

Feature Science and Technology

Developing Orchid Industry Through Tissue Culture

by AS Islam

protection from theft. The S&T Division granted our request. In order to create interest among public and encourage businessmen to invest their money in this enterprise, an orchid house was constructed within the premises of National Museum of Science and Technology Division. In this orchid house

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(66%) of the mericlones of certain varieties such as *LC Kpnt staterichii XLC Vintos* survived. In *Cymbidium bicolor* survival rate was 70 per cent although micropropagation rate was 90.91 per cent in the medium developed (vacin and Went medium supplemented by 25 per cent CW + 1mg/1AA+1mg/1 BAP). In *Acampe praemorsosa* and *Rhynchosstylis retusa*, the micropropagation rate was 80.00 per cent and 93.42 per cent respectively in the same combinations.

Bangladesh Orchid Society

In 1989 an Orchid Society under the title 'Bangladesh Orchid Society' was formed. People associated with it are active orchid flower growers. Some of them sell orchid plants to orchid lovers on a limited scale. Almost all of them are keen to take advantage of the scientific method developed by the Botany Department, DU in the field of micropropagation of orchids. They are however hesitant to invest money for setting up a tissue culture-based industry unless trained manpower to handle micropropagation work is available in the country.

BARC in Tissue Culture

With the help of tissue culture experts available within the country, BARC may finance a training programme to create a cadre of skilled manpower by launching short training courses of, say, one month's duration. Such training courses can be easily arranged in TC laboratory of BARC, BRRI, IPISA, Botany Dept. DU. Initially the programme may be launched for a year turning out six batches, each of, say 10 students. Depending upon how many of these trained people get jobs in tissue culture-related industry, such a training programme can be extended.

Short Term Training on Tissue Culture

Courses for such a training was designed by the Botany Department, DU and submitted to BARC in April 1990. If

the training programme is launched without further delay, it will go a long way not only in encouraging entrepreneurs to start orchid industry but it will also help agriculture research institutes engaged in tissue culture activities such as micropropagation of virus free potato, papaya, sugarcane, banana etc. to run their projects effectively.

Technology Transfer & Training of Technicians

There are interested parties who are keen to take advantage of the scientific methods (tissue culture etc.) developed for micropropagation by university departments such as Botany Dept., Dhaka University for multiplication of orchid plants. They are however hesitant to invest money for setting up a tissue culture-based industry unless trained manpower to handle micropropagation work is available in the country.

From Laboratory to the Greenhouse

A chemical product obtained through research in laboratory needs to be tried on a pilot scale before the patent is bought by an industry for commercialisation. For a protocol developed for micropropagation in a laboratory, innovative methods need to be demonstrated on a large scale by their display in a public place to create an awareness among potential entrepreneurs in order that they establish such industries.

In consideration of this, a request was made by the Botany Department Dhaka University to Science and Technology Division for construction of a suitable greenhouse in a place of their choice. The greenhouse was erected in a record time in the premises of National Museum of S&T, Agargaon, Dhaka.

The greenhouse with 300 mericlones of both local and exotic varieties (from Bangkok, Chiang Mai, Indonesia, Singapore, Philippines) was open to the public in 1990.

The display of tissue-culture-derived orchid plants brought about the desired effect. A number of both amateur and professional orchid growers were convinced about the efficacy of the tissue culture method if they were to make a sizable profit out of this business ornamental flower.



some 200 orchids are now growing. Phalaenopsis species brought from Chiang Mai, Thailand produced a spoke (flower-bearing branch) in 21 months. Ten to 30 plants were added every month to the collection. All the plants growing now in the orchid house are tissue-culture-derived plants.

Clonal Micropropagation in Liquid Medium

During the past year scientists at the Department of Botany, Dhaka University, developed full protocol for rapid clonal propagation of some varieties also in liquid medium. The rate of micropropagation per year in liquid medium is faster and ranges for 1000-2000 mericlones per flask.

