

**Show Transcript
Deconstructing Dinner
Kootenay Co-op Radio CJLY
Nelson, B.C. Canada**

August 21, 2008

Title - Lessons from Cuba / Employing Insect Farmers

**Producer/Host - Jon Steinman
Transcript - Carol Elliott**

Jon Steinman: And welcome to the 107th episode of Deconstructing Dinner, a syndicated weekly one-hour radio show and Podcast produced at Kootenay Co-op Radio CJLY in Nelson, British Columbia. I'm Jon Steinman.

We have another interesting show lined up for you today and, while we'll be focusing on two distinct topics, there are some important overlaps that will, shortly, become more apparent.

Launching today's episode we travel to Cuba, a country that has, especially over the past ten years or so, become of increasing interest to many people around the world interested in more ecological models of producing food.

Starting in 1989, Cubans were quite literally forced into a situation whereby conventional models of farming *had* to be abandoned for more organic models. This was the result of the Soviet collapse and their eventual severing of the economic and technological support that they had provided Cuba for thirty years.

Deconstructing Dinner correspondent Andrea Langlois travelled to Cuba where she met with Fernando Funes Monzoté, the son of one of the most recognized founders of the Cuban organic agricultural movement, Dr. Fernando Funes Sr. His son has followed in his footsteps and is presently completing his PhD on more diversified mixed farming systems at the University of Matanzas.

And as the past seventeen years has proven to be a regeneration of more biodiverse and ecological food production in Cuba, there has, in tandem, been an increase in the attention paid to the biological systems that can more efficiently and effectively *replace* the conventional fossil fuels that Cuban agriculture was once heavily dependent upon. And just as the circumstances pushing Cuba to more ecological food production have too, begun to impact us here in North America, the second half of today's episode will introduce us to some of our smaller friends who are, and will increasingly become, more important to the production of our food: insects.

Helping introduce us to the many pollinators, parasites and predator insects vital to an ecological food system, we'll hear segments from a workshop hosted in March 2008 by

Deborah Henderson, the Director of the Institute for Sustainable Horticulture at Kwantlen University College in Surrey, British Columbia.

increase music and fade out

Jon Steinman: A reminder that today's episode, along with the previous 106 episodes of Deconstructing Dinner, will be archived on our website at deconstructingdinner.ca. And as always, we do welcome your comments, suggestions or criticisms, either by sending us an email to deconstructingdinner@cjly.net or by sending us a letter to Box 767, Nelson, BC, postal code V1L 5R4.

Just two days prior to the first airing of this broadcast, Member of Parliament for BC Southern Interior Alex Atamanenko launched a nation-wide tour to gather feedback from Canadians on what a national food policy in Canada should look like. To date, Canada does *not* have a national food policy, and while the creation of one has been encouraged for decades, it has only in the past few years, become quite apparent that we are in desperate need of policies to help support more responsible food production.

And what this national tour by Alex symbolizes is the *possibility* that, with political will, Canadians can, as we are so democratically granted the right to do, encourage our political leaders to *remove* the barriers to more localized and responsible food systems and instead *encourage* these systems through economic and political means.

Now Cuba is an example of how, through such political will, a country can indeed shift its agricultural systems to more responsible and efficient ones based on ecological principles and *not* on fossil fuel dependent systems.

soundbite – waves

Jon Steinman: Now in the background here is the sound of waves, crashing onto the southern shores of Cuba in the famous Bay of Pigs. Those sounds were recorded by Deconstructing Dinner correspondent Andrea Langlois while she recently visited the country to learn more about their agricultural systems. Andrea lives in Victoria, B.C.

While many of the people she met in Cuba could not communicate in English, one notable figure in the field of agriculture was happy to sit down with Andrea and discuss the Cuban situation. Fernando Funes Monzoté is the son of celebrated agricultural figure Dr. Fernando Funes Sr, whose organic farming association was awarded the Right Livelihood Award (otherwise known as the alternative Nobel) in 1999.

His son, Fernando Funes Monzoté, has followed in his footsteps since graduating in 1995 from the University of Havana. Since then he has worked in one of the research institutions in the Ministry of Agriculture and after thirteen years of research, is just about finished his PhD thesis at the University of Matanzas, just east of Havana. His research is being conducted on mixed farming systems as part of the University's pasture and forage research institute. Needless to say, Fernando is likely one of the most well-

qualified people in Cuba to speak about the Cuban agricultural revolution.

Andrea sat down with Fernando at his home in Havana.

Fernando Funes Monzoté: I started working on integrated farming systems. This topic has been increasingly recognized as a way to convert the very specialized and conventional agriculture in Cuba into a more diversified and sustainable agriculture.

