

## **Utilization of Effective Microorganisms in Vietnam**

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### **Introduction**

Vietnam got access to Effective Micro-organism (EM) technology in an international conference held in Saraburi, Thailand from 9 to 12 December 1996.

After the conference, realizing the great effectiveness of EM technology in agriculture, animal husbandry and environmental protection, the Vina-Nichi Center for Technology Development proposed to the Ministry of Science, Technology and Environment (MOSTE) to officially invite Prof. Dr. Teruo Higa and representatives of APNAN, EMRO and INFRC to pay a working visit to Vietnam.

Discussions on EM technology were held between guests and MOSTE, the Ministry of Agriculture and Rural Development (MARD), the Hanoi National University, the Hanoi Agricultural College, the Institute for Plant Protection, the Departments of Science, Technology and Environment of Hanoi, Thaibinh. The visit resulted in a memorandum signed by Prof. Chu Hao, Deputy Minister of MOSTE, and Prof. Higa on behalf of INFRC, EMRO and APNAN. This is a very important document marking the success of the working visit of Prof. Higa and other guests, being at the same time the basis for the development of a program of EM technology application in Vietnam.

### **Activities**

While implementing this program, the following activities have been carried out in Vietnam :

- MOSTE has issued a decision for establishing the commission of EM technology of Vietnam and assigned the Vina-Nichi Center for Technology Development as the Commission's Office which organizes the implementation of action plan approved by the commission. Members of the commission include representatives of the Center, MOSTE, MARD, the National University and the Hanoi Agricultural College.
- The Commission's 1997 plan has been worked out as follows:

Organizing training courses on the utilization of EM for technicians who become mainstays for the development of EM technology utilization in Vietnam with the assistance of APNAN experts :

Four courses were held in 1997. The first was held in Hanoi and Thaibinch from 12<sup>th</sup> to 16<sup>th</sup> May, the second in Hanoi and Hochiminch city from 30<sup>th</sup> June to 5<sup>th</sup> July, the third in Hanoi and Hochiminch city from 4<sup>th</sup> to 8<sup>th</sup> August and the fourth in Saraburi, Thailand from 23<sup>rd</sup> to 26<sup>th</sup> September.

A total of about 100 trainees have participated in these training courses. After training the trainees have given guidance to other people to pilot utilize EM. The trainees were from the following institutions :

- Hanoi Agricultural College;
- Institute for Plant Protection, under MARD.
- Centre for Applied Microbiology, under the Hanoi National University;
- Hanoi Department of Science, Technology and Environment;
- Hanoi Company for Urban Environment;
- Environment Centre, within the Department of Science, Technology and Environment of Vinhphu Province
- Thaibinh Department of Science, Technology and Environment;
- Haiphong Department of Science, Technology and Environment;
- Department of Industry of Laocai Province;
- Hochiminh City's Consultation Centre for Technology and Environment;
- Company for Urban Environment of Thanhhoa Province;
- VEDAN Gourment's Powder Company (Taiwan) in Hochiminh City;

In Thaibinh province, in combination with mass media, a number of conferences, meetings have been organized for the province's leading cadres and workers of agricultural sector, agricultural cooperatives, the Farmers' Association, the Gardeners' Association, the Womens' Union to popularize EM technology.

EM technology has been applied in 65 among 300 cooperatives of the province. Under the guideline "**Founding the movement to set up new habits**", all expenses for EM stock solution and EM technology development have been covered by the Department of Science, Technology and Environment of the province.

## **Utilization of EM**

### **1. In Agriculture : Such EM derivatives as, EM. F.P.E, EM5, Bokashi**

have been effectively applied for crops. For instance : The results of application of EM in cultivation in different locations are summarised below.

#### **Thaibinh Province**

EM solution has been used in the treatment of seeds of paddy rice, longan, papaya, cabbage. Treated seeds show a quicker germination, a higher germination rate and a better performance of seedlings compared with the control (non-treated seeds);

EM solution has been sprayed on water morning-glory after each harvest; the stem stretches 17-18 cm long, or 2cm longer than the control, and the yield is 14 kg/m<sup>2</sup>, and increase of 21 percent compared with the control;

The application of EM solution on saupopus and cabbage given an increase of yield of 20 percent compared with the control, and soya's output can increase 10 – 15 percent.