Orchid House of S&T Division

After the scheme had been put into operation in the Botany Department, DU for a year, an approach was made to the S&T Division for an orchid house to transfer the tissue culture-derived plants to ensure proper maintenance and

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Science Briefs

Computer reads for blind people

Blind people can now ready the 150,000 works in the Cite des Sciences in Paris, France, thanks to a computer system, unique in Europe, that immediately transforms the text of their choice into an artificial voice.

According to a report in the French newsletter CEDUST, the user installs himself in a listening booth and while waiting for an ordered book, he or she switches on a computer that is fitted with a loudspeaker on top.

The book is placed on a table in the booth and read, a page at a time, by an image numeriser, a kind of scanner. The computer immediately converts the written text into spoken one. The synthetic voice from the loudspeaker is perfectly understandable as punctuation is taken into account. The blind person merely has to press a key to stop or start the reading.

Rather than listen to the artificial voice, the user can also read the text he has chosen, in Braille. If so, he disconnects the loudspeaker and uses a 'Braille bar' in its place. The blind person places his or her fingers on the bar which is pierced with the same number of holes per character as there are dots in a Braille letter (6 to 8).

There are 80 characters to a line. For each character, little rods poke through the holes as required, to form the letters and the blind person can read them by feeling the bar. At the end of a line, a key is pressed to move to the following line. The line just read then disappears.

Pupils from Institutes for the Blind in Paris visit this facility and study there in small groups, while waiting for establishments to acquire such systems. The system is not widespread yet, because of the high cost of the equipment and installation — an equivalent of US\$ 350,000 for four units.

The Louis Braille room was created a team of architects and a computer expert Pierre-Louis Grosbois. A young assistant at the Cite des Sciences, Joelle Corvest, who is herself blind played a crucial role and the Louis Braille room is largely her work, the report said.

Superrail on rubber cushion reduces noise and vibrations

A rail of modified configuration for safer support, allowing trains to run faster and the at the same time quieter and smoother, is currently being tested in Sweden.

The Superrail NAPOL (SN) can use concrete or wooden sleepers of slightly modified shape. The lower part of the rail has no traditional base for support.

The rail is suspended at the top in a pocket in the sleeper. The upper part of the rail has two horizontal wings which are embedded in the sleeper on two rubber cushions.

This design allows for shock absorption and ensures improved precision of track width compared with today's Vignol rails. It is stated. The Superrail is supported as a pendulum while the Vignol rail is supported as a mast, just as it was when it was invented in 1820.

The main advantages of the SN Superrail are less wear and less corrugation of the rail which means reduced maintenance of both vehicles and tracks. It can be fully integrated with today's track systems and extended in stages as required.

An additional advantage of the SN track is that no noise-absorbing barriers will be necessary along the line, thus reducing a frequent source of conflict between those living nearby and railway operators.

The new elastic track was designed by Swedish engineer Bengt Bonstrom, Hovas, near Gothenburg, with technical and economic support from Swedish state institutions and the Swedish Rail Administration.

Rail sections of the SN principle will also be produced for use by Tramways and other light rail both in open and paved areas. It is estimated that the cost for a new double-track Superrail line will be about six per cent higher than that of present-day rails.

Is Bikini Atoll Safe After 23 Nuclear Tests?

by Giff Johnson

BIKINI swimsuits are named after the nuclear test atoll in the Marshalls that lost several islands to atomic explosions. For two generations the word 'Bikini' was also synonymous with the dark side of the nuclear age, and the insidious effects of radioactivity that have prevented islanders from setting foot on their home islands since 1946.

Suddenly in late August, scientists declared that Eneu Island, one of two main islands in Bikini Atoll, is safe for habitation. Bikinians are hopeful and skeptical at the same time.

This caution belies the burning desire of islanders — and particularly the elders who once lived on Bikini — to return to their former home after 46 years in exile.

Is Bikini safe after 23 nuclear tests?

