

Organic Farmers and Soil Health

By Claude Alvares

(From: SPWD's Lovraj Kumar Memorial Panel Discussion on 'Soil Health and Sustainable Agriculture' held on Monday, September 23, 2013 at 6.00 p.m.)

I have some pictures which I want to show about some of these problems you were speaking about. I am speaking actually from the perspective of someone who has been involved in organic agriculture for 30 years and this tradition mainly involves the concept of treating the soil as a living medium rather than a dead one. I am just quickly going to run through these slides which are (the first 31 of them) basically pictures of a mining site where we tried to introduce vegetation. The pictures are of a mining site, but this is not a lecture on mining. The intention is to show you how nature has got tremendous amount of resilience and how it is able to grow things even on surfaces like this. We did not use chemical fertilizers and any of the other things like water, equipment and so on. We only used garbage for this work of restoring the soil.

So you can see this picture of the mine site, here we begin with few types or varieties of grasses we used. The nature of the soil you can make out, it is hard, rocky and it is a mining dump site which has been there for many years and with no vegetation or organic matter whatsoever and no green cover at all. A typical iron ore mine in Goa.

We suggested this to one of the mining companies which agreed to collaborate in this project. We first introduced vetiver grass and we used that as a base for reconstructing the mining site. Now these are the standard methods of just putting in the grass and you can see that the soil is still barren and it has got absolutely nothing and we don't use any chemical fertilizers. What you see (which is somewhat black, slide No.8) is some kind of compost that we got from a landfill, from a municipal landfill where we were doing some composting. Garbage came in because we realized we need something to cover the soil surface.

Now this is very important, for as Dr.Abril had said, we cover the soil from garbage that we get from outside, from the city. They also don't know what to do with the garbage. This is from the market area, this is not from the households and they don't know what to do with the garbage, so we transferred this garbage to the mine-site and we continue putting in that because it helps to keep the soil moist and also prevents the evaporation of soil moisture and provide the very much needed cover for the soil. We don't care how it looks at the moment. This is not a beauty contest. There are some pieces of plastic around but that's not an important thing right now. The important thing is to keep covering the soil and to enable that vegetable grass to keep coming up and as you can see there is a very gradual transformation.

This is a two year thing, a two year project. We began before one monsoon and ended with the second monsoon. Sometimes we use a little water if we have it but most of the times no water is used and you can see how nature struggles but if it is allowed to itself, it manages. Now you can see how the grass is growing a little bit, more tillers have come out. Now you can see ferns right in the middle which we haven't grown (slides 20, 21). We haven't put those ferns in but they have come on their own and you can see there is some diversification in the grass. We had put only one grass species (vetiver) but by the end of the year, we found 23 grasses, none of which we had put. They have come through rain, through birds or whatever. This is the same site which you saw at the very beginning and you see this transformation within eight months.

As you can see, the ground gets covered on its own. We don't put anything more. We don't touch anything more in this case. We only wanted to show how natural processes actually do a lot of things and we interfere with them and sometimes create more problems than before. Now this has gone through one monsoon and now it's on its own. You can now see the seeds already on the top, they would keep propagating and the process would continue.

There are trees on the sides. Those seeds will start sprouting in a plant and at the end of two years you can see the vegetation growing on its own. Now it has got its own momentum and it can't be stopped. I mean you leave this, a situation like this and in twelve to fourteen years you have a forest here. I am talking from experience because some of my colleagues have created forests in fourteen years. This is natural progression. In monsoon areas we take fourteen years for a forest to grow provided you don't touch it at all. You don't want foresters, you don't want the forest department, and you don't want anybody else. You can just protect it and you will get a forest after fourteen years. This is documented and this is available.

You can see there is ash gourd on the top (slide 31) and this is from the vegetable seeds from market, the vegetable waste that has been dumped on the plot.

