

Brief Report on Biodiversity and Plant Genetic Resources

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Description

Gene banks are a type of biorepository that preserves genetic material. For plants, this is done by storage, freezing cuttings from the plant, or stocking the seeds. For animals, this is done by the freezing of sperm and eggs in zoological freezers until further need. With corals, fragments are taken and stored in water tanks under controlled conditions. Genetic material in a 'gene bank' is preserved in a variety of ways, such as freezing at -196° celsius in liquid nitrogen, being placed in artificial ecosystems, and put in controlled nutrient mediums.

Accession is the common term given to an individual sample in a gene bank, such as a distinct species or variety female is required for artificial insemination. While it is often difficult to use frozen animal sperm and eggs, there are many examples of it being done successfully. In an effort to conserve agricultural biodiversity, gene banks are used to store and conserve the plant genetic resources of major crop plants and their crop wild relatives. There are many gene banks all over the world, with the Svalbard Global Seed Vault being considered the most famous one

The Belgian Co-ordinated Collections of Micro-organisms (BCCM) is a Belgian government funded consortium of seven scientific institutions, which manage and exploit a collection of microbial and genetic resources. The consortium comprises more than 269,000 publicly available strains of bacteria including mycobacteria and cyanobacteria, filamentous fungi, yeasts, diatoms and plasmids.

the collection of medical yeasts and fungi of the mycology laboratory of sciensano the collection of filamentous fungi, yeasts and arbuscular mycorrhizal fungi of the bacteria collection of the laboratory for microbiology of the faculty of sciences of the ghent university. In 1990 the plasmid collection of the Laboratory of Molecular Biology of Ghent University was added to the consortium (BCCM/GeneCorner). In 2011, 3 additional dedicated collections were included in the BCCM consortium: the diatom collection of the Laboratory for Protistology & Aquatic Ecology of Ghent University the mycobacteria collection of the Institute of Tropical Medicine in Antwerp (BCCM/ITM) the cyanobacteria collection of the Centre for Protein Engineering of the University of Liège

Micro-organisms are an important raw material in biotechnology. The properties of bacteria, fungi, yeasts and

diatoms are used in countless industrial applications and processes. Consider, for example, fermentation processes and the use of probiotics in foods, the production of antibiotics in medicine, the use of microorganisms as growth promoting elements in agriculture, as bio-remediators on polluted sites, etc.

Moreover, the properties of numerous microbial species are still unknown. Therefore public culture collections truly are a treasure trove of biological material, which can be explored through screening projects

When testing extracts and isolated compounds for bioactivity and toxicity, the use of standard protocols is desirable because this improves test result accuracy and reproducibility. Also, if the source material is likely to contain known (previously discovered) active compounds, then dereliction are necessary to exclude these extracts and compounds from the discovery pipeline as early as possible. In addition, it is important to consider solvent effects on the cells or cell lines being tested, to include reference compounds to set limits on cell line passage number (10–20 passages), to include all the necessary positive and negative controls, and to be aware of assay limitations. These steps help ensure assay results are accurate, reproducible and interpreted correctly

When attempting to elucidate the mechanism of action of an extract or isolated compound, it is important to use multiple orthogonal assays. Using just a single assay, especially a single in vitro assay, gives a very incomplete picture of an extract or compound's effect on the human body. In the case of valeriana officinalis root extract, for example, the sleep-inducing effects of this extract are due to multiple compounds and mechanisms including interaction with GABA receptors and relaxation of smooth muscle. The mechanism of action of an isolated compound can also be misidentified if a single assay is used because some compounds interfere with assays. For example, the sulfhydryl scavenging assay used to detect histone acetyltransferase inhibition can give a false positive result if the test compound reacts covalently with cysteines

Biodiversity and Plant Genetic Resources

Biological diversity or biodiversity refers collectively to the variety of life on earth. Biodiversity forms a "web of life" of which human beings are an integral part and upon which they fully depend.

Plants, including food crops, are an important part of this biodiversity, vital for nourishing and sustaining human society. Biodiversity provides enormous benefits, including aesthetic, cultural, ecological, economic, educational, environmental, genetic, medical, recreational, scientific, and social services.

CGIAR scientists play major roles in collecting, characterizing and conserving plant genetic resources. Eleven centres together maintain over 650,000 samples of crop, forage and agroforestry genetic resources in the public domain. On 16 October 2006, 11 International Agricultural Research Centers (IARCs) of the CGIAR which hold ex situ germplasm collections signed agreements with the governing body of the international treaty on plant genetic resources for food and agriculture placing the collections they hold under the Treaty. These agreements placed the ex situ collections of PGRFA held by those centers (some 650,000 accessions of the world's most important crops) within the purview of the Treaty. Under these agreements, the centers recognize the authority of the Governing Body of the Treaty to provide policy guidance relating to their ex situ collections

As from 1 January 2007, centers have been using the Standard Material Transfer Agreement (SMTA) adopted by the Governing Body of the Treaty at its First Session in June 2006 for transfers of PGRFA of crops and forages listed in Annex 1 of the international treaty on plant genetic resources for food and agriculture. At its second session, the body of the treaty decided that the centers should also use the SMTA when transferring non-Annex 1 plant genetic resources for food and agriculture. As a result, the centers have been transferring all plant genetic

resources for food and agriculture they hold in trust both Annex 1 and non-annex 1 materials using the SMTA. As agreed by the Governing Body, the SMTA used by the centres includes a footnote indicating that the provisions of the SMTA referring to Annex 1 materials should not be interpreted as precluding the use of the SMTA for transfers of non-Annex 1 materials.

The CGIAR is committed to conserving these collections for the long-term and to making the germplasm and associated information available as global public goods. The collections held by the CGIAR gene banks are among the largest in the world and arguably the most important for the livelihoods of the poor and global food security. In fulfilling its stewardship obligations, CGIAR invests \$6 million every year to maintain these valuable resources for the benefit of humanity. In 1992, at Rio Earth Summit, more than 150 countries signed the Convention on Biological Diversity (CBD). Relentless agricultural expansion, environmentally-destructive practices such as slash-and-burn agriculture, reliance on monocultures, environmental degradation and large-scale conversion of habitats all pose threats to biodiversity. Currently, 168 countries have signed the CBD. More recently, the International Treaty on Plant Genetic Resources for Food and Agriculture recognized the CGIAR collections as a central pillar of global conservation efforts. Traditionally, farmers save seeds from one season for planting in the next and seed storage in gene banks is a recent innovation. Storing seeds in controlled temperatures helps maintain their germination viability.