

# Nature Farming and Shrimp Production in South America

H. Ota and S. Kinjo

*Mokichi Okada Foundation, Research Center  
Caixa Postal 033, 13537-000, Ipeúna, SP, Brazil*

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***Abstract** : The development of Nature Farming in Brazil has expanded to a wide range of activities, from agriculture, animal husbandry to environmental protection. There are results showing that it does not depend on the size of the land or type of crop but on the correct management of organic matter. The use of EM (Effective Microorganisms) has been considered as an essential and effective tool to get success in the conversion from conventional to organic or nature farming. However, some factors should be considered to achieve expected results. For the pepper production, the management consisted basically in improving soil quality by using organic matter and environmental equilibrium of the whole farm (field). In Peru, EM got good results in shrimp production, by controlling white spot disease (virus). Too much feed with chemicals and medications have been used to accelerate the weight enhancement of the shrimps, leading to environmental pollution and resulting in the spread of the disease. Bokashi and EM used for the treatment of the shrimp growing-ponds are helping to recover the equilibrium of microbial activities and permit to continue shrimp growing enterprise.*

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## **Introduction**

Facing several problems as lack of government subsidies programs, low market prices, high input costs (chemical fertilizers and pesticides), high environmental costs (erosion; soil, air, water and even ground water contamination) and concerns about health, many farmers are looking for alternatives.

In the last eight years, organic farming movement growth has been improving and many farmers are trying to shift from the high chemical input system to organic one but most of them are just switching the chemical fertilizers and pesticides to organic products, ignoring the various factors implied in crop production, as it happens in the conventional farming. It is important to resolve the cause of a problem happening at the field instead of its effects.

At the beginning of the use of EM (Effective Microorganisms) similar errors were made by many farmers, just applying EM to the field, not considering how, when and where to use it in a proper way.

## **Nature Farming**

The soil must be focused. It is not just a physical support for crops. The soil and several cycles that take place in it are the main factor that affects crop production.

Developed root system is especially needed in soils with low fertility. It allows the crop to explore bigger volume of soil, getting the needed nutrients and turning the crop more resistant to water stress (drought).

What kind of soil do permit the root to develop? How to get to this soil?

Crops need an aggregate soil to have the roots to develop properly. The correct use of organic matter is the point to promote the activity of beneficial organisms as earthworms, bacteria and fungi. The microorganisms metabolize organic matter and resulting substances promote the aggregation of soil particles.

Since beneficial microbial activity is needed, the quality of the organic matter is very important. It can be brought from outside or produced in the field. With the use of EM the organic matter is fermented producing beneficial substances. Therefore when animal husbandry residues are used, for instance, a treatment is needed before applying this material to soil. A good way to evaluate the state of the material is its smell. Bad smell indicates putrefaction and then a treatment like fermentation or even composting should be done before use to avoid negative effects, such as compacted soil and weak plants.

The organic matter can be produced in the field as green manure or weeds that grow with the crop. Despite the term 'green manure' the purpose of this vegetation is not the direct fertilization of the crop but the improvement of soil physical properties. In this case the use of leguminous plants do not seem to give good results because of its nitrogen content, specially in hot and humid places, since its decomposition is very fast and do not improve the soil quality. Since the EM is composed by several groups of microorganism the combination of organic matter source should be diversified. It allows the soil to have a diversity of microorganisms associated to different plant roots, different soil depths reached by the roots, and different nutritional composition.

Another important point to be considered is the way organic matter should be applied to the soil. The best results were obtained when the compost or green manure are just put on the surface of the soil or incorporated to the maximum depth of 10cm. If organic matter is amended deeper, it may putrefy and then produce malefic substances for the crop and soil organisms, letting the soil to harden and the crop to become susceptible to pests and diseases. Placing the organic matter on the surface has the other function of protecting the soil against the action of the sun rays and impact of water from rain or irrigation that compact the soil.

