

***Speech of Dr. Vandana Shiva delivered at launch of Samdrup Jongkhar Initiative on 19<sup>th</sup> December 2010, at Chogyi Gyatso Institute, Dewathang, Samdrup Jongkhar, in presence of the Honourable Prime Minister of Bhutan and more than 500 residents of the dzongkhag.***

Honourable Prime Minister, the Samdrup Jongkhar Initiative coordination team, monks of this monastery and, of course, farmers who are gathered from villages far and near: It's a pleasure to be a part of this Initiative. And I say "*part of it*", because I don't see myself as an outsider. I see myself as part of the team that's going to make this Initiative work.

Perhaps Bhutan is not a little island: It is a lighthouse for the way the world should be, if the world has to have a future. And this is so clear in the area of agriculture. And in the way it relates to the environment, to our biodiversity, to our soil, to our water, to our atmosphere.

There are two roles for agriculture, anywhere in the world, for any farmer, for any community, for any country. The first is the role I started to talk about briefly yesterday. It's the role that really started in the great wars where chemicals were created to kill people, and after the wars those chemicals were deployed to agriculture. This is what Sir Albert Howard, who was sent by the British as an imperial agriculturist in the year 1905, wrote in his book *The Agriculture Testament*. He talked about how agriculture had been reduced to the NPK mentality — Nitrogen, Phosphorous, Potassium — and he wrote that vested interests entrenched in a time of national efforts in the war have now gained a stranglehold over agriculture. These chemicals came out of warfare; they were applied to agriculture; and they have turned agriculture into a wild, warlike situation.

If you use the test of compassion from Buddhism or you use the test of ecological sustainability from modern science, these technologies are totally inappropriate for dealing with a very fragile web of life. And the sad thing is they don't even do the job they're supposed to do, for example, controlling pests or increasing soil fertility. Synthetic fertilizers actually destroy the fertility of the soil.

## **One gram of soil**

A scientific study analyzed a cubic metre of soil, just one cubic metre, and found in it 50,000 small earthworms, 50,000 insects and mites, 12 million round worms. One gram of soil, just one gram, contains 30,000 protozoa, 50,000 algae, and 400,000 fungi. Now when we apply chemical fertilizers we don't see how all of this amazing biodiversity in the soil is being killed.

For example, fungi include this amazing function of microrising soil, and in one cubic inch there are eight miles of these fungi. Eight miles in one cubic inch! And what do these fungi do? Eight miles long, it goes to a plant far away, where there's some potassium, picks it up and brings it to the plant that needs it. I always feel that our model for compassion and cooperation has to be the microriser fungi — how it constantly helps. It brings what's needed from where there is abundance to where there is scarcity, and constantly establishes equilibrium and harmony. On the wonder of compassion, we can learn from the microriser.

Or take another organism in the soil, the earthworm. Darwin is known as a great biologist, but he wrote a book at end of his life dedicated to the earthworm, in which he said it may be doubted whether there are many other animals which have played so important a role in the history of creatures. He called it the most significant of species. The little earthworm working invisibly in the soil is actually nature's alternative to the tractor and the fertilizer factory. By their movement through the soil, these earthworms create channels for the air and channels for water. And plants have 30% more air to breathe in the soil. The aeration increases by 30% due to the work of these earthworms.

There's been a lot of talk, including an exchange I had with farmers on the 17<sup>th</sup>, about how there's intense rain in this region and then it's dry. So in a dry period the most important challenge is having enough soil moisture. Soils in which the earthworms have worked and created channels have 20% more water. And the earthworm casts, which can be up to 40 tons of weight per acre per year, contain more nutritive material than artificially fertilized soil. The castings of earthworms add 5 times more nitrogen, 7 times more phosphorous, 3 times more magnesium to soil, compared to soil without

those castings, and 11 times more potassium and 1.5 times more calcium than chemically fertilized soil. Is that clear? So you could think of adding all the nitrogen, phosphate, potassium from outside, but if you are killing the original organisms that make these elements and more, you're actually going to have a nutrient deficit, and that is why in chemical farming, after a while, your yields go down.

### **Soil, food, nutrition, and health**

Now soil that doesn't have all the nutrients will not produce food with enough nutrients, and therefore we will have nutrients missing in our lives. Studies by scientists across the world have found that, on average, organically farmed soils produce foods that have more nutrition in them. The same carrots if farmed chemically will have less nutrition, and farmed organically will have more nutrition. In the western countries, where this kind of chemical farming was started in the 40's, from 1940 to 1991 vegetables have lost on average: 24% of their magnesium, 46% of their calcium, 27% of their iron, and 76% of copper.

