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EXECUTIVE AND LEGISLATIVE ACTIONS

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PATENTS ON NEEM: WILL THEY DEPRIVE INDIAN FARMERS OF THEIR RIGHT TO USE IT AS A PESTICIDE?

By Professor Anil Gupta[12]

There has been a worldwide media campaign alleging that a patent filed by W. R. Grace & Company on a neem product and a process of extracting the storage-stable active ingredient will prevent farmers from using neem as a source of homemade pesticide.

In addition to this central issue, there are several other issues that this controversy has raised, these include: whether multinational corporations (MNC) have usurped traditional knowledge; whether patents will lead to erosion of the genetic diversity of the neem tree; whether neem seeds will become too costly for the poor farmers who currently use them to produce pesticide; and whether developing countries will be robbed of their rights to use the neem tree as they deem fit.

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[12]This essay was sent to us on the Internet by Professor Gupta. It was modified slightly for publication by Dr. Thomas W. MacAllister.

There are many other issues which arise that have not been discussed until now. For example, why have governments of developing countries (such as India), which spend so much on chemical pesticides, not spent adequately on research on developing herbal pesticides? This is a particularly pointed question when so much relevant research and development has been done in these countries by public sector scientists. Will the availability of neem-based pesticides decrease the demand for environmentally hazardous chemical pesticides? Will restrictions on production of neem-based products increase the demand for chemical pesticides? Should small-scale entrepreneurs be provided with technology developed with publically funded R&D to manufacture neem-based products locally to meet the demands of small farmers at lower cost? What would be the impact of replacement of chemical pesticides in "Green Revolution" areas?[13] Will that not lead to consumers having safer food to eat, devoid of residues of chemical pesticides? Who will gain if the demand for neem seeds or leaves goes up? There may be many other issues that can arise in this regard, but let us first see what the implications are for poor dry-land farmers who grow neem.

Who Grows Neem Trees and Where?

Neem grows well in the Indo-Gangetic plains with good irrigation systems, but it cannot compete with more profitable trees such as mangoes, guavas, or eucalyptus. Hence, neem trees are grown widely in semiarid and light-soil regions. It has not become a crop for agro-forestry systems as yet, but with increasing demand for its seeds, it could become one. This would provide an attractive economic option to the disadvantaged dry-land farmers who work these semiarid regions.

Neem is an ideal crop for such disadvantaged farmers. It grows fast and within a few years starts bearing fruits. During a drought when most crops fail, the neem tree thrives. In fact, its leaves are used as stress fodder for livestock. There is no other crop that is so sturdy and requires so little input yet offers so much economic gain.

Thus, increased demand for neem seeds within India or abroad will only do good to the environment as well as to the economy of dry-land farmers. This is provided that "well wishers of the Third World" in the United States do not succeed in killing the market for neem seeds from India and Africa. In any case do we hear about any opposition to the export of sugar or cotton for use abroad?

[13]The Green Revolution is a program begun in the 1970s with the goal of making India a self-sufficient food producer. The program included importing vigorous strains of agricultural plants to be hybridized with native species. The resulting plants were very responsive to fertilizers and produced so well that India achieved its goal by the late 1970s. The participants in this program remain important food producers in India and are the major consumers of chemical pesticides. T.W.M.

Will Excessive Demand Lead to Erosion of Neem Diversity?

The neem tree produces seeds profusely. For reproduction of its population, the tree needs only a small fraction of these seeds. Given the very short dormancy of neem seeds, they quickly germinate after the rains and die if not replanted or allowed to grow. Thus, collection of wild neem seeds poses no danger to continuance of the diversity.

There exists the danger that once commercial interests become dominant, a few selected germplasm sources may be widely grown, leading to genetic uniformity. This danger is not exclusive to neem but is common to all commercial crops grown on large scale, and it requires generic solution. However, studies by Dr Venkateswarulu at the Central Research Institute of Dry Land Agriculture (CRIDA) have convincingly shown that neem presents a great genetic diversity. Futhermore, the scientists at CRIDA have clonally propagated the elite neem trees successfully. This is an important breakthrough, because it offers a more reproducible alternative to seed propagation. Additionally, cross- pollination made the task of getting true seed of particular kind more difficult. Of course, clonal propagation further accentuates the danger of genetic uniformity with all its attendant dangers. However, this trade-off, as discussed, is inherent in any strategy to maximize returns per unit of land and other scarce inputs.

The point is that excessive collection of neem seeds is unlikely to lead to genetic erosion any worse than that already caused by environmental degradation. Because an increased demand for neem might lead to its cultivation on agriculturally poor lands, it might very well lead to increased genetic diversity because of cultivation under diverse ecological conditions.

