Feature

Food Security Threatened by 'Crazed' Patent System

SPECIES patenting is emerging as the latest threat to world security which is already imperilled by global warming, population explosion and environmental degradation.

"The granting of patents covering all genetically engineered varieties of a species, irrespective of the genes concerned or how they were transferred, puts in the hands of a single inventor the possibility to control what we grow on our farms and in our gardens. At the stroke of the pen, the research of countless farmers and scientists has potentially been negated in a single, legal act of economic highjack," laments Dr Geofrey Hawtin, director general of the International Plant Genetic Resources Institute (IPGRI).

Based in Rome, IPGRI is the lead agency addressing intellectual property issues for the Consultative Group on International Agricultural Research (CGIAR), the world's largest consortium of institutes of international crop research.

IPGRI and several national and international organizations were contacted by the Rural Advancement Foundation International (RAFI) to enlist their support against a "species patent" on soybean.

RAFI is an international non-profit non-governmental policy research organization based here. The organization works with partners in Asia, Africa, Latin America, Europe and Australia.

RAFI announced recently its intention to contest a patent issued on March 2 in the European Community to W R Grace, the world's largest speciality chemical company that is tantamount to a monopoly on the world's US$27 billion soybean crop.

The grant of patents for genetically engineered varieties of a species gives an inventor power to control what is grown in farms and gardens

W R Grace ranked 237 in Frotune Magazine's "The World's Largest Industrial Corporations" in 1992. It has an annual sales of US$62,329.6 million. The company has 44,000 employees worldwide.

The RAFI Communique, which is being circulated by the agency to its partners and the international research community, indicated that the W R Grace patent is "a clear threat to world food security."

Pat Roy Mooney, RAFI's executive director, in a message to the agency's international partners, said Grace's patent is reason enough for the international community to be truly disturbed. In a separate letter to the European Patent Office, Mr Mooney appealed the decision citing Article 99, Section 01 of the European Patent Convention. He requested patent examiners to reconsider and reject the species patent.

"The species patent should be revoked because it sets a precedent 'permitting monopoly patents over food crops," Mr Mooney said.

He pointed out that this is the second patent on agricultural crop species granted to W R Grace. The first, issued by the United States Patent and Trademark Office in October 1992, was for transgenic cotton (transgenic refers to an organism which incorporates and expresses genes from another species). The patent holder is Grace's biotechnology subsidiary, Agracetus.

In challenging the W R Grace patent, Mr Mooney said, "If this patent on the soybean species is allowed to stand, it will guillotine all high-tech research on one of the world's most important crops. It will also give W R Grace the green light to purse similar species patents on rice, maize, groundnuts (peanuts) and beans — all crops in which the company is doing gene transfer work."

Enraged over what they call an "outrageous example of biopiracy," board members of the Jessie Smith Noyes Foundation in New York made a grant of US$50,000 to help RAFI fight the patent.

RAFI has been in the forefront of international efforts against species patenting. Its uncompromising fight with "biopirates" has started to yield modest but promising results. Hope Shand, RAFI's research director, notes: "We campaigned against the cotton patent and, in mid-February, the government of India rescinded W R Grace's claim."

RAFI is now working with groups in other major exporting countries to challenge species claims in their areas.

Agracetus has also applied for patents on transgenic rice, groundnuts, corn and beans. W R Grace has a patent pending on genetic transformation of livestock These efforts have prompted RAFI to intensify their campaigns to inform farmers organizations worldwide of the possible negative impact on far farmers and food security of new and potential species patents.

W R Grace is employing a patented gene technology that allows the company to transfer genes from one species to another. Every time they use the technology on a different crop species they claim they have the sole right to use any form of biotechnology on any germplasm of the resulting organism. "It's like allowing the inventor of the microscope to patent everything he could see (through the instrument) that had not been seen before," says Mr Mooney.

