EM Extension in Sri Lanka - Report on the Current Progress

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Abstract: *Sri Lanka being a country with many agricultural resources, is in search for new technologies to improve the state of the small holder farmers. EM has been introduced initially to serve this purpose. As of 1999, there are about 3000 farmers adapting EM for crop cultivation, animal husbandry and ornamental fish industry. The progress made in the small holder sector has made an appeal to the large scale plantations, thereby to have several plantations to adapt EM. Additionally, the EM is being applied for garbage handling at three town markets and for sewage and waste water treatment at five major tourist hotels. The progress of the EM extension is made mainly by the technology transfer done by the NGO named Sarvodaya together with the continuous research programs done at University of Peradeniya.*

Introduction Sri Lanka, being a tropical country enjoys many agricultural resources. Throughout the history the country had strong social, cultural and economic links to agriculture. Even today agriculture contributes nearly 20 percent to the GDP. An estimated 1.8 million families are engaged in small holder farming. Agriculture is the major sector providing employment to about 35 percent of the labour force. Addition to this, plantation sector which is mainly tea, rubber and coconut contributes to a larger proportion of the economy. Annual tea production remain over 240 million kg. and exports remain over 200 million kg. since 1995.

However, during last decade a yield stagnation has been observed with paddy, majority food crops and the plantation sector as well (Ranaweera, 1998). Paddy yields remain below 3,600 kg/ha while annual tea production has fluctuated between 200 - 240 million kg. for the last ten years. On the other hand cost of production increases continuously. As a result agriculture is more and more becoming a less attractive industry. People employed in agriculture is declining from 44.7 percent in 1990 to 36.8 percent in 1996. Absence of appropriate technology is identified as a major reason contributing to this poor performance in the sector (Indraratna, 1996; Ranaweera, 1998). After the popular adaptation of green revolution technologies in early 1970s, which prompted farmers to utilize synthetic fertilizer and pesticides to boost the yields, innovative technological interventions to provide a macro scale thrust was not visible.

EM technology invented by Prof. Higa (1989), was considered as an ideal technology to help this situation. The research reports on increasing yields of paddy, vegetables, cereals and other food crops by the use of EM in other countries around the world provides evidence. The experiments initiated on EM at University of Peradeniya (Sangakkara and Higa, 1992; Sangakkara and Attanayake, 1993; Sangakkara and Higa 1994; Marambe et. al., 1994; Marambe and Sangakkara, 1995; Sangakkara, 1995) provided much required proof that EM can work in the soils of Sri Lanka as well. Of the list of the micro-organisms contained in EM none of them are alien to the Sri Lankan soils (Vidanapathirana, 1994). Results of the

other experiments based on weed dynamics (Marambe and Sangakkara, 1995), organic matter decomposition and release of nutrients (Sangakkara, 1993; Sangakkara et. al., 1995), positive effects on seedling growth (Sangakkara and Attanayake, 1993), yield increment (Sangakkara and Higa, 1992 and 1994; Sangakkara, 1993) and the scientific predictions about the potentials of organic farming to derive sustainable situation (Sangakkara and Katupitiya, 1989; Senanayake, 1993) in Sri Lankan agriculture provided technological viability of EM to repeat the impressive results it has resulted in other countries.

More importantly the present day farmer is imprisoned in a vicious cycle imposed by the technology itself. Heavy dependency on inputs such as fertilizer and pesticides impose heavy cost of production (Ranaweera, 1998). Successive use of artificial fertilizers increase the weed seed-bank of the soil, prompting farmers to apply more and more weed control measures. As a result technology has an in-built mechanism to enslave farmer on the application of weedicides of which the prices are escalating over time. EM, in contrast, reduce the weed seed-bank of the soil (Marambe and Sangakkara, 1995), thereby save cost, labor and energy. On the other hand EM increase the yield with every successive EM application (Marambe and Sangakkara, 1995, Sangakkara, 1995) without significant change in the demand for inputs. Hence EM reduce the production cost in the short term as well as long term basis, and provides sustaining economic benefits to the farmer (Sangakkara, 1995).

