Invited Session Talk

Microorganisms lead future for mankind

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In order for us to face and directly address the critical situation the environment and the ecosystem find themselves in and pave a path for our future, there is a need to go back and redirect our focus to agriculture and microorganisms.

Agriculture refers generally to farming, forestry, and fisheries; in other words, primary industries. In essence, agriculture can be thought of as something that fulfills man's desires through processes that materialize the energies of nature, mainly solar energy. This fulfillment is entirely dependent on how exactly the forces of nature are used, however. The first of the aforementioned desires would be to use agriculture to "live an easy life in economic prosperity", the second to "bring about a variety of benefits by promoting good health in producers as well as consumers", and the third to "enrich the ecosystem, take active measures to preserve biodiversity, and end not just the global food and energy crisis but global warming and the root of environmental issues (by addressing cyclical processes) as well."

If agriculture succeeded in making all of the above a reality, it would truly be considered a most respectable and coveted profession, and the essential foundation of a nation. Unfortunately, in reality, there is perhaps nothing more antinatural than agriculture. By destroying extensive areas of forests, consuming excessive amounts of energy through use of heavy machinery, causing erosion of large amounts of topsoil, damaging soil through use of chemical fertilizers and causing increased desertification on a global scale, spraying large amounts of poison albeit legally and accelerating environmental damage and pollution as a result, agriculture has driven biodiversity and the ecosystem into an extremely tragic state. Although various research is being carried out on genetic modification in an attempt to find a solution to this predicament, this will undoubtedly simply lead to genetic pollution and further destruction of agricultural land. This chain of events is the combined result of a food crisis, stemming from an ever-increasing population, and ill-intentioned capitalist principles, and has brought us a step closer to the very destruction of mankind.

The modern lifestyle characterized by an expanding population, increased economic activity, chemicals, and electromagnetic waves is the immediate culprit behind global warming as well as the acidification of oceans and the damaging of aquatic ecosystems

and biodiversity; one cannot help but feel our future is grim. Although each of these issues is in reality an amalgamation, in order to address their roots it is necessary to reform technology to be in harmony with the laws of nature, or, in other words, the virtuous cycle. To be specific, this would entail implementing technologies that do not emit pollution, and those that can convert pollutants into highly effective and clean resources and thus allow their use in a recycle manner.

The field of science and technology is flourishing, with the use of renewable energy and technological innovations such as fuel cells, power semiconductors, LEDs, as well as catalytic chemistry, particle technology, super-conductivity and so on advancing steadily at an unprecedented pace. We can expect a solution to the crisis in natural resources and energy to be developed soon, but the complex vicious cycle that can be observed in agriculture has always been unchanging, a blind eye turned to it with no technical progress being made, and as the population continues to increase the situation is only getting worse.

From a historical point of view, the use of iron tools in agriculture was a technological revolution; although the various agricultural machinery, facilities, chemical fertilizers, pesticides, and genetic engineering of today may seem equally revolutionary at first, in reality they are nothing more than the automation of human and animal labor and the chemicalization of compost and pest control measures. As for genetic engineering, it is the biggest and most harmful reinforcer of the contradictory aspects of agriculture. Since its conception, farming has followed a fixed pattern of plowing, fertilizing, weeding, and controlling pests. Ignoring its place as a field that is controlled by the forces of nature, it has entered a labyrinth of its own, ever-increasing in self-contradiction and caught in an ever-worsening vicious cycle. On the other hand, when one strengthens the natural forces that are at play in a field, microbiome with high biosynthetic capacities such as nitrogen-fixing bacteria and phosphate solubilizing bacteria form, and as a result the soil becomes soft and porous, the topsoil does not erode, and earthworms and the like increase in number which removes the need for plowing soil. Pest problems cease to arise, repeated cultivation becomes possible, and weeding becomes considerable easier. This strengthening and reinforcing of nature can be achieved with the use of Effective Microorganisms (EM), which is mixed culture of beneficial microorganisms.

