



# RAFI COMMUNIQUE

RURAL ADVANCEMENT FOUNDATION INTERNATIONAL

December, 1996

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## 1996 Biopiracy Update

**US Patents Claim Exclusive Monopoly Control of Food Crop,  
Medicinal Plants, Soil Microbes and Traditional Knowledge from the South**

The patent plunder of indigenous knowledge and genetic resources of the South continues. Since 1994, RAFI has maintained a list that now exceeds over 50 private and public enterprises (or their intermediaries) who are actively collecting, sampling and acquiring biodiversity and traditional knowledge for the development of food, pharmaceutical and industrial products. "Biopiracy" refers to the use of intellectual property laws (patents, plant breeders' rights) to gain exclusive monopoly control over genetic resources that are based on the knowledge and innovation of farmers and indigenous peoples. Biopiracy and bioprospecting don't just happen in the field--biopiracy is even more likely to take place in the laboratories of industry and academia, and in patent offices in the industrialized North.

This year-end issue of *RAFI Communiqué* highlights recent examples that illustrate the inadequacy of existing intellectual property systems in protecting the rights of farmers and indigenous peoples over their knowledge and biodiversity. Current intellectual property systems do not protect the interests of community innovators, and ultimately threaten conservation and improvement of biodiversity worldwide.

### BOLIVIAN QUINOA CLAIMED IN US PATENT

Quinoa (*Chenopodium quinoa*) is a high protein food crop that is an important part of the diet of millions in Andean countries, especially indigenous people. Since pre-Incan times, indigenous people in Argentina, Chile, Bolivia, Peru, and Ecuador have been developing varieties of quinoa suitable for the wide variety of harsh conditions in the Andes. In particular, they have developed quinoa plants that can tolerate high altitude, low temperatures, little rainfall and poor soils.

It is only in recent years that quinoa has entered the US and European marketplace as a little-known, but increasingly popular "ancient grain" that is exceptionally nutritious. (Barley, maize and rice have less than half the protein of quinoa.) Current quinoa consumption in the US is approximately 3 million lbs. per year, and most quinoa is imported from Bolivia where it is grown by Bolivian campesinos. The value of Bolivia's quinoa export market is approximately \$1 million per annum.<sup>1</sup>

In 1994, agronomists Duane Johnson and Sarah Ward of Colorado State University received US patent no. 5,304,718, giving them exclusive monopoly control of male sterile plants of the traditional Bolivian "Apelawa" quinoa variety and its use in creating other hybrid quinoa varieties. *Apelawa* is an *altiplano* (highland) quinoa variety from the Lake Titicaca region of Bolivia. Duane Johnson readily admits that he and Sarah Ward did nothing to create male sterile varieties of *Apelawa* quinoa, "It's part of the native population of plants," explains Johnson, "we just picked it up."<sup>2</sup>

Johnson and Ward's patent claims that they were the first to identify and use a reliable system of cytoplasmic male sterility in quinoa for the production of hybrids. To produce cytoplasmic male sterile quinoa plants they visually selected naturally-occurring male sterile plants from the *Apelawa* variety, and then crossed these with fertile quinoa plants to achieve a male sterile hybrid. (This type of sterility affects only pollen production, not the seeds produced. It is the same type of male sterile

system that has been used to breed hybrids in crop species such as maize, sugar beet and onion.)



The US patent claim is not limited to a single hybrid variety, it claims any quinoa hybrid that is derived from *Apelawa* male sterile cytoplasm. According to the patent, this includes, but is not limited to, traditional Andean varieties such as:

*Apelawa, 407, Cahuil, Tango, Janco, Kanchi, Baer, Calcha, Chullpe, Killuvirginiana, Lihio, Marangani, Isluga, Sajama, Chuppi, Kanccolla, Blanca de Juli, Rosada de Junin, Blanca de Junin, Illimani, Oxfam, Tupiza, Ccoyto-1, Chewecca, Real, Pasankalla, Litu, Pichaman, Faro, Amarillo de Marangani, Dulce de Quitopamba, Lipez, Litio, Rojo de Cusco, and Tanso Kanta.* The patent also makes specific reference to claims extending to hybrid quinoa plants cultivated from the quinoa germplasm collection of the Universidad Nacional Tecnica del Altiplano in La Paz.

