

vating area is concerned it may be looked upon as non-existing by which I mean to emphasize its degree of frequency. This ant emits a weak but appreciable formic acid odour.

Further three allied species of *Polyrachis* ants, found in Bangalore outside the lack plantation, were examined, each species having an odour characteristic to it and all living underground building very small nests, with about 200 individuals in each nest. All the species of *Polyrachis* I have studied line their nests with a web, the habit of living on a tree or underground making no difference in this respect.

A bacteriological examination of the intestine revealed the presence of rod-shaped bacteria in the midgut of *Camponotus ligniperda* and *Formica fusca*. I had from time to time also isolated the bacteria in pure cultures of all these European and Indian ants, so that I was able to see there was no great morphological difference among them. The intestines of many Pentatomid bugs contain long bacteria but these bugs as a class, when compared with all the ants carrying symbiotic bacteria, show a variation, whereas all these ants exhibit a striking uniformity. So far I have examined only

five species of *Polyrachis* ants and it would be worthwhile extending such observations to other species. Should this note attract the attention of other workers on ants I shall be most grateful to receive say 5 specimens of each species of *Polyrachis* ants preserved in 96% alcohol.

S. Mahdihassan

*C/o The American Express Co.,
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COMMENTARY

The new international seed treaty: Promises and prospects for food security

Bhagirath Choudhary

In a recent article¹, the author has put forth the possibility of broadening the international treaty on plant genetic resources for food and agriculture (ITPGRFA)². In this paper, the author envisions an expansion necessary because the seed treaty knowingly exposes uncovered and unprotected plant genetic resources to exploitation, which may thereby threaten the food, nutritional and health security. The expansion of the international treaty provides possible answers to several basic questions related to food and nutritional security. The line of reasoning to expand the seed treaty has been thoroughly discussed in this paper vis-à-vis crops coverage, intellectual property rights (IPR), World Trade Organization, Convention on Biological Diversity and farmers' rights.

Background

The new, legally binding international seed treaty establishes a mechanism known as the multilateral system of access and benefit sharing. The system aims to facilitate access to plant genetic resources, to compensate farmers and local communities, and to help mobilize resources that contribute to food security and sustainable agricultural development. At present, the treaty is restricted to 35 food crops and 29 forages species, out of about 150 crops that are important to global food security and some 10,000 forage species of immense value to farmers for food and agriculture³.

Evolution of the seed treaty

With the advent of biotechnology era, breeders and private companies increasingly seek free access to genetic variations to identify, isolate and incorporate useful traits for crop improvement and new product development. The latest UNEP report for India further validates that almost 70% of modern medicines in India are derived from natural products, which is three times more than the world's average estimation. On the other hand, India is one of the 25 hot spots of the highly endangered eco-regions of the world, and has some 125,000 described and approximately 400,000 estimated

unknown plant species that are often unmonitored⁴, and about 26,000 known plant species that are on the verge of extinction⁵. Here, it is important to note that only about 6% of all described plant species have been analysed chemically, and only a small fraction analysed pharmacologically⁶. In spite of their vital importance, genetic resources are being lost at an alarming rate due to extinction of conventional varieties, biopiracy and lack of incentives to continue developing and conserving them for sustainable agriculture.

In 1983, the FAO signed a voluntary agreement known as 'International Undertaking' against these bottlenecks,

asserting that the genetic resources are a common heritage of mankind and are to be freely used and shared. The common heritage of mankind framework led to two consequences. First, it created huge asymmetry in the distribution of benefits between farmers as donors of genetic resources and breeders as producers of commercial varieties derived from such resources. Secondly, private companies have increasingly endeavoured to secure exclusive legal rights for varieties drawn from traditional novel genetic resources of developing countries, which further restrict access, prevent use and charge royalties on protected varieties.

Table 1 shows various frameworks and approaches evolved over the last two decades, reinforcing and challenging the use and misuse of the world's genetic resources.

Advantages and challenges of the seed treaty

The multilateral system (MS) is the central stage of the seed treaty. It is a step forward in partially tackling problems related to access to genetic resources and benefit sharing. The handful of crops covered under the MS constitute a part of large *ex situ* collections held in the CGIAR centres⁷. These offer substantial advantages over the crops excluded from the MS and can be described under four categories.

