

Kyusei Nature Farming and Environmental Management Through Effective Microorganisms - The Past, Present and Future

Professor Dr. Teruo Higa

Department of Horticulture, University of the Ryukyus Okinawa, Japan

Introduction

The basis of agriculture from ancient times has been the production of food for humankind. The origin of this was based on the way people lived, it was a philosophy and a way of life. With time, the demand for food grew at a faster rate than the supply. This was overcome to some extent by the green revolution of the 1960's, especially in the poorer nations of Asia, Africa and Latin America. While those who developed the technologies of the green revolution were rewarded with honors and medals, the farmers who adopted the concepts turned the green revolution to one of greed revolution. They tried to extract as much as possible from the ecosystems, and today these resource poor farmers are facing problems of sustainability, loss of diversity and of productivity. Therefore, at present, scientists state - while the green revolution saved millions from starvation, it is now threatening the world's food security'. This is the scenario in most agricultural systems producing food in the developing countries, where food is required to the greatest extent.

What caused this problem? Looking back at the technologies of the green revolution, one can see the excessive use of agrochemicals, which destroy the soils. Productivity as envisaged by the green revolution is totally dependant on chemicals and high inputs. The soil and its life were not cared for, as the latter was not seen. Hence the loss of sustainability and declining productivity can be attributed to this loss of soil quality, which is the key factor in maintaining arable agricultural production.

Looking at all possible alternatives to this problem, one is reminded of the statement " Before renovation of an old house, one must clean its rubbish." This can also be applied to the poor soils of the tropics, destroyed by the green revolution. Thus scientists are looking at possibilities of developing soils through microbial applications, which are a key factor in maintaining soil productivity.

It is in this context that organic farming, which nurtures the soil becomes important. Amongst the many methods of organic farming that are present in this world, Kyusei Nature Farming, advocated by Mokichi Okada in the 1930's and promoted by the International Nature Farming Research Center, Atami, Japan plays an important role. This is because of its five concepts- namely

- The cultivation of safe and healthy crops, without chemicals
- The attainment of economic and spiritual benefits by the producer and consumer
- The ease of practice
- The respect for nature and protection of the environment
- The production of quality food for increasing populations.

It is this system of farming developed in Japan in the 1930's that is being discussed at the conference. However, Kyusei Nature Farming as envisaged by its founder had the

normal problems of organic farming, where productivity was low. This was especially seen in low fertility soils. Therefore, ecologically friendly technologies were required to enhance the acceptance of Kyusei Nature Farming. This is where the technology of Effective Microorganisms, developed by me plays a leading role

**The Technology
of Effective
Microorganisms
- The past**

The technology of EM was developed by me in the 1970's. The process began with experiments using microbes found in all ecosystems which were remixed. Due to the lack of success in many repeated attempts, microbes were eliminated and simpler mixtures were tested on plants. The basis of this process has been stated many times in many fora and in my books. Finally a mixture primarily containing lactic acid bacteria, photosynthetic bacteria and yeast, maintained at a pH of 3.5 was developed as EM in the late 1970's.

As the developer of EM, I was convinced of its benefits. I was also convinced that mixtures of beneficial microbes brought greater benefits than single species. Microbiologists may disagree with this concept, but research and practice in all continents have shown that this concept is true.

The first introduction of EM to overseas fora began in 1986, at the IFOAM international conference in the USA. There was considerable interest, which led me to think of developing ways to promote the technology on a wider scale. It was at this point that a student from the INFRC tested the technology and introduced it to that organization and Kyusei Nature Farming, to overcome its problems of low productivity. This began the beneficial coexistence between Kyusei Nature Farming and EM Technology, as the benefits of using this mixture was clearly evident in Japanese ecosystems within a very short period of time.

The expansion of activities internationally came about at the IFOAM Conference held in Burkina Faso, in January, 1989, where scientists and I discussed the potential of spreading the concepts. The planning of an international conference with the support of the INFRC was discussed. This was clearly endorsed, and the First Conference on Kyusei Nature Farming was held in Khon Kaen, Thailand in 1989. This journey traveled through Brazil, USA, France, Thailand and South Africa at two-year intervals, to encompass the five continents. Today we are here at the seventh to spread the message to Oceania and the Pacific countries.

