

Quest #107: Sustainable Agriculture: Solution or Fad?

(Christine Young, Program Host) Coming up on Quest, hard times continue on the farm and in rural Maine, but with the combination of new and old time methods, Mainers are figuring out how to make farming sustainable and more profitable. Even city dwellers are part of the changes on the farm, as they look for more organic food to buy, and organic farmers are as numerous as ever in Maine. And, we will see the latest in innovations in marketing and genetic engineering for Maine crops such as the pesticide in a potato. A Sustaining Farming in Maine. That is what this Quest is all about.

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OPENING MUSIC

(Christine Young, Program Host) The Clemedow Dairy Farm here in Monmouth is quintessential Maine. It is pretty to look at but for the farmer it is always a struggle to stay in business. The number of dairy farms in Maine is rapidly shrinking. There are now less than 600 dairy producers, and since 1990 we have been losing about 20 a year. Most of us don't like to think about farming not doing well. We don't want to have less open space or not have rural towns to raise our families in. No question about, Maine is a challenging place to farm. Dana Hutchins tells us what more conventional farmers are doing to hang on.

Music: Song: Trouble in the Fields

(Dana Hutchins, Segment Host) Trouble in the fields is an all too familiar theme in Maine and other farming states. The last 40 years have not been good ones for farming in Maine. In a little more than a generation, we have lost three-quarters of our farms, two-thirds of our farm lands and more than half of all agriculturally related jobs.

The trend has been for larger farms to swallow up small ones. But, now even the middle-sized, family farms struggle to survive.

(Bob Fogler, Dairy Farmer) Historically, farms have gotten larger and larger over time, and I don't see that trend stopping even in the state of Maine. I think dairy farms will get larger, potato farms will get larger, and that's pretty much going to be a fact of life, I think.

(Dana Hutchins, Segment Host) But, perhaps even more important than the loss of farms is the steady erosion of the rural way of life, because so many agriculturally related jobs and business have been lost.

What can science do to bring vitality back into small-town farm life? Some would say that science has created some of the problems that farmers now face, that new technology is to blame.

Technology that was supposed to make the farmer's job easier is eating into farming profits. Many of the jobs that farmers once did themselves are now done off the farm and oftentimes outside of the farming community. After the two world wars, beating swords into plowshares meant that chemical manufacturers and factories that made weapons, instead made fertilizers and machinery to sell to farmers. Ever since then, there has been one sales pitch after another targeting farmers in the heartland.

(Stewart Smith, University of Maine Agricultural Economist) Is the industrial system we have now more efficient

than an alternative system would be if we put the same kind of research dollars, public policy dollars into that alternative system? And the question there I think we are getting increasing evidence that the question there clearly is no.

(Dana Hutchins, Segment Host) The decline of farming has been enough to push many Maine farmers into wanting to go back to using methods that used to work well for them years ago. In many cases, when they evaluate their farming from a scientific perspective, they discover the benefits of what is now called alternative farming. To the surprise of many mainstream farmers, they are finding the changes that they are now making for economic reasons are a lot like what organic farmers have been doing for years in order to be more environmentally responsible. This same desire has led some Mainers to experiment with suburban homesteading. One of its most resourceful advocates is Beedy Parker of Camden, who has had as many as five gardens across town, some in yards that don't even belong to her.

(Beedy Parker, Suburban Gardener) You cut off one head and then it grows a bunch more, half size, and then you cut those off and it grows a bunch more, quarter size, and you keep going, and so we've been doing this for months and these are like thirty-second size.

(Dana Hutchins, Segment Host) Parker is concerned that farmland continues to be lost to development. And, she believes that even those living in suburbs can grow much of their own food. It's a noncommercial kind of agriculture, but one Parker thinks would make Maine much more sustainable than it is now.

Farming has not had a good environmental track record. There is a long list of ecological concerns that not only worry consumers but may also be counterproductive to farmers themselves.

Agriculture is believed to be the largest nonindustrial source of water pollution to streams and rivers. Chemicals from pesticides and fertilizers are seeping into the ground water in many farming areas and drifting into neighboring properties, and there's the issue of how safe food is because of pesticide residues on crops.

(Neil Crane, Potato Farmer) We're conscious of our neighbors' concern about pesticide and certainly conscious about the consumers' concern and we're trying and have been for several years trying to develop systems that will help us reduce those.

(Dana Hutchins, Segment Host) It was back in the 70s when the term sustainable farming was first heard in Maine. Alternative agriculture got started over concern over depleting nonrenewable resources. Most fertilizers and pesticides are made from petroleum products.

(Man in field) This little one here might not have gotten harvested.

(Dana Hutchins, Segment Host) What is called sustainable farming now can mean many different things, depending on who you talk to. To Stu Smith, sustainability is good business and good social policy.

(Stewart Smith, Agricultural Economist, University of Maine) There are systems that rely much more on farm resources than on purchased resources, and obviously because of that they are systems that offer much more opportunity at the farm level and they are systems that are much more linked to local community.

(Dana Hutchins, Segment Host) Sustainable agriculture is not one single kind of farming. Components of sustainable agriculture are widely used in Maine, although only a small number of farmers use it exclusively. Most sustainable farms don't look any different than conventional ones.