In summary, my thesis and my idea of the Cuban agriculture is that it has made a shift from a very specialized and conventional agriculture at the national scale towards a more diversified and self-sufficient and locally based agriculture. The change, the achievement, was not a choice. It was a necessity of the country and part of reality, part of the history.

Jon Steinman: Fernando will expand on some of this in just a moment, but in this next clip he first lays out the significant changes that the country undertook following the Cuban revolution in 1959. It was then that the rural/urban population distribution and their agricultural systems in Cuba very quickly became similar to that which we live among here today in Canada and North America. And just as the corporate control of seed and farming systems has limited the ability for farmers to develop their own ecologically specific methods of farming here, the very same thing happened in Cuba post-1959.

Fernando Funes Monzoté: At the beginning of the revolution in 1959 there were about seventy-five per cent of the population in the countryside. In about ten years this situation changed radically. Seventy-five percent of the population concentrated into the cities and twenty-five remained in the countryside. Even with few capacities of development in their own life because the central government organized and commanded the food of our life. Agriculture was very centralized, in some way very controlled by the government, and the capacities of farmers to develop their own ways of agriculture was very limited.

This happened during thirty years but after the collapse of the Socialist countries we could assess, or we could as Cubans realize the weakness that system established. From one day to another we had a very difficult situation in agriculture because all the infrastructure and the capital and the inputs supporting that agriculture just disappeared. And then the crisis was so big that, I could not explain to you. It's part of the big history that in some way has been written but in others not.

Jon Steinman: Now the trend towards more globally dependent food systems has been underway for centuries, ever since the days of colonial powers exerted their influence around the world. Cuba was, of course, a product of this domination and has for 400 years been under economic and exploitive control of some more powerful country. However, not much has changed today. Canada, along with many other developed nations, have become just as much a colonial power as any. And the food choices available on our shelves today are a clear illustration of just how exploitive both socially and environmentally our lifestyles are. Now, while some Canadians may feel assured that as a dominant power we are immune to resource and economic fluctuations, we are in

fact in a position not so different from Cuba. Our agricultural systems are just as export oriented as Cuba's were and our natural resources are extracted en masse every day and sent abroad. From petroleum to natural gas, coal, forestry products and the virtual water embedded in our agricultural commodities, Canada is deeply tied in to a global system which, through trade agreements we, are beholden to. And Cuba was not much different.

Fernando Funes Monzoté: There was a trend in the whole world that we had the conditions created by the agreement that was the economic relationships between the Socialist countries. Cuba produces all the raw materials to export to Europe and Europe exports all the technology and inputs necessary to produce that. And we had for about four hundred years a long monoculture and export-oriented agriculture based on the exploitation of our natural resources.

This was developed in four centuries, first commanded by the Spanish colony. Later by how we call the North Americans controlled our economy. And later with the relationships with the European countries. So we continued developing a monoculture agriculture oriented to export and with a big impact on our natural resources.

We had during about thirty years a very conventional and specialized model of agriculture. This model was supported mainly by the resources we got from Russia, from the Socialist countries of Eastern Europe. And then Cuba was a country to support a very artificial way of agriculture.

This artificialization of our countryside led to many problems into our natural environments. We had problems with water, with deforestation, with decline of biodiversity in the countryside, and especially the deterioration of soil fertility. These systems that were developed were not as highly productive as suspected because mainly our conditions in the tropics were not so conducive to develop so specialized systems designed not for tropical regions but for temperate climates. Then in the application of such models, many, many problems were faced. And even the conditions in the countryside were in some way improved due to the lot of infrastructure established. Many of the people were moved to the cities.

Jon Steinman: As introduced earlier, North Americans have for decades recognized the vulnerabilities of our agricultural systems and our way of life. But it has only in the past few years, since the media started to actually pay attention to this, become recognized by a significant percentage of the population. While we here in Canada and North American are only *slowly* beginning to feel such vulnerabilities, Cuba was dealt these very circumstances that we now fear within a very short period of about four years. In 1989, the Soviet Union collapsed and in the short period or the few years following imports shrank by seventy per cent, including much of the technological and economic resources that had previously been pouring in over the previous thirty years. Included in those imports were the chemicals, the fossil fuels and the technologies required to run the very same agricultural systems that we here in North America rely upon every day. In 1993, the Cuban government made some radical shifts to begin aggressively supporting food production for local consumption. Of course, without fossil fuel dependent technologies,

more ecological models were adopted.