Have Only MNCs Taken Patents on Neem Products? Will Patents Prevent Farmers from Growing Neem Trees or Using Neem the Way They Wish?

Is it not strange that the entire campaign against patents on neem products was aimed at only one MNC, whereas there are several patents on neem products held by Indian scientists and companies other than Grace? One could wonder, if patents are bad, why are they bad only when taken by MNCs and not by Indian companies or scientists? Leaving this issue aside for a moment, however, let us understand how one gets a patent and what a patent does to those who wish to use the source material, in this case, the neem tree and its products.

First, it must be stated unequivocally that every farmer in any part of the world is free to use neem in whichever way he or she wants. Any claim to the contrary is a misrepresentation. Inventions which are patentable include: any new product that is developed afresh; new methods to produce a known old product; and new uses suggested for an old product made by new method or old known method. However, the patent rights are restricted only to the new, nonobvious, and inventive step.

The use of neem extract, its seed or leaves, or any other part of the plant as a pesticide cannot be patented, because such uses have been known for hundreds of years. This is acknowledged in many patent applications. Also, the seed itself — being a product of nature — is not patentable unless considerably modified. (In many countries, instead of or in addition to patenting, plant variety protection acts are provided that cover such varieties.)

Furthermore, there can be no patent on the active ingredient of neem, azadirachtin. However, any synthetic analogue of azadirachtin would be patentable because it does not exist in nature. Some of the neem-related patents which have been granted are:

1. Godrej Soaps (India) No. 5298247 (1994) for a water-soluble, storage-stable, and environmentally safe pesticide;
2. Trumo Corporation (Japan) No. 4537774 (1985) for another method using hot water extract of neem bark for control of lung tumours;
3. W. R. Grace and Company (US) No. 4946681 (1990) for improving the storage stability of neem seed extracts containing azadirachtin;
4. W. R. Grace (US) No. 5124349 (1992) for storage-stable pesticide composition comprising neem seed extract. The major contribution was increasing the shelf-life stability of azadirachtin solution;
5. The National Institute of Immunology (New Delhi, India) No. 5196197, 1993 for a reversible contraceptive based on neem extract.

(For a complete list, see table following this Comment.)

Should we argue here that National Institute of Immunology should let some third-party corporation commercialize the technology that it developed without any return? When it needs funds, should it have to knock at the doors of insensitive bureaucrats in the corridors of power? Should Godrej Soaps not develop a product which may compete with the chemical pesticides and thus help save the environment?

The Indian government's policies are far more sympathetic to the chemical pesticide industry. In the last budget, it reduced the customs duty on the import of chemical pesticides . Furthermore, it denied registration to Indiara, an herbal pesticide developed by an entrepreneur based in Pune, for obvious reasons. What should an Indian company do if the domestic policies favour chemical pesticides? Should it not seek patents and then seek international markets for its products? Incidentally, Indonesia banned 50% of the pesticides used in paddy production in 1987. Since then, paddy production has been increasing and consumption of pesticides decreasing.

Is There Any Reciprocity that National and International Users of Traditional and Contemporary Knowledge Owe Communities and Individuals Generating and Providing this Knowledge?

It is obvious that if the users of neem had to identify uses of the plant without drawing on traditional knowledge, it would have cost a lot more in

terms of time and resources. Availability of traditional knowledge certainly has reduced their transaction costs. There is a strong case for national and international patent holders to share part of the profits accruing from the commercialization of their products with the providers of the knowledge. Article 8J of the Convention on Biological Diversity (see Box) clearly requires such a reciprocity. However, the neem tree grows in many countries, not just India, and knowledge about its uses is widely shared. Therefore, no contribution can accrue to any one community or country.

Article 8(j)

Subjects to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.

The only solution is that this contribution be put in an international fund. This fund would support conservation of neem germplasm as well as R&D by local communities and entrepreneurs for developing various neem products. It must be understood, however, that these contributions can arise only if profits are made. Profits can be made if only an entrepreneur has efficient technology, consumer demand, and some protection from others manufacturing and selling these formulations. Therefore, patents on products do not preclude the possibility of communities benefiting from the international fund; indeed, they would facilitate it.

It should be noted that no such payment was made in the case of human drugs, and unfortunately, there has been no hue and cry on that issue. As many as 74% of the plant-derived human drugs are used for the same purpose as the native people that discovered them (Farnsworth, 1981). Not a penny of the revenue from these drugs has ever gone to the communities from which the plants were obtained. It is the same with improved varieties of fruits, vegetables, and other food crops of which hybrids or other varieties have been developed by the large corporations.