**The Present Status
of Kyusei Nature
Farming and
EM Technology**

An evaluation of the Proceedings of the past 6 conferences, regional meetings, EM conferences, papers presented at international meetings or published in journals, illustrates that the technology of EM has succeeded. More importantly, it is being adopted by many and today, over 100 countries in all continents use EM, not only for experiments, but for production and environmental management. This is the success of the journey that began 12 years ago. You will hear more of this success over the next four days.

What causes this success? Numerous studies show that yields of crops both in conventional and organic systems are increased by EM. This is due to the beneficial effects imparted to the soil and environment. However, a few examples will be stated to highlight this aspect.

The first is the Union of Myanmar, where EM is a national project. EM is used in rice culture in over 450, 000 hectares. Productivity of the fields, especially those located on poor soils have increased by over 50% due to the use of EM and organic matter. The

second is the DPR Korea, where EM has been used in conventional rice systems, with yield increases of over 40%. In Thailand, projects on Kyusei Nature Farming are very successful. No chemicals are used in these systems, and yields are similar to those of conventional systems and in some instances, exceed those of farms using chemicals. The participants from these countries will bear testimony to this fact. In Europe, pasture production has been increased and the quality of silage enhanced by EM. In South America, large extents of land have been brought under cultivation using EM Technology, to provide high quality food for the cities. Many countries in Southern Africa use EM for smallholder resource poor farms. In New Zealand, EM is used on the farm that was judged the best in the South Island, which will be the venue of the conference reception. This is the success of EM technology today. It is an accepted technology.

The question often asked is - What causes this success?

Research has proven that EM must be applied with organic matter. This is a confirmed fact. The advantage lies in the fact that EM can be applied as a liquid or mixed with nutrient rich organic matter to make a fermented compost (Bokashi as it is called in Japanese). The benefits of applying EM with organic matter is ability of EM to ferment the organic matter, thereby releasing nutrients and nutrient rich organic acids which could be utilized by plants. Derivatives of EM, where leafy material, especially those of spices and medicinal plants are fermented with the microbial solutions help offer prophylactic measures to plants. EM can also be applied to crop plants, and research has shown that this enhances physiological parameters such as photosynthesis. The final result is higher yields of crops, which is a key factor in organic farming.

Research and experience also show the benefits of EM in animal production. Addition of EM or EM fermented feed to the normal diets of livestock has resulted in greater productivity and better health. The final outcome is better returns to investment, in poultry, cattle, sheep and even aquaculture, Papers from different environments presented at this conference will show this clearly.

Research has also shown the mechanisms of better feed utilization and reduction of diseases due to EM. The reason is that these beneficial microbes develop positive influences both within the animals and also in the environment.

It is at this point that the importance of Kyusei Nature Farming and EM in environmental management is presented. This aspect was developed in the 1990's when the successes of EM in agriculture were clearly evident, and the disposal of organic wastes posed a problem to humankind. Kyusei Nature Farming envisages the development of a pollutant free environment and EM helps this process. Therefore urban wastes in Vietnam, Thailand, and Myanmar and in many cities around Asia are composted with EM to produce organic fertilizers. In America, projects have been launched to educate students to make compost using EM and food wastes in schools. These projects have won awards. In Pusan city in South Korea, over 3000 apartment dwellers use EM to compost household wastes, which have led to a 50% reduction in garbage. In this city of Christchurch, over 100 households have initiated this program, following that of South Korea.

On a more extended scale, EM has been used treating waste water to improve quality. Research in Japan show that EM has helped reduce BOD, SOD and solids in waste water. A very impressive project in Mc Kay city of Australia uses EM to treat its sewage before disposal. Smaller projects in Europe also show the benefits of treating waste water with EM. Industrial waste waters in China, Sri Lanka and other countries are

being treated with EM to improve quality before discharge. Very recently, pilot studies in Japan have shown the ability of EM derivatives to reduce dioxin. Thus a similar project has been initiated in Australia and we are awaiting the exciting results. This aspect, if replicable, will be a breakthrough. The details will not be presented by me at this point. I invite you to discuss these aspects with the presenters here and read past literature. You will be convinced of the benefits of EM in environmental management. It is on this basis that I say confidently, that Kyusei Nature Farming and EM technology has been accepted by the world. Critics and conventional scientists do not accept this fact as for organic farming. However, one must accept the fact that the technology has created a niche in the world today. The world body on organic farming, IFOAM, accepts the success and sessions on EM are held at their international conferences. It is important to note that the first time a session on EM was held at an international conference of IFOAM was here in New Zealand, in 1994.