Neil Crane's potato operation in East Exeter is a traditional farm experimenting with sustainable practices. Like

many Maine farmers, he prefers to keep any changes he is going to make to be gradual. But standing between Crane and his ability to make a living are two formidable enemies: potato blight and the Colorado potato beetle. He still uses pesticides and fungicides, but instead of bombarding his crops with chemicals, he keeps spraying to a minimum.

(Neil Crane, Potato Farmer) I try not to have any blight to begin with and so you have a preventive spray program to do that, and we're just trying to predict when those severe levels are going to be so that we can spray ahead of time so we will stop those infections from happening.

(Dana Hutchins, Segment Host) By doing more visual inspections, or as he calls it scouting. Crane has a better idea of what he is up against. Crane needs to keep tabs on the weather--real close tabs. He put in several of his own weather stations and hooked them up to his computer.

There are other ways to practice pest management. Crop rotation is one. When farmers plant a different crop in a field each season, they're better off for two reasons, their crops improve and their crops are more pest proof.

When the food source, the crop, is changed each year, destructive levels of pests and disease are usually avoided. When there is less damage from insects and disease, the root systems of crops are healthier, which means that roots will absorb nutrients more easily. And, Ivan Fernandez of the University of Maine says that there is ample evidence showing how chemicals damage soils.

(Ivan Fernandez, University of Maine Soil Scientist) If you embark on a long-term course of just providing inorganic fertilizer, the organic matter that you started with in your soil is continuing to decompose, so every year you find you're adding more and more inorganic fertilizer, because what you had as organic matter in your soil is getting less and less.

(Dana Hutchins, Segment Host) Insects, weeds and diseases continuously build up resistance to the most commonly used insecticides, herbicides and fungicides. After a while, some chemicals no longer repel or kill the pests. Farmers are discovering how predator/prey relationships can play out in farm fields. Scientists like Tim Griffin of Cooperative Extension, called them biological controls.

(Tim Griffin, University of Maine Cooperative Extension) Things like ladybugs also go after and eat whether it's eggs or young insects that may cause us problems, so one of the things that we look at is how can we best take advantage of all those things that are going on, whether it's a natural process that we say. Let's try to help this along, or in some cases where we're actually releasing something else to control a pest.

(Dana Hutchins, Segment Host) Soil, water and air are the chemical ingredients needed for crops to grow. But plants also need large amounts of three nutrients found in soil: nitrogen, phosphorus and potassium. Neil Crane has found he can improve his soil by growing cover crops in the winter. Later, he can plow the cover crop, barley, under for added nutrients. Most soils usually do not have enough of these nutrients. If nutrients and water are not available at the time they're needed, plant growth and development will be slowed down. Soil pH or soil acidity also has to be watched carefully by farmers, because it affects how well nutrients are taken up by crops. Soil acidity is a measure of hydrogen atoms, since they compete for space in soil with nutrient atoms. A number of microorganisms also help plants absorb nutrients. We know much about the harmful types of bugs, like nematodes and some fungi, but little is known about these microscopic bacteria and fungi. When they feed on leaves and other litter, they assimilate nutrients in their tissues which they release when they die.

(Tim Griffin, University of Maine Cooperative Extension) Their sole function or their major function is to take organic forms of nitrogen in the soil and turn it into ammonium, then to nitrite, then to nitrate, and it's at the end of that series of steps that now it's available for the plant. So, for that living plant to utilize the nitrogen that's

in organic matter. It's relying on a number of different comrades in that ecosystem to get the nitrogen from the organic form all the way to the plant form.

(Dana Hutchins, Segment Host) Manure is a source of all three of the main nutrients needed by crops, nitrogen, phosphorous, and potassium. It's no secret that farmers use animal waste to fertilize their fiends. Manure spreading is probably the most recognizable smell in rural Maine. Yet as familiar as the practice of manure spreading is, it's not always done well. Nutrients in manure are often wasted due to poor storage and improper spreading by farmers.

(Tom Settle mire, Sheep Farmer) You can't put it on sloped land, you don't want to put it close to waterways. You have to put it on in amounts that don't over-saturate the nutrient needs of the soil. All of those things have to be understood and you have to do it by doing some testing of the soil, understanding the slope of the land, and all of those go together to mean how much manure you need to put and where.

(Dana Hutchins, Segment Host) Now farmers are finding ways to better utilize the nutrients contained in manure. Tom Settle mire teaches Biology at Bowdoin College. He also raises sheep in Brunswick. Settle mire was one of the first farmers in Maine to use what is called intensive grazing. He keeps his sheep in small pastures.

(Tom Settle mire, Bowdoin College Biology Professor) So you have a series of paddocks, as many as 20 or 30 around your farm that the animals move on. And the idea is that the forage that they are on at that time is as high a nutritional quality as you can possibly provide them with, so that you are using forages to maintain and to provide the energy and protein that they need for their growth, for producing milk, for producing wool.

(Dana Hutchins, Segment Host) Settle mire relies heavily on portable and electric fencing.

(Tom Settle mire, Bowdoin College Biology Professor) Everybody knows how to graze grass. They know how to raise ... how to test the soils and to make that part work. But it's the management part and implementing that process I think that's made our particular system here rather unique.