Now magnesium, which is a trace element, if you are not putting it in as fertilizer, if it's not there in your food, you get attention deficit disorder and failure to concentrate. They did an experiment in British schools where the children were very restless and violent and troubled, and they fed them organic food, and because it made up for the deficiency in magnesium, the children could start becoming calm and started to concentrate on their studies. In Bhutan you find it very strange that kids can't sit still, but you know it's really true. Children can only pay attention for three minutes — that's the highest level of concentration in the West — just three minutes. It's called attention deficit disorder. You can't have a GNH society with attention deficit. So you can't have a GNH society with a deficit of magnesium, or with a deficiency of calcium, which is necessary for children for growing bones or teeth.

In the United States, every third American is suffering from the disease of obesity. I'm fat, but they're fatter. And in India, since our children started to eat the American way for the past 15 years, Delhi schools now have 25% obesity. A lot of people think this is because of over-eating. But these children are not eating — they're nibbling.

Obesity is a result of a disturbed metabolism, and metabolism is the body's self-regulating capacity to manage its balance. The deficiency of calcium, scientists have told me, blocks the ability of the body to release the fat. It arrests the fat, so the fat keeps accumulating.

### **Yield — of what?**

I'm giving these details because all the time when the discussion starts about organic farming — and many questions came up also in the farmers' exchange the other day — the first question asked is: will the yield be enough? But the question to ask is *yield of what?* The thing about food — and agriculture *is* food — is that it is the ultimate relationship between the environment and our bodies. And our body knows how to recognize nutrition, and it knows how to recognize absence of nutrition. Our body's cells cannot be fooled — like a supermarket shelf, can we? You can fool people in the supermarket, but the body you can't fool. So what we are doing is producing more and more empty mass. There's no nutrition in it. It is empty mass, and it works fine as commodity but doesn't work right as food.

***I see food as a gift to us from all the sentient beings who share this life with us.*** Food is not just a commodity for sale. And when we treat food as a commodity we can see what the final consequences are if we look at the industrial agriculture of the United States. Because when it is a commodity, then it doesn't matter whether humans eat it or animals eat it or cars use it. More food is going to run cars as bio-fuel than for feeding people now — 30% of the food grain in America goes to run cars. They make petrol and diesel out of food, out of soya and corn.

And your cows — cows in Samdrup Jongkhar — are free cows, because they graze freely on the grass. They're designed to be herbivores. They eat grass. In the U.S. the cows are in prison, and these imprisoned cows eat 60% of the food grain in America. They inject the cows with hormones; they inject them with antibiotics to bring them to the market very, very fast. So we are always told the United States produces a lot of food grain, but that food grain is not available for people. It is going to run cars and in animals. So it is not enough to talk of yield. We need to think about *yield of what* and

where is it used, because then you really have the objective of self-reliance in food, which is what Rinpoche's message yesterday was.

I haven't visited the farms here but I've read about them, and I know they will be similar to farms in our area in Uttaranchal because in the mountains we have small farms with a lot of diversity. You will always be told your farms are unproductive, because productivity is usually defined in terms of a mono-cultural yield of a single farm. So we have done a major study on what does a farm that is bio-diverse and organic produce, compared to a farm that is a chemical mono-patch. I'll take just one example: In a mixed farm, the maize was four quintals but it also produced radish of two quintals, mustard greens of a hundred bundles, and beans of two quintals. The mono-cultural farm had five quintals of maize and that is compared to the four quintals of maize in a mixed farm, but the mixed farm is producing nine quintals of food and **that** is what should be measured. So when you shift to a mono-culture, you might increase the maize by one quintal, but you have decreased the food by four quintals.

But it isn't just the difference in overall food production per acre, because when we measure yield we must measure the yield of everything our land produces. Switching to a mono-culture, we also actually have a decline in nutrition, because all of that additional radish and mustard greens was giving us nutrition. I am not going to bore you with the details but we are actually now calculating the nutrition per acre and health per acre in organic farming systems, and we're finding that it's way above anything grown with chemicals.