In recent years, advancements in metagenomic analysis are making it increasingly clear that microbiomes are an indicator of health and well-being not just in humans but in nature itself. Put simply, when there are many kinds of beneficial microorganisms and their density is high, everything becomes healthy. However, there are no other

practical technologies besides of EM technology that has been proven to be safe and that improve and maintain the microbiome while being inexpensive at the same time. We have also seen in the over 35 years that EM has been in use that EM: ① has antioxidation effects, ② non-ionizing effects, and ③ convert harmful energy (such as electromagnetic waves, microwaves, radiation, and infrared rays) into harmless or useful forms of energy in a three-dimensional (helical) manner. These functions form the basis of current EM Technology. Only with the help of microorganisms, in numbers several folds that of the cells in their own body, are living things able to live normally, and it is due to cooperative actions of microorganisms as a system that all ecosystems are able to function.

This implies that if we can add useful function of EM on the microbiomes of each living organism will lead to the rejuvenation of nature as a whole as harmful microorganisms are reduced, and eventually the microbiomes themselves will begin to resemble those of EM. To summarize the issues faced by living things and ecosystems, they are the complete opposite of what EM does, namely: 1) escalating oxidation, 2) increase of harmful substances due to ionization, and 3) increase of harmful energies such as electromagnetic waves, radiation, and infrared rays. It thus follows that EM is capable of eliminating all of these issues using its abilities described above. Furthermore, it has also been seen that all environmental pollutants are substrates and sources of energy for zymogenous bacteria and photosynthetic bacteria in EM. This shows that EM Technology goes beyond simply changing the soil microbiome to increase the yield and quality of products; it is also essential for the rejuvenation of the environment and its inhabitants.

EM Technology is currently being used for a variety of applications beyond primary industries: in various efforts to eliminate pollution, including controlling radioactive contamination in Fukushima, Japan; in civil engineering and construction; for the decontamination of lakes, rivers, and seas; in energy; and in medicine. Specific examples of EM applications and prospects for the future have been described in a book I co-authored with Dr. Ichiro Masaki (MIT), which will be published this fall. They include: 1. Prevention of desertification due to salt damage, 2. Improvement of solubility of inorganic nutrients, 3. Use of seawater in agriculture for multiple purposes, 4. Prevention of topsoil erosion, 5. Carbon fixation, 6. Improvement of photosynthetic abilities and pest control, 7. Post-harvest and food processing measures, 8. Application in the livestock industry, 9. Method for increasing food supply to meet the needs of the growing population, 10. Application in the fisheries industry, 11. Water purification and sewage treatment, 12. Countermeasures for soil pollution, 13. Sanitation (hospitals, etc.),

14. Sanitation (improvement of hygienic conditions at disaster-stricken areas), 15. Control of radioactive contamination, 16. Health care, 17. Strengthening of building materials; disposal of industrial waste, recycling of waste plastics, glass, ceramics, and building materials, 18. Transmuting nuclear material into harmless substances. Here, I have mainly only discussed the solutions to the immediate problems we are facing, but the possibilities of revolutionary uses are endless, going beyond science and engineering to various other fields.

Rationally speaking, anything is bound to produce harmful effects in the long term no matter how useful they are. However, EM has been in use for over 35 years and regardless of the quantity or length of time of use there have been no issues, and they have given rise to and maintained sustainable situations in virtuous cycles. Far from an increase in entropy, it has decreased instead; in other words, EM increases syntropy, the restoration of order and life. Considering the fact that the deterioration of health in human beings and environmental damage are due to pollution (increase in entropy), it is important to use EM to improve the sources of medicine, agriculture, and food.

In addition to the above three abilities of EM, the Higa Theory also proves necessary in order to understand that EM is essentially a panacea. This is a theory I have formulated where I hypothesize that EM also has quantum-mechanical functions.