Fernando Funes Monzoté: In that moment started a new era in agriculture in Cuba because was the possibility to stop that model develop for more than four hundred years and to establish a new model of agriculture. This model was based on the principles of organic agriculture. And innovation in the farmers' sector mainly started to bring this into a success. If we produce it for half of our population before the nineties with a lot of inputs and other big amount of food were imported, now we are producing half of that food, the same amount of food, with about twenty-five per cent of the land area based on sustainable agriculture.

Jon Steinman: Fernando Funes believes that the most important shift Cuba made in their transition to a more agro-ecological system was through the diversification of farms themselves. It's this that has formed the backbone of his research.

Fernando Funes Monzoté: The base of Cuban agriculture in the present is diversification. All the farms, from the small farmers to the big cooperatives of more than a thousand hectares, or two thousand, five thousand hectares, are based on diversification in order to overcome the lack of input from abroad. And then to produce food for the local markets is the main task.

Jon Steinman: You're currently listening to segments of an interview conducted by Deconstructing Dinner's Andrea Langlois. Andrea sat down with Cuban agricultural researcher Fernando Funes Monzoté while she recently visited the country. Fernando is currently completing his PhD on mixed farming systems at the University of Matanzas.

Now among the many lessons that the rest of the world can learn from the circumstances Cuba has faced over the last seventeen or so years is their aggressive approach to urban agriculture. It is said that seventy per cent of the perishable foods consumed in the city of Havana are grown in Havana itself. The city goes so far as to employ agronomists who assist the thousands of urban farmers through the provision of knowledge and tools to help ensure optimal yields. Quite the contrast to the lack of interest or authority that North American municipalities have with respect to food production. As for Cuban cities, the rapid shift to more urban forms of agriculture has employed a whopping half a million people.

Fernando Funes Monzoté: Because this big concentration of people in the cities, one main strategy followed by the government was to give support to urban agriculture. And urban agriculture has been a model very fastly developed in the country.

There are many modes of urban farming developed in the country but the main two factors to promote organic urban farming was first, the nearness to the market, so that people concentrated in the cities had close access to food, and the other was the employment of the people in the cities. And other factors were, for example, the use of abandoned lands in the cities and to clean abandoned places around the cities. At the beginning of the urban farming movement the production was very low, like some

thousands of tonnes, in the year 2006 it was about four million tonnes of vegetables and food produced in the cities or around the cities - urban and peri-urban agriculture. And about half a million people were employed in urban agriculture. So the social impact on food production and employment was very, very big. Maybe in the future I don't see urban agriculture as a means for producing food but more as environmental management of lands in the cities.

Jon Steinman: Now of course one of the greatest threats to the food systems feeding many people today is the intensive amounts of energy required to grow, process and distribute food. As non-renewable resources continue to be depleted and their costs continue to rise, seeking more energy efficient systems of food production is vital to our own survival and well-being. Fernando Funes spoke to Andrea Langlois about these inefficiencies.

Fernando Funes Monzoté: Originally I found a problem in agriculture development in Cuba as in all over the world. But in Cuba, for example the livestock sector, according to my estimation, the sector employed about six calories per calorie produced. So it was very inefficient in energetic terms as in economic terms. It was very, very inefficient and the productivity was not as high as expected in that moment. So one of the critical points of the conventional system of livestock production in Cuba was the energy efficiency.

And now as you know energy efficiency, or energy, is becoming another dimension of sustainability. If ecologists and the society define as a dimension of sustainability the social dimension, the economic dimension, the ecological dimension, now we can insert the energetic dimension as a focus, or as key, to achieve sustainability of agricultural systems. And we see, based on our research of fifteen years, that integrated farming systems based on diversification and the use of local natural resources, we can achieve much production as the conventional livestock system and also more energetically efficient.

Andrea Langlois: So what would that look like? What would an integrated farming system look like with livestock?

Fernando Funes Monzoté: A specialized system was based on pastures, forestry, and concentrate broad from abroad. Very specialized breeds and a lot of infrastructure around the system, support infrastructure, energy, etc. An integrated system based its functioning into including different components like a forest component, like crops, and livestock, horses, and pastures that achieve better energy balances. So we see a very diversified system, not difficult to manage, because some people think that complexity is difficult. The integrated system allowed the farmers to have very close the resources that they need to improve production and to manage natural resources.

Jon Steinman: The livestock sector around the world is said to be the greatest contributor of human-caused greenhouse gas emissions in the world, even greater than motorized transportation. And one of the major contributors to this ranking is the feed being grown for the livestock. Fernando also addressed this component.

Fernando Funes Monzoté: Well, we imported about six hundred thousand tonnes of feed per year to the country. And that was a huge amount of energy that was imported into the system. Based on our results and based on the practice of diversified and integrated livestock farming systems in Cuba, we see that we can produce four times more milk in the dairy sector than was produced in the conventional system before the collapse with half of the inputs expended in that time. So we can achieve a very efficient system in producing food and with less environmental impact.