Like the diversity of organisms in EM and weeds, as already mentioned, the diversity of vegetations, some serving as wind-breaks, has shown positive effects on creating a more healthy environment and helps to keep the natural enemies of pests that attack the crop.

### **Report of Pepper Production**

Pepper farmers at the North Region of Brazil - Pará State, nearly 50 farmers are using EM. The oldest user started 5 years ago. Pepper starts production on the first year after planting but just after harvesting 7 to 8 years the plantations are profitable. At the market, the prices are good once in ten years. The problem is that most of the farmers face Fusarium disease that attacks the crop on its third to fourth year after planting. That makes the costs very high. Farmers used mainly manure and oil cake in large amount without adequate treatments and incorporated to soil deeply. As a result, in rainy and hot environment, the organic matter decayed, making the soil hard and creating a good place for diseases to develop. On the hard soil the water from rain or irrigation did not

drain, enhancing the rotting process of the organic matter. The solution was fermenting all the organic matter used, with EM and applying to soil maximum at 10cm or superficially if the fermentation is not good enough. (farmer composts manure for almost 6 months before use). Soil is protected by growing grasses and even planting trees, like Teca (*Tectona grandis*), to shade the pepper which gives extra profits for the farm.

## Report of Aquaculture in Peru

The use of EM has shown promising results in Peru. Shrimp production is an important activity in several countries of Central America, Peru and Equador. But they are facing serious problems of diseases, specially the White Spot virus. The cause of the disease is not clear yet but it seems to be related with the disturbance of the environment in the ponds where the shrimps are grown. High density of shrimp population, large amounts of feed and consequently large volumes of excrement and excessive organic matter accumulates on the bottom of the ponds. The decomposition of these organic matters leads to production of harmful substances to the shrimps beside the fact that microbial unbalance is also created. Some trials were made by farmers to disinfect the ponds using chlorine, antibiotics and other products (products that affect the environment outside the farm), place plastic sheets to isolate the ponds from the soil or to fill the ponds with artificially salted well-water. These attempts were expensive and not as successful as expected, forcing many farmers to give up shrimp growing. The purpose of using EM was to recover the conditions to grow shrimps without such environmental damage.

**Table 1. Results of the Use of EM and Bokashi**

	<b>Before White Spot Virus</b>	<b>With White Spot Virus</b>	<b>With EM and Bokashi Treatment</b>
Year	1998 ~ 1999	1999 ~ 2000	2001
Feed conversion	1.9 ~ 1.47	0.85 ~ 0.67	0.5 ~ 0.3
Mortality (%)	5 ~ 14	46 ~ 61	10
Stocking density (shrimp/m <sup>2</sup> )	10 ~ 12	7	7
Weight (g)	12.5 ~ 14	14.5 ~ 15	12
Growing period (days)	149 ~ 159	90	60
Yield (kg/ha)	1,400	300 ~ 400	600

Promising results have been obtained using Bokashi and spraying EM to treat the ponds' soil before putting water. Bokashi is spread on dried ponds' soil surface (300kg/ha) and extended EM (1%) is sprayed at a quantity of 100 L/ha. After 10 to 14 days, the ponds are filled with water up to 70% of its capacity. After that a solution made of Bokashi (15kg), EM (1.5L), molasses (1.5L) and water (100L) is prepared, let to ferment during 48 hours and applied at a rate of 10L/ha to feed phytoplankton. Solution of extended EM (0.1%) is used daily (50L/day/ha) through drop system. The feed was treated with EM. The population was reduced from an average of 12 larvae/m<sup>2</sup> to 7 larvae/m<sup>2</sup>. The experiments with EM and Bokashi started in 1998. The White Spot disease was noticed in Peru in 1999 reducing the productivity to at least one fourth. At the farm using EM, the results were improving year after year as seen in Table 1. The cause of the disease and how EM is working are not totally clear yet, but respecting the capacity of the environment seems to be crucial and this management allows the farmer to grow shrimps organically, does not harm the surrounding environment and changing the feed to one with organic ingredients allows better price as an organically certified product for exportation.