Agrochemicals produce vicious effects in many facets of the rural life. Recent research conducted in a prominent agriculture area (Mahaweli System C) emphasized that the 38 percent of the suicides committed in the area are farmers (Pushpakumara, 1989). The mode of suicide of the majority (65 percent in 1985) was agrochemicals and the researchers have suggested the wide access to agrochemicals at the rural household as an encouraging factor for committing suicides (Atukorala, 1998).

High suicide rates are observed at the colonized agriculture settlements where the social capital is minimal (Atukorala, 1998). Cultural linkages keep the social capital growing. Any agricultural technology which can encourage the build up of social capital will provide healthy results to the community. Liyanage and Upawansa (1996) elaborated the possibility of EM technology to harness the traditional technologies, thereby to nourish the technological harmony with the existing social systems.

With all these observations, EM emphasize the potential to be technically viable, economically sound, socially acceptable technology solution to break the vicious cycle of the present day farming society.

Extension of EM to Small Farmers

Observing the promises written in the EM technology to provide technological solutions to agriculture, thereby to improve the social and economic status of the marginalized small holder farmers, the extension program of EM in Sri Lanka has been initiated since early 1995. Extending the research experiences gained from the scientists at University of Peradeniya, it has initially been tested with three paddy farmers at two different farming areas (namely Polonnaruwa and Anuradhapura), on a pilot scale. Farmers were instructed to cultivate one selected small plot 100 m^2 using organic matter with EM. Observing the promising results, the pilot project has been expanded to 50 farmers in five districts (Polonnaruwa, Anuradhapura,

Hambantota, Kandy and Nuwara Eliya) including vegetable trials along with paddy. The social response of the farmers was tremendously positive with the field adaptation of EM technology.

A research survey conducted in 1997, with these EM user farmers, emphasized the benefit / cost ratio of EM adapted farmers were 1.79 comparing to 1.37 of the non-adapted farmers. More importantly, research emphasized the tendency of increasing benefit / cost ratio over the consecutive three year period (1995 - 97) with the EM adapted farmers, where as with the non-adapted farmers it was in a decline. Majority farmers, 66.7 percent of paddy farmers and 83.9 percent of the vegetable farmers, identified significant reduction of production costs by using EM. Regarding the yield, 25.9 percent of paddy farmers and 58.3 percent of vegetable farmers reported the increase of yields due to EM application (Kumara, 1998). However, this is far below the potential level of benefits of EM. Under the research conditions, the benefit / cost ratio of 2.72 was observed with sweet potato (with EM) in the first year and has been improved up to 6.33 by the third year with continuous EM treatment (Sangakkara, 1995).

By mid 1999, there are about 3000 small holder farmers adopting EM technology, representing almost every geographical region in the country. EM is being applied for paddy by dry zone farmers, for vegetables, fruits and flowers by wet zone farmers. There are two large scale tea plantations located in up country wet zone applying EM after being converted to organic cultivation systems. One cinnamon plantation is applying EM for their export oriented organic products.

Use of EM in Aquaculture And Livestock Industry

Ornamental fish industry is another thriving sector, though newly introduced to Sri Lanka, already having one percent share of the global export market. The nature of this industry is that the fish production is based on a broad network of small scale outgrowers. As Sarvodaya (NGO) promote ornamental fish culture as an attractive micro-enterprise, Sarvodaya alone provides extension services for 155 outgrowers in 7 districts. Introduction of EM to their feed formulations started since 1998 and there are 12 EM adapted outgrowers by mid 1999.

Improved growth rate of the ornamental fish by EM to have higher proportion of high grade fish is reported, which fetch them high prices in the market. On the other hand, fish producers could alter the ingredients of the feed formula so as to substitute expensive ingredients by low quality, cheaper ingredients together with EM and hence, reduced their production costs.

In the livestock industry, there are 19 dairies and 8 poultry farmers that apply EM to their feed rations and to clean the animals and sheds. Less diseases and good animal growth is reported. There are few piggeries that apply EM, where it helped a lot cutting the bad odor. Majority of piggeries are located within the human settlements of the coastal belt in Sri Lanka. Hence the piggery owners had constant complaints from the neighborhood, who at times have taken legal action to close down the piggeries. Such places found EM as a remarkable rescue.