Jon Steinman: For any listeners that missed our Deceivable Dairy series which aired in early 2007, part I of that series did get into great detail on the environmental and energy comparisons of various dairy systems. Alan Fredeen of the Nova Scotia Agricultural College lent his voice to that broadcast, and he along with many of his colleagues have actually worked closely *with* Cuba on helping them transition to more responsible dairy systems. That series is archived on our website at deconstructingdinner.ca.

In nearing the end of her time with researcher Fernando Funes, Deconstructing Dinner's Andrea Langlois did direct the interview towards the topic of peak oil, an issue of great concern to our food systems here in North America.

Andrea Langlois: We discuss in Canada a lot this question of peak oil and where that positions us in terms of our agricultural systems. Because of this type of innovation in Cuba, where do you think Cuba is positioned in terms of a global crisis around oil and petroleum products?

Fernando Funes Monzoté: We are not exempt of the global situation. We are I think integrating more and more in the global economy after the collapse of the Socialist Bloc. But what we see based on this process of transition is that Cuba has the conditions to overcome the situation presented in the world today based on a new concept of agriculture and developing this concept in a bigger scale. And the opportunities are there but maybe some policies are needed to climb to another step towards a more ecological structure of our agriculture because a structure of the conventional agriculture is still there and many of the technologies apply where input technologies that change the way in which the food is produced but do not change the base of the system. And we need to change the base of the agricultural system towards a more integrated and more ecological concept.

Jon Steinman: Now it's taken Cuba approximately seventeen years to arrive at where they are today. And while it is, relatively speaking, a short period of time to shift a country's entire agricultural system, there is, as Fernando describes, still much work to be done. And so when we look at the direction that our own government here in Canada has decided is best for Canadians, it appears that Canada may be suffering from a symptom of collective insanity. As mentioned earlier on the show, we have *no* national food policy, and instead, the Harper government is pushing our food system into a more industry regulated and managed model. We'll be addressing some of these recent shifts on an upcoming episode.

But one issue of greatest concern is the trend with respect to agricultural land ownership. We've recently spoken of the lack of controls over protecting the agricultural lands surrounding Canadian cities, but there is now even a trend towards the purchase of large tracts of land by private interests, such as hedge funds, on Canada's prairies. It's clear that with the global food system in such a poor state, along with the growing interest in biofuels, agricultural land is being viewed justifiably as a worthy investment opportunity for the future. Now this new trend is not so different from how agricultural land was once controlled in Cuba. And contrary to this direction of land ownership, the one that is going here in Canada toward privatization, Cuba has, since the early nineties, gone in a more responsible direction of public control of food production.

Fernando Funes Monzoté: The structure of land in Cuba is a history of big enterprise land tenure. We had since the beginning of agriculture in Cuba the exploitation of big land states. After the revolution then the State concentrate again the land. Even we had a very progressive agrarian reform in Cuba even though the government concentrated about eighty per cent of the land. But after the collapse, at the beginning of the nineties, the government decided to give most of the land and then there were created a new kind of cooperative called a basic unit of cooperative production. Before the nineties the government concentrated about eighty per cent of the land. In the year 2000 it concentrated only about thirty per cent of the land, and the other land was given to these new cooperatives where the people got use of the land and they bought all the infrastructure.

Jon Steinman: Another major shift that Fernando Funes believes must take place in Cuba is a reversing of the rural to urban migration that took place post-1959. In order for more ecological systems to be effective (systems that are not as reliant on fossil fuel dependent technologies), an urban to rural migration needs to take place.

Fernando Funes Monzoté: The challenge in agriculture is mainly to bring people to the countryside because agriculture in the way towards more ecological concepts should be based on the people living in the countryside and the creation of the agriculture, not the production of food for people, but people living in relation with natural resources. And that way our land will be very productive and give the possibility to people to have a better life in the countryside.

Jon Steinman: In closing out her conversation with Fernando, Andrea Langlois asked what else he believes needs to happen for these new models of agriculture to remain and continue to thrive. There is a lot of fear that, as Cuba becomes more tied in to the global economy, the inroads made over the past seventeen years may begin to fall apart in exchange for the same systems Canadians, for example, are reliant upon today. Fernando believes that education is key and that the media plays an important role as well. He also lent one suggestion that will be the topic for an upcoming show, and that is, that instead of Cuba moving towards systems of organic certification such as those here in North America, he believes that Cuba is in an opportune place to instead create a certification system for the *chemical* and *industrial* dependent models of agriculture that he indicates still represent about ten per cent of the country's production today. So, in other words, he

believes that it's time for organic methods to once again become the conventional norm, just as they were only a few short decades ago.

