

Healthy Soils, Healthy Livestock, Healthy People

Renewable Farming Systems Mean Enhanced Nutrient Cycling



Dean Craine

Dean Craine was raised on a livestock farm in Bureau County, Illinois, and graduated from Black Hawk East College, Kewanee, Illinois, in 1982 with an associate's degree in agriculture production. He initially started working with Dave Larson, the founder of AgriEnergy Resources, on renewable farming principles in 1982 on his family farm with his father and brother. A Certified Crop Advisor, Craine works in the agronomy department of AgriEnergy Resources, planning fertility programs and recommending products to naturally enhance nutrient cycling. He also continues his farming operation in Bureau County, where much of the acreage is used for research and development of AgriEnergy Resources products. Since the fall of 2001, Dean has been the general manager of AgriEnergy Resources.

ACRES U.S.A. You are following in the footsteps of Dave Larson, who started the company AgriEnergy in 1988. He had a vision and a mission. Are you still on target with that?

CRAINE. Yes. More so all the time. We're closer to fulfilling the company's mission statement today than we've ever been.

ACRES U.S.A. What is that mission statement?

CRAINE. Dave put it together many years ago. It says, "Our mission is to develop renewable farming systems and to assist producers in their implementation by providing products and education. The result will be healthy soils that produce plants of high nutrient density and good nutrient balance. The consumption of this produce will result in healthy livestock and healthy people."

ACRES U.S.A. That's a wonderful statement.

CRAINE. We're really proud of it.

ACRES U.S.A. Education, then, is a big component of what AgriEnergy is all about?

CRAINE. Absolutely. We run two seminars a year — one in August and one in February. We travel around the country within our customer base and also put on many field days. We also put out newsletters that are educational. We try to get out at least four of those per year.

"We go to the biology in the soil first, but in order to get the biology right you must have the chemical balance at least close to correct."

ACRES U.S.A. That's to your customer base?

CRAINE. Our customer base plus anybody who's interested. The mailing list is huge, overwhelming. Anybody who's interested gets the newsletters for free and are notified of all the seminars and field days so that they can attend if they wish.

ACRES U.S.A. Facility-wise, are you doing your own laboratory work?

CRAINE. We have a soil lab and a microbiology lab. The soil lab does the Reams or LaMotte soil test. We do ammonium acetate tests to get the Albrecht model. We also do water-soluble testing for troubleshooting.

ACRES U.S.A. That's where the connection comes in with K. Chandler?

CRAINE. He's interested in the test because we're putting so many different extracts into it in order to look at a big picture. Chandler is extremely interested in the tissue-testing end of it, and we are cooperating with him on that.

ACRES U.S.A. Do you do petiole testing?

CRAINE. Yes. Under his guidance we've done more petiole testing along with the leaf-tissue testing.

ACRES U.S.A. We're emerging from that chemical/physical paradigm in which everybody felt that if you had the inorganic chemistry correct you would succeed, or that you could take dynamite and blast the soil apart again after it gets rock hard. Your message has been that without ministering to the unpaid livestock in the soil, you're going nowhere.

CRAINE. Yes, we go to the biology in the soil first, but in order to get the biology right you must have the chemical balance at least close to correct. The further you drift away from the conventional line of thinking, the more alive the soil generally is — and that's when you see really exciting things happen, one example being grazing dairies that have decided to go organic. We've got some examples of customers that struggled, even using commercial fertilizers, to get the crops to thrive and the cows to do well. Several of those have moved to organic and have actually seen production increase as a result. When you get the soil really right, the natural system kicks in and nitrogen's not a big problem — it still takes management, but it *is* manageable — and you can really see exciting things start to happen. That's been one of the most fulfilling things we've ever worked on.

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ACRES U.S.A. This is cows on grass?

CRAINE. Yes. We work with a lot of grazing dairies.

ACRES U.S.A. Let's say that a farmer who's been following Extension and the USDA for the last 20 or 30 years comes to you and says, “We're going in the wrong direction, we've got to straighten out.” Where do you start?