First, the crops covered by the MS will be made available to breeders and private companies only in exchange for royalties/compensation. The money will be used to conserve and develop plant genetic resources for sustainable agriculture in developing countries. However, plant genetic resources outside the treaty would not have restricted access, depriving farmers who have bred them over many years from any return on their efforts. This is at a time when these scarce but essential resources are under threat of extinction, and the need for their conservation and development poses major challenges to the world's agricultural and environmental communities.

Secondly, recipients of the protected genetic resources will be prevented from claiming IPR, including their components 'in the form received'. This new type of IPR arrangement not only respects the contribution made by farming

Forum	Framework	Approach
FAO 1983	Common heritage of mankind	Genetic resources are to be freely used and shared
UPOV 1991	Breeders' rights	Everything and anything can be owned if it meets certain criteria
CBD 1992	Sovereign rights of nation	Genetic resources are no longer viewed as a free resource
TRIPS 1995	<i>Sui generis</i> system	Constituting a class of its own kind
ITPGRFA 2001	Breeders' and farmers' rights	Access and benefit sharing

communities, but also provides an incentive to improve food and feed crops, which will stimulate business interest and investment in food and agro-based industry. The threat, however, is that a handful of breeders and private companies could place legal claims on crops excluded from the MS and held in the CGIAR centres, as well as being available both *in situ* and *ex situ* in different parts of the world.

Thirdly, access to crops covered by the MS will only be allowed for research and breeding, and would be prohibited for application to chemical, pharmaceutical and other non-food industrial uses. Although this will prevent further misappropriation of genetic resources covered by the system, it will also open new opportunities for the private sector to exploit the potential of crops that are excluded from the system.

Finally, efforts will be made to improve the access to information and the transfer of technology for improved forms of crops/products covered under the MS between developed and developing countries. The treaty will therefore offer help in developing concessional and preferential terms and conditions of access to such resources, to smooth technology transfer to developing and least developed countries. This kind of mechanism is certainly urgently required, and could be usefully extended to other plant genetic resources.

Revitalizing the seed treaty

In view of the above manifestations, it is important to seek the revival of scope and coverage of the seed treaty. The following decisive components of the seed treaty are examined in detail while contemplating the possibilities of expansion:

Crops coverage

The treaty represents a small portion of the *ex situ* designated and non-designated samples of a 'gene bank' held by CGIAR under the auspices of FAO. CGIAR centres hold about 6 million accession of different samples of food and non-food species. Most vegetables, fruits and tropical forages, as well as all industrial crops were excluded from the MS and are thus outside the scope of the agreement. Onion, garlic, groundnut, oil palm, sugarcane, soybean, tomato, grapes, peanuts, peppers, cucumber, minor millet, cotton, carrot, pineapple and mango are some of distinct omissions from the list.

Expansion of the crops and forages list was opposed by the US because of three possible reasons; first, article 12.3 (d) of the MS restricts the recipients to claim exclusive legal rights on materials received from the MS; secondly, it requires breeders or private companies to disclose the source of origin of the material used in developing new material; and finally, the treaty makes it mandatory to compensate farmers for the use of such genetic resources. Consequently, had the list been expanded, it would have seriously jeopardized the interest of breeders and private companies. On other hand, megadiversity countries of the developing world like India, China, Argentina and Brazil had not supported the EU and its member states' stand, to expand the list. Brazil and Argentina had advocated for bilateral arrangements possibly with a view that the exclusion of crops from the MS might enable them to earn more by selling access to genetic resources bilaterally. On the other hand, India and China had protested against the inclusion of advanced crop varieties, particularly onion, garlic, sugarcane, soybean and groundnut. Surprisingly, the exclusion of onion and garlic from the MS was the

result of the opposition from the Indian delegation. Indian representatives claimed that *allium* (onion and garlic) is not important for food security because of its low consumption all over the world and that it is used simply as a flavouring and a condiment. Interestingly, Indian representatives did not object to *asparagus*, as they find it important for food security (Fowler, Cary, pers. commun.). Hence, in the course of confined negotiations, the world's megadiversity countries compromised on their rich genetic heritage and consequently may have to pay a huge price for it.

