NOTIFICATIONs NCP GB8-016 MYPoW/DSI and NCP GB8-020 MYPoW/DSI,

Inputs by Brazil

Introduction

Through Notifications NCP GB8-016 MYPoW/DSI and NCP GB8-020 MYPoW/DSI, the Contracting Parties were requested to provide the following information regarding the potential implications of the use of digital sequence information on plant genetic resources for food and agriculture:

- terminology used in this area;
- actors involved with DSI on PGRFA;
- the types and extent of uses of DSI on PGRFA, such as: characterization; breeding
- and genetic improvement; conservation; identification of PGRFA;
- the relevance of DSI on PGRFA for food security and nutrition

I - Terminology used in this area;

Brazil believes that, although there is no international consensus on terminology, Digital Sequence Information (DSI) is not the most appropriate term for the use of the specific order of nucleotides in the genetic material, be it DNA or RNA. The 14th Conference of the Parties to the Convention on Biological Diversity decided to establish an extended Ad Hoc Technical Expert Group to discuss the concept of Digital Sequence Information on Genetic Resources, being that expression a placeholder until an alternative term is agreed.

II - Actors involved with DSI on plant genetic resources for food and agriculture (PGRFA);

The actors involved with DSI on PGRFA are the public and private research institutions, gene banks, breeding companies and institutions involved in the conservation and phylogenetic studies of GRs.

With the advancement of scientific research involving Omics and the lowering of costs to carry out gene sequencing the use of DSI has become essential for science in its most fields. Basic research, development, innovation, conservation and sustainable use of RGs, all make use of DSI.

As examples of the most different fields stands out the supports for taxonomic identification; identification of new species; development, improvement and breeding of new products (crops and breeds); protection against pests and pathogens; sustainable use of GRs, conservation of biological diversity and ecosystems, among others.

III - The types and extent of uses of DSI on PGRFA, such as: characterization; breeding and genetic improvement; conservation; identification of PGRFA;

As mentioned before different fields related to PGRFA use benefit from the use of DSI. For example:

a) Identification and characterization: using DSI makes it possible to identify and characterize plants and/or traits of particular interest in a faster and more precise way. This accelerates and facilitates the development of new products in addition to saving financial and human resources. In this way it is possible to develop more productive and/or more resistant/resilient cultivars to biotic factors (diseases, pests, among others) and/or abiotic factors (drought, salt, different temperatures, concentration of aluminum, among others). It is believed that the development time of a product using DSI is about 10 to 20 times faster than using traditional plant breeding. Through the process of identification and characterization it is also possible to select cultivars more adapted to different regions and needs, which is particularly important when considering food and nutritional security, the need to increase productivity without increasing the cultivation area and climate change.

b) Conservation: The use of DSI, linked to genomic characterization, is particularly important for the conservation of PGRFA because it allows for the preservation of specimens of interest and maintains the diversity of a given population. It is minimally invasive.

All types of PGRFA conservation benefit from the use of DSI. Through ex situ conservation it is possible to search for an individual or characteristic of interest in a gene bank and or prevent the unnecessary maintenance of duplicate material gene banks. In situ conservation is facilitated by the identification and discrimination of individuals and populations of genetic value as already mentioned previously. And through on farm conservation it is possible to evaluate the diversity of a given population by sequencing of representative samples, a tool for the validation of policies and programs that give incentive to this form of conservation.

c) Management and restoration: Through the identification, characterization and conservation of PGRFAs, it is possible to know better a particular ecosystem in order to explore the GRs in a sustainable way, for conservation or restoration. By identifying the genetic representation and make-up of the species in a given ecosystem, the use of genomic characterization - using therefore DSI - the replacement (or enrichment) of endangered or even displaced species can be planned.

d) Monitoring: DSI can be used to monitor and detect threats to PGRFAs in a variety of ways, such as new pests, diseases, invasive species, loss of diversity, population reduction, among others. Once these threats are detected, preventive action can be taken to avoid the loss of PGRFAs or measures can be adopted to reduce the negative impact on them.

e) Development of new PGRFAs and preservation of existing PGRFAs: Using information from databases and synthetic biology, new PGRFAs can be developed for new needs and applications. Among these needs and specific users, some stand out as cultivars adapted to higher temperatures and/or water stress; cultivars that are more resistant to pests and diseases; cultivars that require less or no use of pesticides or fertilizers; cultivars with higher nutritional value; cultivars for people with dietary restrictions or specific allergies ; among others.

f) Information sharing and science progress: the use of digital sequence information on genetic resources for non-commercial research and development should be subject to simplified measures according to domestic legislation, allowing for the faster advancement of scientific research, the advancement of the bioeconomy, the sustainable use and conservation of biodiversity and the fair and equitable sharing of benefits derived from the commercial utilization of digital sequence information on genetic resources. As examples of these arrangements are the various consortia of genome sequencing for different PGRFAs, such as rice, first species to have its entire genome sequenced through a consortium of several public laboratories and which provided the basis for analyzes of other PGRFAs such as maize and wheat. Another is the National Center for Biotechnology Information (NCBI), which encourages and promotes the advancement of science by providing access to biomedical and genomic information from and for research institutions around the world. A third example is the DivSeek Consortium working to enable breeders and researchers to mobilize a vast range of plant genetic variation to accelerate the rate of crop improvement.

IV - The relevance of DSI on PGRFA for food security and nutrition.

As mentioned throughout the document, DSI is of strategic importance to ensure food and nutritional security through knowledge and innovation generated by its application to PGRFAs. Whether conserving individuals, characteristics of interest and the diversity of a species in a germplasm bank; increasing knowledge about GRs and promoting scientific advancement; facilitating and accelerating the development of new products; selecting PGRFAs that are better suited to the new environmental conditions and challenges faced by humanity; among others.