### **Net vs gross income**

In terms of income — because that was another question that came up again and again — we do have to increase our income. But to increase income means two things: one, we have to decrease your costs because if you have very high costs, your net income is lower, and second, you have to improve the quality of what you grow. Net income is expenditure subtracted from the gross income. So if you want to increase your net income, you have to decrease the expenditure and you have to increase the value of what you produce.

In 1991 in India we had what is called structural adjustment — the World Bank tells you how you must change because of your debt. And one-third of our debt at that time was for agriculture. Well, our farmers were told to grow cash crops — cash crops like tomatoes. Every farmer grew tomatoes, and so there was no one to buy the tomatoes. The seed had cost one lakh. The women were giving away the tomatoes for free because they didn't have the heart to plough them back into the soil.

Now typical mixed farming that is organic will give a farmer a net profit of around fifteen thousand rupees per acre, compared to the net profit in a mono-culture farm of less than eight thousand. In every system that is based on external inputs, your net profit is lower, and on internal inputs your net profit is higher. So even as a system of human development, what Rinpoche said about self-reliance is actually economically beneficial to the farmer because self-reliance means higher attainment. Let me tell you what happens when this self-reliance is sacrificed with the false illusion of earning more — but not doing the real calculation, or not having the full consciousness, of what are the costs and the benefits of any system you're adopting. Here's an example:

### **When costs exceed income**

The latest technology that has been sold for seeds is genetic engineering in which a gene is taken from one organism that is not related to the plant and is put into the plant, which reminds me of the Buddhist philosophy and Buddhist values. It's playing with the lives of sentient beings. Normally rice is bred with rice and wheat is bred with wheat. But now they can take a gene from a soil-bacteria and put it into a plant. And one application of this new technology is to put a pesticide into the plant — to put the toxin into the plant so the plant makes its own pesticide; it makes its own poison. And this is called "bt toxin" because bt is a soil organism from where this gene is taken.

So at this time this genetically engineered cotton was sold in India with amazing images: Farmers were told: "you will get 1500 kilograms per acre", and all our divinities were used to advertise the new cotton breed — Hanumanji, Laxmanji and Guruji — every one was used in advertising. And the farmers thought, "I am going to become a millionaire," because this is the season of everyone becoming millionaires. Well, this

yield was not 1,500 kilograms — it was 300 or 400 kilograms per acre. The seeds had to be bought earlier. The seed cost, which used to be five rupees, jumped to 3,200 – 3,600 rupees. Of this, 2,400 rupees was royalty, because now the companies say: “I have created the seed. I am God. You will pay me royalty for every crop you grow.”

And the pests didn't get controlled, so they became super pests. In the meantime, new pests were created, and thirteen times more pesticide was having to be used on these cotton crops.

So with these very high costs — it's about 100,000 or 200,000 rupees per acre — a farmer is in such deep debt that the debt has become un-payable. So when the agents who sold him the seeds and the chemicals on credit against the value of the land come to take the land, they say “the land is mine because you can't pay what you owe me”. That day the farmer drinks pesticide to end his life because he is so ashamed that he has allowed his land to be slipped out of the family hands. So in India we had 200,000 suicides of farmers in the last ten years. 200,000! All of them are related to indebtedness, and all indebtedness is resulting from the farmer thinking he is going to get rich, but actually sinking deep into debt.

And another very important aspect related to this is that, while in the earlier period of the Green Revolution the government got the seeds to the farmers, the government is no longer the public supplier. It now all comes from one company, and five companies rule over that one seed supplier. That's the reality of agriculture change in the world today.

### **Organic farming protects biodiversity**

So, by contrast to that, organic farming in a way fulfills every one of the principles of Gross National Happiness. It respects cultural values. It promotes the protection of the natural environment. And in the area of agriculture, the key elements of the natural environment are biodiversity, diversity of the species, the soil, the water, and the air — the biodiversity of the soil, water, and air. And these elements become more important with climate change, because the climate *is* changing. And the climate is changing because of the pollution of the air. We have done studies over the last three years

comparing chemical farms and organic farms in terms of carbon return to the soil — taking in carbon from the air. Because, while chemical farming is based on industrial external inputs of nitrogen, phosphate, and potassium, organic farming is based on recycling of organic matter — of every kind of organic matter. And organic matter is a way plants take carbon dioxide from the air and turn it into oxygen for us through the process of photosynthesis.

As I already mentioned, bio-diverse organic farms actually produce more food and are the path for food security. But they're also the best way for climate adaptation, adapting to an unpredictable change in climate. Our research has shown that you can increase the carbon content of soil, and that means sequestering that much more carbon out of the air — up to 100% more — through organic methods. And globally one could take out about 300,000 million tons of carbon dioxide from the atmosphere if we would go organic across the world.