The utility of genetic resources seen as useless today, may be commercially valuable tomorrow. For instance, *Taxus baccata*, an Asian yew tree mostly found in the Himalayan regions in India and once believed to be of no value, is now producing *taxol* from its leaves (instead of bark), which is considered effective in the treatment of certain types of cancer. Therefore, in order to safeguard these foreseeable developments, the megadiversity countries of the developing world should develop a common framework and join hands with the EU and its member states to strengthen global plan of action for plant genetic resources (PGR) and expand the MS coverage to PGR in all of its biological forms and manifestations. Consequently, the treaty provisions should help to promote and provide incentives for identification, collection, documentation and conservation of undescribed and unidentified plant genetic resources excluded from the MS.

Intellectual property rights

The seed treaty balanced arrangement should help limit claims to legal rights on PGR in their natural form, that are excluded from the MS. For example, legally binding provisions on topics such as material transfer agreements and prior informed consent, which require breeders and private companies to disclose the geographical origin of material used in developing improved and new products, would promote the wider usage of all PGR, while at the same time reducing their unauthorized use and 'biopiracy'. In addition, it is likely that the facilitated access to genetic resources can be, in the long term, converted into sterile seeds and prevent farmers from growing their hereditary varieties. Therefore, the treaty

needs to incorporate explicit provisions to ban the application of genetic use restriction technologies and terminator technologies on material received from the MS, as it had been done in case of CGIAR centres⁸.

WTO and international seed treaty

As it is evident, the new seed treaty allows breeders to claim the exclusive legal rights on modified parts and components of PGR received from the MS. However, the treaty does not clearly define the extent of modifications necessary for claiming legal rights on PGR. On the contrary, the World Trade Organization's agreement on Trade Related Intellectual Property Rights (TRIPS)⁹, binds its member countries to provide for the protection of microorganisms and plant varieties either by patents or by an effective *sui generis* system or by any combination thereof. To comply with the TRIPS provisions, currently many countries grant IPR on genes for simply having been isolated from a plant and that, in fact, contends the provisions of the seed treaty. In addition, the seed treaty requires the applicant to seek prior informed consent, disclose the source of origin of the material used and compensate the farming community, which is not necessary in the case of TRIPS agreement. In the event of dispute over patenting of PGR, it would be resolved in the dispute settlement system of the WTO. However, under the seed treaty, disputes that cannot be settled may be referred to the International Court of Justice. Therefore, before the treaty comes under implementation, its extraordinary provisions should also be incorporated in the TRIPS and hence, place it on par with other international trade and environment agreements.

CBD and international seed treaty

As described in Table 1, the CBD recognizes that the states have sovereign rights over their own PGR¹⁰. Accordingly, access to genetic resources is under the provisions of 'prior informed consent' (PIC) and on the basis of 'mutually agreed terms' (MAT), with 'countries of origin' under this framework. With such notions, states find PGR as valuable pub-

lic goods, both economically and practically, and envision burgeoning financial rewards. States see themselves as potential sellers of genetic resources and equate potential usefulness with substantial monetary value. This has led to enhanced restriction on access to genetic resources, thereby slowing transfer of genetic materials for research and breeding¹¹. Further, the complexity of procedural compliance, confusion over authorized government bodies, exorbitant expenses and inordinate delays have been deterring access to genetic material and stifling commercial research¹². The recently adopted guidelines known as the 'Bonn guidelines' establish generally accepted norms and advise states on how to set practical conditions for access to genetic resources, and fair and equitable sharing of benefits arising out of their utilization¹³. Nevertheless, the guidelines are not legally binding and do not apply to the genetic material used for R&D, obtained from collections made before the CBD came into the force. However, in the case of seed treaty, it reduces bureaucratic procedures inherent in bilateral negotiations of the kind stipulated in the CBD. Therefore, it is necessary to expand the scope and coverage of the international seed treaty to bring some order and regularity to access and transfer of crop genetic resources for most crops essential for food and nutritional security.

