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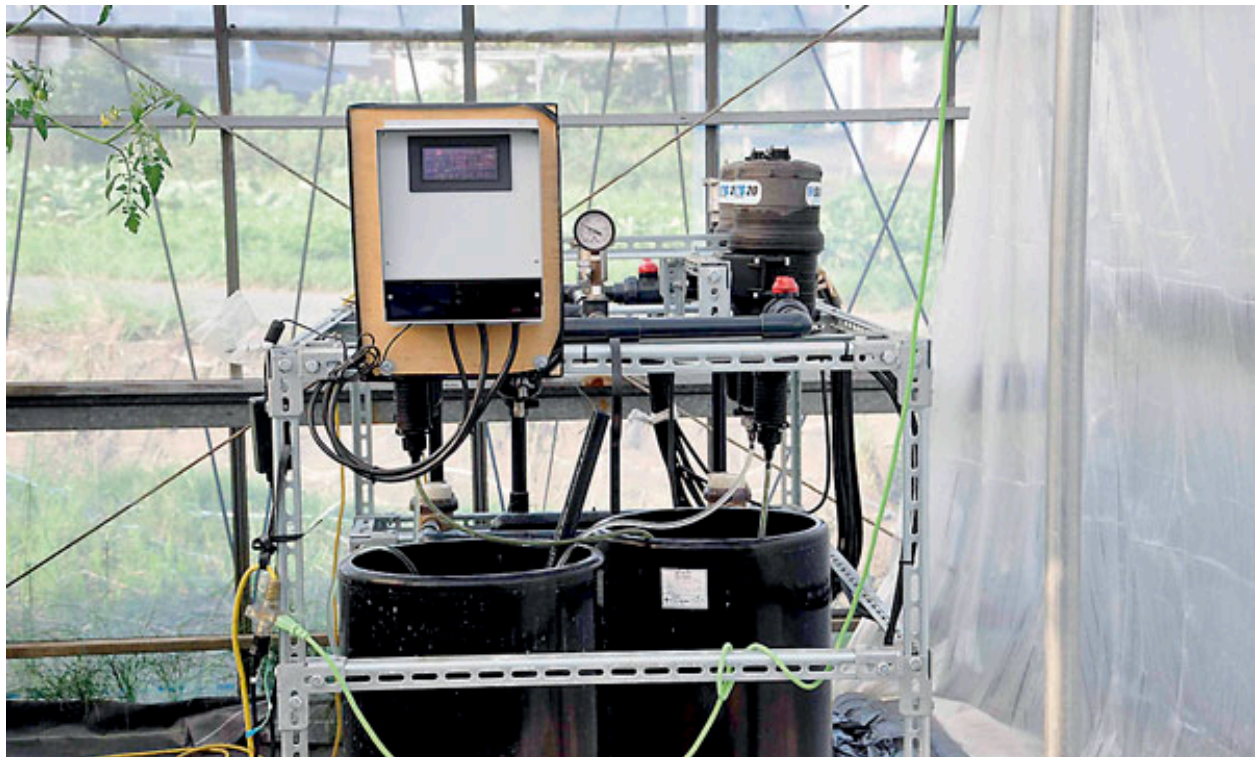
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## **Imec, an environmentally-friendly technology for soil-free film farming on a magical sheet**

1 October, 2014 Text and pix by Harsha, Udayakantha Peiris

A method of farming on sheets of film developed by a Japanese venture firm based in Kanagawa Prefecture is now drawing attention in dessert regions and other areas of the world. The sheets are made from a material similar to the highly-absorbent, high molecular compound used in disposable paper diapers.



This innovative system, namely, Imec – environmentally-friendly film farming, was recently introduced to a delegation of regional journalists from 13 countries including Sri Lanka, at a Multicountry Observational Study Mission on Best Practices in Promoting Innovation and Productivity in Agriculture for mass Media Practitioners, held in Japan. The Japanese residential program had been organised by the Asian Productivity Organization (APO) Head Quartered in Tokyo.

The Imec system is a new soilless agro-technology for safe and high quality vegetable production under minimised water and fertiliser consumption at even barren lands such as contaminated land, desert or concrete, which can be utilised in the industrial farming processes for many crops even in many parts of Sri Lanka and especially in the dry zone of the island.



### **Principle of Imec**

Imec is a plant culture technology by separating the plant from culture medium with a membrane composed of hydrogel – ‘hydromembrane’ – a thin layer of film with a 60cm width and 0.06mm thickness. This soft and flexible film does not lose shape and saves water well. It is also used in making soft contact lenses. This innovative film is now widely used in Japan for agriculture and it only allows water and nutrients to go through.



Since the 'hydromembrane' absorbs water and nutrients from the culture medium but releases none of water and nutrients to the air side, the plant side surface is totally dry. Accordingly, the plant develops a lot of fine and dense roots closely attached on the 'hydromembrane,' so that the plant can take water and nutrients directly from the membrane as much as possible.

Additionally, the plant up-regulates the production of sugar, amino acids, etc. in order to induce the osmotic shift of water and nutrients from the 'hydromembrane,' making the quality of the produce very high.

The other important point of Imec is that the incidence of crop damage infected with pathogenic germs propagated in culture medium is fully-controlled even without chemicals, because none of germs and viruses can penetrate the 'hydromembrane.'