So how must all this scientific background become part of a transition, as part of the Samdrup Jongkhar Initiative? What we want to do is to replicate what we have done in India through Navdanya in the movement for biodiversity conservation in organic farming. And we have started this in 1987. We have started really as a non-violent, compassionate way of farming in the face of the very violent supermarkets. Can you imagine they now want to make seeds that they call “terminator” seeds — that means they are sterile, and that means farmers would no longer be safe even in having seeds. Taking away the life of the seed in order to force farmers to buy seed every year — terminating life — is such an anti-life thinking. And we have stopped it so far through the Convention on Biological Biodiversity, but that is why farmers say their living seed becomes an absolute priority.

### **Community seed bank at monastery**

Agriculture is part of culture — it has the word “culture” in it — culture of the land. And just like there's a culture of clothing, there's culture of eating, and there's a culture of speaking, there is a culture of farming. You all look so beautiful in your Bhutanese clothing because you've decided that pants weren't going to be the standard of

advanced dressing. While in a similar way when we dress the earth in her diversity, she is beautiful. And yet the seeds of the farmers are called the “primitive cultivars” and the seeds that come from the market are called “advanced cultivars”. Into that a cultural inferiority is being bred. But just as our language is not inferior, our clothing is not inferior, our food is not inferior, so our plants are also not inferior — they’re just different.

So the first thing we begin with is taking stock of the natural wealth and the wealth our ancestors have given us, which is biodiversity and is knowledge related. And in your area, the biodiversity is both in the forests as well as in the farms. We document this biodiversity by putting grandmothers and grandchildren together, and by putting all this knowledge in community biodiversity registers, which become the education about the natural environment, about our cultural evolution, and they become the place where the children learn how to protect this rich inheritance.

The second thing we do is to re-claim the seed as a common inheritance — not as private property and commodity, but as a common heritage of the community. So we create community seed banks. I hope the next time at gatherings like this the farmers will bring their seed diversity, and ***this monastery can become the first community seed bank for this region. The community seed banks are the first step in self reliance because if your seed is in your hands, then your agriculture is in your hands because seed is the first thing.***

And the first aspect of this self-reliance has to be the ability to be self reliant, and to protect the environment and practice compassion and all the values of GNH. Then the next potential dependency to avoid is in terms of chemical inputs, for which organic farming has much more sophisticated alternatives — whether it is for soil fertility, weed control, or pest control. My team, my colleagues from Navdanya, will be here for six days doing practical training in organic systems with the farmers. And of course we welcome a group of trainers from here to our school and our farm in Dehradun, so that whatever doubts remain in their minds, they can see how wonderfully organic works to improve food productivity, improve net incomes, and to improve resilience of agriculture.

### **Three issues on “labour scarcity”**

There are two questions that kept coming up from the farmers. One was always the issue of labour scarcity. Now on the issue of labour, there are three things we need to keep in mind. First, in organic farming every other species is working with you. It's not just the farmer who is working. The earthworm is working. The bee is working. All the species are working and they're sharing your work burden. A good agriculture in equilibrium won't have pests because nature will control the pests. It won't have weeds because your farming planting system will control the weeds. So the idea that “oh my god, it's all on my head” goes away, because you are sharing in the work of the production of life with the way of life. Nature's working with you, you're not working alone. Nature's working with you.

The second issue about labour is: In chemical farming with monocultures there's a peaking of labour demand — at the same time everyone transplants, at the same time everyone harvests. So of course there are labour shortages at those times. But in an organic mixed system, there's distribution of labour demand, with labour needed throughout the year rather than the peaking at particular times. So the labour scarcity is really a created scarcity because suddenly everyone needs to hire labour at the same time.

You saw the film about Punjab last night. Punjab used to get trainloads of labourers from Bihar at transplanting and harvesting times. But now we have the rural employment guarantee scheme, so people in Bihar and elsewhere are putting their hopes into getting a hundred days of employment at home and are no longer seeking work in other states. So now there's a crisis of labour in Punjab.

And the third issue about labour is that when there is a real scarcity of labour because the youth have migrated and there's only old people left on the farms, there's still a way to address the labour shortage, and that is through community enterprise. Every farm doesn't have to have its own burning compost or earthworm compost unit. Ten farmers can share one unit, or one young unemployed youth can create a system by which he or she supplies to the farmers. So the community coming together where

there is too little availability of labour is a very, very important way to help the organic infrastructure role.