In accordance with patent requirements, seeds of the traditional Bolivian *Apelawa* variety are now on deposit at the American Type Culture Collection (accession no. 75154) in Rockville, Maryland (USA).

Duane Johnson told RAFI that he has already made his technology for producing hybrid quinoa freely available to researchers in Chile and Bolivia. He claims that he has no intention of enforcing his patent outside of the United States, but he adds, "if they start taking away my market [in the US] I might start to be concerned."<sup>3</sup>

Under U.S. patent law, Johnson and Ward have the right to prevent anyone else from making, using or selling quinoa hybrids derived from *Apelawa* cytoplasm without permission and payment of royalties. Technically, the inventors have the legal right to prevent U.S. imports of hybrid quinoa from entering the US if they were created using their patented technology. They also have the right to prevent other researchers from using *Apelawa* germplasm to create quinoa hybrids--even for non-commercial purposes. Duane Johnson claims that he is already freely distributing his invention to research scientists. So why did he patent *Apelawa* and the technique for developing quinoa hybrids? "Frankly," responds Johnson, "it's because the University likes us to patent this kind of technology--patenting is just one of the procedures."<sup>4</sup> The patent is now available for licensing, and could be acquired by a company that is interested in commercializing the

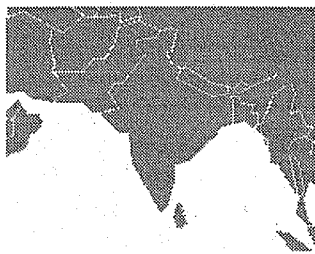
technology for hybrid quinoa. The patent will expire in the year 2011.

The primary goal of developing hybrid quinoa is to increase the crop's yield, and to make it suitable for commercial-scale cultivation in North America. US Patent No. 5,304,718 claims that new hybrid quinoa varieties are capable of producing yields three times the average of 1,344 kilograms per hectare. Ironically, if a larger market for quinoa is developed in the US for high-yielding hybrids derived from a traditional Bolivian quinoa variety, it could displace Bolivia's export market--with very negative economic impacts on small farmers who grow quinoa for export. Whether or not the patent has any direct impact on Bolivia's farmers, however, there is no denying that they have effectively lost control of traditional quinoa seeds that were developed over centuries by indigenous peoples of the Andes. It is a dangerous and disturbing precedent.

Bolivian scientists have raised other concerns about the direction of US quinoa research and future industrialization of the quinoa crop. The outer coat of most quinoa seed contains bitter-tasting compounds, known as saponins, which must be removed before processing. The bitter seed coat is believed to protect the crop from insects, but it must be removed after harvest, a costly and time-consuming step that has hindered industrial processing of quinoa. Duane Johnson is now trying to develop saponin-free varieties without the bitter seed coat, giving rise to fears that new varieties of quinoa could become more vulnerable to pests, and eventually require the application of expensive pesticides.

#### HOECHST CO. PATENTS CHEMICAL COMPOUNDS FROM TRADITIONAL INDIAN MEDICINAL PLANT

German agrochemical and pharmaceutical giant, Hoechst Co. (Frankfurt, Germany) holds at least 6 US patents covering numerous uses for chemical compounds extracted from the roots of an Indian medicinal plant, *Coleus forskohlii*, used since antiquity in Hindu and Ayurvedic traditional medicine. Traditional uses of *C forskohlii* include treatment for cardiovascular disease, abdominal colic, respiratory disorders, painful urination, insomnia, and convulsions.<sup>5</sup>



One of Hoechst's patents, US Patent No. 5,206,241 (issued April, 1993), covers a specific formula of the plant extract, and its use in treating cardiovascular disease and intraocular pressure. Hoechst also holds three patents on the use of extracts from *C. forskohlii* to treat cardiac failure and memory deficit.<sup>6</sup> Another Hoechst patent, US Patent No. 4,724,238

claims a process for isolating the biologically active compounds from the plant, and its use in treating anti-inflammatory and analgesic activity. Hoechst will begin worldwide marketing of its *C. forskohlii*-derived drug in 1997.<sup>7</sup>

The age-old medicinal uses of "forskolin," the biologically active compound extracted from the roots of *C. forskohlii*, are now new. In 1974, a large-scale screening of medicinal plants by the Indian Central Drug Research Institute first revealed the blood pressure lowering and antispasmodic effects of extracts from *C. forskohlii*.