Fernando Funes Monzoté: Well, the main challenge of agriculture and this approach of agriculture in the whole world is education. People need to get informed. Still we have not a social consciousness about this. It is consciousness based on the people working in agriculture mainly, and we need to put this in the social scene, into the media, and to transmit all the concepts and the values of an ecological agriculture in order to transform the possibilities into reality. This is certainly real that the people don't use chemicals because they don't have access. But what we have to focus is on the benefits of this situation created on a national scale by the scarcity of inputs that gave us the possibility to really sign our agriculture in a way that maybe no other country could make it.

In Cuba we still don't have a certification system for organic produce. But I would recommend not to have one. I recommend to certify the production now of conventional systems with chemical inputs, and in that way we will climb a big step towards sustainable agriculture. Because now we could say that totally chemical agriculture is covering about ten per cent of our total land.

Jon Steinman: And that was Fernando Funes Monzoté, an agricultural researcher currently completing his PhD at the University of Mazantás, Cuba. Fernando's research is focused on mixed farming systems. And a big thanks to correspondent Andrea Langlois, who recorded that interview during her recent trip to the country. Andrea has since returned to her hometown of Victoria, British Columbia.

soundbite

Jon Steinman: And you're tuned in to Deconstructing Dinner, a syndicated weekly one-hour radio show and Podcast produced at Kootenay Co-op Radio CJLY in Nelson, British Columbia. This show is broadcast on campus/community radio stations around the world, and if it's *not* being broadcast in your hometown, get in touch with your local radio station and direct them to our website at deconstructingdinner.ca, where all of our shows are archived. The first segment of today's episode has been titled Lessons from Cuba, while this next segment is titled Employing Insect Farmers. Just as Cubans have been forced into more intimate relationships with the biological systems operating there, we here in North America are too, beginning to be introduced to these same ecological models of agriculture.

While Canadians have long been disconnected from the insects who make much of our food supply possible, this next segment will help better introduce us to the many species of insects that help pollinate and manage more biodiverse and ecological food production.

In March of this year, Deconstructing Dinner attended the annual conference of the Certified Organic Associations of BC in the community of Sidney. One workshop in particular of interest to us today was hosted by Deborah Henderson, the Director of the

Institute for Sustainable Horticulture at Kwantlen University College located in Surrey, BC.

Deborah received her Ph.D. in Entomology from the University of British Columbia in 1988 and in 2005 joined the College. Her workshop was titled, *Predator, Pollinator, Parasite* and helped outline to the many organic farmers at the conference the many species of insects that are of benefit to an organic farm or backyard gardener.

When we think of pollinators for one, the first insect to come to mind is often honeybees, but, as Deborah pointed out, honeybees are not a native species, and native species are far more efficient pollinators. Native species include bumblebees, syrphid flies, wasps, and beetles; non-insects such as hummingbirds; and, of course, the wind.

Now I have here first a short segment that will get us into a pollination frame of mind. This is a recording I compiled right in the backyard of my home here in Nelson, B.C, and it's an intimate recording of two bumblebees that were busy feeding on the nectar of a prolific bush of blackcurrants. And you'll notice about halfway through the recording a sound that is reminiscent of a packaged food wrapper, and that is actually the sound of the bees as they work diligently on extracting their food.

soundbite – Bumblebees and currants

Deborah Henderson: So to frame what we are going to talk about today, what is pollination? And it is when pollen from one plant is transferred to another of the same species in order to fertilize the ovum to produce a new seed. So how it gets there is really the subject of today.

And wind-pollinated plants include quite a number. Most of the trees, things that bloom in the spring, things that are blooming now are quite often wind-pollinated like hazelnuts. Currants are generally wind-pollinated and grasses.

About eighty per cent of the flowering plants out there depend on some pollinator to transfer their pollen to produce the seeds. They use things to attract the pollinators. They use nectar because nectar is sweet and some of them are attracted to the nectar. They use colour sometimes and they use scent. And pollen is transferred on the mouth parts of an insect because it is actually feeding on the pollen or collecting it for its young. Or else it's on the body, if the body is very hairy like a bumblebee. So however it can get there. And even when you get to hummingbirds and things it's on their feathers or their mouth parts.

Jon Steinman: As mentioned moments ago, honeybees are most often thought of in terms of pollinators. Deborah Henderson stressed during her workshop that native bees, such as bumblebees, are far more efficient.