"It's quite ridiculous but (this is just) the kind of thing we have come to expect when industry tries to patent living plants and animals. The patent system in Europe and the United States is out of control," according to Mr Mooney.

RAFI has noted a growing resentment particularly from research institutions and public biotechnology experts against sweeping claims on food crops arising from the soybean species patented to W R Grace. This development confirms apprehensions that the intellectual property system, as applied to biotechnology products and processes, has gone crazy and is posing a serious threat to global food security and the well-being of farmers, experts say.

For Asian countries with rice as their staple, Agracetus' claim on transgenic rice should be cause for concern. The RAFI April communique said an application for patent by Agracetus is now pending in Europe. Approval of this application will certainly give exclusive control to the company over the direction of future biotechnology research on the patented varieties.

Publication number WO 92/20809 Al of the World Intellectual Property Organization (WIPO) says the company is claiming a "Method of Creating a Transformed Rice Plant."

The publication noted, "...Though somewhat specific in its claim over transgenic rice, the patent pending is especially significant because rice is the world's most important food crop. Nearly half the world's population depends on rice as the major source of calories."

What is particularly disturbing for the world research community is that the company has genetically transformed rice varieties from the International Rice Research Institute (IRRI) in preparing its patent claim. International research centres like IRRI have assembled invaluable collections of germplasm and developed innumerable crop varieties from genes collected throughout the developing world. RAFI has collected documents showing Agracetus scientists have been working on the genetic transformation of numerous IRRI varieties, including IR-72, IR-36, IR-54 and IR-26.

Does this mean that someday the world's rice farmers will be prohibited from saving seeds from the genetically engineered and patented rice varieties as in the case of soybean and cotton?

Under existing utility patent laws, RAFI says the answer is yes. It pointed out that although the patent applies only in countries where it is recognized, several aspects of the rapidly evolving international trade and patent system may give the claims global force such as:

— The recently adopted GATT accord requires all countries to adopt an intellectual property system for plants and microorganisms and allows signatory states to seek retribution from states that "pirate" technology patented in other countries. GATT stands for General Agreement on Tariffs and Trade.

— Countries admitting species patents (the US and countries covered by the European Patent Office, for example) could prohibit imports of raw materials or finished goods derived from so-called "pirated" technology. Genetically engineered cotton clothing from India or soybean paste from Brazil could be barred, for example.

— The Biodiversity Convention that came into force at the close of 1993 is being interpreted in the US and Europe as requiring all member states to acknowledge the patent rights of other member states when it comes to germple collected prior to the adoption of the Convention. On behalf of W R Grace, the United States government would be able to prohibit access to Grace's technologies or germplasm to countries that do not recognize patent claims. W R Grace could also demand compensation from India or Brazil for the use of domestically-developed genetic engineering technology on these crops even if the countries do not accept Grace's patents.

RAFI said it is not yet too late to challenge W R Grace patent on transgenic soybean. Under Article 99(1) of the European Patent Convention, notice of opposition may be filed for up to nine months after the patent is granted.

RAFI has called on farmers organizations, non-governmental organizations, affected governments, as well as the UN Food and Agriculture Organization (FAO) CGIAR, and concerned private companies to get together for a coordinated opposition to various "species" patents on food crops and to propose that an international conference be held on the implications of patenting life forms. — *Depthnews Asia*

Science and Technology

The Sky's the Limit, Complain the Ozone Critics

by Ndikum Patrick Tanifom

While struggling to raise living standards and tackle a host of poverty-related issues, the Cameroon government has proudly launched a public campaign on the dangers of ozone depletion — an African "first" that has left many people puzzled.

THE Cameroon government has launched a media campaign to raise awareness of the consequences of the depletion of the Earth's ozone layer — to the amazement and puzzlement of its struggling citizens.

Depletion of the ozone layer must rank very close to the bottom of Cameroon's priorities.