*"The most important publications for our researchers are not chemistry journals, but patent office journals around the world."*

-- Dr. Richard Helmut Rupp, Head of Hoechst R&D

According to German researcher, Michael Flitner, Hoechst is doing intensive research on soil samples and traditional Ayurvedic medicine all over India. The company has already screened over 90,000 Indian soil samples and is building a new, high-efficiency screening system in Frankfurt where they will sift through their genetic booty--plant and microbial diversity of Indian origin.

#### AFRICAN SOIL MICROBE SOURCE OF VALUABLE HERBICIDE TOLERANT GENE FOR AGREVO



In 1994, Hoechst and Schering merged their agrochemical businesses to form a new company: AgrEvo. With net sales of (US) \$2,300 million in 1995, AgrEvo is the world's fifth largest agrochemical corporation. (see "The Life Industry," *RAFI Communiqué*, September 1996.) One of its

patented genes for herbicide tolerance (US Patent No. 5,276,268) comes from a strain of *Streptomyces viridochromogenes*, isolated from a soil sample from Cameroon--the so-called PAT gene.<sup>8</sup>

The company's glufosinate chemical compound used in its best-selling herbicide (tradename Basta) was also developed from a soil bacterium of Cameroonian origin.<sup>9</sup> Despite the fact that Basta is one of the company's leading herbicides, Hoechst spokesman Gerhard Waitz told the German weekly, *DIE ZEIT*, that "nothing will go back" to Cameroon.<sup>10</sup>

At the end of 1995, the Hoechst Group held 86,000 patents and patent applications. According to Dr. Richard Helmut Rupp, head of Hoechst R&D, "The most important publications for our researchers are not

chemistry journals, but patent office journals around the world."<sup>11</sup>

#### UNIVERSITY OF MISSISSIPPI PATENTS TURMERIC INDIAN GOVERNMENT CHALLENGES CLAIM

Two researchers from the University of Mississippi Medical Center (US), Suman Das and Hari Har Cohly, have patented a traditional remedy that Indians have used for centuries--the use of turmeric to make external wounds heal faster. US Patent No. 5,401,504, issued on 28 March 1995 claims a "method of promoting healing of a wound by administering turmeric to a patient afflicted with the wound."

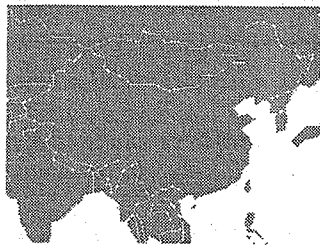
Turmeric has been used as an important remedy in traditional Ayurveda medicine since antiquity. The yellow powder or paste from the dried root of the Turmeric plant (*Curcuma longa*) is routinely applied to scrapes and cuts of children--and is widely known in India as *haldi*.<sup>12</sup> In India, news of the US patent claim on turmeric has sparked public outcry, and the Indian government's Council of Scientific and Industrial Research has responded by requesting a re-examination of the patent at the US Patent and Trademark Office in Washington, D.C.<sup>13</sup> According to Anil Agarwal and Sunita Narain of the Centre for Science and Environment in Delhi, the Indian government will argue that the use of turmeric as a wound healing substance is a well-documented, traditional practice and therefore the inventors cannot claim that their "invention" is novel (novelty is one of three standard criteria for patentability).