Deborah Henderson: We actually have about four thousand species of native bee in North America and we have at least two thousand in Canada. And they are way more efficient than honeybees. I don't know why we got so stuck on honeybees at some point

and keep producing them.

But, of the native bees, an acre of apples can be fully pollinated by 250 mason orchard bees. But if you were going to pollinate with honeybees you would have to put fifteen thousand to twenty thousand, one-and-a half to two hives per acre. And that's the recommendation. And they're not unionized, those solitary bees. They are willing to work long hours in horrible weather. And I can vouch for that. I have been out there in horrible weather and they're still there too.

And they're after the pollen as well as the nectar, and that's important because they're more actively searching out the pollen and they are actually collecting the pollen on their bodies. So the honeybees are after the nectar, not so much the pollen. A little bit maybe... well, they do. The bees are after the pollen and they put pollen in their leg sacks. But when you are actually getting it all over your body, as most of the solitary bees are, you are a better pollinator.

Bumblebees and other solitary bees are willing to work where others don't. Honeybees are used, this is cranberry, and honeybees are brought in for cranberry but the bumblebees really do a much, much better job.

And they use something called buzz pollination and some of the other solitary bees use it as well. Instead of reaching in there and trying to get the nectar, they grasp the flower and then they just buzz with their wings and it makes the pollen just shoot out at them. They get a little shower of yellow. And so it's all stuck to their hairy bodies and then they get more of it that way.

I don't know if you know this about native bees but they are really not that inclined to sting. If they are not protecting a hive they really don't have much inclination to sting you. And I have worked with leafcutter bees and they are actually very cute. They're small and the males have blue eyes, big blue eyes. And they are very docile, you know. And if they do sting you it only hurts for a few seconds and then it goes away. It's probably as bad as a mosquito bite without the itch.

Jon Steinman: Now for any home gardener or farmer wishing to create an ideal environment for native bees, Deborah Henderson did spend some time suggesting how the ideal habitat for native bees can be encouraged and created.

Deborah Henderson: So the kind of variety that you get in native bees, it really is quite fun. Carpenter bees up there. There are mason bees, leafcutters and many, many others. I don't know them all. I am not a very good bee identification person. But there is this beautiful iridescent green one down there which is pretty fascinating. And they can go from very to tiny to actually fairly large. And they don't always even look like bees. Sometimes they look more like little wasps. They don't have quite as much hair on their bodies.

But what do they need? Basically the kind of things we need. We need shelter, food and

water. And thirty per cent of them actually nest in cavities or tunnels, not in the ground. The other group of them nests in the ground. So the kind of things that they are looking for are little dark, dry caves, or holes in trees. And if you have any snags on your property, that's going to be a great place for them. You'll probably find bees there. And logs with beetle tunnels are just beautiful because the tunnels are the right shape and size for some little bee, and they will be in there in no time. And if their front yard is facing the sun, they are really happy because it's sunny and warm and it gets them up in the morning, just like me.

But, the other thing is, if you find something like that don't disturb it because if you disturb it they'll leave and then they might not come back.

You can also create some shelter habitats for them. And here are a couple of examples. These are actually commercially available. I found them on the net. And the top one is something like... it's hollow... I don't know, that one looks a bit like bamboo. But anything that is hollow and tube like, and I have seen even plastic sometimes people use, and give it a bit of shelter with a roof. And put it somewhere sunny, where it's not going to get flooded out. And those little solitary bees, like the orchard bees, they go in there and they actually provision those tunnels with food and they lay their eggs in them. And they then seal them up and they go off and build another one if they have still got time. And so those larvae will actually over winter and come out next spring as more bees.

Jon Steinman: And this is Deconstructing Dinner. Over the past few decades our agricultural systems have become quite artificial. Of course agriculture itself is already a human created system, but there have in the past, as there are today, existed many models of agriculture that look to work alongside natural systems and/or simply mimic them. Now the artificial systems I speak of are those such as the genetic engineering of plants, trees and animals, or the feeding of corn and animal byproducts to cattle, who are otherwise biologically designed to eat grasses. And it's these among other artificial systems that have encouraged us to continuously manage the many threats to agriculture that exist today, from plant diseases, to insect infestations, to soil degradation or poor animal health. And in the case of pollination, this is also the case. Non-native honeybees, as an example, are so often used as pollinators to *so often* pollinate non-native plants. But, as Deborah Henderson describes, evolution instead teaches us that native bees are more attracted to native plants.

Deborah Henderson: So native bees also need food and water. Often we sort of forget that they need water. And open water. Have you ever seen, in a muddy area where there is water sitting there, that the bees are all around those little puddles? They need water. They need some open water somewhere, so if it's complete dry everywhere, it doesn't provide quite all of their needs. So think about that if you are trying to make an area bee-friendly.

