

# Effective Microorganisms in the context of Kyusei Nature Farming – A Technology for the Future

Teruo Higa

*University of the Ryukyus, Okinawa, Japan*

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## Introduction

The concept of Kyusei Nature Farming, developed by Mokichi Okada in Japan in the 1930's was based on principles of nature. The primary objective of this program was to ensure that agriculture, which was the principal vocation in Japan at that time, was free of stress and was sustainable. The program also advocated the use of available resources within the ecosystem to the maximum possible extent, while preserving and possibly enhancing the quality of the soil.

The program of Kyusei Nature Farming was strengthened by the introduction of the technology of Effective Microorganisms in the 1980's. From this time, it enhanced the productivity of Kyusei Nature Farming, as proven in a diverse range of environments and presented at the last five international conferences of this nature and also at many other for a such as the IFOAM. Today, EM is a key component of Kyusei Nature Farming, as it fits into the themes stated by its founder, Mokichi Okada.

Originally, 80 species of 10 genera in five families were used to develop the solutions of Effective Microorganisms (EM). This selection was done from over two thousand species of microbes found in Japan. This was very complex process for a simple and environmentally friendly technology such that of EM. Thus studies were carried to simplify the process of developing EM in all environments.

Today, EM is developed using three principal organisms, namely Photosynthetic bacteria, Lactic acid bacteria and Yeasts. These three types are indispensable for EM and even if other species were not included, these would develop coexisting forms with other beneficial organisms in the environment. This happens, as EM is not made under sterile conditions, but using simple technology in many difficult environments. Thus, the EM of today consists of these three principal types, which is subsequently enriched naturally by other species such as filamentous fungi and Actinomycetes. The fundamental principle is that the three principal species must be abundant in EM and the pH of the solution must be below 3.5. This is the technology and if this combination is found, that solution, made anywhere will develop the beneficial effects of EM.

## Technology of EM

EM is used widely in many environments in all continents. This was evident from the video shown and will again be shown by the many presentations at this conference. However, I wish to state the basis of the technology and the mode of activity of EM.

The application of EM is easy and is harmless. However, the use of EM does not only enhance the microbes found in EM in that environment. It acts as a catalyst with a synergistic effect to promote all the beneficial microbes of that environment. When this happens, the microbes that develop harmful effects are excluded from that ecosystem, in a manner akin to human activity, where good people weed out the bad ones. Thus the soil microflora and fauna change from a disease inducing

soil to a disease suppressive soil. With time and with EM and organic matter, such a soil has a capacity to develop into a zymogenic soil, which as we know is capable of sustaining production. The process enhances to increase the humus content of the soil and generally an infertile Oxisol would finally end up as a black fertile soil, capable of supporting bountiful yields. This has been well proven in many environments and more examples will be presented at this meeting.

The technology of EM is based on holding the three principal species together at a very low pH, when most species of microbes die. Many microbiologists have tried combining these species in laboratories and examining the functions and activities of EM in isolation. This does not work and they claim that EM is ineffective. However, I do assure you that EM works as shown by numerous examples every day. I do request the microbiologists to work with EM and organic matter in soils, where the activity really takes place.

Many have studied the mode of action of EM and interesting results have been reported. I presented some of them at the last conference two years ago. It was stated that EM helps produce antioxidant substances such as Inositol, Ubiquinone, Saponin, low molecular polysaccharides, polyphenols and Chelates of minerals. These antioxidant substances, which are now proven to develop disease suppression even in humans, are formed with the application of EM. This in turn allows the multiplication of beneficial microbes, while inhibiting the harmful species.

The antioxidant substances formed by EM in the decomposition and fermentation of organic matter has the capacity of detoxifying harmful substances. They suppress harmful reactions by deionization of hazardous substances and also promote the chelation of heavy metals such as iron and induce microbes to secrete decomposing enzymes such as lignin peroxidase. Such enzymes have the capacity to decompose residual agrochemicals and even dioxin in soils. Thus, if EM is used with organic matter in soils, which have been heavily contaminated with pesticides or have high concentrations of dioxin, they are detoxified within 2 – 3 seasons. This has been proven in many environments.

The role of EM is also enhanced by the nuclear magnetic resonance waves originating from the photosynthetic bacteria. These waves have higher frequencies and lower energy than gamma and X rays. These waves are capable of transforming harmful energy forms in nature into beneficial forms through resonance. This is the technology of Effective Microorganisms.

## **Functions of EM**

EM is something that is environmentally friendly and safe for use in any system. Its continuous use results in strengthening the vigor of plants. Research and farmer experiences present instances where crops grown with EM have withstood droughts, floods and temperature extremes. Use of EM has resulted in the increase of soil fauna such as earthworms. Such a phenomenon softens the soil, which in turns reduces the requirement of excessive tillage. Further examples of the benefits of EM include weed control with time. This is by spraying EM at dilutions of 1:500 or 1:100 and lightly cultivating soils. This process composts the weeds, and thus reduces weed populations with time. EM increases soil temperatures due to microbial activity. These are some of the many benefits of EM in Agriculture.