(Dana Hutchins, Segment Host) In Monmouth, Russ Suchar's dairy cows are on the move too in the growing season. From late spring to early fall Suchar's 70 cows rotate through 15 paddocks or pastures, all about an acre in size. Every day the cows are moved to the next paddock. By the time they return to the first paddock, the grass has grown up again. This new growth grass is healthier because it's higher in protein than typical forage. The pastures also stay in better shape and the grass grows better because it's not trampled as much.

(Russ Suchar, Dairy Farmer) That's the beauty of it right there. That's the best part of it. Mother Nature divined it just the way it's supposed to be operated and, for many years, we haven't been operating it like this, or taking care of it like this, and our recent discoveries that have come around, this is the best way to utilize or take care of or manage this efficient process.

(Dana Hutchins, Segment Host) Suchar also thinks his cows are healthier, because there are fewer parasites for them to eat when they spend less time in each grazing area.

(Russ Suchar, Dairy Farmer) Well, we have flatworms and tapeworms here in the state of Maine and they go in, the cows actually eat these off the plants and it goes into the stomach where they grow. This is a natural place for the adult which lays eggs in the manure. The cows deposit the manure out in pasture and if they stay there these eggs will develop into larvae and the cows will eat the larvae again. And, complete the parasite cycle.

(Dana Hutchins, Segment Host) Since graduating from the University of Maine five years ago, Suchar has done his own research on intensive grazing. More than once, he was told that he couldn't depend on his pastures to

feed his cows. But it's been working well for him the past two summers.

(Russ Suchar, Dairy Farmer) Most dairy farmers see a big flush in the springtime of a large increase in milk production, early in the springtime when cows are first going out to green grass. But, I, on the other hand, see a large increase of milk production through the entire growing season because I have cows going out to fresh paddock every day.

(Dana Hutchins, Segment Host) Intensive grazing is one of the best examples of sustainability in Maine, because we are well suited to grow forage. It seems like a rather simple idea. But, farmers apparently never thought to do it before because it takes more of their time, yet about 30 livestock farms from Freeport to Caribou are now using intensive grazing.

(Stewart Smith, Agricultural Economist, University of Maine) Farmers that are adopting those systems are getting into dairying without the heavy overhead. They are farmers that like to work with their animals and not necessarily equipment and they are farmers who like to spend some time with their family rather than out driving tractors most of the night.

(Dana Hutchins, Segment Host) Sustainable agriculture also is reviving some farming methods we once used in Maine.

(Music)

(Dana Hutchins, Segment Host) A handful of farmers are moving away from specialization and in Maine we're seeing combined potato and dairy farms. Two different farmers get together to make one business. John Dorman and Robert Fogler of Exeter decided to join their farm operations when Dorman noticed his land wasn't getting the yield he wanted. And Fogler was looking for more land to use his manure on.

(Bob Fogler, Dairy Farmer) We used to be competing for a lot of the same land that we rent, because we needed land, John needed land, so there might be a section of land come to rent and I'd be trying to get it and John would be trying to get it. So, by working together, that's made more land available to us that way.

(Dana Hutchins, Segment Host) They've been sharing resources such as land and equipment for seven years now.

(John Dorman, Potato Farmer) We lost a truck in the fall when we were trying to harvest there and Bob was through with his corn so it brought, freed a truck up with him, so we just dumped the potato body. Bob was up on the prairie, up above Brownville, hauling potatoes to Milo there in October this year. You know, it's things like that have really been a real benefit to us in our operation.

(Dana Hutchins, Segment Host) Dorman and Fogler get more out of their farmlands by using manure and by rotating their fields between potatoes and forage.

(Bob Fogler, Dairy Farmer) It's a challenge, you know. There's a lot of people that say you can't make a living in the dairy business and you can't make a living in the potato business, and I get up every day to prove to people that you can make a darn good living in the dairy business if you're willing to change and willing to look at different ways of doing things and do it.

(Dana Hutchins, Segment Host) It wasn't environmental idealism that brought these two farmers together. It was economic necessity. And, as it turns out, better cooperation between neighbors, cutting expenses and increasing productivity can be, in the long run, more sustainable.

Music

(Christine Young, Program Host) All over Maine, more mainstream farmers and suburban gardeners are trying to be more environmentally responsible. But much of what we now call sustainable agriculture is not all that new. There is a large group of farmers in Maine that has been advocating for the return to the old ways of farming for quite some time now. Maine has been the home to some of the most well-known homesteaders and organic farmers in the country. And, while the number of farms in Maine keeps decreasing, the number of farmers using organic methods is on the rise, as we will see in this report by Kate Arno.

(Kate Arno, Segment Host) To organic farmers like Will Bonsall, the term sustainable has become a bit too trendy.

(Will Bonsall, Homesteader) It's a very trendy, a very fashionable word and it often includes practices and ideas that, to me, don't seem to fit the basic criterion of sustainability but, in the last analysis, any time you are bringing in a nonrenewable resource, at any level, and to any extent, you're not talking about sustainability.

(Kate Arno, Segment Host) Will Bonsall and Molly Thorkildson have homesteaded these 85 acres on the outskirts of Farmington since 1970. They feed themselves and their two adopted children on what they grow in their gardens, which are no more than an acre in size.