Despite the Indian government's challenge, one of the patents' "inventors," immunologist Hari Har Cohly, told RAFI that he hopes to "carry on" with the patent, but a final decision has yet to be made with his co-inventor and the University. The university is concerned about the cost of defending the patent. "Never did I imagine that we would get such controversy," Cohly told RAFI. Colhy is familiar with the traditional uses of turmeric, but he doubts the legitimacy of traditional knowledge until tested (and patented?) by institutional scientists: "There are so many home remedies all over India," said Colhy. "But are these scientifically valid or just gibberish? That's the point. We have used it [turmeric] on patients, it has been clinically tested."<sup>14</sup>

#### US GOVERNMENT'S NATIONAL INSTITUTES OF HEALTH AND NEW YORK UNIVERSITY PATENT PRODUCTS OF TRADITIONAL KNOWLEDGE FOR USE AS ANTI-HIV, ANTI-TUMOR THERAPEUTICS

The National Institutes of Health (NIH) and New York University have received US and international patents on four botanical folk remedies which claim anti-HIV and antitumor therapeutic utility. The NIH is now

seeking an industrial partner for commercializing the ancient botanical remedies.



US patent no. 5,484,889 (issued 16 Jan 1996) protects a protein purified from the fruit or seed of

*Momordica charantia*, or the recombinantly synthesized equivalent. *Momordica* fruit is commonly known as the bitter melon and has been used in China and southeast Asia for centuries as an anti-infection and anti-tumor agent, and also as an immunomodulator, according to New York University molecular biologist Sylvia Lee-Huang. Lee-Huang, the first "inventor" listed on the patent, remarks candidly that *Momordica* fruit is "very widely eaten in the Chinese community for health reasons."<sup>15</sup> Even the fruit's anti-HIV properties were widely known before NIH and NYU patented it: Many communities of HIV positive patients in the United States eat bitter melon extract as an anti-HIV therapy. In Los Angeles, for example, there's a "Bitter Melon Therapy Group."

Another botanical remedy patented by NIH and NYU is *Trichosanthes kirilowii*. According to Lee-Huang it "has been used in China for many, many years...and is well known for its therapeutic effect in ovarian cancer and trophoblastic tumor, as well as against viral infection."<sup>16</sup> In Chinese, its common name means "the powder from the flower from the Gods." It may be from the Gods...but US patent # 5,317,009 (issued May 31, 1994) grants NIH and NYU exclusive monopoly on a protein purified from the plant's root tuber, or the same protein produced by recombinant DNA technology.

"So now we don't have to try so hard to go to the Himalayas to get the seeds, or to China to get the bitter melons," Lee-Huang told *Bioworld Today*, "We can use recombinant technology to produce them in our labs in large amounts. And our recombinant proteins are as active as the natural protein."

US patent no. 5,317,009 (issued May 31, 1994) covers both *Dianthus caryophyllus* and *Gelonium multiflorum* extracts, both natural and the biosynthetic equivalent. *Dianthus caryophyllus* is commonly known as the carnation flower. According to Lee-Huang, Native American Indians have long used the leaves of *Dianthus* as a sort of bandage for treating cuts or infections."<sup>17</sup> *Gelonium multiflorum* originates in the Himalayan mountains, where it's known as the "heavenly fruit."

Dr. Lee-Huang claims exclusive monopoly on not only the isolated and purified protein from four traditional medicinal plants, but also the recombinantly synthesized

equivalent of each protein. She explains the significance of the patented technology:

"So now we don't have to try so hard to go to the Himalayas to get the seeds, or to China to get the bitter melons," Lee-Huang told *Bioworld Today*, "We can use recombinant technology to produce them in our labs in large amounts. And our recombinant proteins are as active as the natural protein."<sup>18</sup>

#### US GOVERNMENT DUMPS THE HAGAHAI PATENT

It's official. After months of indecision and confusing signals, the US National Institutes of Health (NIH) has finally put an end to its internationally-denounced patent on the human cell line of a Hagahai indigenous person from Papua New Guinea. The NIH gave official notice of its decision to "disclaim" the patent on December 10, which is, coincidentally, International Human Rights Day. The NIH disclaimer forfeits all of the US Government's "past and future rights in each and every claim of United States Patent No. 5,397,696...thereby relinquishing all control over said patent."

