

Show Transcript
Deconstructing Dinner
Kootenay Co-op Radio CJLY
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Title: Exploring Ethnobiology IV (The Immaterial Components of Food Sovereignty / Comparing 17th/18th Century Cereal Grain Productivity Among Iroquois and Europeans)

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Jon Steinman: And welcome to Deconstructing Dinner, produced in Nelson, British Columbia at Kootenay Co-op Radio CJLY. I'm Jon Steinman.

Once again here on the show we'll visit with a new series that we've been airing since June of this year – Exploring Ethnobiology. Through a scientific lens, ethnobiology examines the relationships between humans and their surrounding plants, animals and ecosystems. And so with seemingly more and more people becoming interested in developing *closer* relationships *with* our surroundings (our food, the earth), there's much we can all learn *from* ethnobiologists and in particular from the symbiotic human-earth relationships that so many peoples around the world have long maintained.

Food sovereignty is also a subject that permeates much of what we air here on the show, and similarly permeates much dialogue among ethnobiologists. At the 2010 International Congress of Ethnobiology held in Tofino, BC, a group of ethnobiologists gathered to discuss food sovereignty and in particular, the immaterial or intangible components of food sovereignty. We'll listen in on some of that discussion today in the first half of the show, and in the second half, we listen to Associate Professor at Cornell University's Department of Horticulture Jane Mt. Pleasant whose research has involved a fascinating comparative look into 17th and 18th century cereal grain farming among the Iroquois people of what is now Upstate New York and early European colonizers. Her research paints a telling picture of just how much of our western food system is built upon a propensity to maintain the status quo instead adapting to our surroundings and working in closer relationship with the land on which we grow our food.

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JS: While food sovereignty is a theme underlying much of what is discussed here on Deconstructing Dinner, it's been a while since we've specifically examined just what food sovereignty is.

The Nyéléni Declaration has become the most referred to explanation of what food sovereignty should mean. It was defined in 2007 at the Nyéléni Forum for Food

Sovereignty in Sélingué Mali and named after a legendary Malian peasant woman who farmed and fed her people well. Gathering at the forum were peasant farmers, herders, fishworkers, indigenous peoples, migrant workers, women and young people. The forum recognized the participant's heritage as food producers as being critical to the future of humanity and especially so in the case of women and indigenous peoples who are historical creators of knowledge about food and agriculture, and are undervalued. The forum further recognized that this heritage and all of our capacities to produce healthy, good, and abundant food are being threatened and undermined by neoliberalism and global capitalism. With the principles of food sovereignty guiding our relationship to food and food policies, it's believed that we can find the power to preserve, recover, and build on our food producing knowledge and capacity.

Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods. It defends the interests and inclusion of the next generation. It offers a strategy to resist and dismantle the current corporate trade and food regime, and directions for food, farming, pastoral and fisheries systems determined by local producers and users. Food sovereignty promotes transparent trade that guarantees fair incomes to all peoples as well as the rights of consumers to control their food and nutrition. It ensures that the rights to use and manage lands, territories, waters, seeds, livestock, and biodiversity are in the hands of those of us who produce food.

The full Nyéléni Declaration is linked to from the Deconstructing Dinner website but it was the principles of food sovereignty that formed the foundation for a fascinating session held in May 2010 among ethnobiologists at the International Congress of Ethnobiology held this year in Tofino, British Columbia. While food sovereignty can often be defined quite tangibly through food, farming, hunting and gathering, systems of trade as examples, what can easily be overlooked are the *intangible* principles of food sovereignty – in other words, the ways in which maintaining food sovereignty contributes to the social, cultural and spiritual well-being of peoples around the world. By looking at food sovereignty through this lens, the importance of all people's interests to maintain and create the food systems that we *all* want to see is elevated substantially.

There were about 25-30 people participating in the session, and we'll have time to hear four of those participants – the first, Justin Nolan – an assistant professor in the department of anthropology at the J. William Fulbright College of Arts and Sciences at the University of Arkansas. Justin specializes in ethnobotany and the foodways among the Cherokee and Ozark peoples, and he shared the outcomes of his own research when he discovered that food sovereignty is intimately connected to language – the language of food and the preservation of language itself.