### **Self-reliant vs dependent market strategy**

A second question that constantly comes up is about markets. I personally believe that if you want to have self-reliance, if we want to take responsibility, then we must look at the market from within — from ourselves, from our farms, from our communities, and look to the market outwards, rather than have the market dictate what we will be as human beings, or what our farms will look like. A **self-relying marketing strategy** first states: (1) this area can grow this crop well without harming nature; (2) it can grow this without undermining our food security; and (3) it can grow this without adding additional cost burdens to our lives.

By contrast, a **dependent marketing strategy** allows big interests to determine how agriculture should be done. So instead of your farm finding a market, the market finds your farm and sells you what *it* wants. And a dependency-creating market tells you that everything you have is wrong. These wonderful mandarins that are delicious and juicy and sweet — they don't transport well for 6 months, so it's the very hard oranges that get planted that are harder to peel. They have hard oranges that are now bred in Florida and other places that are made for processing and long distance marketing, and they will say the juicy mandarins are inferior — say your produce is inferior. You know, we have 1,500 banana varieties in India, and Del Monte, this big processor, says they should all be wiped out, and we should get the Del Monte banana from Central America to plant in its place. The tastiest apples I've had since childhood — in childhood in the mountains we had wonderful apples — but the apples that were given to me after my last trip to Thimphu were delicious, because what you get in the name of apples in the markets anywhere in the world these days is pure starch and pure cellulose. They have no juice, no taste, no flavour.

So what a self-reliant marketing strategy for organic would be is first — food security. And then the unique products that Bhutan has on the basis of its biodiversity — both cultivated as well as wild — and to develop these bounties in healthy, natural

products, which will become more and more important as time goes because these products will be less and less available.

### **Growing real food and real human beings**

In Navdanya we save the seeds of old grains and we call them “forgotten foods”. People used to laugh at us and say: “Do you really think people will give up beaten rice to eat this millet?” Today the biggest queue at Navdanya retail is for the old grains. I notice buckwheat is a very important product of this region. I also notice when I travel in Europe that every second European has wheat allergies, an allergy to wheat. Buckwheat would be a wonderful export opportunity. And of course your wonderful nuts and fruits as well as your handicraft products — for example land-based products.

The agricultural system that is destroying the planet, destroying our farmers, destroying our land, destroying employment, is based on two assumptions that are really vile assumptions. And these have been spoken about more and more in consciousness raising debates around the world. The first assumption says that farmers should not use their heads. Maybe the farmers giving up their heads could be considered development; maybe the farmers giving up the use of their hands could be considered development. But that is creating waste out of talented, skilled, knowledgeable human beings.

The second thing we know is that only farmers working with nature, with the soil, with the biodiversity, with the water, with the sun, can produce real food. But at a meeting on food security, one expert said to me: “Let’s get used to the idea that we will not need farmers, we will not need food, we can live on pills.” And it is this arrogance and this hubris which is at the basis of the violence to the earth and to human beings, and which constitutes the second vile assumption about so-called ‘modern’ agriculture.

For us in Navdanya, good agriculture, organic farming is not just about cultivating a good crop. It is about cultivating real human beings with compassion, with responsibility, with a sense of interconnectedness, and with the joy of living on this beautiful planet. As you have said, Honourable Prime Minister, ***organic farming is living GNH***. And there

is no more fertile ground for beginning that initiative than here in Samdrup Jongkhar, and ***we are at your service***.

A lot of farmers still had their hands up at 8:30 at night the other day, so I'm sure you have questions. So if there are any unanswered questions, any doubts, please do ask them. (applause).

### ***Question period:***

*(NOTE: Due to problems recording with the wireless microphones used on the floor during question period, most questions were inaudible in the recording. An effort has been here made to summarize the basic question content.)*

1. **Question** (inaudible) concerned Dr. Shiva's comparison of output in mono-culture vs organic farming: "If you were to cite an example, how would that apply?"

**Answer:** I actually picked an example from a terrain that's exactly like this and where maize is the mono-culture and where the associated crops that are given up when you become cultivators of chemically fertilized things are usually beans and pulse. I'm absolutely sure it's the same here. Maize alone, as I mentioned, as a mono-culture can be found at five quintals. Maize together with an organic mixture with four quintals of other foods, which would be peas, which would be beans, which would be vegetables, produces more food and more output overall.

