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ACCESS TO MICROBIAL GENETIC RESOURCES

1. Introduction

1. This document has been prepared by way of information for the Conference of the Parties at its third meeting, in relation, in particular, to item 9 (conservation and sustainable use of agricultural biological diversity) and item 12 (access to genetic resources) of the provisional agenda. The document describes some special characteristics of microbial genetic resources, a number of which are relevant to the issue of access to genetic resources. In particular, it focuses on issues relevant to access to microbial resources in ex-situ collections. It is not the purpose of this document to draw specific conclusions or to make specific recommendations, but rather to raise awareness of issues concerning microbial diversity which might otherwise be overlooked.

2. This document draws heavily upon a document prepared by the World Federation for Culture Collections (WFCC) entitled "Access to Ex-Situ Microbial Genetic Resources within the Framework of the Convention on Biological Diversity", which is being made available by the WFCC at the third meeting of the Conference of the Parties. In drawing upon that document, which has been utilised by the Secretariat only as a source of information, the Secretariat does not express any view as to any conclusions or recommendations contained therein.

2. Significance of microbial diversity

3. Microorganisms include bacteria (including archaea and cyanobacteria), fungi (including micro- and macrofungi) and algae. The inclusion of microorganisms in the Convention (Article 2) demonstrates recognition of the fundamental role played by microbial diversity in the maintenance of the biosphere and as a

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resource for humankind. Without microbial activity, life on Earth would not be possible. Microorganisms are to be found in every ecological niche, performing essential recycling roles and interacting with other living forms in ways that are only now beginning to be understood. Their total numbers are unknown and their study in situ is difficult.

4. Microorganisms are essential to the functioning of the ecosystems which the Conference of the Parties are addressing under the medium-term programme of work. For example, document UNEP/CBD/COP/3/14 (Consideration of Agricultural Biological Diversity under the Convention), in paragraph 42, highlights the role of soil microorganisms in maintaining nutrient cycling, soil structure, moisture balance and the fertility of soils. Mycorrhizae, fungi that live in symbiosis with plant roots, are essential for nutrient and water uptake by plants.

5. As well as their role in ecosystem functioning, microorganisms provide basic material for the development of many pharmaceutical drugs, agrochemicals, bioremediation and biocontrol agents, food/drink agents, toiletries, and products for other industries. Scientists isolating microorganisms may have a variety of objectives: they may be involved, for example, in environmental, taxonomic, agricultural or biochemical research; or may be interested in screening for novel products that may have commercial value.

3. Access to ex-situ microbial resources

3.1 Culture Collections

6. Microorganisms that are isolated from the natural (or man-made) environment are typically conserved in culture collections (whether public service centres or specialised research collections). These isolates form the basis of much of our present knowledge of microbial diversity and constitute archival material for future study. The conservation and accessibility of type strains (those on which the taxonomic description is based) and other representative isolates are fundamental for the purposes of describing new taxa, for reference standards, and to form the necessary basis for future study and use. This forms the major purpose for the deposit of cultures with culture collections. In addition, cultures may also be deposited, for example, for safe keeping (so that they may be properly maintained), or for patent purposes (see below).

7. 484 culture collections from 58 countries are registered with the World Data Centre for Microorganisms (WDCM), the database of WFCC. This database is accessible on the Internet. Registered culture collections may be public, private, academic, governmental or industrial, and one is intergovernmental. All culture collections operate according to their own institutional or governmental policies and provide a number of professional services, including: preservation and maintenance of isolates for long-term access; distribution; characterisation and identification; deposit facilities for patent strains; supply of standard strains; quality control testing; research; and training. In 1994, the registered collections held some 815,568 cultures of microorganisms. Many other culture collections exist which are not registered within the WFCC database.

8. Not all countries have culture collections competent to maintain all types of microorganisms, and therefore microbial genetic resources isolated in one country may be deposited in a culture collection in another. Moreover, some culture collections specialise in certain taxonomic groups or technical skills and play an international role in these areas.

9. Some culture collections are International Depository Authorities (IDAs) for the purposes of the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure (Budapest Treaty). In order to be recognised as an IDA under the Budapest Treaty, a culture collection has to meet a number of quality requirements.

10. The WFCC is a multidisciplinary federation within the International Union of Microbiological Societies and the International Union of Biological Societies of the International Council of Scientific Unions (ICSU). It has as its objectives the overall support of the activities of microbial resource centres (culture collections), and the promotion of a world network for information, communication and exchange of microbial genetic resources. The WFCC, in collaboration with other organisations, has been active in raising awareness of the Convention among microbiologists (e.g. WFCC, 1994).

