual mold.

Fusarium causes massive crop losses in cereal crops, and also generates the mycotoxin *deoxynivalenol* (DON), often called



vomitoxin. This toxin persists in the food chain; it can't be "processed out" with cooking.

Arden says that typically, up to half of the samples of wheat, buckwheat, oats, rye and other grains are contaminated with vomitoxin.

He added, "One medical researcher couldn't find a baby food product at retail that was totally free of vomitoxin contamination."

☐ **Aspergillus** — This is an aflatoxin found with increasing frequency in corn, peanuts, and cottonseed. It will contaminate milk via the feed. The B1 Aspergillus is a carcinogen.

☐ **Ochratoxin A** — Found in cereals, dried fruits, cocoa, wine, and eggs. Suppresses the body's immune system; causes birth defects.

☐ **Zearalenon** — This is an estrogenically active mycotoxin found in grains. "It's a major problem," said Arden, citing observations in his Michigan clinic.

Arden has been tracking field research at the University of Missouri showing that Roundup is associated with higher levels of Fusarium fungi, which generate mycotoxins.

3. Genetically modified plants. We asked Arden's opinion of the recent National Academy of Sciences statement that GM breeding is the same as conventional. Arden said it's

a "politically correct view, but any good geneticist will tell you that there is *no similarity* between conventional plant breeding and genetic engineering."

He recommended studying a website by Ann Clark, Associate Professor of plant agriculture at the University of Guelph, Canada:

<http://www.plant.uoguelph.ca/research/homepages/eclark/>

Another website where scientists are discussing GE issues is:

<http://www.indsp.org/gmggroup.php>

On top of those three major threats to nutritious food, Arden said: "We also encounter pesticide residues in crops. Food irradiation wipes out the last vestige of nutrition. We also have wide use of antibiotics in feed. Thus, manure from antibiotic-fed animals isn't as healthy for crops as manure used to be in the days of Carey Reams and William A. Albrecht."

Arden sums up: "More supermarkets would offer high-quality foods if they could get a consistent supply. You have to produce it consistently before you can market it in substantial quantities."

Fortunately, more consumers than ever are searching for natural, tasty, highly nutritious foods — *and they're willing to pay for it when they find it.*

What you can do now for more crop quality and profit in 2005

Plan your fall Residue applications to follow the combine as soon as possible. Residue from a 150-bu. corn crop holds about 55 lbs. of nitrogen. The challenge is to make it available to crops next season. Without active digestion of residue, this "free" nitrogen remains tied up, and 80% of applied nitrogen is immobilized during the growing season.

We have consistently improved Residue formulations with research over the years, and we now have formulations which fit into virtually every type of application program wherever you farm. Following are typical applications per acre. To fine-tune the rates for your soils and conditions, visit with an AgriEnergy Resources representative.

Residue

2 gal. Residue (shipped separately)
1 gal. M-Carb (shipped separately)
2 to 10 gal. 28% or 32% nitrogen
0.5 to 2 gal. ThioSul

Residue Plus

2 gal. liquid
0.1 lb. Residue culture powder (requires minimum agitation)
2 to 10 gal. 28% or 32% nitrogen

Residue DF

3 lbs. dry Residue DF (dry flowable)

Organic Residue Treatment

2 gal. SP-1
0.5 gal. molasses
1 to 3 gal. fish
0.5 gal. humic concentrate (if allowed by applicable organic rules)



Visit with us about your interests and fertility plans for next season. In the photo above, Dave Lubben of Monticello, IA, is chatting with Dean Craine during our August seminar field visits. Dave feeds cattle, practices rotational grazing of a herd of 200 beef cows, and raises crops. He is a former president of Practical Farmers of Iowa, a farmer research organization. Just call our office at:

815-872-1190.

Often, you can see the difference Residue makes!

An early fall application of Residue plus favorable fall weather can accelerate digestion of cornstalks so significantly that side-by-side differences with untreated areas are easily visible. Farmers often tell us they can feel the difference in tilth as they walk the field, too.

The photo at right, taken in early July, shows a close-up of soybeans on untreated stalk ground (left side) and Residue-treated ground (right side). More stalks remain on the untreated soil. Also, untreated soil is not as mellow as on the treated area.

Residue is available in liquid or dry forms. In the column at right, we show four typical formulations, depending on your need. The dry



flowable form, Residue DF, is especially beneficial for producers who farm a considerable distance from our plant and want to reduce shipping costs. We also can formulate residue treatments for organic producers, using organic SP-1 (see column at right).