Indian J. Plant Genet. Resour. 35(3): 53–56 (2022)
DOI 10.5958/0976-1926.2022.00042.0

Networks and Partnerships are Tools for Efficient PGR Management

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Agriculture is facing unprecedented challenges from a rapidly expanding human population and an unstable and changing cultivation environment. With the global system facing a multitude of crises across the social, health, environmental, and peace and security spectrum, there is an urgent need for scaling up international, regional cooperation and partnerships to find lasting solutions to ensure food and nutritional security. Plant genetic resources (PGRs) can be used for breeding improved crop varieties, providing food and nutrition for ever-increasing population of animals and human beings. An attempt is made briefly to discuss about the importance of network and partnership and key role, feature and challenges for sustaining the network and partnership on long-term basis for management of PGRs.

Introduction

Agriculture is facing unprecedented challenges from a rapidly expanding human population and an unstable and changing cultivation environment. To increase food production sustainably in the face of these challenges multiple tools ranging from the application of novel technologies in breeding and farming to the broadening of the genetic base are needed. The plant genetic resources (PGRs) include wild relatives of cultivated species, varieties and hybrids, as well as breeding material. PGRs can be used for breeding improved crop varieties, providing food and nutrition for ever-increasing population of animals and human beings. It is well known that agriculture affects natural biological resources, but it also uses these resources to obtain varieties and hybrids, the reciprocal relationship leading to increased economic benefits and sustainability.

Sustainable Development Goals and International Partnership

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart there are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries – developed and developing – in a global partnership (https://sdgs.un.org/goals). It is clearly evident that biodiversity plays a significant role in achieving several SDGs, particularly SDG # 2 (Zero Hunger), SDG # 3 (Good Health and Well-being), SDG # 12 (Responsible Production and Consumption, SDG # 13 (Climate Action) and SDG # 15 (Life on Land). SDG # 17 (Partnership for the Goals) deals with strengthening the means of implementation and revitalize the global partnership for sustainable development (https://sdgs.un.org/goals) to: (i) enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the sustainable development goals, including through North-South, South-South triangular cooperation; (ii) enhance the global and partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources and (iii) encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships. However, according to SDG Progress Report (2021), the interconnected global economy requires a global response to ensure that all countries, developing countries in particular, can address compounding and parallel health, economic and environmental crises and recover better. Strengthening multilateralism and global partnerships is more important than ever as about 63% of low-income and lower-middle-income countries are need of data and information sharing and additional funds particularly to face challenges posed by the pandemic (https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.

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Networks and Partnerships

Although individuals or organizations have been getting together to collaborate and to share information and resources for a very long time. However, agricultural research networks have been proliferating in recent past, and these networks are seen as mechanisms for more efficient and cost-effective exchange of resources, information and research results. As for as PGR management is concerned, the Second Global Plan of Action for Plant Genetic Resources for Food and Agriculture (PGRFA), adopted by the FAO Council in November 2011, is the main reference document for national, regional and global efforts to conserve and use PGRFA.

Key Features

Networks are commonly used to increase the effectiveness of international agricultural research by involving a number of individuals, organizations or countries in sharing information and other resources at regional and global level. However, success of any PGR network or partnership depend on some key features as discussed below:

1. All partners should identify the clear objectives of common interest for sustainability of the partnership.
2. All partners need to ensure mutual equality and equity in a network.
3. Role/responsibility of each partner needs to be defined clearly and exchange/sharing of data, information or genetic material must take place for vibrancy of the network.
4. Each associated partner should have capacity to utilize the information and resources to maintain continued interest to fulfill common objectives.
5. A coordinating committee comprised of network members needs to be established for developing a work plan and periodically monitoring the progress.
6. Depending upon the progress of results/outputs, the objectives may be evolved. Therefore, there must be flexibility to make modifications and changes in pathway in the interest of each partner.
7. Sharing of intellectual property rights be fair and equal, as due to any partner.
8. Trust-building and ethical values to be respected by each partner in a network for long-term sustainability.

Key Roles

The role of PGR networks is stressed by almost all international agreements, including the Convention on Biological Diversity (CBD) and the International Treaty on Plant Genetic Resources for Food and Agriculture, to fulfill the respective objectives under obligations of a mutual agreement. A network is generally interdependent on each other partner(s) to develop the synergies and respect their mutual requirement related to exchange and management PGR and related information. At the same time networks not only facilitate the exchange of PGR, but also provide a platform for scientific discussion, sharing responsibilities and information, technology transfer and research collaboration (Maggioni and Engels, 2014) .

PGR management requires functional convergence of global policy and regulatory frameworks that deal with PGR to contribute significantly to food and nutritional security. Regional initiatives need to bring neighboring countries together to address the common goals in PGR management. Regional networks can play significant role for management of PGR, as discussed below [adopted from Tyagi (2019)]**:**

1. *Prioritization of Research*

As discussed, role of networks is also to provide platform for scientific discussion for various stakeholders engaged in PGR management by organizing High Level Policy Dialogues, Expert Consultations, Workshops, Seminars, Symposia and Brainstorming Sessions to priorities the research agenda at national/regional level.

2. *Capacity Development*

Capacity development is an important area to conserve and utilize the PGR. The major issues are to identify the areas of capacity development and the stakeholders. Therefore, mapping the existing capacity and need of capacity development is pre-requisite to build the capacity not only for technical but soft skills also. Capacity also needs to be developed to create robust impact pathways, prepare logical frameworks, measure indicators, from research to extension, policy, and livelihoods impact on farmers' livelihoods. Functional capacity development is

also required to build awareness among policy makers, media and the general public.