The country ranks 124th in the United Nations Development Programme's "human development index." Life expectancy is 17 years behind the Caribbean island of Saint Lucia; less than half the population has access to formal health services; 40 per cent of rural people live in "absolute poverty."

On almost every measurement, it's a very poor country.

So there was bemusement when the government opened Africa's first ozone monitoring office and pledged to phase out the use of substances which damage the ozone layer.

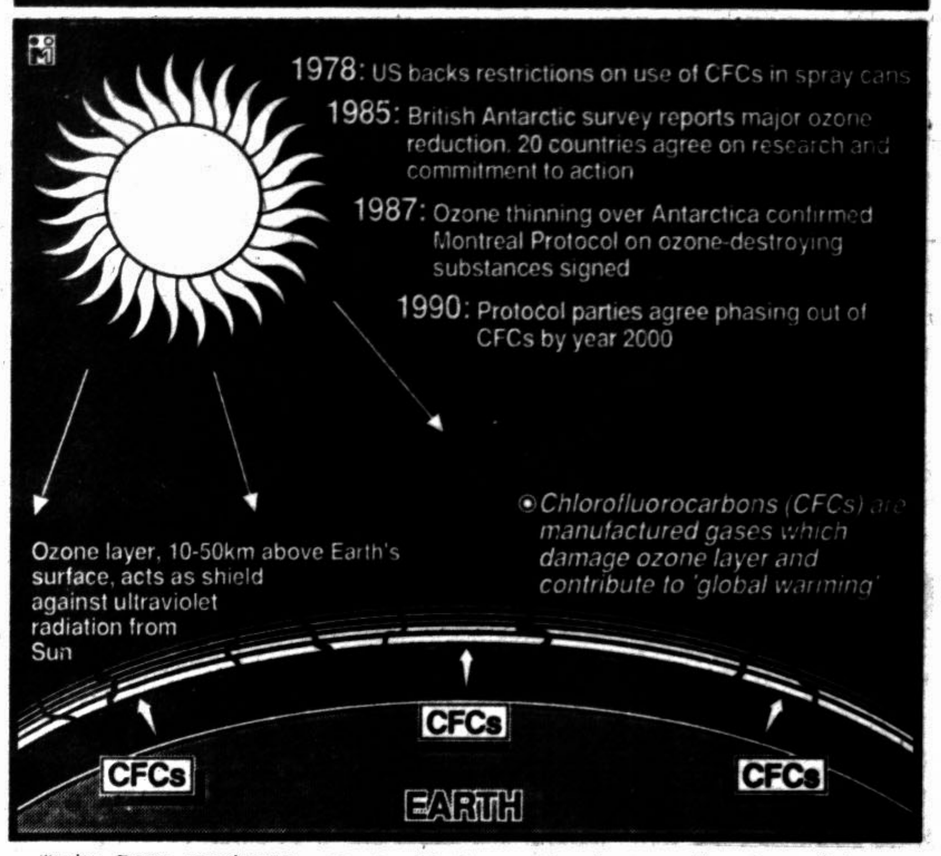
In global terms, ozone damage is serious. The ozone layer in the upper atmosphere protects life on Earth against ultraviolet rays from the Sun. Ultraviolet radiation can interfere with human immune systems, increase skin cancer and eye cataracts, harm marine life and lower agricultural yields.

After scientists reported a thinning of this vital protective belt in the 1970s, several Western governments took the warning seriously and in 1987 negotiated an international pact, the Montreal Protocol, to phase out the artificial chemicals identified as contributing to the problem.

When the Protocol was updated in 1990 it was agreed that production and consumption of chlorofluorocarbons (CFCs), for instance, which are used in a range of goods from aerosols to refrigerators, should stop by the year 2000.

But the main producers and users of CFCs and other ozone-damaging chemicals are the industrialised countries, and so far the main effects of ozone depletion have been felt nearer the poles, such as Chile in the south and Canada in the north, rather than at the equator.