3.2 Research, training and capacity building by culture collections

11. Culture collections carry out research in the fields of taxonomy, systematics, culture preservation and database software development, as well as in areas relevant to the parent organisations where, for example, plant pathology control, health surveillance or marine microbiology may be important. Staff therefore need a high level of training and technical skill. Collaborations between culture collections and other research groups are common and are often based on regional or international programmes. Culture collections run training courses at the national or international level, at their own institutes or in other countries under the sponsorship of such organisations as UNESCO, UNEP and other funding organisations or from private sponsorship, and often in collaboration with the WFCC or regional culture collection federations.

12 Databases and networks are well established and in the major culture collections information is organised at a high technical level. Catalogue information of some culture collections is available on the World Wide Web, and data on strain properties is increasingly computerised and networked.

3.3 Administrative and distribution procedures of culture collections

13. Current operating practices in culture collections demonstrate some common features. These are dictated mainly by scientific requirements relating to the microorganisms held, but also depend on the policy of the parent organisation. The WFCC has published Guidelines to the Establishment and Operation of Collections of Cultures of Microorganisms, and runs training programmes on collection management.

14. Each microorganism held in major culture collections is allocated a unique identifying code. However, once the culture is distributed by a culture collection to a third party, there is no control over the continued use of its identity code, which could be changed by the recipient for internal reasons. Information normally supplied to culture collections upon deposit of a strain is quite limited, and would not presently seem to be adequate for effective implementation of the Convention's access and benefit-sharing provisions.

15. Users of culture collections include research scientists in universities and institutes, educational establishments and industrial users. Existing legislation affecting access to and distribution of ex-situ microorganisms relates primarily to the control of hazards to people and the environment, to the transport of microorganisms, and to quarantine regulations. Subject to such safety regulations, and with certain exceptions (see below), essential research material held in public collections is currently made available to

any applicant, regardless of country and usually without knowledge of the ultimate use. It is uncommon for material transfer agreements to be made (although some of the major collections are introducing general sales agreements). The principal categories of microbial resources subject to distribution restrictions are:

- strains that have been deposited for patent purposes, or for safe-keeping as industrial production strains;
- pathogens; and
- strains collected by culture collections for their own internal purposes.

16. The final uses to which a distributed microbial genetic resource may be put is generally not known to culture collections and may not be known to the end user at the time of request, since the importance of a strain may only be recognised following further study on it or on related isolates.

3.4 Special characteristics of microbial genetic resources which may affect implementation of Article 15

17. Microorganisms have some distinctive features which may raise issues other than those which arise in relation to plant or animal genetic resources. These characteristics may suggest the need for policies, agreements and institutional arrangements for access and benefit sharing specifically tailored to microbial resources. Specific characteristics of relevance include:

- Microbial genetic resources replicate frequently (sometimes every thirty minutes), leading to changing populations both in the environment and during conservation. If not preserved expertly ex-situ this can lead to genetic and phenotypic instability ("strain drift") and a failure to conserve the original sample;
- Because of their microscopic nature, microbial genetic resources cannot be tracked and monitored conventionally; they cannot yet be readily fingerprinted for authentication purposes, although this technology may become available in the future;
- The occurrence of many bacterial and yeast species is recorded in a number of geographical locations, and few such species occur in one country alone; and
- Within a population of microorganisms in the environment, each isolate of a species may show slight genetic variation from isolates of the same species from similar habitats in other countries - or even from isolates from the same habitat at different times. The isolate is therefore often of considerable significance in terms of genetic expression and many isolates of the same species may be held in a collection for taxonomic or screening purposes.

3.5 Policy considerations arising from the Convention with respect to access to ex-situ microorganisms and their distribution

18. Microbial genetic resources acquired prior to the Convention's entry into force and those provided by a country of origin that is not a Party to the Convention are not covered by the Convention's access and

benefit sharing provisions (Article 15(3)). However, there may be some practical difficulties in ascertaining which ex-situ microbial genetic resources are covered by the Convention. The uncertainty arises because of the need to know both the status of each country of origin regarding ratification of the Convention, and the date on which a microorganism was collected, isolated and/or deposited in a culture collection for conservation. Because of nomenclatural changes, transfers between scientists, and the longevity of many of the deposits in culture collections, the necessary information may not always be easy to track and may not be available to the culture collection whose role it will be to decide whether or not a particular deposit is covered by the Convention and what distribution policies apply.

19. The Convention acknowledges sovereign rights of a Party over genetic resources within its jurisdiction. While it is necessary to be able to ascertain the country of origin of isolates that may lead to benefits for that country, the question of ownership of genetic resources is not addressed by the Convention. It is not clear to what extent national laws presently cover the ownership of microbial genetic resources, but this is likely to vary from country to country (see UNEP/CBD/COP/2/13), and may not always be explicitly dealt with in national legislation.

20. Given the importance of the reference and type strains held in culture collections to further research, culture collections are concerned that distribution of this essential research material should not be unnecessarily restricted in implementing the provisions of the Convention.

