

Down on the FarmWhat is EM?

Bokashi and Mud balls!, and recycling food waste

The idea of seeding matter with desirable bacteria to give us the product we want is nothing new. We do it commercially all the time. We do it in the home and even on the farm. Successful silage making is dependent on getting the right “starters”. Wine makers seed pulp with their chosen yeast to get a good tittle and your home yoghurt maker relies on carefully selected bacteria.

That is the principle behind EM (Effective Microorganisms) technology as well. From a practical point of view there are several ways we can go about it, on the farm, in the garden or orchard. Last month I looked at how to extend concentrated EM and how the resultant liquid could be used.

This month, let us go a step further and see how we can mix EM liquid with organic matter and apply a bulk of fermenting nutrients to our land. The combination will have an even greater positive effect on our soils.

Bokashi (pronounced pickaashee) is like a super fast super charged compost. This can be made using the organic materials we have on hand. In Thailand the most widely available drymatter is rice husk and rice bran. During the workshop we mixed these two with a portion of chicken dung and dampened it all with extended EM. We mixed all the ingredients by hand and shovel on a clean concrete floor and built tidy little heaps about a metre square and 200mm high. These were then covered in jute sacks.

All this work and all in 40 degrees C heat. Boy did we sweat! But if we thought we were getting hot, then so was the heap. Within 12 hours it was almost painful to touch and needed stirring to bring the temperature down to the ideal 25 to 35 degree C. More work! It soon showed the unfit office wallahs from the “poor farmers” amongst the conference delegates. The trickiest part was getting the right degree of dampness with the extended EM solution. The ideal is a mix that holds together when squeezed in a ball but does not ooze excess moisture.

Within seven days the Bokashi would be ready to use. The microorganisms having moved throughout and attached themselves to the material. This was aerobic bokashi. The organisms used oxygen in their activities, so the heap heated up.

But we also made Bokashi anaerobically. The mixture was the same, but this time we pressed it tightly into a sealed drum so that air was excluded. This prevented any heat developing, so less energy was lost during the fermentation process making the result a richer fertilizer.

Obviously in New Zealand we don't have a lot of rice husks. And a tidy little heap a metre square isn't going to help much on a thousand-acre farm. But we do have bulk sawdust, hay and straw, surplus grass at some times of the year, and we have silage cutters and wagons. Many farms have loaders on their tractors that could be put to mixing up truckloads of ingredients. We also have animal manures and fresh cut pasture for the nitrogen component needed. In fact for anyone operating a feed pad through winter, then disposing of the manure becomes a problem. Here that problem becomes a solution... For instance in Myanmar, Bokashi is made using ten parts of straw, to three parts of any type of animal manure and one part of bran. (As well as the added EM and molasses.)

Firstly they soak the straw in the EM solution. (Made of 1:1:100 of EM concentrate, Molasses and water). Then put down a layer of straw, sprinkle on some of the bran and some animal manure, spread another layer of straw on top and repeat the layers until the heap is about 80 to 100 cm high. Then it is covered with sacks or a polythene sheet to stop the mix drying out too much.

After a week the bokashi should have a sweet fermented smell and white fungi will appear throughout it. Then it is ready to use. It can be dug into the garden, spread on the pasture or piled under fruit trees...

Look on Bokashi as a busload of visitors coming to help on your farm but who bring their own food with them. Microscopic workers of course, but millions of them. Of course microbes with a food source will stay a lot longer than those just sprayed on in liquid. They can get better established and last longer both on the ground and in storage.

At Saraburi in Thailand, bulk bokashi is made in massive great hoppers and mixing machines. It is like a factory operation, with hundreds of bags produced whenever there is sufficient rice husk and chicken dung ingredients to make a run worthwhile. The bags can then be used around the demonstration farm as needed, or sold at cost to local farmers who want to use EM technology.

Besides using bokashi directly there are two more applications, which really interest me. Refuse and water pollution. Rubbish disposal is a problem everywhere in the world. Getting rid of our mess seems to get more and more complicated even with our tiny population. And the speed at which we fill our dumps and the difficulty of finding sites for new ones means anything that will reduce the flow of garbage to the tip is exciting.

