

Access to Plant Genetic Resources: Policy Vista

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Introduction

Plant genetic resources (PGR) is the term used to refer to any plant material *containing functional units of heredity of actual or potential value* (UNEP 1992). PGR include cultivated varieties (extant and obsolete), landraces, wild and weedy crop-related species and all other potential sources such as breeder's lines, populations and mutants. PGR are, thus, the raw material of crop improvement – traditional or molecular plant breeding or genome editing. There is global interdependence on PGR as no nation is self sufficient (Table 1). Hence, sharing/exchange of PGR is of paramount importance in securing sustainable food, fibre, fuel, nutrition, health, livelihood, environmental security, etc.

Genebanks are institutions conserving PGR *ex situ*, making them available for current use as well as for

posterity. In fact, genebanks carry out a host of operations including exploration and collecting, characterization and evaluation, import and quarantine, etc. Therefore, experts refer to genebanks as genetic resources centres. Such centres have a responsibility of helping users identify and obtain the most suitable material. Most genebanks provide web-based access to accession level and trait level information about the collections. Systematically organized information has dramatically improved the task of identifying desirable material and eventually potential use of PGR in research.

Prior to the implementation of CBD, the biodiversity was considered as common heritage of mankind and exchange of PGR was unrestricted and facilitated. Subsequently, however, accessing PGR for use has become increasingly challenging. Reasons include:

Table 1. Top providers and recipient countries based on germplasm shared from CG genebanks between 1985–2009 (from Galluzzi *et al.*, 2016).

Provider country	Total samples provided	Accessions provided	Recipient countries
India	188,911	48,635	144
Peru	67,899	16,216	158
Ethiopia	40,143	13,683	120
United States	36,652	6294	156
Iran	29,829	9779	87
Turkey	29,579	9634	83
Syria	26,029	7487	78
Sudan	24,262	3457	61
Philippines	21,626	4016	109
China	18,559	7225	125
Recipient country	Total samples received	Accessions received	Provider countries
India	284,454	115,849	181
United States	45,992	39,963	178
China	33,690	18,664	151
Ethiopia	28,863	17,572	150
Australia	20,218	17,566	150
Japan	17,628	12,022	141
United Kingdom	17,231	14,283	144
Morocco	16,362	14,618	97
Philippines	16,332	8798	107
Iran	13,083	12,301	135

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(i) increased awareness about the value of PGR; (ii) global agreements aimed at facilitating access and benefit sharing have ended up restricting access (e.g., Convention on Biological Diversity, CBD; International Treaty on Plant Genetic Resources for Food and Agriculture, ITPGRFA); (iii) increased compliance with the phytosanitary measures related to PGR movement (The Commission on Phytosanitary Measures, CPM; Sanitary and Phytosanitary Agreement, SPS); (iv) national legislations concerning import and use of genetically modified organisms; (v) increased footprint of private seed industry with IP protected cultivars. India responded with legislating and institutionalizing the PGR access and exchange process (Fig. 1). By the turn of the century, these regimes in combination have made it rather complicated to obtain and use the genetic resources.

New Technologies and New Restrictions?

Post-CBD era has witnessed fast and intense technological developments in plant biology and agricultural research

led by genomics. Accessibility to huge amount of DNA sequence data in the public domain, computational ability to store and mine big data, availability of genome editing technologies *inter alia* have made it practically possible to use PGR in a dematerialized manner. Consequently, international forums —including CBD and the Nagoya Protocol, ITPGRFA and the FAO Commission on Genetic Resources for Food and Agriculture, PIP Framework of WHO —are deliberating on *Digital Sequence Information* (DSI), its definition and access and benefit-sharing aspects of DSI. There could be serious implications on the access and benefit-sharing of PGR (Brink and van Hintum 2022).

Countries have option to consider DSI-PGR to be in scope of the Nagoya Protocol (bilateral access and benefit-sharing systems), either by mentioning the inclusion of DSI in their legislation. As a consequence, access to and use of DSI from this country may not be free anymore (in principle at least), as potential users are bound by the national laws of the country irrespective of global agreements. A study by CBD shows that

