

Use of Effective Microorganisms in Brazil

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For approximately 10 years the system of Kyusei Nature Farming, created by Mokichi Okada, has been used in Brazil. A new phase was begun with the development of effective microorganisms (EM) by Professor Teruo Higa, University of the Ryukyus, Okinawa, Japan. At Ipeúna, a city 50 km from Sao Paulo, the Kyusei Natural Agriculture Research Center (KNARC) was established to develop the most effective methods for using EM technology. During the first year, the laboratory, office and dormitory were built; the goals are to improve the production, experimentation and use of EM to increase soil quality and productivity. The soil at the Center is marginal at best, being very coarse, infertile, and low in organic matter. Sugarcane bagasse has been applied to improve the soil physical properties, especially soil tilth.

Soon after the Center was established, we began to work with farmers to test the effect of EM on their crops. Since then, we have contacted nearly 50 farmers from several regions of São Paulo State and elsewhere in Brazil, and have used EM on a large variety of crops such as vegetables, flowers, fruits and cereals.

I would like to report the results of some of these studies. Mr. Hasegawa has a large 80-hectare farm in the Green Belt Area of São Paulo City. His main crops are lettuce, escarole and Chinese cabbage. He started using EM one year ago, and has noticed a definite improvement in soil physical properties, i.e., less compacting and crusting. Also, from using EM Mr. Hasegawa's lettuce yields have increased from an average of 750 to 1350 boxes per day during the harvest period. The quality and size of the heads are better, and he has received higher prices in the marketplace. Since using EM, he has reduced the use of chemical fertilizers and pesticides by more than 95 percent, the main reason being that soil fertility has increased and pest problems have decreased.

Mr. Mine is a farmer in the same area and he has also used EM for one year on his 12 hectares of land. The soil on his farm was infertile and very low in organic matter. He has been able to improve the quality of this soil by applying crop residues and compost made with oil cake, fish meal and rice meal fermented with EM. EM was applied 2 to 3 times during seedbed preparation and before planting. The effects were:

- reduced soil erosion;
- efficient drainage of water so that crops were not damaged in the low areas of the field;
- reduction and elimination of nematode infestation;
- decomposition of crop residues without malodors;
- efficient weed control by inducing uniform germination with EM and then turning the soil;
- excellent quality of cauliflower with 4 heads filling a box instead of the usual 8 heads;
- laborers reduced from 5 to 1 in order to control weeds in all crops; and
- reduction of pesticide and chemical fertilizer use by 95 to 100 percent.

Mr. Casa Grande is a farmer in the Rio Claro region (near the Center); he started using EM on his farm in December 1990. Previously, he used chemical fertilizer, chicken manure and pesticides; now he is using EM and chicken manure. He cultivates several crops and observed some interesting results after using EM:

Leaf Cabbage: Before using EM, the crop was harvested every 6 days, now the crop must be harvested every 3 days. For the first harvest, 3 leaves could be taken from 10 plants; now, 7 leaves can be harvested from just one plant. Therefore, the yield has increased more than 100 percent. Formerly, he needed 8,000 plants to supply the demand, now 4,500 plants are sufficient.

Beet: The size is larger than before the use of EM, so that, instead of 100 to 120 beets to fill a box, 80 are now sufficient. **Green Onion:** In the same area where 40 to 50 bunches were harvested per day, now he can offer 300 to 400 bunches to consumers.

Lettuce: By using EM he has achieved the same productivity using only half of the quantity of chicken manure that he previously used in seedbed preparation. EM application has also solved a problem of *Erwinia* infestation. After the loss of 100 percent of the crop, the soil was prepared again with 3 applications of EM; following the EM treatment the plants were virtually uninfested.

Prior to using EM, Mr. Casa Grande found that it required considerable time to remove the old, discolored outer leaves from the vegetables before packing; now, after using EM the vegetables have very few "old" leaves that need to be removed. Moreover, before EM was used, the cost of production was increasing while crop quality was decreasing. With EM the farmer is able to produce higher yields and better quality crops. This, in addition to lower production costs, has substantially increased his net return.

For these farmers, the use of EM has enhanced their personal health by reducing their dependency on pesticides. They have greater satisfaction in offering higher quality and safer products to consumers, and they are more conscious of the environment and soil health. In order to efficiently disseminate information on EM techniques, we are adding more technical members to the staff of KNARC. In addition, we are creating a model farm where farmers can visit and learn about the application of EM technology.

There is mounting evidence that EM provides the means whereby farmers can make some significant advances in the performance of their farming systems. These include crop yield improvement, crop quality improvement, production system simplification, decrease in costs and energy demand for production, longer shelf life of the produce after harvest, health enhancement for both farmers and consumers, and protection and preservation of the environment. All of these goals can be achieved with the use of EM.

The application of EM is not restricted to agriculture, i.e., reducing the need for fertilizers and pesticides. It can be used in animal husbandry to control ectoparasites and digestive problems. EM has also been used in a water treatment project, as well as for the treatment of domestic sewage and agro-industrial wastes. Appropriate studies on the use of EM to solve such problems will also be conducted by the staff at KNARC.