Justin Nolan: I'd like to share today with you guys a sort of embarrassing story, which is the result of having used conventional anthropology and a foodways study and Cherokee nation recently. But it was embarrassing in a good way because I realized that through humility and recognition of one's failures in the field, exciting, rewarding, and new discoveries I think can be found. I have been asked about two years ago to work with the

Cherokees in a way that would help them revive or maybe re-perpetuate their language. Right now in Oklahoma there are maybe 900 speakers left of the language and the number is dwindling. I was charged with the task of finding out what keeps the families, or what keeps the language, alive. Little did I know that by looking at this question and examining who speaks the language and using conventional field techniques, that I would be led to the study of foodways. But the two are connected, and I'll sort of conclude with that and I won't take up too much time. But the main thing I wanted to explain was that after about a year of having used conventional surveys and spending time with the elders and their community, and participant observation, and asking questions related to language use and context, it became very apparent that families who were raised in proximity to their maternal grandmothers were about twelve times more likely to acquire and speak the language than not. It turns out there's a strong matrilineal, social force that's at work in maintaining the integrity of the language. But in so doing I was led inevitably to the realm of cooking and food. So I began to understand and wonder, 'because it's a matrilineal society, to what extent can more be learned about language and foodways?' I spoke with the grandmothers. The grandmothers finally let me into their community centre and asked me to show them the results so that they could look it over and scrutinize all the charts and the fancy ethnoscientific graphs and so forth.

After long pauses and these sort of glances of discontent, I figured I really need to know how I can improve this or how I can make it right. So they said, "Get some poster board. Roll out a big piece of paper. We want to really show you the way that foods are understood and used and classified. So they drew a big big wheel and started with Mother January and progressed and proceeded through the cycle of the year. They said, "Although you've almost shown seasonality, you've failed to show how knowing the words for foods links directly into their location and to their habitat and to their use and so forth."

Although this had become sort of clear and this had begun to reveal itself, it was not clear at all until I realized that by learning the names for things like "fire on the water," which is watercress in February, which they placed on the northeast side of the quadrant. They said that in the northeast when you're looking for watercress, you're looking for fire on water. It's a green plant that's sort of herbaceous but it's a little bit like seaweed that grows on top of clear, moving streams. One of them said, "Well fire on water, it's green flames that grow and you can see it sparkling on the stream." And immediately another one said, "Well, that's not exactly true. It's really more of a spice on the stream." And so I thought, Green fire on water and spice on the stream. Then they both laughed and said both are true. There was sort of something sublime and revealing in the fact that in the name for things they become known, but then they become known *because* they are named.

It seems to me very relevant now that by understanding and taking a subtle approach to language analysis, and by using unconventional methods, and sometimes by throwing away what seemed to be safe, conventional, anthropological techniques, and just abandoning yourself to the forces around you, you learn things in strange and fascinating ways. We were able to complete a fairly comprehensive and exhaustive list of the types

of foods that were found. For example, in January you gather hickory nuts to make Kanuchi, which is later on delivered to neighbours as a sign of communion and commitment in February. In February we begin to look for other things like possum grapes and watercress. Then March and April roll around and you begin too look for other things like huckleberries and at that time you'll look for morels and mushrooms and all the 8 to 10 types of mushrooms that are edible. But it was never really apparent to me, for example, that wild rose, "the rabbit eats it," or that learning the word for fern, "the deer and the bear lay upon it," that you begin to develop more comprehensive and metaphoric understandings of foods and their role in sustaining Cherokee social life.

Later on at the end of our project, we had a big communal feast. Everyone in the community came out and I realized that it's not just through talking about food and participating in gathering that ultimately the preparation and sharing of it, that the social life is rendered especially meaningful. I was especially rewarded to have learned the art of humility in the field. Or not the art but at least just the embracing of what seemed to be on the spot alternative methods or unconventional methods, but in a way I think that may be more a testimony of my own ignorance. Learning how ignorant you are, for me at least, has become a passageway into perhaps new and more rewarding avenues of inquiry. There's no doubt that through food and through language at least, that new understandings of the cultural life and the texture and fabric of social life and how it's woven together through the social events such as foodways and food sharing.