CRAINE. With a soil test. That's not an uncommon statement at all. We like to see a soil test first, then we like to get on their farm and get the spade in and dig and observe and see where that farmer is at. Oftentimes we'll also do microbiological testing in order to see which organisms are dominant in the soil that day and try to show the farmer a progression over a period of years. If he has a specific problem, if he's got some disasters, then we would definitely do the microbiology testing, then we can tie those results together with the soil chemistry results and paint a really complete picture of what's going on.

ACRES U.S.A. What do you do by way of extracting solutions to approximate what nature does?

CRAINE. The LaMotte test is close. In a trouble-shooting scenario for a farm that has an immediate problem, water-soluble testing can really give a good picture as well. It's not uncommon for soils that are extremely high in calcium to show a calcium deficiency on that water test, therefore it can sometimes lead us in a direction to help the producer.

ACRES U.S.A. Do you make use of the carbon dioxide test?

CRAINE. K. Chandler uses it, but we have not done that yet. We've talked about it, though.

ACRES U.S.A. The reason we bring this up is because K. Chandler seems to be quite impressed with your entire operation and thinks that it's one of the best in terms of biologically correct agriculture.

CRAINE. We sure appreciate that. Carbon dioxide testing is still under consideration. Because of the volume of tests we run through, we've been a little nervous about whether it can be automated or how labor intensive it would be.

ACRES U.S.A. Well that's the problem — it's labor intensive and not too easily automated.

CRAINE. Right, and we're not totally automated by any stretch because of all the different extracts we're doing, but that's one that's still to be considered. I

personally think we probably should head in that direction.

ACRES U.S.A. What's the big deficit out there among these people who've been practicing this so-called conventional farming all this time?

“The energy in the soil creates the growth of the plant. . . . It's all about energy. We're trying to capture solar energy with the plants to develop grains or fruits, etc.”

CRAINE. Soil life — specifically, diversity in soil life. Conventional operations have so much disease and insect pressure because they don't have the diversity in the soil to keep the plant healthy. There's no doubt in our minds that the more natural you are, the more likely you are to build a really diverse chemistry within the plant that gives it the ability to repel insects and disease. That's been stated for years. It's more obvious to us all the time. I wish there was a way to test for that!

ACRES U.S.A. You do have a test so you know how many units of life are out there.

CRAINE. Yes, you can do that, but it would be exciting to test that plant and actually lay something in front of a scientist and say “this is why this plant is staying healthy and not attracting insects.”

ACRES U.S.A. The trouble is, there are so many variables out there in nature — but our science, which is largely statistical, likes to isolate things into little airtight compartments and draw conclusions. But let's turn to remedies. Let's say you've got the soil test. You've got a pretty good audit of what's going on out there and you see a deficit in the life factor. How do you install it again?

CRAINE. After doing the testing — if the farmer truly wants to improve the soil — then we would work with microbial inoculants and get his chemistry balanced so that the microbes will thrive — because if we're going to put microbes out there, they have

to have the correct environment. The environment doesn't have to be *perfect*, but it has to be close enough to allow the soil life to thrive and propagate. Again, it's nutrient balancing first and then putting microbial inoculants on as often as possible. Set a budget and go at it often. Don't go out there in the spring and just put on one application — take every opportunity that farmer has to put small doses out there, which increases the odds that they would catch and start to function well.

“For farmers — especially the commercial farmers — who can't rotate crops, or choose not to, and don't have manures, that's where our microbial inoculants come in: to try to rebuild the diversity of the organisms in the soil.”

ACRES U.S.A. What role have you found for humates and humic acids?

CRAINE. They have always been part of our program. They work very well, particularly on heavy clays or lower humic matter soils. Humic acid has been part of the program since day one.

ACRES U.S.A. What form do you use?

CRAINE. We find the liquid form to be very reactive. There are occasions where we will recommend dry, but we get the quick response we really like with the liquid.

ACRES U.S.A. You don't use much irrigation agriculture up there in Illinois, do you?

CRAINE. We don't work with a lot of it in Illinois, but we have a lot of experience with it in the West. Just north of us here at Princeton, there's a tremendous amount of irrigation, but it's new irrigation that's just started in the last five years.

ACRES U.S.A. What kind of irrigation?

CRAINE. Center pivot. But, yes, we work with a fair amount of irrigation, and it is a wonderful way to put microbials on.

ACRES U.S.A. How far do you travel with your educational program and your field days and so on, in terms of geography?