EM is also used in pest and disease management. Medicinal herbs and spices such as pepper, garlic and onions are blended with EM and fermented with molasses for 7 – 10 days. This solution not only prevents pest and disease incidence, but also promotes photosynthesis in plants and enhances plant vigor.

The above examples show the multitude of benefits of EM, which have been well proven in many environments. Thus it is a holistic technology. All these benefits are due to the combined benefits of the nuclear magnetic wave resonance and antioxidant properties of EM. The negative effects are reduced and at times, the negative energy is transformed in to developing positive effects. A clear example is the use of EM in mitigating radioactive contamination as that found in Belarus, which will be presented at this conference. These studies have also shown that continued use of EM has reduced contamination. This could be attributed to the development of nuclear magnetic waves with very high frequencies and ultra low energies. Thus, EM and the nuclear magnetic resonance waves produced by EM are used in areas such as energy saving technologies and mitigating the effects of dioxin.

The above stated activities of EM are due to the phenomenon of snytropy, which is the opposite of entropy. This EM has the power to change the nature of things, where pollutants can be made into beneficial materials. This is well exemplified by the many integrated farms developed with EM in places such as Thailand and Indonesia. I also know of such units now being developed in South Africa, for research and testing purposes.

**The role of EM in modern life** Modern agriculture is heavily dependent on chemicals, which has caused tremendous problems of environmental degradation and human health. In addition, the inclusion of genetically engineered species has further aggravated the problems by causing imbalances in nature. Thus, Nature Farming is fast gathering momentum as an alternative way of life and productivity. However, nature or even the common organic farming systems are beset with problems, primarily of low yield and poor returns to investment. In addition, they require large quantities of good quality organic matter. This is the modern trend in agriculture.

EM can help these changes in Nature Farming significantly, to overcome its problems. This microbial solution can convert all wastes into very good fertilizers in a short time. It can enhance soil quality when used with organic matter. Many examples of this aspect have been presented over the past 10 years and again many will be stated over the next two days, and you would see the results in the field as well. Thus EM technology combined with Kyusei Nature Farming can be considered a form of agriculture that is safe, comfortable, low cost with a significant potential of producing high yields of good quality crops. Thus, the excessive use of energy and chemicals seen in modern agriculture could be replaced with EM, for greater profits through agriculture, using a lower quantum of energy. Thus EM is an alternative but very appropriate technology for the modern world.

**EM in the new Century** Agriculture of the future must be self sustaining and sustainable. This is a very ambitious objective. However, this is possible with Kyusei Nature Farming and EM. This system will ensure the best utilization of resources found in all ecosystems. It will ensure that all pollutants, that are problems today are converted

into good organic fertilizers. This is vital for sustaining productivity and soil quality. The enhancement of photosynthesis by EM will ensure the entrapment of the solar energy and also reduce the problems of carbon dioxide increase in the atmosphere. EM can be used even in desert and sodic environments such as those in Pakistan, Egypt and Mongolia. These are not dreams as projects are already underway in these regions, which are showing very good results. EM would enable the cultivation of soils in cold regions as it increases soil temperatures by 2 – 3 degrees Celsius, due to microbial activity. EM can increase soil fertility, as shown by the high degree of success in the Democratic Republic of Korea, where wheat, rice and other crops have been cultivated in infertile soils under very low temperature conditions. In the United States, EM is also used for increasing yields of wheat and cotton in organic systems, with very low inputs. Thus it will be an ideal system of agriculture for the future, to ensure the sustenance of soils and maintenance of productivity, an aim that is being stated in all international fora discussing agriculture.

It is also important to note that most predictions state that the world will run short of good water for humans and farming in the next century. It is with happiness that I can state examples of wastewater treatment with EM, which has ensured recycling many times. This has been well proven in Japan, Indonesia, Egypt, United States and many other countries. Thus, again, EM technology is something that could help mitigate a crisis by purifying water for recycling. This would certainly avoid a crisis.

## **Conclusion**

The agriculture of the world is facing many problems. They can be site specific or global. However, if one thinks diligently and with care, it would soon be realized that there are answers to these problems. Amongst the many types of solutions offered, the role of Kyusei Nature Farming with EM technology has a very important role. This is not stated as a forecast, but with very successful experiences in all parts of this earth.

Today we are here, holding the Sixth International Kyusei Nature Farming in Africa. It is a great continent, where agriculture is practiced in all forms. Large plantations, high tech systems of farming, smallholder systems and even desert farming are seen in the diverse range of environments of this continent. One could find all these systems in this beautiful country of South Africa. All these systems have problems of low production, pests and diseases, loss of sustainability and environmental hazards. Thus, it is important to note that EM could offer possible solutions to all of these. This is shown here in Pretoria, at the Ubuntu center, where EM is used successfully. You would see this on the field day at this beautiful center. Thus, in conclusion, I do wish to emphasize that EM is something worth trying – it is not heresy but a technology well tested and proven.

I sincerely hope that this conference and the presentations made here and the field trips organized will show you the potential of EM and Kyusei Nature Farming for this great country and continent. I also hope that it will encourage you to use the concepts of Kyusei Nature Farming and EM Technology for solving problems of agriculture, environment and even industry. This will ensure that this great continent and region will preserve its environment while producing ample food for its populations at the present time and of the future.