One other thing: You know, we have made a commitment from Navdanya, that we would help monitor the transition to organic farming here. And as far as monitoring, we will do the kind of research we've done in all other areas. We'll actually work with you all to see what are you growing today? What is your production? What is your soil fertility? What is the health of your soil? How many soil organisms are there? And as the years pass with organic cultivation: How has the soil improved? How has the food output improved? How has the health of your plants improved? All that will be part of what we work on with you if you participate.

2. **Question** (inaudible): "Thank you for your time. My point is this: You mentioned how there are so many uncountable beings in the soil. So the question is: Yes, the ones you

described are beneficial, but there are some organisms that are harmful. How do you manage those?”

**Answer:** In a healthy balanced soil, the organisms manage each other and they prevent the harmful organisms from growing too much in population. That’s why you need diversity in the soil, so the healthy fungi and the healthy bacteria keep the others under control. The same for insects and pests. When you have enough diversity, then one kind of insect will eat another kind of insect. For example caterpillars and lady bird beetles are very, very good pest control agents. If you have caterpillars on your farm, you can be sure they are controlling the pests. When you spray the pesticides, you kill all the beneficial species, so there’s no control and the nasty ones increase in number. Similarly in the soil when you kill your beneficial organisms, then your fungi that cause damage, your viruses that cause damage, increase in numbers, which is why we need bio-diversity as a way of controlling the bad infestations.

A parallel is, you know, that human beings now are getting infected with what is called the Acquired Immune Deficiency Syndrome — AIDS. Immune deficiency means any infection will catch you. The same happens to the eco-systems. When your soils are depleted, they lose their resilience and any infection can infect the plant.

3. **Question** (inaudible) had to do with sunlight reaching plants.

**Answer:** “Well, even in the forest floor, you have herbs that are growing because little bits of light are filtering through.

4. **Question:** (inaudible) Translator says that people are expressing how fortunate they are to have you sharing your skills and to have this interaction with other people. The question is: “If you use the urea, what is the impact of urea and how will it also impact your health? Will it also affect the crops in the other nearby plots where urea is not utilized?”

**Answer:** As I mentioned, you know, urea is a very partial diet for the soil as well as for plants. And not only is it a partial diet, it kills the organisms that could provide the full diet. The earthworm is one example. And one of the steps we take in letting farmers

become aware of how violent their farming is, is take earthworms and sprinkle them with urea — they start to die. And if you're applying urea again and again, of course, all the soil organisms are being killed.

Will other land be affected? It depends. If the water — if I have a field and I apply urea and the water carries it to the next field, it will get affected. And what you accumulate is nitrates in the water, which are very bad for you, both for human life as well as for fish life. Nitrogen fertilizer run-off is the biggest reason for what they call the dead zones in the oceans. Where the rivers enter and they carry all this nitrogen fertilizer, no fish can live. Nitrogen fertilizers are also a very important source of nitrogen oxide, which causes damage to the atmosphere — 300 times more damaging than carbon dioxide.

**5. Question:** “If we stop using the urea, how do we make the transition to a urea-less farming — because the addition of urea has helped increase the output. Now, how do we make a transition?”

**Answer:** I've already mentioned with the earthworms, with vermi-compost, compost made using earthworms, you actually have far more nitrogen than urea provides. And you have absolutely no loss in terms of the narrow NPK — you actually have a gain. The transition is a wonderful transition. And it's the time it takes to start making the different kinds of compost. You get the compost with earthworms. You can make the compost with organic matter from the farm. You can make compost with animal waste.

And I think we need to start seriously thinking of making compost with human waste. Compost toilets in remote areas are probably the most ecologically sustainable way to go, where the urine gets separated and the waste gets composted into fertilizer. And human urine is about ten times more nutritious than even cow urine. Human urine is the richest and we're wasting it and turning it into pollution for our streams and our rivers through the flush toilet.

Another place for making a transition to urea-less farming is to re-introduce nitrogen fixing crops. All the beans and legumes fix nitrogen for free. And if you have a mixture with nitrogen rich crops they're already providing your nitrogen fertilizer.

6. **Question:** (inaudible). The question was about pest management: "In a traditionally Buddhist nation, the teachings of the Buddha are about respect for life, so we should not use chemicals and pesticides, especially if we use pesticides that are killing both beneficial and harmful pests. But what are the other options available?"