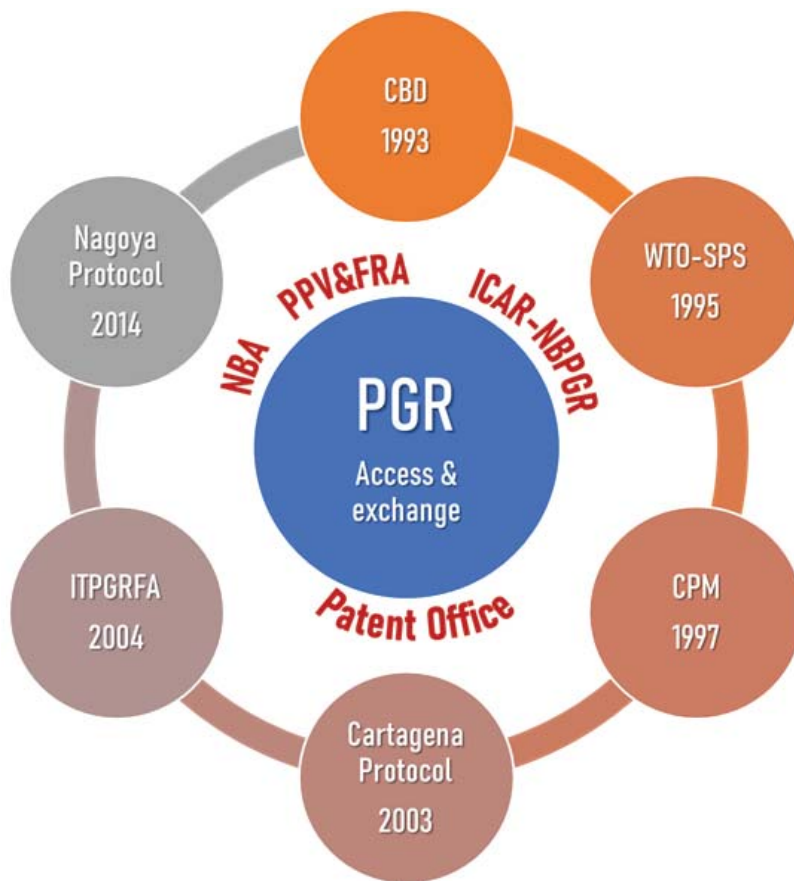


Fig. 1. International agreements and Indian institutions involved in access to PGR and their exchange

many countries are considering including DSI in their access and benefit-sharing legislation (https://www.cbd.int/abs/DSI-peer/Study4_domestic_measures.pdf). This might mean the need of country-labels for DSI on genetic resources uploaded in public databases to ensure compliance, a serious challenge for implementation. Add to that country-shopping for PIC and MAT. Alternative scenarios have also been proposed where access is free but benefits are shared with the specific provider countries of the genetic resources to which the DSI applies (including application of blockchain technology or commons licenses). Following a multilateral system can avoid tracking and tracing as well as country-shopping by decoupling access and benefit-sharing. Access continues from public databases and benefits are shared through a multilateral fund via say subscription systems. In contrast, countries argue that DSI should be kept out of the Nagoya Protocol or ITPGRFA jurisdiction by not including DSI in the definition of genetic resources. As a result, no specific monetary obligations are connected to the access to or utilization of DSI. Supporters of this option argue that free availability of information in itself is a form of benefit-sharing. “Open access” to valuable information from indigenous accessions is practically equivalent to “PGR being heritage of mankind” and against the premises of CBD – sovereign ownership.

The DSI conundrum reiterates the fact that national policy and legislation affecting plant genetic resources should support both international obligations and national objectives (Engels *et al.*, 2000). Countries have been unsuccessful to achieve a consensus on DSI either at CBD or at ITPGRFA for lack of clarity and practical examples. However, keeping India’s interests in mind and respecting the international obligations, authors recommend that India consider the following:

- i. Continue DSI negotiations under the aegis of ITPGRFA for crop genetic resources rather than opting for Nagoya option;
- ii. Decouple access and benefit-sharing; safeguard open access to researchers from public databases

and ensure that benefits are shared through Treaty multilateral fund via subscription systems.

India is at a critical juncture with respect to PGR policy options. Failing to comprehend the enormity of the state of affairs and forsaking proactive approach will be disastrous to the PGR stakeholders. Following activities may be prioritized:

Action Points

1. Harmonization of legislations and cross-talk between institutions regulating PGR access (e.g., National Biodiversity Authority, Protection of Plant Variety and Farmers’ Rights Authority, Indian Patent Office, National Bureau of Plant Genetic Resources (along with focal point in the Ministry of Agriculture) to minimize paperwork and expedite access (supply, import, statutory approvals).
2. Build a policy for digitalization of import permits, MTAs, release and feedback process; Provision of click wrap MTAs for germplasm supply.
3. Building bilateral and regional processes (with policy support) within a multilateral system for effective exchange of PGR of common interest.
4. Awareness generation among stakeholders as well as capacity building of PGR researchers in PGR policy issues and procedures including recent developments such as DSI.

References

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