CRAINE. We have the two main seminars here at Princeton each year. We've been running a small seminar and a large field day-type situation in eastern Indiana or western Ohio; we've also done some in eastern Nebraska and south-central Wisconsin.

ACRES U.S.A. Pretty much in the Corn Belt, huh?

CRAINE. Mostly Corn Belt, but we have dealers from Pennsylvania to Colorado. We're working from North Dakota down to southern Texas to some degree. The core business is right here around the Midwest, but it's scattered more widely all the time. During the winter we do meetings virtually everywhere. During the winter there are meetings from Pennsylvania to Colorado up into the Dakotas and down into Tennessee.

ACRES U.S.A. What is the scope of your short courses? Where do you start, how do you progress, and where do you end up?

CRAINE. It's evolved over the years. It used to be that the winter seminar was a three-day event and the summer one was a two-day. Over the last several years we've done one and a half to two days in the winter and a one day in the summer because folks are so busy then.

ACRES U.S.A. How many participants do you draw?

CRAINE. Winter meetings will be 160 to 250. This summer we had about 160, which was good for a summer.

ACRES U.S.A. You do those out on the farm?

CRAINE. Mostly. Part of it's in town, in air conditioning, and then we'll go out to the farm for plot tours and tour the facili-

ties. It used to be that the first half-day or maybe the first whole day was introductory — where we'd show some videos, we'd talk about paradigms, the importance of shifting your thinking patterns, we'd show the video *Life in the Soil* that was done in Japan — a wonderful video that you're probably familiar with.

ACRES U.S.A. We've shown it at the Acres U.S.A. conferences for years.

“Each different crop stimulates different microbes in the soil, so if you've got a good crop rotation you stimulate a lot of diversity of microorganisms — therefore suppressing disease and insect pressure.”

CRAINE. It is so enlightening for growers. It's one of those films you can watch over and over, and every time you get something new out of it. Well, we've kept the original focus in our current courses — we start off the seminar for beginners. If you're new to us, then you're new to these concepts, you know — What's it all about? What's the big picture? Then we'll work into staff presentations, our microbiologist Kathleen Draper, for example, oftentimes will talk about the importance of life in the soil and how we've adapted that into our system, how the products are put together, the quality control that we use, how we're always working on stability so that these products can be stored for a month or two or three or four before they're used — that's a huge issue. We'll talk about the microbiology, then some of the agronomists on staff will talk about real-life programs or examples — this farm has this soil test, which we show them, then ask, what are the deficiencies? What do we see as the limiting factors? Then we'll build a program which will include dry amendment, liquid amendment, maybe starters, solutions, foliar, and residue management — where we incorporate the residue — is a huge deal

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December 2005 • Vol. 35, No. 12

to us in the fall. We lay out a farm program and then open it up to questions and try to get the audience to relate. So the program starts with the basics and then moves on to what the business is about and how to improve the health of your soil, then we move into real-life examples.

ACRES U.S.A. So you still lean heavily on the Albrecht type of findings?

CRAINE. Yes, that's true. We integrate it a little bit with the Reams theory, as well. The reason our soil test is put together the way it is, is to try to blend the best of the Albrecht model with the Reams theory. Especially with troubleshooting, the more angles you look at, the more apt you are to identify the limiting problems.

ACRES U.S.A. To what extent do you get into the Reams program?

CRAINE. We draw on the basic concept that the energy in the soil creates the growth of the plant. That concept is, to me, is crucial. It's all about energy. We're trying to capture solar energy with the plants to develop grains or fruits, etc. I believe growers should have at least a little bit of background in role of energy in agriculture — ionization, conductivity, and so on — all those things have been particularly helpful for me in understanding a given piece of soil. Base saturation is critical also.

ACRES U.S.A. Reams literature is sort of hard to come by. Have you worked up your own presentation or your own manual?

CRAINE. No, I wouldn't say that we have. Dave Larson attended Reams' meetings, and they were very helpful for him. The Reams reunion that was held in Kansas City a few years back was particularly good for me. They brought together some of Dr. Reams' children as well as former students who were really into it and are teaching now. I've been to Dan Skow's classes for years, they also brought in Sande Beddoe, who handled the human health side of it. That was extremely helpful for me to understand because they brought together so many of these students who really had a tremendous grasp of what it was about. I would say the information provided by Dr. Skow and Dr. Beddoe over the years really opened our eyes as to why the Reams piece of the puzzle is so important.