Farmers' rights

The seed treaty has been hailed as a historical achievement in the sense that it recognizes the importance of contributions made by the indigenous and farming communities and establishes the concept of farmers' rights to be equally significant as the breeders' rights. The farmers' rights have been not only extended to save, use, reuse and sell farm-saved seeds, but also for protection of their traditional knowledge and to participate in decision-making and to equitably participate in benefit-sharing arising from utilization of PGR for food and agriculture. In effect, however, the scope of realising farmers' rights has been confined compared to breeders' rights and rests within the national jurisdiction. Hence, for the balance of rights, the global dimensions of the farmers' rights need to be recognized¹⁴.

At a first glance, expansion of the MS to all *ex situ* and *in situ* plant genera, landraces and wild relatives, might be seen to increase opportunities for breeders and private companies to obtain legal rights on the derivatives and/or products derived from these genetic resources. Interestingly, however, this arrangement would actually prevent breeders and private companies from claiming exclusive legal rights on all naturally-occurring PGR, as has already happened in cases such as Indian turmeric and basmati rice. At the same time, this new form of intellectual property arrangement would ensure that the economic returns from legally protected derivatives and/or products would provide an equitable return to farming and local communities.

Implications for developing countries

If the scope and coverage of the seed treaty is confined to limited PGR, the provisions of seed treaty would prove to be detrimental to the subsistence, biodiversity and economies of developing countries in the following possible ways:

(1) Fair and equitable benefit-sharing provisions would be applicable to only a handful of crops and forages, which would prevent the germplasm depositors from sharing of benefits if they were accrued from the use of crops and forages not covered under the MS.

(2) It will provide exclusive legal rights to private companies to charge patent royalties on patented varieties drawn from traditional novel varieties of developing countries.

(3) Export market for important varieties or products made by medicinal plants can be affected by patents owned in foreign countries. This can result in considerable loss of export revenue and position in crucial markets like the EU, Middle East and West Asia.

(4) Domestic markets could be flooded with patented agricultural products, leading to displacement of local producers, resulting in higher prices.

(5) Collaborative R&D projects on plant varieties can diminish, resulting in substantial loss of shared skills, expertise and knowledge.

(6) Access to and transfer of new technologies and improved varieties would be restricted, because the terms and conditions of such access and transfer have to recognize and comply with applicable IPR. This particular provision would be a setback in the process of transferring new technologies to developing and least developed countries.

(7) Innovation and creative processes of indigenous and local communities can be eroded due to increasing corporate dominance of seed markets.

(8) IPR laws can provide a disincentive to public and private sector scientists from carrying on research and breeding on patented varieties.

(9) The treaty may increase threat to the diversity of genetic resources, escalate biopiracy and inactivate identification, collection, documentation and conservation of PGR excluded from the MS.

Therefore, while considering the ratification of the new international seed treaty, developing countries should be encouraged to demand special provisions to further open up negotiations to expand the coverage and scope of the seed treaty

along the lines proposed above, in order to improve food security and promote sustainable agriculture development.

1. See <http://www.scidev.net/dossiers/dossier.asp?xc=A005>.
2. See <ftp://ext-ftp.fao.org/waicent/pub/cgrfa8/ia/ITPGRRe.pdf>.
3. See <http://www.fao.org/news/2001/011005-e.htm>.
4. Govindasamy, A. *et al.*, *Curr. Sci.*, 2002, **82**, 224–225.
5. See <http://www.igc.org/wri/biodiv/gba-unpr.html>.
6. Goswami, A. *et al.*, *J. Sci. Ind. Res.*, June 2002 (in press).
7. See <http://www.fao.org/WAICENT/Fao-Info/Agricult/AGP/AGPS/pgafa/pdf/swr-full.pdf>.
8. Human Development Report, United Nation Development Programme, 1999.
9. See http://www.wto.org/english/docs_e/legal_e/27-trips.pdf.
10. See legal text of the CBD at <http://www.biodiv.org/doc/legal/cbd-en.pdf>.
11. Fowler, C., *Science*, 2002, **297**, 157.
12. K. ten Kate, *Science*, 2002, **295**, 2371–2372.
13. See UNEP/CBD/COP/6/20, pp. 262–287; <http://www.biodiv.org/doc/meetings/cop/cop-06/official/cop-06-20-part2-en.pdf>.
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Bhagirath Choudhary is in the National Institute of Science, Technology and Development Studies, Pusa Gate, Dr K. S. Krishnan Marg, New Delhi 110 012, India. e-mail: bc@nistads.res.in