The hole in the sky



Tonleu Roger, coordinator of the ozone project, puts Cameroon's consumption at a tiny 0.0087 kg per head.

So Cameroon could be forgiven for not worrying too much about the issue.

Yet three workshops with customs officials, businesses, and journalists have been held, plus an inter-ministry meeting bringing together officials from the ministries of commerce and industry, economy and finance, agriculture, and environment and forestry.

Enow Peter Ayuk, assistant coordinator of the ozone project, admits that the Customs Department is finding it difficult to identify the chemicals cited in the Montreal Protocol.

He also admits there is resistance to the proposed changes, and that some industries are ignorant of the whole programme.

Roland Bibaya, general manager of a company that manufactures electrical appliances, emphasises the importance of realistic figures, without which "any elaborate plan to eliminate ozone-depleting substances risks ghastly consequences for the Cameroonian industry and the economy as a whole."

Asks environmental activist Ngu Sama Joseph: "How do you expect people to wake up suddenly to a strange and abstract phenomenon like ozone depletion and take government seriously when they have been abandoned by the same government to other, more concrete, environmental hazards?"

Hazards such as the garbage which threatens to engulf Yaounde. The government delegate to Yaounde council said government did not have any money to clear the mess.

Hazards such as the rapid commercial logging of forests, which has outraged many villagers in surrounding areas.

Some opposition political parties have openly supported anti-logging campaigns by calling on villagers to destroy railway lines and sabotage other attempts to take timber from their villages.

It is widely believed that forest exploitation, particularly by French companies, takes place with tacit government approval. Critics ask why the Ministry of Environment and Forestry, which is the coordinating body for the ozone campaign, is making such a fuss over ozone while apparently turning a blind eye to deforestation.

One theory is that the government hopes to get financial support from the Montreal Protocol's project fund, set up when developing countries made it clear that their cooperation in protecting the ozone layer — a problem created by the rich world — depended on funding from industrialised countries.

Ayuk denies the government is motivated by the desire to tap foreign sympathy and support, and insists that the government cannot allow the ozone project to die "especially as ours is a pace-setting task. We were not just one of the first African countries to ratify the Montreal Protocol, we have been given the privilege of running the first national ozone monitoring office in Africa."

— *Gemini News*

Ndikum Patrick Tanifom is a Yaounde-based freelance journalist who was formerly editor of the Cameroon Post.

HB Virus

Can It Be Controlled?

by Saqib Hussain Shirazi

ALL over the world, including our own country, AIDS has led to panic. Scientists are desperately trying to discover a drug to combat this fatal disease. So far they have discovered a few drugs (e.g. azidothymidine and dideoxyinotsne) to control this disease, but unfortunately these drugs cause a variety of side effects including bonemarrow depression in humans. Besides this modest success, scientists are unable to find any solution to this deadly problem. However there are many other diseases which are still non-curable. One of these is hepatitis B. This infection is caused by a kind of virus called hepatitis B virus (HBV).

An infection of the liver is called hepatitis. Viral hepatitis is a systemic disease primarily involving the liver. Five categories of viral agents that cause hepatitis have been implicated. These are HAV (hepatitis A virus), HBV, HCV, HDV and HEV.

Mortality rates are not alarming in cases of hepatitis A virus. But hepatitis B can be deadly. HCV is equally dangerous. HBV infection is a threat to mankind. Routes of infection of HBV are:

(I) Transmission from carriers to close contacts by oral routes or by sexual or other intimate exposure.

(II) If needles, syringes, scalpels or even car piercing objects are improperly sterilized.

(III) HBV infection is associated with parenteral inoculation of infective human blood.

Health care personnel (surgeon, pathologists, and other physicians, dentists, nurses) have a higher incidence of hepatitis. Persons who have received a transfusion, especially from a paid donor, have a higher incidence of hepatitis.

The presence of hepatitis B virus in an individual is detected by the occurrence of viral surface protein antigens (HBs Ag) in the serum of that individual. HVs Ag can be detected with antibodies specific against them.