ACRES U.S.A. Reams always had a big role for manures — we suppose to inocu-

late the soil with a whole range of microorganisms plus giving them something to eat. Do you rely much on farmers making a connection for a manure source?

CRAINE. As much as possible. The most dramatic changes I've seen on problem soils is where we can get manures into the system. Manures are wonderful. The

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monoculture environment — especially up here in the Midwest, where we're into a corn/bean kind of rotation and now it's even continuing corn — is what creates problems. If we had to sum up, that's really what we're all about in a sentence. Because of today's economics and the government's agricultural programs, we no longer have long-term crop rotations, and many of us don't even have manures anymore. Fifty years ago, when we were rotating crops, we had a lot of diversity in our farming system. Each different crop stimulates different microbes in the soil, so if you've got a good crop rotation you stimulate a lot of diversity of microorganisms — therefore suppressing disease and insect pressure. That's what we're all about with our microbial products — we're trying to mimic crop rotation and manuring because so many producers can't do that anymore. For farmers — especially the commercial farmers — who can't rotate crops, or choose not to, and don't have manures, that's where our

microbial inoculants come in: to try to build the diversity of the organisms in the soil. Poultry manures definitely did that very well back in Reams' day, but today many growers don't have that option.

ACRES U.S.A. Do you think we're going in the right direction with this monoculture?

CRAINE. *Absolutely not.*

ACRES U.S.A. Are you taking any steps to try to get farmers to become a little more diversified?

CRAINE. Always — we're always preaching that. For a farmer who is locked into short rotations, if we can at least get the cover crop in between there and improve the health of the soil to capture nutrients, to add biomass back to the soil, we're always promoting that. We demonstrate it on our research farm here — many different cover-cropping systems. Organic production is exciting to me because at least they used to force crop rotation into that. There's less crop rotation in organics today than there was a few years ago, and that's unfortunate. But absolutely, crop rotation and animals on the farm is where it should be.

ACRES U.S.A. We can't make the case that your clients are all going to be organic compliant then, can we?

CRAINE. No. I don't envision many of the larger conventional, row crop farmers ever going in that direction. Hopefully we'll see more of it in the future, though. We're actually seeing growth in the number of small farms, and those folks tend to care about the soil and about the nutrient density of the crops they're growing. The reality is that the larger farms are getting larger, while on the other side of the spectrum there are more small farms. We service both.

ACRES U.S.A. So, in the larger farms, we're still in effect mining the soil?

CRAINE. Most of them.

ACRES U.S.A. But you're trying to bend that a little bit with your philosophy and your instruction and education.

CRAINE. Yes, and some of them *will* listen. There are some large farmers out there who do care enough about the soil that they'll listen to us. It's not uncommon for a larger farmer to ease up and try to restore soil life on his owned acreage —

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December 2005 • Vol. 35, No. 12

maybe not the rented acreage — and then stick with it, because it does take years to correct the problems and develop the soil. We have several larger farmers who do that, but if they're in a cash/rent scenario without stability on their leases, some of them are more reluctant to put the time and effort into trying to build those soils up, unfortunately.

ACRES U.S.A. Basically there isn't too much you can do about this situation economically, as long as we have open borders and production coming in from the poverty pockets of the world.

“We're actually seeing growth in the number of small farms, and those folks tend to care about the soil and about the nutrient density of the crops they're growing.”

CRAINE. That's a bad situation. It's unfortunate.

ACRES U.S.A. And you're trying to overcome this loss leader, so to speak, by agronomic efficiency?

CRAINE. Yes, sound agronomy — and it doesn't have to cost more! Many of these farmers, even the larger farmers, are over-spending on the wrong fertility practices. It's not uncommon at all to work with them on an existing program in which we can't reduce costs enough so that they can add our product and services without increasing their total cost per acre. That's always our goal — to try not to increase their cost per acre, to figure out what you can back out of the program and how to make the system more efficient with better fertility and benefit them all around.

ACRES U.S.A. So you try to move them off of simplistic NPK and into the uplands of biological diversity to make the natural carbon and nitrogen cycle work.