Maine has been and still is home for a number of internationally known organic farmers. Bonsall and Thorkildson are the most recent homesteaders. Before them, there were two of New England's most revered back-to-the-land pioneers, Scott and Helen Nearing.

After homesteading in Vermont for about 20 years, the Nearings settled on the Maine coast in the early 1950's.

(Helen Nearing, Homesteader) So, we'll make beds, take care of all those birches, all the brush, and start anew on a garden. And that's nothing strange, because when we left Vermont we left beautiful gardens. I think better gardens than we had here perhaps. More extensive. And we started all over again up there. We'll start all over again here. Maybe that will be enough for this life. I don't know.

(Kate Arno, Segment Host) For the next 45 years, the Nearings' farm in Harborside was a mecca for organic farming. All except for grains, the Nearings could grow enough food to feed six people year round on less than one-third of an acre. The Nearings became experts in renewing depleted soils with compost and soil testing. They were fond of saying soils could be built and rebuilt with the same accuracy that metals could be alloyed.

(Scott Nearing, Homesteader) This isn't random. This all has to be planned and thought out, and each shovel full and each wheelbarrow full has to follow an ordinary line of, what shall we call it, scientific procedure from swamp and wilderness into pond, garden and other amenities of modern homestead living.

(Kate Arno, Segment Host) It was the Nearings who wrote the book and, in their case, more than 50 books on how to live a subsistence lifestyle in the 20th century. Their books included best selling How To manuals on how to grow as much food as local soil and climactic conditions would permit. And how to barter for goods they couldn't produce themselves. The Nearings also had lots of practical advice to share on four-season gardening, when there is only 85 days for frost-free growing.

Scott Nearing lived to be 100 years old. Helen died in 1995, at the age of 91.

Maine also was where you will find one of the country's most famous organic gardeners, Cable TV host Eliot

Coleman.

(Eliot Coleman, Organic Gardener) When I read the Nearings' book, the value it had for me was that it opened my eyes to the fact that there is such a thing as small farming existing. I was, I sort of refer to myself as a semi-pro adventurer. I was a rock climber, white water climber, mountaineer, and it sounded like the greatest adventure I had ever heard of, that one could actually investigate the possibilities of what the natural world would do and farm that way, rather than sort of going with the formulaic approach, where you just buy whatever they're offering you in the store in order to make things produce.

(Kate Arno, Segment Host) Coleman remembers everything he started doing on his farm in 1965 was considered unthinkable by most farmers.

(Eliot Coleman, Organic Gardener) And so I bought phosphate rock and I got lime to raise the pH, and there was a horse farm nearby that had a huge pile of rotted horse manure that they were willing to deliver for free to get rid of it, and I spread plenty of that on. The most amusing part of it was that the neighbors came over to see what this new kid was doing and to offer him help. And they found out that the new kid was doing better than they were.

(Kate Arno, Segment Host) Many followers came to Maine to learn from these masters. Today, conventional farmers who want to be more sustainable don't have an organization of their own, but organic farmers have their own advocacy group, the Maine Organic Farmers and Gardeners Association, or MOFGA. Maine was one of the first states in the country to have such an advocacy group and it is still, today, one of the most active in the United States.

(Russ Libby, MOFGA President) I think MOFGA's reputation has improved a lot from the early years when all the members were seen as hippie, back-to-the-landers. Now we're a part of agricultural mainstream in many ways. I think organic farmers have been able to develop a reputation for producing quality product and for kind of a return to a more traditional agriculture, in the sense of hard work and respect for the farms that they're working on, and a willingness to work with their neighbors, which is harking back into all the traditions that Maine agriculture has been built on over the years.

(Kate Arno, Segment Host) Russ Libby runs MOFGA now, but he directed marketing at the State Department of Agriculture. He knows there are still deep divisions between conventional and organic farmers in Maine.

(Russ Libby, MOFGA President) For people who have been trained or worked in the system like that for many years, it's threatening to think of doing something entirely different. And, to be honest, at times there are fundamental differences of opinion about whether we should be moving in certain directions.

(Kate Arno, Segment Host) But Libby and others think that lines between conventional and organic farming are blurring.

(Eric Sideman, MOFGA Technical Consultant) And what we've seen in conventional agriculture is the great development in the past couple of decades of integrated pest management called IPM, where they don't use pesticides unless it's actually called for. They monitor pests and when certain thresholds are reached, then they will come in with a pesticide.

(Kate Arno, Segment Host) For its own members, MOFGA has an apprentice program so those who would like to farm can learn organic techniques.

(Russ Libby, MOFGA President) The apprenticeship program provides a really important match for farmers and

people who want to be farmers.

(Kate Arno, Segment Host) About 85 Maine farms are certified as organic by MOFGA. As many as 500 farms across the state use at least some organic practices. To be certified, farms are checked each year by MOFGA inspectors. The farm cannot have used any chemical or synthetic pesticides for at least three years.

(Eric Sideman, MOFGA Technical Consultant) Once a grower is in the program and has been certified, the standards that they have to follow are quite detailed. Our standards are about 20 pages long and they include practices for controlling pests and weeds without using chemicals, and trying to recycle nutrients from the farm rather than going to outside sources.