JS: Justin Nolan of the University of Arkansas. Also sharing perspectives on the intangible components of food sovereignty as part of the session was Canadian Nancy Turner of the University of Victoria who we've heard from on a few occasions now as part of this Exploring Ethnobiology series here on Deconstructing Dinner. Nancy Turner uses the example of the sword fern in helping describe the important relationships between plants, food, and culture.

Nancy Turner: As I walked over here I started thinking about food sovereignty and what it means. I should probably introduce myself maybe. I have worked in British-Columbia and learned from elders and knowledge-holders for over 40 years in different parts of British-Columbia, but including here in Clayoquot Sound. What I've learned is pretty hard to describe, but it shows just the deep, rich, and complex connections that people have with their home places, and the knowledge that goes so deep; it's not divided up into little bits and pieces, but interconnected in so many ways.

I thought I would maybe share a little bit of that with you. This plant, I picked the oldest leaf because it's going to be dying back. You probably recognize it; it's that big clumping fern that is used quite a bit as landscaping around here. This is the sword fern, and one of the elders I've worked with a lot is John Thomas of the Ditidaht Nation, and he told me about this fern. They call it *pilapilaamat* in Ditidaht language. *Pila* means "one," and he told me one of the contests that especially young men would play in his childhood (he's passed away now) was that every boy was given one of these sword ferns and they had to take each leaflet and pull it off one at a time, saying "*pila*" with each in one breath to see how many they could take off in one breath. So "*pila*," "*pila*," "*pila*," "*pila*," "*pila*,"

“*pila*,” and so forth, all in one breath, and the one who could do the most was the winner of the contest. But there was more to it than just a contest because it was very important for young men to be able to hold their breath for a long time because they were the divers. They went to special places along the coast where there were beds where the kelp was very long. They had to dive down to cut the bottom of the kelp site. That was their fishing lines among other things. So they needed nice, long, strong ones and there were special places (it wasn't just any kelp any place), but special places where they went to get the very best ones.

And so they had to hold their breath for two or three minutes while they're diving down like that. Then they took those kelp lines and they had to cure them. It took sometimes a year, John said, to cure the kelp. They had to soak it in fresh water and stretch it and twist it, dry it out, and rub it with oil. Pretty soon it was totally impregnated with oil. And then when you use them, you have to soak them. You can tie them together using a fisherman's knot.

The other part of this story goes on and on. But if you go to the forest you get the tree knots from rotten logs. They are like daggers, and those are the wood that's very very strong and tough because if you think of the tree branch as being leveraged by the wind all the time, they are the last bit of solid wood that is left when a log has rotted.

And you take those, you get one about this long from the hemlock and you cut it, you split it lengthwise into three or four pieces and you shape each one, rounded on the top and flat on the bottom. Then you take the bulb of a kelp plant and you put a bit of water in the bottom and you put those long pieces in there and you plug them up with wood or moss and you bury it in the hot sand under a fire overnight. In the morning they're just flexible. Then you bend them according to a form to make the hooks that are used for catching cod and halibut. The kelp has all of that importance to it in fishing and in creating the fishing gear.

And the same young men who are trained to dive for the kelp are the same young men who are trained to dive down and tie the whale's mouth shut when they caught the whale. And you know the whale was killed with a long harpoon made of pieces of yew wood that are very carefully fit together. They also use a really complex harpoon head that's made with a giant mussel shell and with tree pitch from the forest, the Spruce pitch.

So all of these elements that seem to be disconnected in our food systems are really all tied together like *Hishuk ish Ts'awalk* ["everything is one"]. You can't separate the forest food from the ocean food; you can't separate the food from the materials that are used to harvest and to process the food. It's all interconnected in amazing ways that we never normally think about. That's just one small example of a small little bit of a much larger system of knowledge around food and this place. If we think about this place, and then think about the food systems in other communities up and down the coast, and other communities in the interior, other communities across North America, across the Americas, and all the other continents, the complexity and the richness of that is just overwhelming. Yet there are these forces in the world that are the industrialization,

commercialization, homogenization that's trying to I guess erode, corrode, what's the word, just eliminate all of that complexity and try to feed all of us cardboard in a bun. I'm getting carried away here, I better stop now.