"If it's true, it is really good news for the Bikini people," says Bikini Mayor Tomaki Juda after conferring with the scientists. But he said "we don't understand why the radiation has so completely disappeared when not so long ago the scientists told the US Congress that the Bikinians could not safely live on Eneu Island and eat 1000 per cent local diet."

"One meeting on Bikini was not enough to ask questions and receive the information. So we've requested a follow-up meeting with scientists in November."

Dr Herwig Paretske, a scientist the Bikinians hired to independently check radiation data from the United States, agrees with the conclusion that Eneu Island is safe for habitation.

Still, Bikinians have reason to be skeptical of scientific pronouncements. The Bikinians have lived in exile since 1946, when the US Navy evacuated them for the first of 23 nuclear tests on their atoll. Bikini was chosen for the first post-war test series because it was isolated, under US control and had a small population.

The 166 residents were quickly moved to neighbouring Rongerik Atoll, given a two week supply of food and soon forgotten as Operation Crossroads moved into high gear. Within months of their arrival, the Bikinians began asking to return home: Rongerik had not been inhabited precisely because the atoll could not sustain a permanent population. In less than two years, an American medical officer pronounced the Bikinians "to be on the verge of starva-

tion." Although Bikini had become almost a household word in 1946 because of media exposure given to Operation Crossroads, the people became the forgotten victims of the nuclear age. They were to endure repeated food shortages and neglect into the 1970s.

Operation Crossroads in 1946 was planned as a three-test series. But "Baker", an underwater explosion, so contaminated the atoll and lagoon with radioactivity that the Navy cancelled the third shot and Bikini was left in peace for eight years.

The infamous 1954 "Bravo" hydrogen bomb test — at 15 megatons, the largest blast ever set off by the US —

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rocked the atoll, vaporising two islands and part of a third and severely contaminated Bikini's horseshoe shaped necklace of low coral islands. Atolls downwind of the Bikini test were engulfed in a snowstorm of radioactive fallout, sentencing the inhabitants to a legacy of cancer and thyroid disease that continues to this day.

The US ended its nuclear testing programme in the Marshalls in late 1958 after 66 nuclear explosions at Bikini and Eniwetok atolls.

By the late 1960s, conditions on Kili Island had continued to deteriorate, spurring the islanders' desire to return home. They began to receive extensive international publicity for their struggle to survive in exile, increasing pressure on the US to return them to Bikini.

In 1968, President Johnson announced that Bikini would soon be returned to its people. A short time later, the Atomic Energy Commission (AEC) said: "The exposures to radiation that would result from the repatriation of the Bikini people do not offer a significant threat to health and safety."

from the tests and dumping them into the ocean near islands to be inhabited. New houses were built as part of the rehabilitation programme.

But the Bikini council was not impressed with the assurances of the US scientists and voted in 1972 not to return to their atoll as a group. Nevertheless, more than 100 workers and individuals had returned to Bikini by 1975 when medical examinations discovered the presence of low levels of radioactive plutonium in their urine.

Other warning signs were ignored as well. In 1975, an AEC study noted that ground wells previously approved as safe for drinking use were suddenly found to be too ra-

dioactive for safe use. By 1977, tests showed an 11-fold increase in the islanders' body levels of cesium, a radioactive element taken up from the soil by fruit grown on the atoll. The US began a programme of importing foods to cut exposure levels people were receiving from eating locally-grown food.

It didn't work, and by 1978 a study by the Department of Energy (which succeeded the AEC) said bluntly: "All living patterns involving Bikini Island exceed federal (radiation) guidelines for 30-year population doses." Finally, in September 1978 the people were once again evacuated.

Today, the majority of the 1,600 Bikinians live on Kili Island, where they have built a "temporary" home that becomes more permanent every year.

The Bikinians have a US-provided trust fund worth US \$90 million — provided when the islanders agreed to drop a US\$450 million law suit against the US. The fund will finance a nuclear cleanup and resettlement of their atoll.

experiments since 1988 demonstrated that Eneu Island is now safe for habitation.