(Kate Arno, Segment Host) Jean English oversees her own small organic farm in Lincolnville. It has Christmas trees, a family garden, and a bayberry nursery. She also writes gardening columns for local newspapers and edits the MOFGA newsletter.

(Jean English, Organic Gardener) It seems that since we've been here, we can really remark one thing has led to another. Get to talk to a lot of growers. I call them on the phone, go to the farmer-to-farmer conference, things like that. So, I'm learning all the time and then I apply those principles to my farming and gardening and then I can write about them. One thing plays off another.

(Kate Arno, Segment Host) Perhaps it is because of her Ph.D. in plants and soil sciences that English was led to organic farming.

(Man) I think I'm going to take this.

(Kate Arno, Segment Host) But, English would be the first to admit there is so much more to learn about organic farming.

(Jean English, Organic Farmer) There is a lot to learn about organic farming. It's more difficult, I think, to farm organically successfully than to farm conventionally successfully. For example, to know the proper rates of manure application. That's important. Anything more than one-half a cubic yard per thousand square feet of fresh manure can contaminate ground water.

(Kate Arno, Segment Host) Many of Maine's small blueberry growers are also going organic. Gretchen Gaffney harvests organic berries from 50 acres of fields in Stockton Springs. Gaffney knows that more consumers are demanding the option of organic produce. But the demand within Maine is still too small to get into it full time.

(Gretchen Gaffney, Blueberry Grower) If growers such as myself could get together and develop our own cooperative so we can expand our markets here in Maine, we would be able to share information about what works and what doesn't work.

(Kate Arno, Segment Host) Food with pesticide residues are troublesome to many Maine consumers and that's another reason why organic produce sells well here. During the summer and fall it's easy to find all kinds of produce that is pesticide free. Early this summer morning, Paul and Karen Volckhausen are harvesting and cleaning vegetables to sell at the Ellsworth Farmers' Market. Beside the Farmers' Market, they also sell wholesale to restaurants and stores in Hancock County.

(Paul Volckhausen, Organic Farmer) I find it my most satisfying market, because of the direct contact you have with the people who are using the products you sell. They can understand that you are having a dry summer and things aren't as big as they usually are. It's just a real satisfying relationship.

(Kate Arno, Segment Host) At Willow Pond Farm in Sabattus, there's another way for organic growers to supply eager customers. This is the state's first and largest community supported agriculture project, where consumers pay in advance for a portion of the year's organic vegetable production. This means fewer worries for Jill Agnew, who owns and operates the farm.

(Jill Agnew, Organic Farmer) Well, I guess the biggest advantage is that we have such direct interaction with our shareholders, and they get fresh organic produce within hours of when it is picked and 35 different varieties of vegetables which they might not ordinarily be able to get anywhere else organic. But it's even more than vegetables, it's interaction with the people and that they can come to the farm and they can have a picnic and experience farm life at the same time and really be connected to where their food's coming from, which I think now a lot of people feel is more important than maybe before.

(Kate Arno, Segment Host) But it's not easy to farm organically. Apple growers know that as well as anyone. To ward off bugs and disease, more chemicals are sprayed per acre on apples than any other crop grown in Maine. But there are ways to avoid fungicides and insecticides, even for this pest-prone crop. Steve Page and Cynthia Anthony are the experts in growing handsome organic apples. At Bear Well Orchard in Searsmont, Page and Anthony grow 20 varieties of apples.

(Cynthia Anthony, Organic Apple Grower) Steve and I have done a lot of grafting here. The primary reason is economics. We find that we can purchase root stock and put the variety that we select on it. Right here at the kitchen table, and we're also able to choose varieties of interest to us. Some of the older varieties are fun to see what they taste like and how they perform in our climate.

(Kate Arno, Segment Host) Fancy apples get shipped to cooperatives in Boston and locally. Utility apples are squeezed into cider.

(Cynthia Anthony, Organic Apple Grower) I would say that using all the apples is important economically to any orchard. And, there are always apples that can't be sold to fresh market because they are blemished and, so, to put them into cider is the best way to utilize them.

(Kate Arno, Segment Host) Anthony and Page have 600 apple trees growing on their one acre orchard. They use dwarf root stocks for their apple trees, which are all wired up to trellises.

(Steve Page, Organic Apple Grower) We do grow the trees on trellises. Several reasons for that. One is that the dwarf trees need the support. They're not free standing. The other reason we grow them on trellises and orient the rows north to south is that it increases the fruit quality by exposing both sides of the trees to the sun, the morning sun and the afternoon sun. The apples have more sugar content and the other benefit is you reduce the possibility of fungus diseases, such as scab, powdery mildew, sooty blotch, these fungus diseases which can be a real problem in organic orchards.

(Kate Arno, Segment Host) Page also has spent a lot of time testing his soils and the tissues of his trees.

(Steve Page, Organic Apple Grower) These are analyses that have been sent to us from the State. We send the leaves into them; they determine what elements are in them. They test for things like magnesium, boron, copper, zinc, manganese, some of these trace elements which are like vitamins to the trees. They're essential for the plant growth, they're essential for photosynthesis.

(Kate Arno, Segment Host) Also in his arsenal for insects are only organic pesticides. But not just any organic insecticide. Page and Anthony use Ryania which kills only one type of insect, the codling moth.