CRAINE. The world revolves on the carbon and nitrogen cycle, and a big factor in that is how producers handle their residues at the end of the season. Down in

the southern United States we try to preserve more residue in order to try and cover the soil and protect it from erosion, but in the Midwest, we find that the quicker we can decompose those residues, the healthier the soil will be, the better the tillage, the better the seedbed, the better the next year's crop.

ACRES U.S.A. So whereas they might want to keep the residue on top of the soil in the Rio Grande Valley, in your area you have to get it *into* the soil and the microbes working as quickly as possible?

CRAINE. Yes, we want to turn that material into the aerobic zone right behind the combine and get it converting in order to recycle those nutrients and create a living, dynamic soil surface that will decompose those residues and have those nutrients ready for the next year's crop. In our latitudes we promote getting the residue in the aerobic zone quickly, especially in a corn situation where you've got a tremendous amount of residue.

ACRES U.S.A. So your tillage is going to be in the fall, not the spring?

CRAINE. We much prefer to start in the fall, although if you travel further north, that's a whole different animal again, because oftentimes they harvest on nearly frozen ground, and thus you're forced to figure out a way to deal with it in the spring.

ACRES U.S.A. Sometimes fall closes in pretty fast before the soybeans are in.

CRAINE. Yes, we have some customers up to the north who harvest their corn on frozen ground, and the first day it thaws they plant the next crop.

ACRES U.S.A. Let's talk about your marketing approach — some consulting operations feel that they should not get involved in materials because then they let what they have to sell influence what they recommend. You don't find any problem with that?

CRAINE. The approach that Dave Larson took from the start was that it's difficult to sell a consulting business every year, so we, in effect, don't charge for the consulting part of our business.

Instead, we encourage the producers to work our product into the system. Working with the goals and budget that the farmer lays out, we try to work it with in the system, but we also set priorities.

ACRES U.S.A. But that can only work in a company with high integrity, otherwise you're pushing off 17-17-17 or something like that on somebody whether he needs it or not.

CRAINE. Yes, and we pride ourselves in making sure that doesn't happen here. We stay close to our mission statement.

ACRES U.S.A. Knowing your background, we really resonate with that.

CRAINE. When we prioritize the budget, generally speaking, nitrogen is first. If the farmer only has money to buy nitrogen, then that's all he buys — and we don't sell nitrogen. Here in the Midwest, potassium is normally second. You must have adequate potassium or you don't have soil life. Beyond that then you get into your limes, calcium.

ACRES U.S.A. What about phosphates?

CRAINE. In the corn states, if you're dealing with high-value crops, the phosphates come in a lot higher on that priority list.

ACRES U.S.A. What kind of uptake do you think you're getting on phosphates?

“The world revolves on the carbon and nitrogen cycle, and a big factor in that is how producers handle their residues at the end of the season.”

CRAINE. With biologicals and humic acid it's dramatically higher than without them — we do know that. We've seen it many times in petiole samples, most dramatically on potatoes in alkaline, high-pH soils. If you put humic acids or biologicals in the system, you see the phosphates in the petioles. Folks we've worked with for

years have said that before they started using biologicals or humic acids, they oftentimes put phosphates on and never saw their petiole levels come up. These folks that I'm referring to are on high-calcium soils and are using about half the phosphates as before, which is remarkable because they used gobs of it. So we know that phosphate availability goes up dramatically with the use of mycorrhizal fungi, humic acid, and if you get that soil alive.

ACRES U.S.A. Have you turned to Elaine Ingham's compost teas?

CRAINE. We're not a big believer in the tea because it takes an artist to make good product, and then it has to be used immediately. We use different versions. We've used compost extracts and then added back the biology that can't survive composting processes in order to build diverse product. We do use high-temperature compost that

is made specifically under our direction for our use. We use worm-casting extract as well as other manure-based products and cultures from the lab. It's an exciting thing to visit a farm, maybe one that hasn't been farmed very long, and see a really good crop growing, and also to bring those soils back to the microbiology lab and have the microbiologist do a work-up on it. Kathy sometimes will identify beneficial organisms that aren't common out there in the environment. We then have the ability to propagate those organisms and add them back into our culture so that we can provide them to farmers throughout the country.

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