JS: Nancy Turner speaking as part of a session titled the Immaterial Components of Food Sovereignty – held as part of the May 2010 International Congress of Ethnobiology hosted in Tofino, British Columbia.

If you miss any of the show today, it is archived at deconstructingdinner.ca and the October 28th 2010 broadcast.

A couple more voices to listen in on who shared their perspectives as part of that session including Lewis Williams of the Tsawout First Nation (one of five bands that make up the Saanich Nation and located north of Victoria, BC near the community of Saanichton). Lewis Williams is involved in Feasting for Change – a project that looks to preserve traditional indigenous foodways on Vancouver Island.

Lewis spoke of some of the threats to food harvesting practices among indigenous peoples and used the example of the reef nets once used by indigenous peoples of the Pacific Northwest to harvest salmon.

Lewis Williams: The reef net technology is our technology that we use to harvest our salmon. And it's a really excellent way to harvest a salmon because you can selectively harvest what you are going to actually be taking. The way the reef net is set up is actually for the salmon into thinking they are going into neoglass bed. It's a really massive net and the willow bark fibres is used to construct the reef net, and then dune grass is used to fool the salmon when you lay your trap in a cove. It's so massive that you can actually go in and selectively harvest the ones that you want. It's a sustainable method because it's not an enclosed trap. There's a whole at the end of that trap so that the salmon can go and continue the next generations. The reason that I was told that that was put there is that if you are smart enough to find that hole, you're smart enough to live. [audience laughter]

The reason why we're so sustainable in its ability to selectively harvest is that it actually gave us the opportunity to sit in the canoe and pick out the salmon that we were going to harvest, and then the ones that we didn't need to harvest we just let go again. Because with each school of salmon they are all individual families, and you never want to wipe out a whole family because you want that family to keep coming back to you.

JS: Lewis Williams described how that practice was intentionally destroyed by Europeans; yet today, is now used by European descendants.

LW: It was actually outlawed in, I don't know when, because of the European fisheries. *Hunitum* is Saanich's word for Europeans. And if you translate *Hunitum* into English it translates to "the people who appeared," because they just showed up on our beach one day. But it was outlawed by their fisheries because they thought we had an unfair advantage over the modern fisherman. Look at what's going on now. Just a lot of

devastation within a lot of the fish stocks, especially the salmon stocks for various reasons. But now actually there's a group just down in Washington that is using our technology as an environmentally sustainable way of harvesting salmon. If you take all of their technology that they are using now and overlay it on our technology, it is ours. They are borrowing it. I'll be polite when I say they're borrowing it. The only difference in those two technologies is the materials. They're using synthetic materials whereas we used organic materials.

JS: Lewis Williams speaking of the reef nets once used by indigenous peoples of the Pacific Northwest. And the last voice we'll hear from the session on the Immaterial Components of Food Sovereignty is that of Linda Different Cloud. Linda is an ethnobotanist and restoration ecologist of the standing rock Lakota nation in what is now North and South Dakota. Linda also teaches at Sitting Bull College and she shared another unique perspective on food sovereignty by suggesting that food sovereignty doesn't necessarily equal local food, but can also equal the cultural and social connections that all peoples share through the *trading* of food.

Linda Different Cloud: Hi, I'm Linda Different Cloud and I'm from the Standing Rock Lakota Nation and I just wanted to talk about something that could potentially be really interesting. It's sort of in the discussion phase right now. The story behind this is that I was talking to an elder one day, and we were pit-roasting bison, we were pit roasting a buffalo, and we put certain plants in there and things with it, and she said, "Do you know this just always tastes so much better when we pit roast it with seaweed." I looked at her and said, "Do you mean like the algae from the river?" She was like, "No stupid! I mean seaweed." She was kind of frustrated that I had questioned her. She was like, "I mean seaweed." I'm from the Dakotas right, the most landlocked place. I had to of course ask her about it. I said, "Well, where would we have gotten seaweed." And she said, "Think about all the things that we eat that are traditional foods," that even I know of, "that we don't actually produce or harvest: huckleberries, corn," which we would steal from the Mandan, but hey [audience laughter]. But she named off of this list five or six different things, even things...almost a palm that grows in the southern United States. She was like, "We, as indigenous people, have these extensive trade networks that supplemented our diet in really healthy and fun ways that also I think promoted peace. We had the talk about peace and sustainability the other day. I think it helped us to appreciate each other as people, and so I want to go to Terra Madre in Italy again this year because when I was there, there were people selling their wares. There were people from three different continents selling nettles, for the same purpose. I just think that it would be so interesting if we could renew these trade networks, and it would also promote sustainability within our tribes and within our groups and outside of that also, and give us a new appreciation.