The use of potassium fertiliser as prophylactic against the uptake by fruit tree roots of radioactive cesium has proved successful during experiments over the past four years. This new information has led scientists to revise earlier estimates of when Eneu would be safe for resettlement.

Eneu Island is the second largest in the atoll. It is nearby Bikini Island, the island where the Bikinians lived when they were removed in 1946 that remains heavily contaminated with radioactivity. Eneu has been developed as a base camp for cleaning up Bikini Island, and already the US has funded a power plant, dock, roads, airstrip, warehouses, and a large dormitory.

Beginning in 1988, the entire island of Eneu was covered with potassium fertiliser to experiment with its ability to limit the absorption of radioactive cesium 137 by coconuts and other crops grown on the island. "Mr Robison and the other scientists told us that the cesium levels on Eneu have stayed below the US federal standard," says Bikini spokesman Jack Neidenthal, an American who works for the local council. "They say we can return to Eneu and a diet of 100 per cent local food."

Earlier, scientists estimated that the Bikinians would have to eat a diet of at least 50 per cent imported food to control the cesium does they would receive from locally-grown fruits and vegetables. Now, scientists believe that the use of potassium fertiliser, which has chemical properties similar to cesium, can pave the way for an early resettlement of the former nuclear test site.

Mr Neidenthal says one cleanup proposal under consideration is scraping contaminated topsoil from the lagoon living area only on Bikini Island, and bringing in soil from another source to replace it. The rest of the island would be covered with potassium fertiliser — as Eneu Island has been — to decrease the uptake of cesium by the fruit trees.

The soil scraped off could be encased in a cement tank, he says. "The main problem with this option is the cost for scraping and disposing of the contaminated soil."

Mr Neidenthal says all of these suggestions are preliminary in nature, and a follow-up scientific meeting is scheduled for November. (Depthnews Asia)

Villages Farm Seas for Seaweed Bounty

by Paul Icamina

THE outrigger canoe sliced the sea gently and only small waves ripple across the boat's path over a reef surrounding Santiago Island.

Far in the distance, one can see the surf breaking up on the edge of the reef as the under-water mesa plunges down into the depths of Cape Bolinao.

Above the reef, seagrass leaves are just a foot below the water. One may wade back to shore or wander for miles in waist-deep waters.

Which is why this is an ideal site for seaweed farming: far from the reef's edge and the onslaught of tall waves and where the current is moderate.

Seaweed farming is being encouraged around Santiago Island, just off Bolinao town about 275 kilometers northwest of Manila. But in 1990, a violent typhoon caused sea-

The seaweed trade is third after tuna and shrimps as the main fishery export of the Philippines. The industry provides a livelihood to more than 70,000 seaweed farmers

On nearby Dewey Island lives Antonio Calim, one of the villagers trained in seaweed farming. In 1990, he had six rafts of seaweed ready for harvesting when the typhoon struck. He estimates those rafts contained as much as 4,000 kilograms of the Eucheuma seaweed, a significant amount for selling on the market. He lost his seaweeds but not his enthusiasm.

"There are interested buyers, but we simply cannot meet their demands," Mr Calim says. "If we can get together and organise, we stand a better chance of meeting this

"The potential of seaweed production in the developing countries of Asia is very high," says Dr Gavino Trono of UP-MIS. "In the Philippines the increased harvest of Eucheuma seaweed from farms has made the country the major supplier of this species in the international market."

In 1990, the Philippines exported about US\$36 million worth of refined and semi-refined carrageenin, a gel-like substance extracted from Eucheuma seaweed. Carrageenin is used in a variety of food products such as ice cream, jams, syrups, and pie fillings. It

also given seedstocks and some equipment.

Funding for the training and purchase of materials was provided by the Philippine Council for Aquatic Marine Research and Development and the United Nations Development Programme (UNDP), in conjunction with IDRC.

In addition to training core groups of farmers and advising on farming methods, project researchers also wanted to study systematically the types of seaweed in the Philippines for commercial use.