Although there is a vaccine agains HBV, there is no vaccine against the similarly dangerous HCV (some scientists are claiming that infection of HCV is much more dangerous than HBV because the presence of HCV in an individual can not be detected until it reaches its final stage, in which stage patients have no chance to recover). It should be mentioned in this regard that HCV is not common in our country but it is very common in Japan, Singapore and surrounding regions. As we have close relationships with these countries in terms of business, education, travel, etc there may be no guarantee that HCV will not come to our country in the future.

Researchers have been unable to cultivate HBV in culture. This type of culture has been the means by which vaccines for polio, mumps, measles have been developed. Current research indicates that the genetic coding for the HBs Ag can be inserted into the genome of the vaccinia virus. Another recent approach to vaccination involves genetically engineered yeasts. There are some deficiencies in these vaccines; in many cases antibody formation against HBV does not appear after completing full course of vaccine (i.e. taking three injections for primary immune response). Moreover, the vaccine is so expensive that it is beyond the reach of general people.

To prevent hepatitis B infection, firstly persons who have had hepatitis should not be blood donors. Secondly, syringes, needles, and all other equipment should be sterilized during blood collection and transfusion. Thirdly, staff members should wear gloves or other protective clothing when in contact with blood containing acute hepatitis B virus. In spite of taking all precautions against this fatal infection, infection rate and mortality rate is going up every year. Very recently, scientists claimed that vaccine against HBV can curb the problem, but they did not mention about those patients who are already carriers of HBV. They also did not mention anything about HCV infection. Thus, can we conclude that we are travelling from HBV infection area to HCV infection zone within the next few years?

HB Virus can be detected by the presence of viral surface protein antigens, HBs Ag, (above). No such tests exist, however, for the deadly HC Virus.

Researchers Discover 'El Nino' in the Indian Ocean

by Jim Fuller

SCIENTISTS report that the El Nino phenomenon that occurs about twice a decade in the Pacific Ocean — bringing devastating weather to several global regions — also occurs in the Indian Ocean.

The scientists told a meeting of the American Geophysical Union in San Francisco that the latest research for the first time links the two vast oceans in a related pattern whose effects on the world's climate could be more far-reaching than previously thought.

Their report, which was published early next year in the Journal of Physical Oceanography, also says that the same kind of pool of very warm surface water associated with El Nino develops in the Atlantic Ocean about 12 to 18 months after the phenomenon occurs in the Pacific and Indian oceans.

Warren White, a researcher at the Scripps Institution of Oceanography at the University of California in San Diego and a co-author of the report, said the latest findings go against conventional wisdom. "What's become canon is that El Nino is basically a Pacific phenomenon," he said.

El Nino occur every three to seven years when westward-blowing winds slacken along the equator, allowing ocean warmth from the western Pacific to spread east. These so-called warm events alter typical weather patterns worldwide, bringing torrential rains and destructive floods to some regions and severe droughts to others.

El Nino, Spanish for the Christ child, is so named because it often appears off South America's west coast around Christmas.

Using ocean temperature readings collected over a 12-year period, White and Yves Tourre, a meteorologist at Columbia University's Lamont-Doherty Earth Observatory in Palisades, New York, discovered an El Nino pattern in the Indian Ocean that occurs in lock-step with that in the Pacific Ocean.

In both 1982-83 and 1986-87, the Pacific and Indian oceans each experienced a characteristic El Nino warming that moved eastward. The scientists theorize that the El Nino in both oceans are in phase and may influence each other.

In the Pacific Ocean, El Nino moves to the coast of South America, where the warmest sea surface temperatures form. In the Indian Ocean, over approximately the same time period, El Nino moves to the central region of that body of water to form the warmest surface temperatures.