"I hope this is the end of what is arguably the most offensive patent ever issued," said Alejandro Argumedo of the Canada-based Indigenous Peoples' Biodiversity Network, upon hearing the good news. "There has been no greater affront to fundamental human rights by Western intellectual property systems than the Hagahai patent," he added.

It's not the first time that indigenous peoples, NGOs and foreign governments have succeeded in pressuring the US government to abandon a patent claim on human cell lines of indigenous peoples. In 1993, following international protest by the Guaymi General Congress, RAFI and numerous other NGOs, the US was pressured to withdraw its first patent application on the cell line of an indigenous Guaymi woman from Panama. Later, in collaboration with the Solomon Islands government, RAFI suppressed another patent application for the cells of a citizen of that country.

Even in disclaiming the patent, NIH has failed to address many of the numerous inconsistencies and missteps that have dogged the US government since the beginning of the patent controversy in 1994. A recent NIH backgrounder on the patent "raises many more questions than the few it credibly answers" said Neth Dano of the Southeast Asian Regional Institute for Community Education (SEARICE) in the Philippines. "We've been consistent, and right, all along while the US government has equivocated and contradicted itself," said Dano.

Aroha Mead of the Maori Congress in Aotearoa/New Zealand agrees: "While the US may have now disclaimed the Hagahai patent, a trail of trauma and mistrust have been left behind" said Mead. "It sent a message to Pacific communities that researchers cannot be trusted and it will take a long time to convince them otherwise. While the Hagahai patent is dropped, which unsuspecting community will it be tomorrow?"

Although the US government's strikeout on indigenous peoples' cell line patents is encouraging, the scope and number of patents on human tissues is dramatically expanding. Opponents of human tissue patents, including indigenous peoples' organizations, RAFI, and other NGOs will remain vigilant in identifying, opposing and seeking the revocation of claims like the Hagahai patent.

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#### COMMUNIQUE UPDATES:

##### *LIFE INDUSTRY CONSOLIDATION CONTINUES*

### **Monsanto Stakes Out Major Position in Hybrid Maize**

RAFI's recent report on the life industry (See *RAFI Communiqué*, October, 1996) highlighted Monsanto's voracious appetite for acquiring seed and biotech companies in 1995-1996. In the first week of 1997, Monsanto announced it will take a giant bite out of the hybrid maize seed market with the (US) \$1.2 billion acquisition of Holden's Foundation Seeds, and its marketing divisions Corn States Hybrid Service Inc. and Corn States International.

Holden's Foundation develops the inbred lines used by other seed companies to create hybrid maize varieties marketed worldwide. More than 35% of the maize acreage planted in the US is based on germplasm developed by Holden's. Combined with its 40% stake in Dekalb Genetics (a major maize seed company), Monsanto now becomes a major player in the commercial maize seed industry, with a ready source of germplasm in which to insert its proprietary genes for the marketing of genetically engineered maize. One observer refers to Monsanto's acquisition of Holden's as "a major structural change in the industry." In the past two years, Monsanto has invested nearly \$2 billion in ag biotech.

### **DowElanco Takes Control of Mycogen**

In December 1996, DowElanco acquired a 51.8% majority stake in plant biotech company Mycogen, reportedly because it wanted to prevent Monsanto from buying the company and gaining access to Mycogen's proprietary collection of insect resistant *Bacillus*

*thuringiensis* genes. DowElanco was formed in 1989 when Dow Chemical Co. and Eli Lilly & Co. merged their agricultural and plant sciences businesses. DowElanco holds approximately 7% of the global agrochemical market.

### **New Source of Natural Rubber Latex**

The US imports over 1.1 million tons of natural rubber latex per annum that comes primarily from *Hevea* rubber trees (*Hevea brasiliensis*) grown in Malaysia and Indonesia. The worldwide AIDS epidemic has led to growing demand for latex gloves, but over 17 million people in the US alone have developed serious allergies to proteins found in *Hevea* rubber tree latex.