The seaweed industry is primarily based on a few commercially important species: *Eucheuma denticulatum*, *Kappaphycus alvarezii*, and *Caulerpa lentillifera*. Production of *Gracilaria* spp., *Sargassum* spp., *Gelidium* spp., *Codium* spp. currently depends on natural stocks. But there are more species that are economically important and others which are potentially valuable.

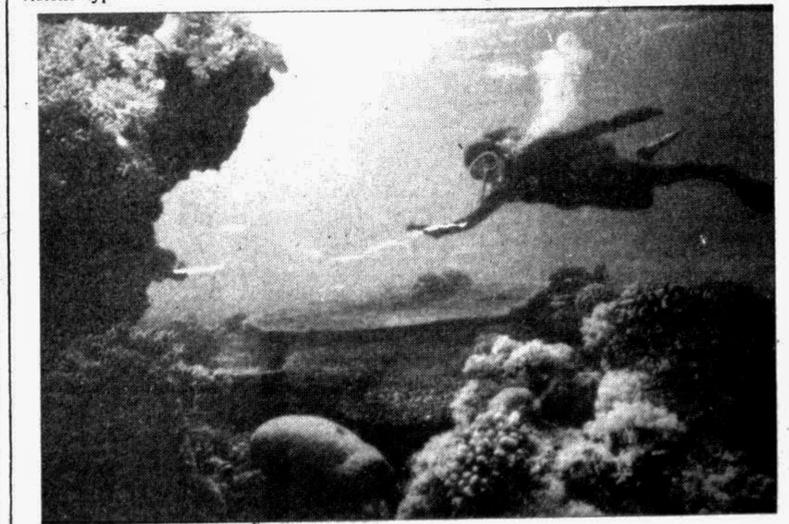
The IDRC-sponsored study surveyed 18 out of 60 coastal provinces. Field surveys recorded 103 seaweed species (out of 158) that were economically important. Some 138 species were collected, of which 81 were important either as food for humans or animals or as local sources of chemical and biochemical products.

The number of species recorded makes up 23 per cent of the total number of seaweeds known to be of economic value in the Philippines. It was the first systematic inventory of seaweed resources in the Philippines.

The study divided the country into two major biogeographic zones based on the distribution pattern of seaweeds, tidal types, the air-streams and their effects on current circulation, and on rainfall distribution. Previous studies have delineated the country into seaweed and non-seaweed provinces without any scientific basis.

The Seaweed Information Centre (SICEN), based in the UP-MSI at the Diliman campus in Metro Manila, was also established. It specialises in making seaweed information readily available.

The SICEN also manages a phylogenetic herbarium. It contains over 50,000 dried and mounted specimens, representing mostly Philippine seaweeds belonging to about 450 genera in 1,400 species.



weed farmers to lose thousand of tons of their harvest and a great deal of potential earnings.

Still, many remain undeterred and, with the help of the University of the Philippines Marine Science Institute (UP-MSI) at Bolinao, are receiving intensive training in seaweed farming. The UP-MSI, under a study grant from Canada's International Development Research Centre, is encouraging seaweed farming in Bolinao and other nearby towns of Pangasinan province.

Seaweed farming brings to some islanders hope of a bustling local industry and a chance to cash in on the lucrative seaweed trade, third after tuna and shrimps as the main fishery export of the Philippines.

In the last 15 years, seaweeds have become an important Philippine industry, exporting more than half-a-billion pesos (US\$20 million) in 1989 and providing a livelihood to more than 70,000 seaweed farmers.

The significant export figures are all the more reason to train villagers in the cultivation of seaweed. They were provided with a manual, equipment (metal stakes, mallets, knives and scissors), supplies (bamboo, stakes, straw, and nylon monolines), and seedstocks to re-start them on seaweed farming.

Dewey Island fishermen, like Mr Calim, provided the bamboo and labour to build the bamboo rafts on which seaweed is farmed, but they were