Garbage Handling and Sewage Treatment

Urban garbage is a growing problem in Sri Lanka, as well. According to the reports 80 percent of them consist of organic waste. Vegetable markets contribute a great proportion, specially owing to the 20 – 45 percent loss of agricultural (food crop) produce due to poor pre-harvest and post-harvest practices (Ranaweera, 1998). With the absence of effective recycling systems, market wastes are also subjected to dumping. EM is being identified as an effective technology to help the situation by promoting the recycling of organic wastes. There are three town markets (Kandy, Piliyandala and Bandaragama) where EM is effectively used to convert the garbage into compost, just within 14-21 days of decomposition. The ability of EM to accelerate decomposition without resulting in any bad odor has appealed to many who are considering to replicate the garbage conversion system at several other townships.

Increasing tourist arrivals, and the changing urban life styles in Sri Lanka increase the consumption at luxury hotels around the country which in turn keep adding the pressure on their existing capacity of sewage and waste water treatment facilities. On the other hand, growing environmental concerns of environmental activists in Sri Lanka raise the attention of authorities on this aspect. The tourist hotels, being pressurized by both sides, are in search for a rescue system where EM is being found as an effective solution. There are five hotels applying EM to their existing treatment facilities and they reported the healthy maintenance of BOD and COD levels of the output, while effectively controlling the intensive odor. One hotel (Hotel Le Kandyen) noted saving as much as 80 percent of sewage and waste water handling cost, as they could be effectively recycled into nearby cultivations, which save money, energy and labour needed for the transport of sewage water into other disposal sites.

Extension Procedure

Extension program of EM is centered on a leading NGO named as Sarvodaya in Sri Lanka which enjoys national recognition and long historical presence for more than 40 years. The philosophical foundation that the organization is based on, which is to 'awaken the people through correct engagement and correct livelihood' ideally provides the environment to promote the EM technology. The people centeredness, non-profit making motives, environmental concerns and the enthusiasm to empower people with appropriate technologies are found to be common concerns of both Sarvodaya as well as the inventors of the EM technology. Such similarities encouraged the spirited engagement of the Sarvodaya staff in EM extension activity, which cut down a considerable amount of resource requirement, otherwise needed. Hence the volunteer engagement of Sarvodaya staff to promote EM, in addition to their assigned duties, was observed.

The broad spectrum of Sarvodaya activities, from village preschools to village based Sarvodaya banks and credit facilities, youth leadership development to women and farmers training, home gardening to entrepreneurship development provided the variety of avenues to accommodate EM related awareness building. The island-wide Sarvodaya network having over 10,000 villages engaged in community development activities, provided the area coverage for EM extension.

Two main units within Sarvodaya, namely Social Empowerment Division (SED) and Sarvodaya Economic Enterprise Development Services (SEEDS) volunteered to share their resources for EM extension. As a result, strengths of both units, social mobilizing expertise of SED and the agriculture based extension expertise of

SEEDS could be shared properly. Sharing of resources, coined with the inherent farmer-friendly qualities of EM provided the required thrust for the EM extension program, without demand for specific financial and human resources. To date, there is no staff attached to the EM program on a full-time basis. Services are provided through the regular administrative system. Nevertheless, staff engaged in EM extension activities are provided with required specialized training with the support of APNAN.

The strategy adapted by Sarvodaya is to facilitate access to EM for any interested party without distinction of being rich or poor, private or public, academic or non-academic, charity oriented or profit oriented. Equal access to the technology will distribute the benefits to every body, thereby, the country as a whole will benefit from EM technology. The results are visible with the response EM received today; just in four years after introduction, EM is widely known in Sri Lanka, having the participation of farmers to entrepreneurs, NGOs to Government Institutions, hotels to academic institutions.

However, the EM extension program has a long way to go to translate the full potential of the technology to realized benefits of the country. For this purpose, more cooperation of institutions and resources are required. With the progress of the extension program, as EM gains public recognition, there is a growing skepticism observed by concerned parties about the technology. It is vital to promote correct understanding about the technology in order to dissolve such negative concerns. To help this, various levels of communication together with scientific communication (supported by more and more local research and developments) will be of vital importance.

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