

## **National Agricultural Policy on EM Technology in Bhutan**

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First, on behalf of the Royal Government of Bhutan I would like to express my thanks and appreciation to Professor Teruo Higa, President of the Asia-Pacific Natural Agriculture Network (APNAN) for his kind invitation for me to address this conference. We are especially grateful to Professor Higa for his efforts to advance the principles of Kyusei Nature Farming in Bhutan. Through Professor Higa we have received generous support from APNAN, the International Nature Farming Research Center (INFRC), and the EM Research Organization (EMRO) in establishing a national nature farming project in Bhutan, which includes the use of EM technology. Thus, we in Bhutan wish to thank the leaders of APNAN, INFRC and EMRO for their valuable assistance and cooperation. We attach great importance to this conference because it is taking place at a time when there is worldwide concern about the excessive use of agrichemicals in agricultural production systems. This has caused extensive pollution of soil, water and air which, in turn, has adversely affected food safety and quality, and endangered human and animal health. Thus, it is not surprising that during the past decade many consumers, scientists, environmentalists and farmer's organizations began to seek alternatives to chemical farming methods. One such alternative is Kyusei Nature Farming, the subject of this conference and the use of EM technology in agricultural production and environmental conservation. I hope that this new approach to farming using a technology involving Effective Microorganisms (EM) will provide an opportunity to all of us in reducing the dependence of farmers on chemical fertilizers and pesticides and assist in our efforts to develop a more sustainable agriculture and environment.

Until the late 1950's, Bhutan had chosen to remain isolated from the rest of the world. Then in the early 1960's we embarked on a planned economic initiative with the beginning of our first Five-Year Plan. In little more than three decades, we made very significant progress in almost every field. Agriculture is one exception where there has been strong policy emphasis on sustainable development, conservation of natural resources, and environmental protection in accordance with the following objectives:

- To develop sustainable, arable farming systems that enable self-sufficiency in food production;
- To enhance the income, living and nutritional standards of the rural population; and
- To ensure the sustainable use of natural resources.

In general, the farming systems in Bhutan are predominantly mixed and involve the integration of arable agriculture with livestock and forests. Bhutanese farmers depend on all these sectors for their livelihood and economic development. Traditional farming practices in Bhutan use locally-available organic materials and farmyard manure as nutrient sources for crops. Agrichemicals are used minimally, but mainly for cash crops. Chemical fertilizer application ranges from 2 to 3 kg/ha/year on cultivated land, which is surely among the world's lowest consumption rates. Thus, Bhutan is in the forefront as far as natural agriculture is concerned.

We have been able to maintain a pollution-free agricultural system because of our low input of agrichemicals, and our late start toward agricultural and economic development. We have also gained from the experiences of other countries who have faced a myriad of problems from excessive use of agrichemicals. Moreover, we have benefited from the wisdom and judgment of our leaders, especially the present ruling monarch. In all the development plans, our leaders have always insisted that we preserve and promote our culture and natural mountain heritage. Our government has long maintained a development policy that emphasizes protection of the environment, improvement of rural living standards, and sustainable use of natural resources for achieving self-sufficiency in food production.

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\*Dorji was unable to attend the conference; thus, his paper was presented by Mr. Sherub Gyaltshen, Head, Research, Extension and Irrigation Division, Royal Government of Bhutan, Thimphu, Bhutan.

In such a setting, any technology based on the principles of nature farming holds substantial advantages over modern technologies based on high levels of external inputs. Thus, we are very interested in Kyusei Nature Farming practices especially in using Effective Microorganisms (EM) for advancement of our agricultural system and preservation of our pollution-free environment.

There are strong similarities between Bhutan's agricultural development objectives and those of APNAN which advocates the principles and practices of Kyusei Nature Farming in countries of the Asia-Pacific Region. Consequently, in June 1994, the Ministry of Agriculture of the Royal Government of Bhutan, with the assistance of UNDP/OPS, IFAD and the Kyusei Nature Farming Center (Thailand), introduced the concept and practical aspects of Kyusei Nature Farming and EM technology to Bhutan.

EM technology is being tested in Bhutan at different research stations over a range of agroecological conditions before promoting it for practical use by farmers. The agroecology in Bhutan ranges from humid to dry subtropics; warm to cool temperate; and warm to cool alpine. The main objectives of EM technology in Bhutan are:

- To utilize on-farm, household and municipal wastes for making EM bokashi to be used as an organic fertilizer and soil conditioner, and to minimize environmental pollution;
- To suppress malodors and improve the sanitation (and productivity) of livestock farms and slaughterhouses; and
- To maintain and improve environmental quality by minimizing the use of chemical fertilizers and pesticides.

Trials are being conducted to evaluate the effect of EM bokashi and EM sprays on apple, citrus, mango, vegetables, paddy rice, maize, piggeries, poultry farms and slaughterhouses. I am pleased to inform this conference that we have already seen a definite improvement in soil fertility and the general growth and health of crops with EM treatments. EM cultures added to poultry rations have improved the feed conversion efficiency and reduced the mortality in broilers. EM sprayed in slaughterhouses and livestock pens has totally suppressed malodors. EM 5 solution sprayed once a week on cabbage effectively controlled the attack of harmful insects.

Another potential area for the application of EM technology is in composting organic wastes, including crop residues and farmyard manure. The indigenous composting method requires considerable time before the compost reaches proper maturity and is ready for application. Our researchers have found that by treating a mixture of rice straw and cow manure with EM solution, the time required for composting was reduced to about 11 days. This application of EM technology will be invaluable in helping our farmers to save time which can be devoted to other farm activities.

Recently, the Ministry of Agriculture of the Royal Government of Bhutan in cooperation with APNAN, INFRC and EMRO agreed to establish a nature farming project in Bhutan with the objective of promoting the concept and practices of Kyusei Nature Farming using EM technology. This joint project can be attributed to the successful preliminary EM test results mentioned earlier.

Overall, we are highly encouraged by the performance of EM in our agricultural production systems. We look forward to expanding these studies by virtue of the cooperative project on Kyusei Nature Farming with EM technology. Through the assistance of APNAN we have started to produce EM stock cultures in Bhutan to complement the nature farming methods which we are promoting.

The use of EM in agriculture is a sustainable and appropriate technology that appears to hold great promise in making nature farming a successful reality for all mankind. In Bhutan, EM technology is highly relevant to our agricultural development objectives.

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