They need a diversity of blooms because you are going to have several species, even if you just have one crop. Around your crop you're going to have several species. And you need to support them all. So they come out at different times. They can come out as early

as February, those queens looking for a nest. And they can be through the season 'til the end of August into September.

So you want things that are blooming for them. And, for some reason, and this is just from studies, they are more attracted to plants in clumps, rather than single plants here and there. So if you are going to plant something blue for the bumblebees, and you're going to put ten plants in, put them all together because it is a bigger signal probably.

And the other thing that has been noticed is that native plants are more attractive to native bees than garden variety plants. And it doesn't mean the garden variety plants aren't but the native plants are more attractive, and that makes sense because they have evolved with their native plants.

Jon Steinman: Among native bees as an important group of pollinators, there are many other insects and birds that act as important pollinators for any agro-ecological system.

Deborah Henderson: Okay, onto some of the other pollinators. And none of them are as wonderful as the bees. But some plants actually don't attract bees. But other pollinators are attracted to them.

The syrphid flies are a personal favourite of mine. They're bee mimics. You see they are striped. One thing that's really different about them is.... Did you notice when we were looking at bees that they had really long straight antenna? 'Cause these guys don't. They have little clubbed antenna. And they are called hover flies, because they have the ability to hover in front of you and stare at you and then go zooming away, like a helicopter. And they have great big eyes, much bigger than bees if you actually look carefully. Small antenna, but they are flies. And they are pollinators. The females, the adults, feed on pollen and nectar. And they lay their eggs in aphid colonies and their larvae eat aphids.

So you get a double whammy with the syrphids. They like open flowers because they don't have very long mouth parts. And you'll see some insects that do have really long mouth parts.

I love the syrphids because they need flowers and they need aphids. And if you have got both of those on your farm, most people do, you have got a really good little biological control there as well as a pollinator. But, they need something a little different than the bees. They're not just after the pollen and nectar, they're after the aphids. So they are going to be spending a lot of their time looking for aphids, and also some of their time looking for water and for nectar and pollen.

Jon Steinman: Now while not as effective as the previous varieties of pollinators, there is yet another group of pollinators, and those are butterflies and moths.

Deborah Henderson: Now the butterflies and moths also pollinate. And see here they are on the flowers. Because they are after the nectar, they are not necessarily after the pollen. But because they are there and they get pollen on them they take them to the next plant.

They are capable of going deep, deep into flowers to get nectar. So they need water as well. So even a bird bath is helpful. Nectar, and some of them will actually feed on rotting fruit, which you may not want to leave around because it will also attract the wasps. Morning cloaks do that and they are pretty common around here.

They like sunny warm places, and so hedgerows and shelter are good for them. So you will see them in areas where there isn't a lot of wind.

Jon Steinman: And even another group of pollinators is the family of larvals, which are the juvenile forms of insects, such as caterpillars.

Deborah Henderson: Larvals - the kind of things that wouldn't be crops that would attract them would be things like aspen and poplar, actually support a lot of caterpillars, willow, clover, grasses, lupins, and ceanothus too, for some reason. They also like to sit in sun, so rocks in sunny places, or even fences that get lots of sun that are sheltered. And they need overwintering sites for their eggs. So if your farm is too clean you'll take them all away with the litter. So they say a little untidiness goes a long way. They need to get under leaf litter, and logs and debris to spend the winter as larvae or as eggs or pupae.

Jon Steinman: And then there are beetles, yet another important pollinator as part of a biodiverse agricultural system.

Deborah Henderson: And then there are also beetles that pollinate. And they are not as spectacular and they don't do quite as much as the others. And usually when you see them on flowers they are mating so they have other things on their mind. But they do feed on the pollen. And some of them are very tiny and you probably find them here and there. And they are actually doing a pollination job for you, because they are there and they are getting pollen and they are going to another plant.

So what do they need? They're better with open flowers with easy access to pollen. So, we don't have a lot goldenrod here but sunflowers and others. And blueberries, there are actually a lot of soldier beetles around blueberries when they are blooming.

They need water, too, and their habit, I mean there are so many different kinds of them. The best thing you can do to encourage the beetles is just have some biodiversity. Just have lots of diversity on your farm, and ground cover. Rove beetles, which maybe aren't the best pollinators, but they are really good little predators, will move along under a mulch and move up onto plants. Some of them actually will go down into the roots and take out root maggots.

Jon Steinman: And the last group of pollinators to focus on during this segment are wasps. Wasps are both pollinators and parasites and are, too, an important insect to help pollinate our food sources.