21. A number of points arise out of these considerations:

- As only microbial genetic resources provided by culture collections in states Parties will be affected, the situation which applies when microbial genetic resources are provided from a Party to a non-Party or from a non-Party to a Party needs to be clarified;

- It will be necessary to determine whether ownership of microorganisms is covered by national law in the countries of origin, and to make this information widely available;

- It will be necessary for depositors and culture collections located within Parties to provide and keep accurate and complete records of dates of deposit and origin of isolates so that the requirements of the Convention are not inadvertently violated. Attention will need to be given to the development of appropriate and practicable procedures and documentation for the collection and distribution of microbial resources. Specific consideration may need to be given as to the types of benefit-sharing arrangements which might be appropriate in relation to microbial genetic resources.

- It will also be necessary for procedures to be adopted in the case of the death of a microorganism covered by the Convention, and any need for it to be replaced. As with the Budapest Treaty, such requirements need to recognise the fact that it is often difficult to maintain certain microorganisms ex-situ. Account must also be taken of the difficulties arising with contaminated or mixed cultures. Furthermore, culture collections need to retain the right to cease to maintain a deposit, and provision must be made to allow for the notification of such action and the implementation of appropriate transfer arrangements;

4. Specific issues regarding in-situ microbial genetic resources

22. The distinctive features of microbial growth and activity are such that in-situ conservation is difficult and uncertain. Microbial populations are dynamic and continually responding to environmental changes on a far greater scale than other organisms. It may therefore not necessarily be productive to try specifically to conserve such populations, particularly in the case of prokaryotes, even if this were possible. However, there are cases where conservation in-situ will be of greater importance than ex-situ conservation, particularly in the case of habitat-dependent species. The major need with regard to microorganisms in the environment is for greater study and an increase in knowledge of the interactions between the micro- and macroflora of the environment. Consideration should be given to microbial diversity in implementation of Article 7 (Identification and Monitoring), as well as more generally in implementation of Articles 6 and 8 of the Convention (Glowka, 1996).

23. For many bacterial, viral, micro-algal or yeast species, it seems unlikely that sampling in situ would lead to species depletion. However, the loss of hosts on which microorganisms depend could lead to the loss of the dependent microbial species. Moreover, the depletion of certain fungal species occurring in unique habitats is known to have taken place and eight per cent of fungal species are endangered.

5. Conclusions

24. Given the essential role played by microorganisms, as well as their potential uses, it is important that work under the Convention does not neglect consideration of microbial diversity. The COP may wish to consider what steps, if any, it may need to take in order to ensure that this does not occur. For example, the COP may wish to consider issues relating to microorganisms within its discussions of particular ecosystems, or it may wish to consider requesting the SBSTTA to consider the need to add microbial diversity as a specific item to the programme of work of the Convention.

25. In relation to taxonomy and capacity-building, the COP may wish to consider, for example, recommending that appropriate partnership arrangements between established and emerging culture collections be encouraged, with emphasis on training in technical and administrative capacity, and with the development of agreements to ensure benefit sharing between the partners.

26. Furthermore, the COP may wish to encourage the continued participation of the microbiological community, through organisations such as the WFCC, in future discussions at the national and international level on the implementation of the Convention.

27. In relation specifically to the issue of access to microbial genetic resources, the COP may wish to initiate a process of clarifying some of the issues raised above, and of raising the awareness of ex-situ culture collections of the provisions of the Convention. In particular, the COP may wish to encourage the establishment of a multidisciplinary expert group to consider a number of issues regarding access to microbial resources in ex-situ collections. For example, such a group might:-

- provide assistance and expertise in drawing up operational guidelines (or a voluntary code of conduct) for culture collections to incorporate access and benefit sharing procedures
- develop model agreements, such as model prior informed consent acquisition agreements and

material transfer agreements, which could be helpful to culture collections, reducing unnecessary duplication of effort and minimising costs;

- consider how to establish management and information systems to track to acquisition and transfer of microbial genetic resources, including identifying minimum items of information which should be maintained by culture collections with regard to the acquisition and distribution of microbial genetic resources; and

- consider the desirability of establishing registered culture collections to meet the access and benefit sharing provisions within the framework of the Convention. Such as system of registration might require that certain standards were met and confer certain obligations upon culture collections, but at the same time could provide a number of benefits in terms of, for example, pre-arranged export/import authorisations and pre-negotiated benefit arrangements. Parties might draw upon the experience, standards and quality controls of International Depository Authorities to establish and operate such a system.

REFERENCES

World Federation for Culture Collections, Information Document on Access to Ex-Situ Microbial Genetic Resources within the Framework of the Convention on Biological Diversity, 1996.

World Federation for Culture Collections, Biodiversity of Microorganisms and the Role of Microbial Resource Centres, 1994.

Glowka L., The Convention on Biological Diversity: Issues of Interest to the Microbial Scientist and Microbial Culture Collections. Paper presented at the Eighth International Congress for Culture Collections, 26 August 1996.

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