The argument that improved varieties or neem products will be available to farmers and should therefore be considered as sufficient reciprocity is not tenable. Those who benefit will be either commercial farmers in the West or Green Revolution farmers in developing countries who grow crops that require much of the pesticides. However, those who grow neem trees or collect its seeds and provide knowledge about its use are generally the farmers in rain-fed regions, and they will not benefit so much from this.

Why Do Governments in Developing Countries Not Allocate More Resources for Research and Product Development Based on Indigenous Knowledge and Resources?

One of the first papers that renewed the interest of global community in neem was in 1962 by Dr. Pradhan et al. It led to isolation and identification of the active principle, azadirachtin. The properties of this compound as a growth regulator and reproduction-inhibitor in a number of insects were reviewed by many authors. Rao and Mani (in the 1993 book edited by Ananathakrishnan and Raman) discussed at length how this compound has been used for insect control. Koul lists products made of neem and highlights the pitfalls of relying on a narrow base of compounds as well. The list includes Margosan-O (W R Grace), Azatin (Agrodyne, USA) Achook (Godrej Soap Pvt. Ltd., Bombay), Neemgold (SPIC Ltd., Madras), Replin (ITC Ltd. ,Hyderabad), and Margocide CK (Monofix Agro Prod. Ltd., Hubli, India). Larson (who also holds a patent on neem based pesticide) presented a paper on development of Margosan-O as a pesticide from neem seed at the Third International Neem Conference in Nairobi. Narendra, one of my former students, has recently set up a plant in Belgaum for producing a neem based pesticide using a stable form of this compound called "Rakshak."

A significant reason that many neem-based products have not succeeded in the marketplace is that they are relatively unstable when exposed to sunlight. It was this problem that Grace sought to solve. If a firm such as Grace invests in research on this subject and seeks protection, should it be denied, even if that means no further research?

What Next?

While farmers have used neem products for pest control for thousand of years, scientists and companies have been looking for ways of making products out of neem for at least three decades, maybe more. Indian or Western concerns are free to make any product based on available scientific information. True, none of them so far has paid any special price to those from whom they collect neem seed, but that may change. If the demand for leaves or bark or seeds of neem increases in the future, I look at that as a great contribution to both economic development and conservation. As an example, when the Khadi and Village Industries Commission began using nonedible oilseeds for making soaps, employment opportunities for the poor people increased.

Will value addition take neem out of the reach of the poor? Not necessarily. If the product is made by decentralized but competitive small sectors, it will remain within the affordable reach of the poor. But I do not care who makes it so long as it reaches the poor and serves its purpose. As Deng, the pragmatic Chinese leader, said once, "what does it matter what colour the cat is so long as it catches the rats?" To me, what is of greater consequence is the overlooking of the potential of the large number of other plants such as calotropis, ipomoeae, custard apple, and others in the development of herbal pesticides. If this neglect continues, a few years from now, we will again complain when Western scientists develop patentable products derived from these plants.

Patents on new ways of extracting active compounds in more stable or purer forms or for novel uses should not be discouraged. Why would someone spend a fortune on research and development if no returns accrue from such an investment? The magnitude of such returns, who should have a share of the

returns, and how such returns accrue are matters on which debates can take place. However, spreading absurd claims about patenting neem tree does not serve any purpose.

When Truth is a Casualty, the Interests of Science and Society are Bound to Suffer

Further vital questions must be asked. What is the farmer's choice? Should he use chemical pesticides when crops cannot the stand onslaught of pests? Is a raw extract always more efficient? Why did Ayurvedic philosophy emerge? Should we oppose value addition in plant products? Why is such a question not raised about the crops that Green Revolution farmers raise? If good and cheap neem-based products can come into the market, who will/can benefit? Should an attempt be made to give neem growers attractive prices and their own factories that process the seeds? Alternatively, should we try to depress the demand for their products so that they remain perpetually dependent on lazy intellectuals or largess distributed by insensitive government in the form of food for "unskilled" work? Is neem the only plant of pesticidal importance? Are Indian scientific institutions devoting significant attention to the development of herbal pesticides? Will only Western companies win the game of patenting? Cannot Indian inventors, innovators and creative farmers file applications for patents abroad or in India when product patents are allowed?

I am sure that asking many of these questions will disturb readers. Honey Bee has documented hundreds of such innovations. SRISTI has been campaigning to defend the intellectual property rights of Third-World farmers. True, the present property right arrangements do leave much scope for improvement, but we cannot defend the rights of individual farmers or communities on moral grounds unless we also respect the rights of scientists and inventors in developing and developed countries.