Now when we deal with soils we have this problem today, with all those people who have been educated. Soils now are no longer seen as soils or earth or as mud, now people in cities look at it as dirt. The first thing that women will tell their children when they come into the house is, Why do you come in so dirty and why do you bring this dirt into the house. Talking about soil as dirt seems to be symptomatic of the way we have treated soils through modern agricultural practices for the last fifty-sixty years.

I am conscious I am providing a totally different perspective from the one presented by my

predecessor speaker. In some ways it will complement what he has said and in some ways it might not. But that's not a problem. We need to have a basis for a good discussion.

We see soils as basically dead. We don't see them as alive because we document only the things that we see.

If we go to the National Bio-diversity Plan, which was put up in 2008, and is there on the National Biodiversity Authority's website, you will find that all the things that we know have been put up, that is, the vegetation, the amphibians, the insects and everything is up there and the microbes are at the bottom of the list and they are shown as only 10%. Now you would think that this is very funny because microbes are actually the population of the planet and they are the hosts and we are the guests. Everything is covered by microbes. Even our skin now is covered by microbes. Your table is covered with microbes. You go to bathroom it's covered with microbes. Everything is covered with microbes and because we are living in some sense of harmony with these microbes, we survive. The moment this harmony breaks down, we get ill.

Then of course we have this modern invention of 'antibiotics'. As its name signifies, it is anti-life, anti-bios. It is to kill. So we think that we kill. For a few days, we use this very toxic medicine, we clean everything out, we clean the good and the bad and then we hope everything restarts again. The doctors tell you to have nutritional supplements, the B complex and all sorts of things so that you can restore your gut bacteria and bring it back to your normal state.

In the cities we try to cover the microbes. Look at all the trash thing that goes out. We don't want any connection with the soil. You take Delhi city, we were talking to Prof. C.R.Babu this afternoon and he was saying that maybe about 80% of Delhi city today is built-up area. If you have built-up area, then where will your plants grow, because there is no place.

I saw the National Green Tribunal a few weeks back telling the Delhi Corporation, go and uproot all the pavements, so that the trees can breathe again and so they got around destroying all the pavements, maybe that's the new commission for them. They went on breaking everything and when they are going to put it back, no body knows but the ostensible purpose was to allow the trees to breathe again. Because everywhere the cement has actually engulfed and like a constriction gone around the trunk of most of the trees of Delhi city. This is the extent of our hostility towards microbes. We don't want to see them anymore, so we brought them under cement and we don't want any further interaction with them.

When I present the work of our organic farmers I think this picture should be kept in mind because what they are trying to do is something different. They are working with microbes and a very interesting thing that I was discussing with Prof. Babu this afternoon, he is dealing with degraded ecosystems and he also works only with microbes. He says you may do whatever you want, you may have whatever vegetation you want but if suitable microbes are not there to sustain it in the root level, there is not much chance that they are going to survive.

Our organic farmers are only working with microbes. They are not using chemicals. They have stopped NPK for a very long time. They are not interested in pesticides, synthetic poisons. They work largely with microbes.

Now the person who highlighted all this wisdom was a British scientist called Albert Howard who was sent to India in the thirties to try and improve Indian agriculture. He wrote a book called 'An Agricultural Testament' and the conclusion of the book is that I came here to teach these guys how to do farming, but there is nothing I could learn but I had to learn things myself. He went back after discussing with farmers, created the Indore method of composting and today he is the icon for organic farming all over the world. One of my friends in Indore has just published his second book, 'Soil and Health'. I told him to come for this meeting and bring copies because this is just the new edition of the book 'Soil and Health'. Howard's interest was again only working with microbes.

Now if we try to look at the two systems that we have today, and if we look at microbes as a world community – 80% of what you call biomass in the soil is microbes, is earthworms, is termites – but our scientists are glued to biodiversity above the ground because it's the trees that you see, animals are what you see. What you don't see, it doesn't seem to be of any importance. But it's the microbes eventually that do all the things in the soil. And since we don't see them at all, for all practical purposes for us they have no function.