The things that I'm hearing, we're talking about food sovereignty; I can't imagine anything more sovereign than building these networks back up. And even extending them now that we have access to people all over the world. There's so much focus on eating locally, which I think is fantastic and important, but I think there are also really sustainable ways to appreciate the food that other people have. I invite you all to have this discussion with each other and with me hopefully at some point about how we can

renew these trade networks. I would love to be pit-roasting bison with seaweed again. You know what I mean? That's just a thought.

JS: Linda Different Cloud of the Standing Rock Lakota Nation. Again, all those voices heard in the first half of the show today were recorded as part of a session titled, The Immaterial Components of Food Sovereignty, held as part of the 12th annual International Congress of Ethnobiology in Tofino, British Columbia. The session hosted perspectives on how the principles of food sovereignty – that is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods – goes beyond just the tangible outcomes of food and enters into the intangible realm of the cultural, social and spiritual relationships that all peoples can maintain through their food.

If you missed any of this first half of the show today, it is archived online at deconstructingdinner.ca and the October 28th 2010 broadcast.

soundbite

JS: This is Deconstructing Dinner – produced in Nelson, British Columbia at Kootenay Co-op Radio CJLY. I'm Jon Steinman. Today marks part 4 in our ongoing series Exploring Ethnobiology, which features recordings from my visits to two international gatherings of ethnobiologists held back in May of this year in Victoria and Tofino, BC. The field of ethnobiology brings together people from many disciplines, anthropology, ecology, botany, archaeology to name just a few, who are in some way examining the relationships between peoples, plants, animals, and ecosystems. It's a field that helps bridge the sometimes difficult to describe interconnectedness of peoples foodways and culture by looking at those relationships through a scientific lens. In what was one of the more *tangible* examples of this shared as part of those two conferences, Associate Professor Jane Mt. Pleasant of Cornell University's Department of Horticulture shared some fascinating research on indigenous cropping systems in what is now Upstate New York.

In the 17th and 18th Centuries, Iroquois farmers produced 3-5 times *more* grain per unit of land than their European counterparts. Her research is suggestive that the root of the many agricultural woes that plague North American farmers today might very well have been due to our inability then and *now* to adapt to our new surroundings. Instead of adapting, it appears that Europeans looked to *maintain* the same cultivation practices of the same foods, while on that same land Iroquois farmers were producing more food per acre using different foods and different practices. As Jane Mt. Pleasant described, while many scholars assume that the plow played a major role in advancing agriculture in Europe, the Iroquois have demonstrated that more stable agricultural systems can be achieved by *not* plowing. Here's Jane Mt. Pleasant speaking in May 2010 at the annual gathering of the Society of Ethnobiology held in Victoria, B.C.

Jane Mt. Pleasant: I have a great deal of interest in Iroquois agriculture particularly in maize. After having done quite a bit of both field research and other types of

investigations, I got very curious about how Iroquois agricultural production, particularly maize as a cereal grain, might have compared with European grain production at the same time. So I began looking at wheat yield or cereal grain yields of barley, wheat, rye, oats looked like in the 17th and 18th Centuries in Europe. And as you can see from this graph, yields were generally pretty low. In much of Europe they struggled even up until the end of the 18th Century to get above 10 to 15 bushels per acre of grain. It was only in the temperate North Sea and also South and Western Europe that they were able to get yields that approached 20 to 25 bushels per acre. Much of this data comes from Slicher Van Bath who is an agricultural historian. He took this yield data from all sorts of records beginning probably from about 600 A.D on. Manour records, monetary records, tax records, and so these are multiple types of data that were collected over long periods of time.