Deborah Henderson: Now the wasps usually we don't really appreciate. Not the

yellowjackets, in any case. But they do hang around flowers. And they get pollen all over them because they feed on the nectar and then they take it somewhere else. More interesting really are the other two, which are parasitic wasps. And they also feed on the nectar. So they need nectar, and they also need insects, because they are parasitic. But they will often lay their egg inside the larva and the eggs, their own larvae, eat the larva and it kills it. It doesn't die right away, but it eventually kills it, and out come some more wasps. Biodiversity is the best thing you can do for the wasps.

Jon Steinman: And this is Deconstructing Dinner. There will be a few more audio clips from Deborah Henderson's workshop posted on our website at deconstructingdinner.ca. We were not able to get around to all of them on today's episode and so those clips will be posted under the August 21st 2008 broadcast.

And in closing out today's broadcast, we'll wrap it up with a short segment once again on the topic of Cuba. Deborah Henderson has, too, been to Cuba, where they are moving towards more ecological models of food production. And just as biodiversity is so critical to a system that moves beyond fossil-fuel dependent chemicals and technologies, biodiversity within Cuban systems is clearly much richer than our conventional systems here in North America. In this next clip, Deborah uses the word trichogramma, which is in reference to a family of small wasps that are often used as a biological control on farms. And here once again is Deborah Henderson.

Deborah Henderson: So I wanted to share a little bit about biodiversity in Cuba because Cuba in the early 1990s lost all of the imports that they had from the Soviet Union. The Soviet Bloc collapsed and stopped trading with Cuba. Cuba was under embargo from the U.S. And so they couldn't trade with the US and their main trading partner was the Soviet Bloc. And they had become terribly dependent on shipping out sugar and shipping in everything else, including oil and fertilizers and pesticides and food.

So they were on the point of starving. The average Cuban lost twenty pounds during that period. They really couldn't trade with anyone else. So they had to figure out how to feed their people. It became a priority.

They had some things going for them. Like they had a very highly educated population. And I think they have four per cent of the population of Latin America and eleven per cent of the scientists. So they had a society that valued education and trained a lot of people. Plus they had cooperative farms so they were already were working together on some things.

And they had started also producing biocontrols even before that collapse because of resistance issues with pesticides. But they went into the biocontrol big time at that point. They are world leaders in the use of biocontrols for food production.

I was there two years ago and I attended a national workshop of extension people from every province who were sitting down going over an index for biodiversity for growers to use on their farms. Every grower understood the value of biodiversity on their farms and

they were now going to be able to measure it. And we were actually testing out this little thing. We got in groups and we had a fictitious farm and we went through the process to determine our biodiversity index. And so that's where they are. They are amazingly ahead of the rest of the world.

And so I brought a few pictures to show you. This is a total permaculture farm. It's in the middle of a city. They call them organoponicos. In Havana, which is 3000 people, they produce seventy-five per cent of their vegetables that they consume in the city within the city limits.

This is a small city called Sancti Spiritus in the middle of Cuba. But this is the most amazing farm. They bring nothing in and they just simply sell vegetables. So everything they require is here. They have got a fish pond. And they have the rocks around the raised beds. They got lizards in. And, they got the lizards by paying the kids in the neighbourhoods to bring lizards. (laugh) Yeh, it was pretty ingenious.

And vermicomposting is used everywhere. This is another farm. And you just see even at the end of every of those raised beds there are flowers. And they vermicompost everything. And they micro-irrigate, too. They don't do any major irrigation.

And this is an example of a corridor, a refugia. It has got a number of good things about it. This is actually an organoponico that grows flowers. And they sell flowers. But these little edges of the fields, they plant them there for the biodiversity, for the corridors, for the beneficial insects, and also to prevent erosion.

And you know what was so encouraging about seeing Cuba is, I went down there and I talked about our trichogramma rates, that we were putting out 800,000 per acre in cranberries. We had very low tolerance for the pests, and we had to put out two applications, 400,000 each. And they looked at me and just about fell off their chairs because they put out 20,000 per hectare over a season. The biodiversities there, they have got so many. Everything is protected. They have got microbials. They're vermicomposting everything. Their systems are so resilient that they don't need that kind of dump of pesticides or biological pesticides.

Jon Steinman: And that was Deborah Henderson, the Director of the Institute for Sustainable Horticulture at Kwantlen University College located in Surrey, British Columbia. Deconstructing Dinner recorded Deborah in March 2008 at the Certified Organic Associations of BC conference held in Sidney.

ending theme

Jon Steinman: 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. I thank my technical assistant John Ryan.

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

Shaikh.

This radio program is 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.