The most important aspect, especially of EM is that its use is growing through adoption, rather than through scientific research. The real success of a technology is its adoption by users. Many may state that a technology is very successful in laboratories or experimental fields. However, if it is not accepted by users, that technology does not impart a benefit to humankind. This is true of the gene revolution that is taking place today. Even China, which has adopted genetically engineered crops on a large scale has restricted it to non food crops such as cotton and tobacco. The growth of food crops is yet being tested. The future will determine its adoption, although much research indicated the benefits of modifying food crops. In contrast, EM has shown the reverse trend, adoption has surpassed research and in some countries of Asia, scientists are being forced to do research because farmers and users vouch for its success. The lack of research is being rectified - but not at the rate of adoption, which has placed immense pressure on my staff and me. However the best is being done - This is the technology as it is today.

The Future

What of the future? World fora have pointed out three important problems facing the humankind today - The first is the rising income gap, the second is the destruction of the natural resource base and third, the growing pollution. Thus any technology of the present or the future must be suitable ecologically, economically and socially. This is why, UNESCO, has developed the term ecotechnology, by coining the words ecological knowledge and technology.

I am happy to state that EM fits this definition well and could solve the three problems outlined earlier. Research and adoption has proven that EM works. EM when used as advised will not cause harm but develop beneficial effects. EM is not brought in from my laboratory, but made from microorganisms used locally. This is evident by the production of EM in over 60 countries, including ones with the strictest quarantine regulations, such as USA, New Zealand and Australia. Hence it is eco friendly. The photosynthetic bacteria of EM help the beneficial process, which is known as syntrophy. Free radicals, which cause diseases are suppressed by EM. Hence the future of EM holds much potential for humankind - both for reducing the income gaps by enhancing productivity of smallholder resource poor farmers, reduce the destruction of the resource base by improving water quality and other benefits, and overcoming pollution by producing useful material such as fertilizers from organic wastes.

The advancement of EM not only lies in its use in Kyusei Nature Farming. The developments have gone further. Antioxidants, which are household names in health programs have been extracted from EM. Thus a health drink EMx, which contains a high proportion of natural antioxidants, extracted from ingredients such as sea weed fermented with EM is sold in many regions. The benefits of EMx are being tested with HIV positive patients to improve their health conditions, in pilot studies conducted by qualified doctors in many parts of the world. Thus doctors meet annually In Japan to discuss these developments.

These aspects show that EM technology has a place in the future. This was brought to light clearly when the Government of Japan introduced the technology to the world summit of G8 countries, held in Okinawa, the home of EM, in 1999. This is the future I do admit that there is much more to study, and request you all to do it diligently - but the real test has been passed - EM is increasingly being used in many projects on a personal, non governmental or even governmental scales.

Conclusions

The work on Kyusei Nature Farming and EM is far from complete. There are many hurdles yet to be overcome. As in organic farming, there are many critics of Kyusei Nature Farming and EM. They say that EM contains genetically modified organisms, it destroys ecosystems and one person even stated that it decomposed a house in Korea! I assure you again that EM is made in over 60 countries and used in over 100 countries. One just cannot import genetically modified organisms, nor can it be so freely available as EM is. EM uses microbes found in all ecosystems, ranging from rain forests in Brazil to the deserts of Egypt, where EM is made from local organisms. Thus how can such a mixture destroy organisms?.. They only can improve it, not harm it.

One must also realize that EM and Kyusei Nature Farming are not promoted for profit. It is based on a sound philosophy of helping humankind. This is why EM is given to all countries almost free. In the developing world, it is given free so that they may use it for the development of their farming enterprises and their environment. While skeptics may also see the negative aspects of this, we believe that the correct path is followed, to make this world a better place for humankind.

This conference is the last of a series. I see this not as an end, but a beginning of a new era. You are all a part of this new beginning from over 30 countries. I therefore request all to actively participate in this venture, research, study, discuss and be aware of the benefits and promote the technologies of Kyusei Nature Farming and EM in your environments. You will surely be successful and we assure you of our support to make this world a better place for humankind.

In conclusion. I do express my sincere thanks to all of you, the scientists who have diligently researched, the people who have promoted the technologies and those who have adopted it. I also thank those who helped promote the technologies, especially the INFRC, APNAN and its young staff, the New Zealand Nature Farming Societies and all of you. for being with us today.

I wish you well - and do assure you that Kyusei Nature farming and EM technology, developed in the past, strengthened in the present will surely be a technology for the future.

Thank you.