(Steve Page, Organic Apple Grower) We're confident now that we have a sustainable and profitable way of growing these apple trees, that we can expand and grow more trees and have it be even more profitable. It takes a lot of work, it takes work in the layout of the system, planting of the trees, choosing the right varieties to grow. Then there is maintaining the soil fertility, maintaining disease control, weed control, pest control. There's a lot of work to it.

(Kate Arno, Segment Host) For those farming just for their own consumption, the homesteaders, there's an interest in the ultimate sustainability. Will Bonsall and Molly Thorkildson think they're just about as close as anyone else to finding it.

Although they still use some petrochemicals, for a woodchipper, rototiller and chainsaw, everything else they use and eat is produced on the farm. And you won't find any animals here. Will and his family are total vegetarians.

(Will Bonsall, Homesteader) If we were to use an acre or give an acre of hay field to produce milk or meat or manure in the form of a cow, we won't be able to feed, to sustain so many people, x number of people from that acre. If we were to bypass that cow, shorten that circuit, and go directly to a system where we, instead, raise soy beans instead of feeding the soybeans to the cow, and getting meat and milk and leather, then we will be able to have a lot more people having a very comfortable standard of living on that same acre of land.

(Kate Arno, Segment Host) So if Bonsall and Thorkildson don't have animal manure at their disposal, how do they fertilize their soils? A few years ago, Bonsall remembered something from high school biology. Plants can produce fertilizer. He grows crops to add nitrogen to his soils, so-called green manure, and he also adds plants to his compost to make an animal-free manure.

(Will Bonsall, Homesteader) Not a cow pie in the whole pile. We don't bring stuff in from off the farm. We don't buy lime, we don't buy soppomag, we don't buy animal manure from elsewhere, and so it's very important to us that we make a lot of compost and that we make it right.

(Kate Arno, Segment Host) Think of it as a huge tossed salad. It may never end up in one of your favorite restaurants, but for the plants that use the nutrients, it's a gourmet's delight. But Bonsall took that a step further, and may have discovered what he calls the true free lunch.

(Will Bonsall, Homesteader) Here we've got trees, hardwood trees, a thriving forest, which is producing a huge amount of biomass every year. Not grass, but biomass, organic matter in the form of detritus, twigs, leaves and so on. Every single year without any inputs at all, those trees are going down many, many feet deep into the ground to bring up what otherwise wouldn't be available to the system at all, and so those components, the leaves and the woody matter from the forest are actually a much more sustainable, much more efficient source of nutrients than the cow manure or even the grass.

(Kate Arno, Segment Host) All those wood chops and leaves he had at his disposal lacked one key ingredient for food crops, nitrogen. So, Bonsall came up with the idea of still using the woody material as fertilizer but on his clover fields, which are nitrogen rich.

(Will Bonsall, Homesteader) By putting a lot of humus in the soil and breaking up the soil, then they help the clover plant to more efficiently extract nitrogen from the air and so what we're basically doing is taking the wood chips which we have too much of... swapping them for nitrogen from the air.

(Kate Arno, Segment Host) This pioneer will continue experimenting with ways to sustain him and his family.

(Will Bonsall, Homesteader) Basically we hope that the sustainable organic farm in the future will be a lot less ... have a lot less drudgery in it and be a lot more efficient of the power that runs it than we are now and I hope that's the picture of tomorrow.

(Music)

(Kate Arno, Segment Host) Organic farming has come a long way in Maine over the last 30 years. Organic produce is in higher demand because consumers are looking for healthy food. In Maine, a group of organic entrepreneurs has cropped up to supply farmers' markets and food cooperatives. And farmers here are also testing glossier packaging for Maine-grown products. And, at the same time, genetic engineering has as strong a presence as ever in Maine. Diane George-Chapin brings us up to date on what's the latest for farms, in marketing and in the laboratory.

(Music)

(Diana George-Chapin, Segment Host) You won't see many potato farmers in Aroostook County still burning the tops of their plants with propane torches like this one, but former homesteader, now organic entrepreneur, Jim Gerritsen, prefers this kind of burning to the kind potato farmers get when they use chemical herbicides. He is also experimenting with unusual compost mixes to nix potato blight. His brews have included liquid copper, liquid seaweed, compost tea and vitamin C.

(Jim Gerritsen, Potato Farmer) To keep the health of the potato tiptop we use a compost tea. We fill burlap bags with well-made compost so that it's kind of like a teabag, which is where they got the name compost tea, and then let that steep for two or three weeks and then pump that into the sprayer and then use the sprayer to spray it onto the foliage.

(Diana George-Chapin, Segment Host) Between potato crops, Jim and Megan Gerritsen grow grain and clover. To improve their soil, they truck in manure, fish scales and sawdust. The Gerritsen family runs a specialty potato business called Wood Prairie Farm here in Bridgewater.

(Megan Gerritsen, Potato Farmer) It's a big country and there is a certain segment that really wants a high quality, reliable product with very, very good taste, and that's what we supply.

(Diana George-Chapin, Segment Host) The Gerritsens market premium certified organic potatoes, some to high end retailers in New York City.

(Megan Gerritsen, Potato Farmer) We do have a small wholesale business to some larger cities and we sell to the white tablecloth restaurants through a wholesaler and that's what they want they want the very smallest potatoes.