**Dr. Yuichi Mori who developed the film farming technology in Japan showing the flexibility and mobility of film farming**



**A closer view of the Imec film farming. Here the roots are highly secured in the 'hydromembrane'**



## **Composition of Imec system**

The Imec system is composed of the 'hydromembrane' waterproof sheet, drip tubes beneath and on 'hydromembrane' and non-woven fabric. The liquid fertilisers supplied through and on to 'hydromembrane' contribute to the quality and the growth of the produce, respectively. The waterproof sheet perfectly prevents the runoff of the liquid fertiliser and also enables farming on contaminated land and desert or concrete.

The Imec system can be easily set by the farmer or domestic cultivator without any heavy machinery.

"The first step is to spread an anti-grass sheet and set plastic drip pipes on it in Greenhouse Soil Culture Farm. Next spread a waterproof sheet and set drip tubes where non-woven fabric is laid on it. Then spread 'hydromembrane' and spread peat-moss in thickness of one to two centimetres. Set drip tubes again and styrofoam board with aligned holes on it. Finally, cover it with mulching film and set young plants on it," said Atsushi Tsuji, the young farmer at a tomato farm yard that uses film agriculture in Isehara, Kamikasuya in the Kanagawa Prefecture.

"Here, tomatoes can be grown with 70% less water than in traditional cultivating methods," he added. "The fertiliser amount is also minimal and this adds a lot to the saving of water and fertiliser costs."

Tsuji's tomato farm is a green house of 1,200 square metres where 4,300 tomato plants have been grown in 17 ridges. Now, many tomatoes are red and ready to pick. At the farm, a machine connected to a computer sends water and nutrients to the tomato plants through the drip lines. The computer controls the ideal amount of water and nutrients needed for the growth of the plants.

"It needs only 150-300 millilitres of water a day depending on the desired outcome. Fertilisers are also dissolved in water. There is no need for tractors and other heavy machinery for this type of farming as it needs no tilling of the soil. As the water volume is controlled by the computer, the wastage is kept at a minimum and the quality is high. Here, we don't need to prepare the soil for farming, which is said to be the hardest part of farming and even a beginner like me can do it. Also, it is unlike the traditional methods of farming that need a lot of skill and care of the crop. For this reason, a lot of young people who have never farmed before are now adapting to this new technology," Tsuji noted.

Another advantage of the method is that the water in the nutrient content here is tightly shut beneath the film, keeping evaporation to a minimum level, which means the plants actually consume water and fertiliser lesser than it needs in open field farming. This adds up to a huge saving on water and fertiliser costs.



Imec technology consumes a lesser amount of water and fertiliser and is therefore welcome news for people in many areas of Sri Lanka, especially in the dry zone, where water is a scarcity. On the other hand, the news on this new technology of farming also gives scope for emerging agro scientists in Sri Lanka to search for alternative methods to supply water and nutrients to Imec film farming facilities without the use of a computer, for the farmers who would like to adapt to this new method at domestic or industrial level in many rural areas of the dry zone of the country.

Dr.Yuichi Mori, who developed this film farming technology in Japan, is also the CEO of the Japanese company that invented this technology. Mori used to be a research scientist for the development of company's fibre and medical equipment. He has spent around 30 years developing artificial organs that are used in medicine, utilising techniques for making the files of membrane for making human organs artificially.



Japan is globally at the top in relation to artificial membrane technology. Although Mori's efforts in producing an artificial membrane for agriculture failed during many attempts to produce a film that could be used in soil-free agriculture, a few years later, he was able to find this magic hydro gel membrane where seeds germinated and put out shoots.

Mori is now engaged in introducing film farming to many Japanese regions where water is scarce. "I like to see this method developed as a social business that can help stop the problem of poverty in emerging economies from the ground up," he says.



Within four years since the spreading of Imec film farming technology started in Japan, the total area of tomato farms has amounted to over 200,000 square metres and over 70 tomato farms can be seen in the area that uses the Imec technology. Another reason Imec has widely spread sooner than expected is that even inexperienced young people can also sooner acquire the Imec technology, because the 'hydromembrane' industrial product easily eliminates difficulties related to soil.

In the past several years, as consciousness of food safety increased dramatically, after the Great East Japan Earthquake where vast farming land was seriously damaged by the giant tsunami and Fukushima nuclear plant crisis, in 2011 the

Imec tomato has received a higher evaluation from consumers in many parts of Japan. Hence, Imec has become a leading candidate for regeneration and Japan Agriculture has started to recognise the merits of Imec. A lot of Imec farms have now acquired subsidies from the Ministry of Agriculture of Japan.

### **Barren land to farming land**

Imec converts any place such as concrete, sand, polluted or barren land where current farming is impossible to a successful farm land, by separating from earth by the waterproof sheet. In addition, Imec is portable because the 'hydromembrane' on which produce grows is easily transportable, differently from earth.

Owing to stronger sunlight, longer daytime and consecutive fine weather, productivity could be increased beyond expectations with a crop that uses Imec technology as the system can change a barren land to a production base of agro-produce within a very short period of time.

So far, 127 countries have applied for the basic patents of Imec technology and at present, it is registered in 100 countries, including Sri Lanka.