**Answer:** There are 3 big alternatives available to toxic chemicals that kill the beneficial species and actually turn the pest into a super pest. There has been a 1,200 times increase in pests because of the use of pesticides. So they're not succeeding in controlling pests; they are succeeding in destroying life on earth — 70% of the bees on this planet have disappeared because of damages caused by pesticides. And I think this area will be very rich in bees, because you still have so much forest, which would be very, very fortunate as a conservation role — a safe zone for bees.

So the first way to manage pests organically is to increase the diversity in your eco-system, whether it's forests or it's the farming eco-system — because different insects feed on different plants. And when you have many plants of different species, you have many insects of different species. And they manage what is called the pest / predator balance. This is the most effective way to control pests.

On our farm, the first two or three years we had a few pest attacks when we started the organic farming and then we used the second alternative, which is botanical pesticides like neem. Neem was patented because it is an effective pest control agent. And our team will bring in booklets of all the things you can use as alternatives to toxic pesticides. But on our farms now we have absolutely no pests. We've lots of species. We got lots of pollinators. I think our pollinating population has increased by 5 times by stopping any chemicals.

But the third very important aspect of pest management that's forgotten was studied brilliantly by a French scientist called Chabuso, who studied plants that were fed organic food, which means organic fertilizer, and plants that were chemically fertilized. The

plants that got organic food had more resilience to pests; the plants that were chemically fertilized were more vulnerable to pests. And he did this very systematically.

My research on Punjab, on the Green Revolution, has also shown that agriculture that is chemically based, promotes pests, first because the plants themselves are vulnerable to pests. Second, when you grow only one mono-culture, one kind of pest thrives and becomes damaging. And third when you spray with pesticides, you create an imbalance and therefore create super resilient pests, which can't be controlled by any spray, which is what's happening to the bollworm in India now. And it's what's happening to weeds in America, where weeds are becoming resistant to Round-Up. And what's sad is they're paying \$12 an acre to farmers, to tell them to break the contract and use a more lethal herbicide.

So there are alternatives. They're tested, they're tried. They're part of government policies around the world. They're part of the FAO no-pesticide management systems. So this is a no risk path; to give up pesticides is absolutely no risk for farmers.

**7. Question:** (inaudible) "There are pests that are destroying our crops. How do we manage once they are destroying our crops?"

**Answer:** The first thing is that pests become damaging pests because the agriculture is in disequilibrium; the agriculture has gone out of balance. Good agriculture will not have pests. They will have insects, but they will not have pests, which become economically damaging.

And I quoted Sir Albert Howard on the fertilizer issue. He was sent to India to improve Indian agriculture with chemicals. And he said our soils were fertile, there were no pests in the fields. "I decided to throw away my spray guns and turn the pests into my professors." He then wrote *The Agricultural Testament*, which is called the bible of organic farming. But the pests were its feature — how many pests are there, and how do we get organic balance? And it was the understanding of the ecological relationship of balance that was important.

So the way to not allow individual insects to become pests that are damaging is to grow biodiversity, to insure harmony among different species, and to give healthy food to the plants, which is organic food, so that the pests can be resisted. Just as in society, a vulnerable person will get an infection — a vulnerable person will be swayed by whatever is a negative value — a plant is vulnerable if it is not getting the full diet for resilience. So the way to control pests is not to treat individual insects as the problem, but to treat the imbalance that has allowed that insect to become dominant as the problem, and to reintroduce the equilibrium. Organic farming is a way of reintroducing equilibrium.

**8. Question:** (inaudible) concerns spraying crops.

**Answer:** But if you love to spray, you're dying to spray, then spray natural sprays and spray neem oil. The Navdanya team will tell you exactly how to create biological, natural sprays for controlling pests. They will give you exact amounts to be mixed, and tell you how to make them and how to make neem oil.

**Translator:** Last question.

**9. Question and Answer:** (inaudible) asks what the government's position is on using urea. Although also inaudible, the Honourable Prime Minister indicated that the Agricultural Ministry representative should answer the question. However, this answer was also inaudible.

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The talk ended with an expression of warm appreciation for Dr. Vandana Shiva, sincere thanks for her promise to help the farmers of Samdrup Jongkhar transition to organic agriculture, and a robust round of applause. Both she and her Navdanya staff have pledged to continue to train the Samdrup Jongkhar farmers and to help monitor the progress of those who participate.