(Diana George-Chapin, Segment Host) But most of their potatoes sell by mail order. Their catalogue is polished but homey, with antique line drawings, full color photos of the farm, and well over a dozen potato varieties.

(Megan Gerritsen, Potato Farmer) This is our Sampler of the Month Club and people are really happy with it because they just want some variety, they want good taste, and they like to have their potatoes clean and perfect.

(Diana George-Chapin, Segment Host) The Gerritsens take pride in how they pack their potatoes. They are all the same size, give or take a half an inch, and dirt has been nylon brushed off instead of washed off.

(Jim Gerritsen, Potato Farmer) We're marketing by varieties and we're highlighting the details that are intrinsic with the varieties, some that have red skin or yellow flesh or purple flesh, or fingerling, long skin-ny shape and different taste, different textures, and it's those kind of differences that people seem to find interesting and want to explore.

(Diana George-Chapin, Segment Host) The Maine Potato Commission in recent years has been promoting new ways to package the Maine potato, which isn't as famous as the Idaho spud.

(Potato advertisement) Bake me, Oh, treat me. I'm a yummy, Maine round white.

(Diana George-Chapin, Segment Host) The potato board is testing 7-pound boxes--not bags--of potatoes in Massachusetts, Pennsylvania and New York. The boxes come with glossy pictures and recipes for baking or frying.

(John Logan, Maine Potato Board) We feel that we're in competition with everything else that's in the produce counter. We're in competition with very nice, shiny, waxed apples and oranges and other kinds of very colorful products, so we need a very colorful container to put things in, and an interesting container, that means both convenience and quality to the cus---tomer.

(Diana George-Chapin, Segment Host) The Board also has high hopes for a plastic sleeve that holds four baking potatoes just the right size for a small family diner.

(John Logan, Maine Potato Board) Average time spent in the grocery store now is about 15 minutes. And, so we want to make things as convenient for people as possible. With an industry the size of ours compared to what we're competing against and with the economy the way it is, we can't afford to pass up any niche market that looks like a potential sale of any volume of potatoes.

(Diana George-Chapin, Segment Host) Another innovative idea in the works is for a new potato processing plant in Mars Hill that will also take the best, unblemished potatoes for bagging. The culls will be peeled and diced so that defects are less noticeable and divvied up into meal-sized packages. The processing plant will be owned and operated by fou-rth generation Maine potato farmer, Rod McCrum.

(Rod McCrum, Northland Packers & Growers) We have studied this and looked at some of these potatoes, and like this one here just has a small nick on it and we feel that if you just take that, you cut that away and it's a relatively real nice potato. So, as we looked at this and studied it in our company we decided that the average consumer is busy today, their families are busy, and its up to us to peel that potato for them. We're not the first ones to do it. the Europeans have been doing this for 10 or 15 years. So we went there, we visited their facilities, we went to their stor-es and we studied what and tried to learn from them.

(Diana George-Chapin, Segment Host) Russ Libby used to coordinate marketing for the State Department of Agriculture. He's happy with the advances Maine farmers are making in marketing organic and non-organic products.

(Russ Libby, MOFGA President) In general, I think Maine farmers are doing a bett-er job of marketing their products than they were 20 years ago and, in some ways it's been forced on them. The years when the producer had a market that had no competition has kind of gone away. I think the best place for Maine farmers to do their marketing is right close to home, that is, I think the most of us are not at a scale where we can really talk about the export ma-rkets. We're people who are going to have market to our friends and neighbors and build our markets from our home base outward.

(Diana George-Chapin, Segment Host) Maine farmers still look to future scientific advances to help make their

work more sustainable. One of the latest developments in genetic engineering could help farmers stave off the Colorado potato beetle. Monsanto Corporation scientists have come up with a combined pesticide and potato. Monsanto's new leaf potato was created by gene splicing from bacteria that produce a natural pesticide. This new gene allows the potato to produce the toxin.

(Jennifer Feldman, Monsanto/New Leaf Manager) New leaf potatoes contain a gene for a protein that was derived from a bacterium that exists in nature. The plants manufacture this protein and when the insect feeds on the plant, it disrupts their digestion and eventually die, so that the plants are completely protected from the Colorado potato beetle all seasons long.

(Diane George-Chapin, Segment Host) The pesticide in a potato isn't harmful to small animals or humans, says the Environmental Protection Agency and consumers will not be able to taste the pesticide in the new potatoes.

(Jennifer Feldman, Monsanto/New Leaf Manager) The new leaf potato has been studied very, very extensively. We think it's probably the most studied potato ever produced. It was very thoroughly reviewed by three Federal Regulatory Agencies, the Food and Drug Administration, the US Department of Agriculture, and the Environmental Protection Agency.

(Diane George-Chapin, Segment Host) Monsanto's potato is now being field tested in Maine. Neil Crane of East Exeter planted a small area with Nature Mark last summer and was pleased with the results.

(Neil Crane, Potato Farmer) The results were astounding. If you haven't seen Colorado potato beetles, there's two states. There's the hard shell, which is the first beetles that fly in, and then they lay eggs on the plant. There can be hundreds of eggs from one beetle and those hatch into what is soft shells, and those are the ones that really do the damage. They don't have wings, they can't fly, they just stay there and eat. And, so you can have a section of plants that are just completely defoliated. And on the New Leaf product, in that section of the trial, you didn't see any damage from the beetles.