In fruit trees (longan trees, rose-apple trees), EM and EM5 have been sprayed on the trees, and as a result buds and shoots burst stronger with better flowering and fruiting. Less pests and diseases and nicer appearance. The same success has also been obtained in the application of EM and EM5 solutions on longan trees in Hanam province.

EM has been sprayed on some kinds of flowers and bonsai. Flowers can keep freshness and beauty longer. The freshness of flowers cut from treated plants may be kept one day longer compared with the control.

EM has also been sprayed on mushroom right after the harvest. Its change of color is 6 hours later than the control.

In paddy rice, EM solution has been used for treating seeds and sprayed on the nursery. Rice plants grow better, have higher resistance against pests and diseases and give higher yield than the control.

### **Haiphong City**

The SAP Centre has sprayed EM and EM5 solutions on different fruit-trees such as litchi, orange, mandarine, pomelo, grape, papaya, rose-apple, persimmon, saupopus, water morning-glory, amaranth, yielding good results. In the treated lots of trees, the leaf is thicker and its green colour is darker, the fruits, with glossy colourful skin, ripen earlier than the control.

The trees of orange, mandarin, pomelo, papaya show better foliage and quicker growth of fruits than the control.

Grape and rose-apple ripen earlier and more simultaneously, with a yield increase of about 10 percent.

Other fruit trees have also a similar good performance in cases of EM5 application.

Vegetables are of thicker, bigger leaf with a darker blue, and can be harvested 3-4 days earlier and 10 – 20 percent higher yield than the control.

### **Hochiminh City**

The application of EM5 produced by the Japanese Kanefuku Foods Co. for longan trees has given a good result.

The application of EM5 has brought about a very good effect in plant protection: after 3 times of application within 10 days cereal pests and other insects reduce by 80 percent, and almost entirely eliminated after 5 or 6 consecutive times of spraying within 15-20 days. Especially in fruits, longans in the treated lots are of smaller seed, sweeter and tastier than the control.

In the Hanoi Agricultural College, EM derivatives have brought about similar effects.

### **Application of EM in animal husbandry has shown the following benefits.**

Satisfactory results have been obtained in mixing EM solution with feed and drinking water for animals (pigs, chickens, buffaloes and cattle in the Hanoi Agricultural College, and rural areas of Hanoi, Hochiminh city and Taibinh province:

All tested animals are healthy and develop well with good appetite, digestion and sleep. Especially, piglets' diarrhoea and cholera have seen a distinct reduction. Hens' eggs are bigger, of attractive yellowshi-pink (before the use of EM, eggs are white), showing that the calcium content of the shell is adequate.

EM secondary stock solution diluted with water (1/100) and sprayed on animals and pigsty, stable, hen-coop, helped decrease the fetidness. After one week of absence of EM spraying, the bad smell re-appears.

## **2. Treatment of Garbage with EM Solution**

Garbage is a source of serious pollution, and the treatment of garbage becomes an urgent work for all cities and towns in Vietnam. Hence EM have been used in treating solid waste in a number of towns.

In Thaibinh province, a 4,000 cubic meters dump has been sprayed with 200 cubic meters of EM secondary stock solution diluted with water (1/1,000). After 12 hours the bad smell begins to reduce, and after 36 hours 90 percent of fetidness and such insects as flies, mosquitos disappear.

In Thanhhoa province, EM secondary stock solution diluted at the above dosage has been sprayed on a dump of 2,000 cubic meters, and the same result has been obtained.

In Haiphong city, EM and EM Bokashi solution has been used for treating life waste in a number of households with good results. Reduction of bad smell, quick decomposition of organic matters of waste; the liquid oozed from treated waste may be used for irrigating plants and effectively eliminating fetidness of sewers.