3. ***Public Awareness***

Network can play significant role in creating public awareness by sharing of experiences, and best practices, indigenous knowledge, success stories across various communities, regions and countries.

4. ***Policy Advocacy***

By engaging concerned PGR stakeholders in High Level Policy Dialogues and Expert Consultations, enabling and supportive policy environment may be created by developing policy legal frameworks including policy briefs, development of the value chain and exploration of markets at local, national and international levels.

5. ***New Partnership Development***

Networks are instrumental to facilitate increased cooperation at regional and international levels to develop synergies by building new partnerships and networking of groups and institutions including non-governmental organization, community-based organizations and civil society organizations for implementing the programmes efficiently.

6. ***Mobilization of Investment***

Success and sustainability of any network will depend on continuous availability of adequate financial resources. Donors from private sector play an important role to mobilize the funds for conservation and utilization of PGR at national and regional level. Networks may be instrumental to develop mechanisms for partnerships by greater involvement of private sector, philanthropists and international donors by brokering of partnerships.

Key Challenges

Limited trained human, financial and physical resources are major challenges for establishing the PGR network. A pre-requisite of a strong network is that the individual partners are strong. In addition, there are other challenges are also faced for long-term sustainability of the network as mentioned below:

1. ***Low Level of Coordination of Activities***

Despite the best efforts and enthusiasm for establishing the regional and global networks for PGR management, it has been observed that there was still a low level of coordination activities on long-term basis. The expectation is that breeders and other users will be able to have easy access to well-characterized and well-maintained genetic resources among the associate member institutions. Therefore, established networks should consistently and actively grow and sustain for long-term for mutual benefits of the associated partners.

***2. Technical Impediments for Sharing Information and Data* (Halewood, 2018)**

(i) Data are fragmented and dispersed across organizations and international borders and are not managed following the FAIR principles of Findability, Accessibility, Interoperability and Reusability (Wilkinson *et al*., 2016);

(ii) Inadequate systems exist for logging and tracking PGR as well as metadata related to PGR, for example, there is no universally agreed-upon system for permanently and uniquely identifying PGR (*e.g.* publications do not provide traceable, permanent unique identifiers for PGR); and,

(iii) Radically different approaches to data management and sharing within and across public and private sectors due to fundamentally different objectives and low levels of mutual trust.

3. ***Political and Institutional Impediments***

Until the late 1960s, PGRs were generally treated as 'global public goods'. In the decades that followed, after Convention on Biological Diversity 1993 (CBD; https://www.cbd.int/) technologically advanced countries pushed for the international recognition of intellectual property protection for living materials through various agreements, treaties, protocol. In light of this recent history, it is perhaps not surprising that some country and regional representatives, civil society and farmers' organizations have voiced concerns that technological breakthroughs in genomic breeding, gene editing, and gene synthesis will widen the technology gap, and concomitant economic disparities, between the developed and developing countries.

4. ***Trust-deficit in Global South and Global North***

There is a worry that the major gap of capacity of understanding and use of advanced knowledge and new technologies (expertise), infrastructure (research for development facilities) and enabling policies dealing with new legal instruments between developed and developing countries for utilization of PGR, will exacerbate tensions associated with the unrealized expectations of monetary benefits accruing from access and benefit

sharing laws. These stakeholders note that at present the requisite technological capacities principally reside in elite research institutions in the global North. They are skeptical that these new capacities will be used to develop technologies targeted at resource-poor farmers working in vulnerable agricultural systems. This has led to demands (by some civil society organizations and developing countries) that research organizations stop providing unregulated open access to genetic sequence data until benefit sharing issues can be addressed (Hammond, 2016; The International Civil Society Working Group on Synthetic Biology, 2016).

5. ***Continuity of Financial Resources***

Generally, developed countries are well-placed in terms of expertise, infrastructure and availability of funds but poor in occurrence or availability of genetic resources. At the same time converse is true in case of developing or least-developed countries who are rich in availability of PGRs. This situation likely to warrant the availability of adequate finance resources to carry out the mutually accorded activities in a network, if the terms and references are not made transparent. Even otherwise, it is observed that there is less investment is made by private sector for the basic research for utilization of PGRs by the breeders. For sustainability of the network and partnership, assurance of availability of financial resources are very important be engaging public and private partners on mutually agreed, equal and transparent terms of references to achieve the defines objectives.

Conclusions

Networking and partnerships are potentially effective tools for sharing and exchanging of information, germplasm resources, conservation techniques and tool through which institutional and capacity building can be developed and strengthened. It is through networking arrangements that PGR activities or programmes can be properly facilitated, coordinated and implemented. This is important because, with limited resources, no individual institute can really afford to carry out all the operations. Joining hands and sharing resources is the way into the future for the effective conservation and efficient use of PGR. As the network develops and becomes sustainable, the responsibility of running the network may be more formalized through a regional organization. A successful and viable network needs a coordinator with networking experience as well as its technical and political expertise, which is well positioned to offer its contribution to this process and to actually assume more responsibilities for a co-ordinated involvement of the all associated institutions with mutual trust and respect. If efforts are not made to enhance trust and inter-stakeholder cooperation between developing and developed countries to establish and sustained new networks at South-South and North-South levels, such situations might ultimately undermine the development of an open-science culture, slowing the rate of the scientific advancement in PGR management and consequently crop improvement for food and nutritional security and climate challenges.

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