Why do plants survive without human beings? Now look at the Amazon forest there (slide 32). These are pictures of Amazon forest. Next pictures, these are again pictures of other good complex forests. If you look at these pictures the thing that strikes you is, how do these forests survive? How do they grow? Do you see anybody putting fertilizers and chemicals for these trees? Do you find anybody spraying pesticides on them? How do they maintain ecological balance? How do they freeze carbon the way these trees have done in their trunks (slides 38, 39)? How do they occupy every layer of space (slide 40)?

Now this is a plot just outside my house (slide 41). Every year this is the covering which comes up

on the entire plot and no body lives there and no body puts any seeds. It just comes up and covers the soil. Nothing is left uncovered. This produces flowers, flowers produce bees and a huge amount of bee population, very fine bees, using those plants. That's what nature will do for you, if you give it half the chance, it will cover it up (slide 42).

You see that's the principle by which the forest survives. If you want microbes to survive you don't expose them, you don't expose them to the sun, you don't expose them to other things like chemicals. Soils that have no life are called sterile soils. They are by our logic dead and what chemical agriculture has done to the world is to reduce the biological component more than 80%. Most of the soils where chemicals have been used for thirty-forty years, there is a complete desert as far as living communities are concerned. You will not find earthworms in any case, you won't find termites, you won't find spiders, you won't find a whole lot of other organisms which are there in soils that you find in forest.

Now what our organic farmers say is, if this is the way our forest functions – without cost, without inputs, without imports from the gulf countries, naphtha plants, without loans from the Reserve Bank, World Bank, etc., – then why don't we do it the same way. The soil is our bank. So that's what they started doing and this is an organic farm which has actually eighty leguminous crops. (slides 43, 44). There is a young guy Nandish, a very good organic farmer, who grows these eighty leguminous crops plus all the other things that he uses for his production including coconut, etc., that he is growing there. It looks like a jungle and he says it's a jungle because the jungle is the most efficient way to produce biomass.

We educated folk however feel that the most efficient way of doing farming today is the American way where you have one farmer operating 500 acres but doing agriculture in a most inefficient way. He is using 50 units of energy to produce one unit of food and the *adivasi* farmer using one unit of energy is producing 50 calories but the *adivasi* farmer is considered to be inefficient and American is supposed to be efficient.

If you look at these types of productivities then you know that American agriculture is extremely mediocre, inefficient, it guzzles resources and it actually destroys soils and people, it destroys farming communities and it eventually puts the entire agriculture in the hands of just less than 1% of the population and you know with all the consequences.

Now this is that you will see in the next picture (slide 44). This is the soil at the farm of Nandish. It is almost impenetrable, just like a forest is and a 100% canopy density and the ground is cool, the

moisture is always there, no water evaporates and because of that the microbes survive for any length of time and the microbes supply all the nutrients. Now this is exactly what nature does in a forest.

I remember reading in my old botany text book that plants get 97% of the nutrition from the atmosphere. Is that correct? 44% oxygen, 44% carbon, 17% nitrogen – from the atmosphere! They are geared to take their food from the atmosphere. Why do we treat them as requiring 95%-97% of the nutrition from the soil? I have discussed with endless number of agricultural scientists and they can't give me an answer. If plants take 97% of the nutrition from the atmosphere, then what do they take from the soil? 3%, 3%-5%? Who supplies it to them in the forest,.Microbes, termites.

In Indian agriculture we have a very sound principle that you may not be able to get the enzymes that are there in the termite mound and you may not be able to isolate the microbes that are there in the forest, but we have the cow which is a fantastic multiplication factory for microbes, for beneficial microbes and actually for the soil. And that's exactly why there is this great relationship between cows and Indian agriculture, animals and agriculture, because animals have typically provided the fertilization required for maintaining the soils and we have any number of examples in India.

I remember in many places where animals are tethered every night from field to field and many of us have seen this from our own experience and at some stage we thought we should ban all this, we should export their meat to the gulf countries because they are useless, they are inefficient animals. But we did not understand the system.