Subsequently, the warm pool in the eastern Pacific dissipates, while the warm pool in the Indian Ocean continues eastward to Indonesia and southward into the Timor Sea north of Australia. Unlike the vaster Pacific Ocean, circulation in the smaller Indian Ocean appears to be strongly influenced by powerful monsoon winds that blow along the coastlines of Africa, India and Indonesia.

According to White and Tourre, recognition of a cyclical El Nino pattern in the Indian Ocean holds the potential for forecasting droughts and floods in the Indo-Pacific region six to twelve months in advance. During the 1987 El Nino events in the Indian Ocean, for example, India and northwest Australia experienced severe droughts.

The two scientists also found what appear to be linkages between the Pacific El Nino and shifts in surface winds and atmospheric sea-level pressure in the Atlantic Ocean.

At the peak of the El Ninos in the Pacific and Indian oceans easterly winds across the equatorial Atlantic become stronger, which cooled Atlantic surface waters. Twelve to eighteen months after the Indo-Pacific El Ninos occurred the easterly winds over the Atlantic relaxed and surface waters warmed again.

The scientists theorize that these Atlantic ocean changes affect the amount of rainfall produced over adjacent continents. They suggest, for example, that the 1984 drought in western Africa was due to such changes.

In their research, White and Tourre used more than 650,000 ocean temperature measurements collected around the world between 1979 to 1991 by commercial ships, fishing boats, research vessels and naval warships. The ships deployed sophisticated, expendable probes that fall through the water to measure temperatures at various depths.

Using data consisting of both surface and subsurface temperatures, White and Tourre analyzed the Pacific, Indian and Atlantic oceans separately. They then compared the El Nino signals they found in the three oceans, finding linkages over the entire global tropical ocean.

— *USIS*

Anti-Cancer Effect of Mustard

Mustard, a popular condiment and oilseed in Asia, may have potential anti-cancer effects, according to preliminary studies at the National Institute of Nutrition (NIN), Hyderabad.

Mustard seeds contain isothiocyanates and related compounds which are potent inhibitors of neoplasia in experimental systems.

In their studies NIN researchers incorporated mustard power into rat diets and analysed the amount of mutagens present in urine samples after the animals were exposed to benzo(a) pyrene — a cancer-causing agent.

The scientists fed 1.5 and 10 per cent mustard powder into the diets of rats for four weeks, after which they exposed the animals to one mg each of benzo(a) pyrene. The rats' urine samples were assessed 24 hours later.

The results of the studies indicate that mustard seeds can protect against the mutagenic effects of benzo(a) pyrene, reports a NIN newsletter.

Growing Crops in the Desert

Two scientists from Strathclyde University in Scotland and a horticulturist from the Scottish Agricultural College believe it will soon be possible to grow plants and crops in drought conditions or salty water.

Professor J Graham has been researching "hydrogels", which are small plastic granules capable of holding moisture, and has invented a "smart" value that can respond to the water needs of plants. The plan is to combine the two so that when the moisture-holding hydrogels are placed around the roots of the plant, the value will sense and control how much water is released.

Prof Graham and his colleague Dr Ralph Kirkwood, from Strathclyde's bio-science and biotechnology department, claim that the technique appears to increase the tolerance of crop plants such as tomatoes, cucumbers, and lettuces to levels of salinity that would normally damage them.

Dr Kirkwood commented: "Some species like the tomato would actually appear to be enhanced in their growth in the presence of that particular polymer or molecular compound.

Revamping the Two-Stroke Engine

To combat the environmental pollution caused by combustion engines in cars, motorcycles and machines, stringent emission controls have been introduced. However, little has been done to curb the excesses of the ubiquitous two-stroke engine, whose fuel mixture of petrol and oil is only partially burned, which presents a great environmental hazard. Researchers in Germany have no developed an electronic fuel injection system designed to make the two-stroke engine "greener". This device, which can reduce emissions by up to 85 per cent and petrol consumption by one third, is currently being tested in numerous boat and vehicle engines.