There are no farmers' agitations for continued deprivation of poor people in biodiversity-rich and economically poor regions such as hilly areas, forested regions, drought-prone areas, etc. Why, then, are we making issue of neem? Is it because an increase in the income of growers and seed collectors of neem and other such trees and herbs in the dry regions will deprive urban and rich people of cheap labour? The social and intellectual inertia has generated a good market in India for half-baked theories and populist slogans, even if these are based on inaccurate information. Why make a fuss about "patenting the neem tree" itself when this has not been so — indeed, cannot be and will perhaps never be possible?

Professor Antil Gupta welcomes comments on this article, which may be sent to him at anilg@iimahd.ernet.in

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NAME	COUNTRY	NUMBER	DATE	DESCRIPTION
Trumo Corporation	Japan	4515785	1985	1
Max planck Gfw	Germany		1990	2
US Govt.& Cornell Research Foundation	USA	4942247	1990	3
Rohm & Haas	USA		1990	4
W.R. Grace & Company	USA	4946681	1990	5
Native plant Institute (NPI)	USA	4960791	1990	6
W.R grace & company	USA	5001146	3/91	7
Nature Plant Institute(NPI)	USA	501149	3/91	8
NPI	USA	507242	9/91	9
PPG industries		5110591	5/92	10
The National Institute of Immunology	India	5196197	5/93	11
Agri Dyne Technologies	USA	5229007	7/93	12
W.R. Grace & Company	USA	5281618	1/94	13
W.R. Grace & Company	USA	5298251	3/94	14
Godrej soaps	India	5298247	3/94	15
W.R. Grace & Company	USA	5124349	6/94	16
FMC corporation	USA	5352672	10/94	17
Agri Dyne Technologies	USA	5352697	10/94	18
Trumo Corporation	Japan	4537774	1995	19
Vikwood Limited	USA	556562	12/95	20
Godrej soaps	India	5298247	3/94	21

1. For extracting certain compounds having anti-tumour & anti-neoplastic activity from neem bark.
2. For extracting a compound similar to azadirachtin from the kernel of neem tree. Besides this, the patent acknowledges use of various pesticides, like use of tobacco extracts in 1690 in England for Killing sucking insects.
3. For extracting a new compound having antifeedant property against worm & European Corn Borer from a plant belonging to Cruciferae family. They also acknowledged studies which reported 22 spp. of plant from Meliaceae (f) for similar purpose.
4. i) For using hydrogentic extract of neem seed as insecticide. ii) The patent acknowledges the longstanding use of Neem for medicinal or insecticidal purposes in India.
5. i) For improving the storage stability of neem seed extracts containing azadirachtin. ii) The patent also provides a method of selectively removing water from neem seed extract. It is reported that almost 20% water content of the neem seed extract is the primary cause of degradation of azadirachtin in solution.
6. i) For discovery of naturally occurring plant compound 'Salannin' derived from neem. ii) The patent is a process of producing antifeedant compound which could be effective in lower doses than available formerly and less expensive.
7. i) For developing azadirachtin based storage stable pesticide compositions. ii) The patent deals with non-toxic natural pesticide formation, and in developing a process for preparing extracts with improved storage stability.
8. For derivatives of azadirachtin from which a synthetic insecticide having greater stability than the naturally occurring counterpart could be developed.

9. For identifying a derivative of azadirachtin having storage stability and better insecticidal and antifeedant activity.
10. For a storage stable neem oil emulsion having pesticidal properties.
11. For developing a reversible contraceptive based on neem extract.
12. For developing a method for removing contaminants including aflatoxins from azadirachtin containing materials.
13. For a process of extracting storage stable pesticide and for developing novel non-degrading pesticide formulations containing azadirachtin.
14. For a fungicidal composition of neem primarily by preparing a non-polar, hydrophobic solvent seed extract substantially free of azadirachtin. Also for a pesticide having low phytotoxicity, low skin irritation and good wetting ability.
15. For storage stable, water soluble and environmentally safe pesticide.
16. For storage stable insecticidal composition comprising neem seed extract. The major contribution was increasing the shelf-life stability of azadirachtin solution.
17. For controlling different kinds of mites by using neem seed extracts. It acknowledges the use of neem seed extract for ascarid control and for controlling pyrethroid-resistant miters.
18. For developing a storage stable composition in which the composition remains stable at a variety of azadirachtin concentrations and in which stability remains independent of the solvent system.
19. For its method of using hot water extract of neem bark for controlling tumours.
20. For a storage stable neem-based compound for protecting crops against the Japanese beetle.
21. For discovery of a fatty, neem oil distillation residue-based pesticide that was storage stable, water soluble and environmentally safe.