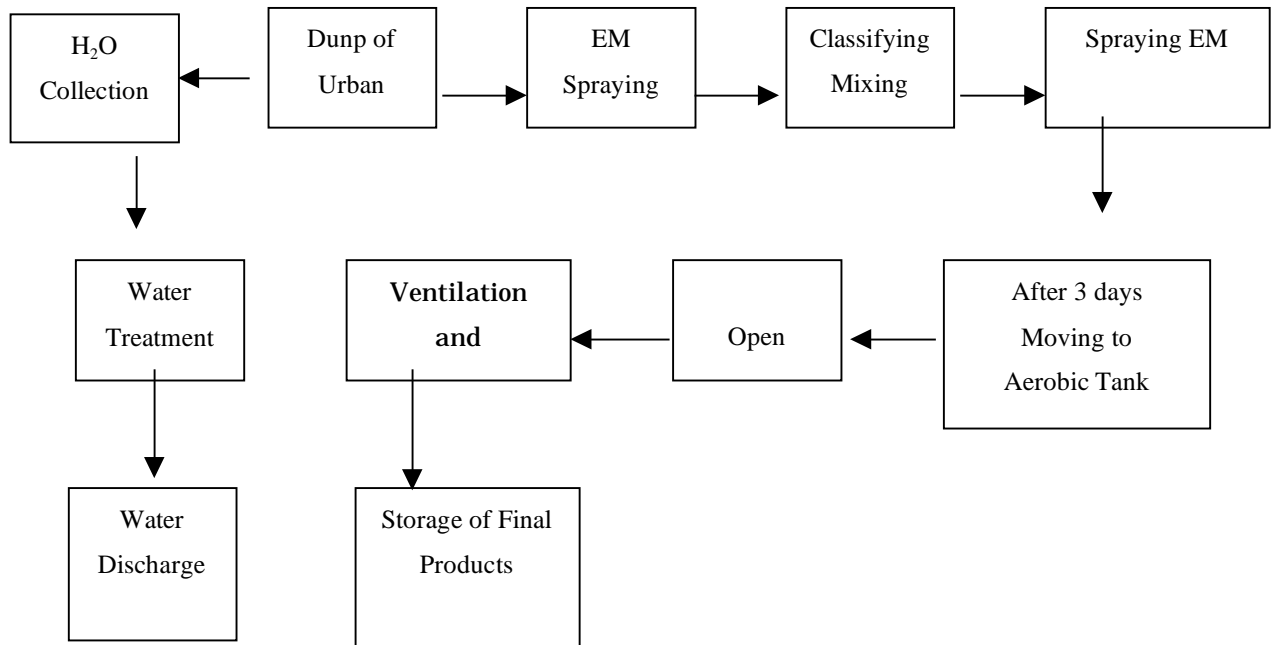
In Hanoi city, the daily amount of waste to be treated is about 1,5000 cubic meters. EM secondary stock solution is produced from 2 percent EM1 + 3 percent molasses + 95 percent water. After 3 days, the solution is diluted with water at the ratio of 1:500 or 1:1,000.

The diluted solution is sprayed 13-15 l cubic meters of waste in sunny days and 7 – 10 l cubic meters of waste in rainy days.

On the average, 20,000 – 25,000 liters of diluted EM solution are necessary for treating 1,5000 cubic meters of waste everyday in the following times :

10-10.30 am.	2,500 liters
16-16.30 pm.	2,500 liters
21-21.30 pm.	5,000 liters
23-23.30 pm.	5,000 liters
2- 2.30 pm.	5,000 liters

The flow-chart for treating urban waste in the Cau Dien Garbage processing Factory, Hanoi city is as follows:



Above mentioned are some initial results obtained from the application of EM technology in Vietnam. In the period from June to October 1997, EM derivatives were used in different domains: cropping, animal husbandry, environmental protection. In different localities, the results were satisfactory, no negative aspect was noticed.

In the near future and in 1998, the orientation for application of EM technology will be as follows;

- To continue and expand EM technology in cropping, animal husbandry, treatment of liquid and solid wastes;
- To expand the introduction of EM technology through mass media;
- To organise training courses on EM technology;
- To produce and supply EM1 for production units and localities;
- To work out nation-wide and regional research projects on the application of EM technology in Vietnam.

It is believed that EM technology will be more widely and effectively applied in Vietnam.