EM research has found that household scraps, fruit and vegetable peelings, waste veges and the like fermented with bokashi, can be ready to add to the soil within a matter of days. This is a distinct advantage over composting. In reality, many home composting systems tend to just be a heap of garden and kitchen stuff that is left to rot in its own good time. Poor compost making can smell bad and attract rats and the like. And it is more likely to be months rather than weeks, before it makes a safe and valuable addition to the garden.

So the EM research people came up with a little kitchen garbage disposal unit. It consists of one bucket with holes in it, inside a larger kitchen tidy type of unit with a tap at the bottom. Every day you add your peelings and treasures from the back of the fridge, sprinkle a handful of bokashi on the top, press it all down, seal the lid again and leave it to ferment a bit longer. After a few days a liquid juice can be drawn off the tap at the bottom. This stuff is rich in nitrogen and can be used as a plant food in its own right, but carefully, as it is unbalanced nutrient and if used too richly can make plants disease prone. However the remaining bits and pieces in the bucket make a rich fertilizer. They don't pong. Well they do, but it is a sort of fermented fruit type of smell, not a rotten smell at all. They are covered in microorganisms and can safely be buried in the garden. Then by the time the roots of any crop that is transplanted on top of them, reach the mix it will have been converted into a rich mix of nutrients. The wider the variety of scraps involved, the more balanced the nutrients will be.

For those who want to keep the unit handy in the kitchen make your bokashi without animal dung. Stick to sawdust and bran. For every kilo of garbage, add about 50 grams of bokashi. Press it down firmly and close the lid tightly to keep it anaerobic. Draw

the fermented juice off daily. Mix it with water at 1ml to 500ml as a plant food. Add it to your septic tank, pour it down the drains to stop them clogging. The juice is rich in lactic acid bacteria and yeasts, which will work on any sludge in your pipes or septic system. Don't add cigarette butts, already rotten garbage or large chunks of meat or fish.

The fermented garbage can even be buried in a planter. First put down a layer of gravel for drainage. (Note the planter must have a drain hole.) Then add a layer of fermented garbage, up to a quarter of the depth of the planter, then fill it with soil. Cover it with plastic and allow it to ferment for ten days or so. You will probably get a lovely crop of white mould under the plastic. That's fine, but don't put your plants in until the mould stage of fermentation has passed or your seedlings will end up as just so much more bokashi. Usually after a month the planter is ready to go and your plants will thrive in it.

Besides fertilizing hungry soils, bokashi can be used environmentally...as a cleanup solution for polluted waterways, smelly effluent ponds, farm drains and dams. Considerable work has been done in Japan and Thailand applying balls made from bokashi and mud into the sludge of canals and waterways. Not only is the depth of sludge radically reduced but the smell and water clarity improve out of sight. This is really exciting stuff. It seems the mix of beneficial bacteria combat the harmful bacteria, which produce rotten and sulphide smells and go to work on the sludge layers breaking them down.

Forming bokashi into heavy balls enables the EM's to sink down through the water and get deep into the sludge at the bottom. Then as they proliferate outwards, they attack the pollution in their area. EM liquid can also be applied to the surface of still bodies of water. The combined approach of regular applications of EM liquid and bokashi mudballs seems to be the most effective. I will certainly be trying some on our dams and will see if the neighbour wants to try some in the cowshed settlement ponds. What a breakthrough if we can reduce the effluent that ends up in our waterways, and improve the quality of our stock water supplies.

To make mudballs simply mix up about ten litres of soil, a litre of bokashi, and a litre of activated EM solution. Grab a generous handfull of the mix and press it tightly into a ball shape. At Saraburi the balls were further compressed with a small mould which squeezed out excess air and made the balls a uniform shape and hard enough to survive being dropped into water.

After a week the new balls will probably be covered with white fungi. As soon as that has disappeared they are ready to use. Drop the balls into the waterway at about one to ten balls per cubic metre of water (depending on the pollution level) monthly or until the pollution is cleared. The mudballs can be used where water is flowing and EM liquid can be poured into areas where the water is still. To combat sludge dilute your activated EM about ten times, and add 30 litres of that diluted mix per metre of sludge once a month.

So here we have a solution to our polluted lakes and putrid waterways. Get the millions of little microbes going to work for us. Twenty-four hours a day, no strikes, no overtime, just busily converting degraded ecosystems full of harmful microbes into productive ones with beneficial bacteria. If it can work overseas, it can work for us too. We just have to get out there and try it.