

# Views and other information on “Digital sequence information”

---

## 1. Terminology used in this area

“Digital Sequence Information” (DSI) is a terminology is widely adopted at multiple fora, including the Convention on Biological Diversity and World Intellectual Property Organization. The terminology “genetic sequence data” (GSD) as proposed by some countries is an alternate terminology. Other similar terminologies include “genetic sequence data”, “genetic information” and “dematerialized genetic resources”. There is therefore a need for clarity and consolidation of these terms into one which could be “digital sequence information” for all multilateral purposes. Definition for plant genetic resources for food and agriculture, genetic material, and traditional knowledge are already harmonized with definitions in the Convention on Biological Diversity. Conservation of PGRFA, technical assistance, and sharing of benefits through the exchange of information, access to and technology transfer, capacity building, and the monetary and other commercial benefits often have linkages to the use of “digital sequence information” and the use of uniform terminology across multilateral forums avoids unnecessary confusion.

## 2. Actors involved with DSI on plant genetic resources for food and agriculture (PGRFA)

The technology of DNA sequencing and synthetic biology is being highly decentralized, based on which sequencing, synthesis, storage, assembly, screening and other activities are conducted by multiple actors operating in multiple jurisdictions. Scientific bodies, universities and sequencing companies play a pivotal role in generating DSI and making it available for research and innovation. Some important scientific institutions follow an open source model where there is a requirement for the submission of DSI in public databases as a condition of publication. Another set of actors are the professional biotechnologists and hobbyists who require access to the DSI for striving innovation and become the “users” of the DSI.

## 3. The types and extent of uses of DSI on PGRFA, such as: characterization, breeding and genetic improvement, conservation, identification of PGRFA

Large volumes of DSI will be essential for dealing with gene sequences and use of these genes relevant for recent advances in plant biotechnology, including gene editing, in crops within the ambit of ITPGRFA. DSI has a huge impact on targeted gene editing, using enzymes such as CRIPR – Cas9. DSI can facilitate the pursuit of more complex protein engineering, functioning with the kind of specificity similar to natural proteins. Using computer software, researchers have the opportunity to screen DSI to identify genes or proteins that encode for desirable traits or functionality. Once identified, genes can be synthesized and tested *in vitro* or *in vivo*. In phenotype engineering DSI and genome editing technologies facilitate the construction of multiple alterations to multiple genes across an organism. The wider use of DSI in synthetic biology means plants will be more efficient producers of chemicals and enzymes than microorganisms. This will result in the plant DSI to be mined within the ambit of the Treaty to have useful purposes.

## 4. The relevance of DSI on PGRFA for food security and nutrition

DSI collections are diverse in structure, ownership and usage. Some are public databases like iGEM, and some have public/private partnerships (foundries) and some are privately owned. The open and unregulated access to DSI can become critical for food security and nutrition because it is a critical tool in research. Recent advancements in agro-biotechnology research have been facilitated by a drastic reduction in the cost of sequencing and the availability of sequence data made possible through multiple public databases. Open access model of DSI in PGRFA will bring more social benefits than increased regulation of DSI. While the issue of access to such information and sharing of benefits (ABS) while using the DSI is an issue under negotiation within the Nagoya Protocol of CBD, care should be taken to facilitate access to DSI than develop complex regulatory frameworks that many countries will find difficult to implement and comply with.