(Diane George-Chapin, Segment Host) But as with other types of bioengineering, there are those who dispute Monsanto's claims that it has discovered the panacea for the dreaded potato beetle. Stewart Smith of the University of Maine is afraid the Nature Mark potato will not be as successful as farmers hope it to be.

(Stewart Smith, University of Maine Agricultural Economist) The problem with genetically engineering toxins into plant materials is this-that toxin is always there when the plant is there. If all plants have a toxin engineered into them, then as insects develop that immunity, which they inevitably will, then that whole plant loses its value.

(Diane George-Chapin, Segment Host) Monsanto, however, thinks farmers are eager to try whatever looks promising.

(Jennifer Feldman, Monsanto/New Leaf Potato Manager) The potato industry is very anxious to have this technology and this specific product, the New Leaf potato. They see it as a way that they can reduce their insecticide inputs and manage their insect pests without chemicals and that's a very large benefit to them.

(Diane George-Chapin, Segment Host) Genetic research has already greatly increased the productivity of plants and animals in agriculture. Conventional plant breeding research such as hybridization has produced many crop cultivars that are naturally resistant to various diseases and insects.

(Jennifer Feldman, Monsanto/New Leaf Manager) Conventional breeding takes pollen from one plant and crosses it with another and you generally get a lot of traits, you may get the desired trait, but you also get a lot of other characteristics that may be undesirable from a production standpoint and there's a lot of crossbreeding and

backcrossing to remove some of those undesirable characteristics. Using the techniques of plant biotechnology, you can add a gene for a single trait and that's the only thing that is introduced into the plant, so it's a much more precise and specific form of improvement.

(Diana George-Chapin, Segment Host) US agriculture has always taken pride in its ability to apply science and technology to solve the everyday problems of farmers. Many states, Maine included, have had to cut back on people who can bridge the gap between the advances in the lab and the practical applications on the farm.

(Stewart Smith, Agricultural Economist, University of Maine) If the public sector does not assume its share of the responsibility, that means more and more research and the extension of that research information to the farmer is going to be done with the private sector and that's going to be done with firms that have something to sell. What I think we need to get to, and in some cases it's back to, is actually doing more research with farmers on their farms. Because, one of the things we should be testing is not just how a single input affects the system but we need to be looking at the total system.

(Diana George-Chapin, Segment Host) There's another kind of research that's been given very little attention until now. Only recently have researchers placed a high priority on reducing the use of agricultural chemicals, particularly those that threatened human health and the environment. It is generally acknowledged that there is not enough scientific information of economic, environmental and social costs of farming. If Maine farming is to become more sustainable, people like Smith think there needs to be new priorities in research and development.

(Stewart Smith, Agricultural Economist, University of Maine) I'm concerned because there is an alternative way to approach pest management. And that is with systems that rely more on a balanced ecosystem where you keep a lot of insect, a lot of pest populations, but you don't let any of them get built up to the extent that they can do economic damage. But generally no, we don't have a lot of information about how effective and efficient these integrated systems might be, because we don't have a whole lot of them out there working.

(Diana George-Chapin, Segment Host) Smith would like to see more research on plant predators and prey, better plant nutrition and other means of making sustainable agriculture more feasible and profitable for Maine farmers.

More and more Mainers are looking at their communities as another way of keeping farming sustainable. The thinking is the agricultural lifestyle will thrive if farming communities are sustainable.

In several places around Maine, communities like Limestone are planning how they want to develop. Limestone is trying to survive the loss of the huge Loring Air Force Base and more than three-quarters of its population. Particularly with agriculture, it sometimes takes more than one community to plan. In the case of Limestone, they came up with a list of long-term goals several years ago, and decided which ones would be done first. Limestone is now getting to some of the agricultural ideas on the list of goals, which will involve surrounding towns. Limestone decided they needed secondary crops to rotate with potatoes, to rebuild their soils. Broccoli is working well, and so is flax, which recently was judged among the highest quality in world.

(Greg Ward, Limestone Planning Board) When Loring closed, we were working on the flax project then. I said here's a beautiful opportunity. I mean they've got all kinds of facilities, a place to store the flax. One of the things is you have to put this stuff under cover once it's rolled into bales. And I said there's all kinds of storage and basically we've got the stuff stored on Loring at little or no cost.

(Diana George-Chapin, Segment Host) The next step would be processing the flax. Limestone wants to encourage a flax mill to set up shop in the area. And the town has decided to encourage more potato processing, using the Mars Hills plant as an example. Some would say good marketing can help profits, but not always increase sus-

tainability. Yet, what we see happening in the Limestone area where science is combined with good sense is a prime example of what's taking place all over Maine to bolster one of our most traditional ways of life.

(Christine Young, Program Host) As you see, sustainable agriculture can mean many, many different things to Mainers. But it's clear that every farmer in the state is working to become more sustainable. Because, in the farmer's mind, being sustainable, no matter what your definition, is better than the status quo, and it may be the best way for surviving these hard times.

Next time on Quest, we'll see how Maine hopes to become a hot bed of biotechnology. Until then, I'm Christine Young. Thanks so much for joining us.