We have got organic farmers now who are not bothered about whether their cow gives milk or not, they are only interested in the dung. They take the dung. They take all the other elements of the cow, ferment it and make it into *panchagavya*. They make a brew out of it. They mix it up for 15-20 days and then feed the soil with it.

I don't know of any organic farmer today who talks of looking after the plant or feeding the plant. They all only talk of looking after the soil. I know organic farmers who began with *panchagavya* and *jeevamrutha* and things like that. After five or six years they have reached such a remarkable status as far as their soil health is concerned, they said we have even stopped putting any *panchagavya* or anything any more because we don't require this and we are getting very good production every year by year in whatever we produce, be it rice, sugarcane or turmeric, only by following these soil-nurturing systems.

Now these systems are, as I said, all free of cost. They are all from locally available materials. In organic farming you don't enrich your soil by stealing or borrowing organic materials from some other place on the planet. When you want to put organic matter into the soil, you generate it yourself and you put it back into the soil yourself. You don't go steal organic matter from somewhere else. If you do that, then you are depriving that particular piece of earth of getting its organic nutrients. So don't do that.

We have organic farmers who have reached this very good level of farming where they really don't spend any money on their agriculture. In certain areas in Tamil Nadu, for example, as a result of very good organic farming, the agricultural divisions, credit divisions of the banks had to be closed down because nobody was coming to them anymore for money to purchase chemicals or fertilizers because they don't want them anymore.

Women folk are once again finding a central place in farming: they are actually better at manufacturing *panchagavya* and selling it in one litre bottles and there is good demand for them from all over. There are farmers who are now generating earthworms on the scale of units as large as football fields. Sorry I don't have with me at the moment those slides and that's why I am not able to show them to you.

There is a tremendous amount of fervor among people who have finally understood what the soil is all about. Soil is not a petri-dish in which you dump NPK and then expect the plant to grow. That is assuming that the plant needs you in the first place. You can have a system of agriculture in place where you assume that the plant doesn't need you in the first place. All our modern agriculture is in production of seeds, production of NPK, fertilizers and production of pesticides. So we have come to the conclusion that these things and we who produce them are essential to the growing of plants. That's not necessarily true.

I have had difficulty with planners and whole lot of bureaucrats – even farmers – who today are convinced that the plant will not grow without chemicals. That's why I carry these pictures with me. They tell me, you mean to say that life can grow without chemicals; you mean to say that wheat can grow without chemicals? I tell them, it's growing like that all over the place. Plants are growing all over the place. Forests are growing all over the place and you say you require chemicals! You please try and refute how all these things are growing and how this phenomenal quantity of biomass is being generated all over without using chemicals. Then they have no answer because the mindset is, without research and if we don't put these massive doses, we won't get any output.

We take scientists to farmers who are growing today successfully and get very good yields, as good yields as on any chemical farms. They are surprised. The agricultural scientists say that we don't know how to use this system. They don't know how to put it into their system. I think Tej Pratap will tell you the problems our agricultural universities and scientists face. We have taken legions of them to organic farms and they say sorry we can't replicate this. They say this is not our science. Our science is modern science. What you are doing is natural science.

Now I don't know how modern science is ever contrary to natural science because nature is the mother of everything. It is the mother of all inventions. Science is the understanding of natural laws. Nature is showing you how for million of years even without you she was growing plants. We in the last thirty-forty years think that it is essential we use chemicals. We have created this mess and mortgaged our entire agriculture to chemicals which we don't even own, which have to be brought from an area as insecure as the Persian Gulf. So if tomorrow, if we have some sort of a crisis in the Persian Gulf, we will really not know what to do because we'll say, how do we grow anything any more because we don't have any good soil left. That's all I want to say right now. Thank you very much for listening to me. We can have the discussion now.

For the slides discussed in the lecture, please download:

<https://dl.dropboxusercontent.com/u/6179856/IIC.pdf>