Also, I have particular wheat yields in England, Germany, France, and the Netherlands, again from 1600's through 1800, and you see once again these very low yields that farmers were getting at this time, with the exception of the Netherlands. At that time in the 1750's to 1800's there were several records of very substantial yields in this area, primarily because they were using compost and night soil and animal waste in an intensive management scheme.

Now switching from European grain cereal production to North American, your first question might be, What is the basis of that comparison? Well it turns out that actually the cereal grains in both places are produced in quite similar environments in terms of climate, and also in terms of soils. Iroquoia, in northeast New York are glaciated soils, tend to be alfisols and inceptisols. In Europe they tend to be alfisols, inceptisols, and mollisols. But very similar in terms of climatic conditions. Also, both the crops—maize in North America and wheat in Europe—are cereal grains. They're grasses and relatively similar in terms of food value.

So I've been very interested for a long time in how we might get a handle on grain yields, maize yields in Iroquoia. Some of our best evidence comes from documents by European observers. I have just two examples here. The first is Denanville who was a Frenchman in Montreal. In 1687 he came down into Iroquoia around present-day Rochester, New York. He was on a mission to wipe out as many Iroquoian, and particularly Seneca villages as he could and to destroy their agriculture because the Seneca and the Onondagas, both Iroquoian nations part of the Confederacy, were allied with Great Britain at that time, and they were supporting Great Britain with corn, with maize. Of course France and Great Britain were in a contest for who was going to control North America. Denanville came down in a period of about nine days he reported that he destroyed more than 1.1 million bushel of corn grain. This was both stored grain and grain that was standing in the field. He was there in about July. He quoted at one point, he said, "The quantity of corn which we found in store in this place and destroyed by fire is incredible." So he was clearly impressed at the quantity and the extent of agriculture in the 1600's. One hundred years later, during the Sullivan campaign, this was the Revolutionary war, John Sullivan ordered by George Washington also came up into the center of Iroquoia, once again on a mission to destroy Seneca, Cayuga, and Onondaga corn fields because, once again, the

Iroquoia were allied with their allies Great Britain, and were supplying Great Britain's soldiers with corn.

We have the records of literally hundreds of soldiers who came into Iroquoia in the 1700's (1787) and they recorded in their diaries and journals what they saw. These are simply three quotes all taken at the end of August in 1787 that describes the type of agriculture that was there. They are remarkably similar in terms of what they say, "Large expenses, 150 acres, of the best corn I ever saw. In such quantities would be almost incredible to a civilized people. Some corn stalks measured 18 feet and a cob one foot and a half long." So we have lots of description of this agriculture that makes it sound as if it's very high yielding. As an agricultural scientist, I wanted to see if we could reproduce those conditions in the field and get quantitative measures of what the corn might have yielded. So we did experiments two years in Tompkins County, this is in the southern tier of New York State. And then two years in Cayuga County, which is located more in the center part of New York in our agriculturally rich soils. So Tompkins County, not so great soils, they tend to be acid and relatively infertile with a shorter growing season, whereas Cayuga County is our most intensive agricultural area. So what you see is we're looking at bushels per acre of grain in 1993-1994. We had a couple of different spacings: 30, 40 and 48 inches in 1993-1994; 40, 48, 60 inches in 1996-1997, and you see in Tompkins County we're basically running from 20-40 bushels per acre of maize. In Cayuga County we're running between 40-75 bushels of maize.

So when I began thinking about these numbers in my head, and then doing some comparisons, I was shocked because all of the sudden I'm thinking European agriculture wheat and they're getting 7, 14, maybe 28 bushels per acre of grain, and Iroquois farmers at the same time period are getting 30, 50 and 70 bushels per acre of maize. So then I thought a little bit more about it in terms of the carrying capacity. As I mentioned before, wheat and maize are quite similar in the numbers of calories that they provide per unit per kilogram of grain, so it's pretty easy to calculate out how many people you can support on an acre of maize. If you get a low yield, you could support 3.5 people for a year with that yield of maize, to as high as 8 at our very highest yields (that would be 75 bushels per acre). At the same time the European farmers were struggling even at their highest yield levels to support even 3 people per acre of wheat.

