联合国粮食及农业组织 | Food and Agriculture Organization of the United Nations | Organisation des Nations Unies pour l'alimentation et l'agriculture | Продовольственная и сельскохозяйственная организация Объединенных Наций | Organización de las Naciones Unidas para la Alimentación y la Agricultura | منظمة الأغذية والزراعة للأمم المتحدة

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 5 of the Provisional Agenda

EXPERT GROUP ON MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES FOR FOOD AND AGRICULTURE

First Meeting

Rome, 3–5 October 2018

DRAFT WORK PLAN FOR THE SUSTAINABLE USE AND CONSERVATION OF MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES FOR FOOD AND AGRICULTURE

TABLE OF CONTENTS

I. INTRODUCTION

1. Micro-organisms and invertebrates are the most numerous and diverse groups of organisms on earth. They play important roles at all stages of the food value chain. In 2007, at its Eleventh Regular Session, the Commission on Genetic Resources for Food and Agriculture (Commission) formally recognized the important contribution of micro-organisms and invertebrates to the provision of ecosystem services, sustainable agriculture and food security and included micro-organism and invertebrate genetic resources as a work stream into its Multi-Year Programme of Work.[1] Ten years later, at its last session, the Commission requested FAO to prepare a draft work plan for future work on the sustainable use and conservation of micro-organisms and invertebrates.[2]

2. This document briefly recapitulates the Commission's activities in the area of micro-organisms and invertebrates over the last 10 years and presents a draft work plan for the Commission's future work in this area, for review by the Working Group.

II. BACKGROUND

3. At its Twelfth Regular Session, the Commission considered two brief scoping studies describing the main functions and services provided by micro-organisms and invertebrates of relevance to food and agriculture.[3] The Commission emphasized the need for assessing the status and trends of micro-organisms relevant to food and agriculture. It requested FAO to prepare targeted assessments, in particular of the status and trends in the conservation and use of soil micro-organisms, biological control agents and plant pathogens, in particular of important crops.[4] The Commission also requested FAO to prepare further analyses and studies of the role of micro-organisms for ruminant digestion, agro-industrial processes, and food processing as well as a global synthesis of the status and trends of the ecosystems services provided by invertebrates relevant to food and agriculture.[5]

4. At its Thirteenth Regular Session, the Commission welcomed progress made in the preparation of the targeted assessments and took note of two studies on the role of climate change for invertebrate and micro-organism genetic resources.[6] It also welcomed the inclusion of micro-organisms and invertebrates in the report on *The State of the World's Biodiversity for Food and Agriculture* (Report). The Commission agreed to consider, in the future, the preparation of global assessments of micro-organisms and invertebrates and the establishment of an intergovernmental technical working group on micro-organism and invertebrate genetic resources.[7]

5. At its Fourteenth Regular Session, the Commission took note of a set of comprehensive background study papers on the role of micro-organisms in food[8] and agro-industrial processes[9] and in ruminant digestion,[10] as well as on the role of invertebrates in rice production[11] and root-crop based systems.[12]

---

[1] CGRFA-11/07/Report, *Appendix E*.
[2] CGRFA-16/17/Report, paragraph 78.
[3] CGRFA-12/09/15.1 and CGRFA-12/09/15.2.
[4] CGRFA-12/09/Report, paragraph 60.
[5] CGRFA-12/09/Report, paragraph 63.
[6] Background Study Papers No. 54 and 57.
[7] CGRFA-13/11/Report, paragraphs 92 & 94.
[8] Background Study Paper No. 65.
[9] Background Study Paper No. 64.
[10] Background Study Paper No. 61.
[11] Background Study Paper No. 62.
[12] Background Study Paper No. 63.