After ten years of research, the US Department of Agriculture has developed and patented a process for deriving latex rubber from an alternative plant source -- *Parthenium argentatum*, commonly known as guayule. Guayule produces high-quality latex but does not contain allergy-causing proteins. It is a low-growing desert shrub native to the Southwestern United States. The latex-producing technology has been licensed by a new company, Ulex, Inc. of Philadelphia, Pennsylvania (USA) whose mission is "to do nothing but commercialize guayule," says Ulex President, Dan Swiger.<sup>19</sup>

Dr. Katrina Cornish, the researcher responsible for developing guayule as a commercial source of natural latex said that, "there is no doubt in my mind that guayule will provide a significant portion of domestic latex needs" in the near future.<sup>20</sup> (For further background, see *RAFI Communiqué*, "Biotechnology and Natural Rubber," June, 1991.)

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### **NEW WORLD WIDE WEB ADDRESS**

RAFI's world wide web address has now changed to:

<http://www.rafi.ca>

Visitors will notice the gradual introduction of added features at the new site. The improvements will make our site easier to navigate and more helpful and informative. Within a few months, visitors to our internet site be able to search RAFI Communiqué and other information by keyword. A new publications orders system and a live query system for database information is also planned. We'll do this while maintaining a low-bandwidth site that won't strain the connections of users on slow internet links or visiting us from far-away places.

- 1) Personal communication with Marcelos Soldan, Executive Agriculture Specialist, Bolan Vest, La Paz.
- 2) Personal communication with Prof. Duane Johnson, January, 1997.
- 3) Personal communication with Prof. Duane Johnson.
- 4) Personal communication with Prof. Duane Johnson.
- 5) Hermann P.T. Ammon and Axel B. Muller, "Forskolin: From an Ayurvedic Remedy to a Modern Agent," *Planta Medica*, Vol 51, No. 6, December, 1985, pp.473-477.
- 6) US Patent No. 5,177,207 (issued January 1993); US Patent No. 5,145,855 (issued September, 1992); US Patent No. 5,093,336 (issued March, 1992); US Patent No. 4,999,351 (issued March, 1991).
- 7) Chattopadyay, S. 1995. Hoechst: A leader in natural products leads, *Express Pharma Pulse* (Bombay), 37, August 10, 1995.
- 8) Personal communication with Michael Flitner.
- 9) Personal communication with Michael Flitner.
- 10) Martina Keller. 1996. Raubzug auf dem Acker. *DIE ZEIT* No. 24, Dossier, June 7, 1996, p. 10.
- 11) Quoted on Hoechst web site at: [http://www.hoechst.com/press\\_e/13096e3.htm](http://www.hoechst.com/press_e/13096e3.htm)
- 12) Anil Agarwal and Sunita Narain, "Pirates in the Garden of India," *New Scientist*, 26 October 1996, p. 14.
- 13) Anil Agarwal and Sunita Narain, "Pirates in the Garden of India," *New Scientist*, 26 October 1996, p. 14.
- 14) RAFI interviewed Dr. Hari Har Cohly by phone in December, 1996.
- 15) David N. Leff, *BioWorld Today*, "Age-Old Folk Remedies Resurface as Recombinant Anti-HIV, Anti-Tumor Therapeutics," October 23, 1996.
- 16) David N. Leff, *BioWorld Today*, "Age-Old Folk Remedies Resurface as Recombinant Anti-HIV, Anti-Tumor Therapeutics," October 23, 1996.
- 17) David N. Leff, *BioWorld Today*, "Age-Old Folk Remedies Resurface as Recombinant Anti-HIV, Anti-Tumor Therapeutics," October 23, 1996.
- 18) David N. Leff, *BioWorld Today*, "Age-Old Folk Remedies Resurface as Recombinant Anti-HIV, Anti-Tumor Therapeutics," October 23, 1996.
- 19) Potera, Carol. "Genetic Engineering Improves Natural Rubber," *Genetic Engineering News*, September 15, 1996, p. 8.
- 20) Personal communication with Dr. Katrina Cornish.



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