So now the question is, What in the world is going on here? Why are the Iroquoian farmers so much more productive than their European counterparts? It is, I think, probably counterintuitive to the messages and certainly my understanding of agriculture in Europe vs. agriculture in the Western hemisphere. I've used my experience and my knowledge of agriculture crop management and I've come up with an explanation for this. It has to do first with plows and soil organic matter, the interaction between these; and second, the differences in these two crops, maize and wheat. So let me explain as quickly as I can what I think is going on here.

The first is what I call the paradox of plows. Agricultural historians have been telling us for a very long time that the adoption of the plow is the mark of civilization and it leads to increased agricultural productivity, increased human populations, more complex social

organizations, and the rise of cities. Hurt, one of our American agricultural historians, has said “through the ages the plow has been the most important agricultural tool; indeed without it farmers could not till the soil and prepare their fields for extensive agriculture.” What is most amazing about this quote is that Hurt is most known for his work as a historian of Indian agriculture in the Western hemisphere. One wonders how could he have written this sentence and been studying indigenous agriculture in the Western hemisphere. Where does this meet and make any sense at all? Plowing has enormous advantages, and farmers the world round have often succumbed to its many things that it offers: primarily a seed bed that facilitates germination, it can increase plant available nutrients, it’s a way of removing weeds that are already there, it’s a way to incorporate animal manures, fertilizers, and lime, and it also can increase rooting depth. In particular, for European farmers in this time that I’m talking about, plowing was absolutely critical because it created this optimal seed bed for the germination of wheat and other small grains. Wheat seeds, because of their size, germinate most readily if they are in direct and firm contact with moist soils. The wheat seeds are very vulnerable to moisture stress, and so even if the seed germinates, unless there’s sufficient moisture in the soil and the seed has good contact with that soil, the seedling dies if the young roots can’t penetrate the soil to access more water. The wheat seedlings are also very vulnerable to competition from existing weeds. So plowing for wheat makes a lot of sense. It also was incredibly important because plowing initially increases soil fertility. It does this because oxidation of soil organic matter occurs when the soil is disturbed and exposed to the air. When you oxidize soil organic matter you release nitrogen, which is usually the most limiting nutrient for cereal grains. So when you plow and you oxidize soil organic matter, you get a nice boost in grain yields. So plowing fields that have been fallowed or pastured and allowed to accumulate soil organic matter is a very reliable mechanism for providing nitrogen to crops.

Alright, so all of these advantages, what are the drawbacks? They are primarily related to two things: When you plow and you oxidize that soil organic matter, it’s a great trick the first year and maybe even the second, third, and fourth years, but if you do it continuously the oxidation continues and every year less nitrogen is released because the soil organic matter levels burn up. Pretty soon you get down to what we call a very stable soil organic matter level, about 2%. The amount of nitrogen that is released when soils have 2% is very small and it remains at that level indefinitely. Farmers call soils with this amount of soil organic matter level “worn out.” They are no longer able to release nitrogen. We know that plowing is the single largest cause of decreased soil organic matter in agricultural fields. The second thing that happens when you plow fields is that you increase soil erosion. The combination of these two things makes plowing soils one of the most destructive activities that farmers can engage in.

So let’s go back and look again at maize in Iroquoia. Some of the characteristics of this: first, it’s an agriculture that’s done without plows. Hand tools, there’s no animals. Now most agricultural historians have looked at Iroquoian agriculture—at Western hemispheric agriculture—as deficient or at a disadvantage because of the lack of plows and domesticated animals. I would argue otherwise. In addition to the fact that the crops were planted and managed without tillage and without animals, the maize was often

frequently intercropped with beans and squash, and again in contradiction to common understanding, these fields were most likely planted continuously. This was not shifting cultivation. The intensive maize production in Iroquoia takes place in this band that's outlined by red there, it's the center part of the State. These are high lime soils relatively flat, quite fertile, and in an environment and climate with sufficient moisture and temperature for good corn yields. The soils where these are taking place are predominantly alfisols: they have high soil organic matter levels, about 4% before they were plowed and cultivated by Euro-American farmers at the end of the Revolutionary War. If we calculate out what they might contribute in terms of releasing nitrogen, about 90 pounds per acre per year, that when it's combined with other nitrogen sources is sufficient to produce 50 to 75 bushels per acre of maize. As I mentioned these are high Ph soils with moderate base status in making them very favourable for maize growth.

What I would argue then is as long as these soils were not plowed and maize yields were moderate, somewhere between 50 to 75 bushels per acre, these yields could be maintained indefinitely without depleting soil organic matter. And in fact the Iroquois, then, had these very high stabled yields because they didn't plow. This was not something that they were operating under a deficit and managing to accommodate the lack of plows, but one of the main reasons for their high productivity was the fact that they didn't plow.

The second thing has to do with characteristics of the plants themselves, maize vs. wheat. First, it has to do with seed size. Maize is quite a large seeded cereal grain, whereas wheat is much smaller. That means that maize is ideally suited for growing in a rough seedbed, which is what a no-till system is. In contrast, wheat needs that very finely prepared seedbed. Maize is much larger, it's tall, it's very hearty, it's fast growing, it competes aggressively against weeds and it's resistant to a wide variety of pests. Again in contrast to wheat, which is much slower growing and smaller in stature, much more vulnerable. Surprisingly, this is often overlooked; a kernel of maize produces somewhere between 200-600 kernels in the field. If you look at wheat, typically a wheat kernel produces less than 100 kernels and often times less than 10. The other thing, this then affects the seeding rate. The seeding rates of maize (18 to 15 pounds per acre), wheat (60 to 180). If we look at seed yield ratios, this is often what were calculated in Europe, you're looking at the amount of yield divided by the amount that was planted. If you harvested 20 bushels per acre of wheat and you used 2 bushels per acre to plant, you have a YSR of 10. You look at that same 20 bushels per acre of maize, if you use 15 pounds per acre to plant you have a YSR of 75. If we look at the seeding rates and yields of wheat and maize, you see that maize, the yield seed ratios, at 70 bushels per acre are over 300. Wheat never gets at even 70 bushels per acre; the yield seed ratio is under 50. If you look at the portion of your harvest that you have to save for wheat as opposed to maize, 20% at the lower yield levels of say 15 bushels per acre to less than 3% from maize. So all of these things give incredible advantages to maize over wheat. Iroquois farmers 3 to 5 times as much on the same area of land, this higher productivity is attributed to the maintenance of soil organic matter levels, also to the fact that maize itself is ideally suited for these conditions, has a higher yield potential, and a much lower portion of the maize yield has to be saved in order to plant next year's crop. Thanks. [audience applause]

JS: This is Deconstructing Dinner and that was Jane Mt. Pleasant, speaking in May 2010 at the annual gathering of the Society of Ethnobiology held in Victoria, British Columbia. Links to more information on the topics covered today including links to past episodes of our Exploring Ethnobiology series can be found online at deconstructingdinner.ca.

And in closing out this part 4 of the series, here's a short clip of well-known Canadian ethnoecologist Nancy Turner.

NT: I'll just say, because I happened to remember, that as we did that beautiful walk through the forest, I looked down at a Timaat plant and the beautiful yellow flower. And there was the little beetle that was crawling up the (they call it "the club") the flower spadix, it reminded me very much that this little beetle that pollinates the Timaat is specific to that plant, and the Timaat needs it and it needs the Timaat. It's just a reflection of these amazing connections. We can't just think about any one particular food without thinking of the entire system, the pollinators that allow the food to reproduce. Just about any food system you think about, there are those kinds of connections.

[Native singing]

ending theme

JS: And that was this week's edition of Deconstructing Dinner produced and recorded at Nelson, British-Columbia's Kootenay Co-op Radio. I've been your host Jon Steinman. A thanks to my technical assistant John Ryan.

The theme music for Deconstructing Dinner is courtesy of Nelson-area resident Adham Shaikh.

This radio show was provided free of charge to campus community radio stations across the country, and relies on the financial support from you the listener. Support for the program can be donated through our website at deconstructingdinner.ca or by dialing 250 352 9600.