6. At its Fifteenth Regular Session, the Commission reviewed its work on micro-organisms and invertebrates. It reiterated the importance of microbial and invertebrate genetic diversity, including the role of pollinators, for sustainable agriculture, food security and nutrition. It also noted that bacterial, yeast and fungal genetic resources used in food processing need to be included in the future work of the Commission.[13] The Commission emphasized the need for the Report to address issues related to micro-organisms and invertebrates and appealed to all FAO Members to provide relevant information in the course of the preparation of their country reports.[14] It also requested FAO to review the planning of its work on the conservation and sustainable use of micro-organisms and invertebrates following the presentation of the Report to the Commission.[15] In considering the draft report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*, the Commission also referred to the draft thematic background study on *Genetic resources for microorganisms of current and potential use in aquaculture*.[16]

7. At its last session, the Commission requested the Secretary to invite countries to provide their views on the development of a draft work plan for future work on the sustainable use and conservation of micro-organisms and invertebrates. By Circular State Letter C/CBD-7of 22 May 2017, FAO invited Members and observers to provide their views in writing by 30 September 2017. The Commission also requested FAO to prepare the draft work plan, taking into account the findings of *The State of the World's Biodiversity for Food and Agriculture* and any other relevant information, including inputs provided by Members and observers, for review by the Working Groups and the Commission at their next sessions.[17] The Commission also reiterated the importance of pollinators, in particular honey bees, of micro-organisms of relevance to ruminant digestion, food processing and agro-industrial processes, of biological control agents and of soil micro-organisms and invertebrates, and requested that these key groups be reflected in the draft work plan.[18] The Commission stressed the need for FAO to continue building partnerships with other international organizations and initiatives to mobilize expertise on micro-organisms and invertebrates and requested FAO to reflect this in the draft work plan.[19]

III. TOWARDS A DRAFT WORK PLAN FOR THE SUSTAINABLE USE AND CONSERVATION OF MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES FOR FOOD AND AGRICULTURE

(a) Objectives

8. Micro-organism and invertebrate genetic resources form part of a number of ongoing international initiatives, programmes and activities that relate to biodiversity for food and agriculture. Through the Global Soil Partnership and the Global Action on Pollination Services for Sustainable Agriculture, FAO provides guidance and technical advice to countries and facilitates decision-making processes on soil issues and pollination. The Organization facilitates the implementation of international initiatives on pollinators[20] and soil biodiversity[21] that were established by the Conference of the Parties of the

[13] CGRFA-15/15/Report, paragraph 66.
[14] CGRFA-15/15/Report, paragraph 67.
[15] CGRFA-15/15/Report, paragraph 69.
[16] Russell T. Hill, Genetic resources for microorganisms of current and potential use in aquaculture. Draft (January 2017)
[17] CGRFA/16/17/Report Rev.1, paragraph 78.
[18] CGRFA/16/17/Report Rev.1, paragraph 79.
[19] CGRFA/16/17/Report Rev.1, paragraph 80.
[20] COP 6 Decision VI/5, *Annex II*.
[21] COP 8 Decision VIII/23.

Convention on Biological Diversity. Furthermore, FAO has a long tradition of working in the field of biological control through its integrated pest management programme.

9. Other organizations, such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), also significantly contribute to strengthen the knowledge foundations for better policy development for the sustainable use and conservation of micro-organisms and invertebrates and of the ecosystem services they provide. IPBES' assessment report on *Pollinators, Pollination and Food Production*[22] has generated a wide range of follow-up products, actions and policy initiatives, including an ever-expanding list of national strategies and action plans on pollination, premised on the outcomes of the assessment.[23] FAO is one of the four UN collaborative partners of IPBES.

10. Since 2007, the Commission has also steadily been strengthening its work in the field of micro-organisms and invertebrates, as summarized above. Macroinvertebrates make up a significant component of aquaculture and fisheries (23 percent and 15 percent of global production respectively) and are covered in detail in the *State of the World's Aquatic Genetic Resources for Food and Agriculture* report (SoW AqGR) and will be incorporated into the follow-up priority actions. This process also covers some aquatic micro-organisms such as microalgae. In addition, the revised draft Report on *The State of the World's Biodiversity for Food and Agriculture*, prepared under the Commission's guidance and to be finalized and launched before the end of 2018, addresses, *inter alia*, the use and conservation of soil micro-organisms, pollinators, biological control agents as well as management practices believed to be favourable to the delivery of ecosystem services by micro-organisms and invertebrates.

11. The Commission's draft work plan, as given in *Appendix I* aims to:

i) consolidate the Commission's activities and processes relevant to the sustainable use and conservation of micro-organisms and invertebrates, and to plan in a coherent and consistent manner future activities in this area;

ii) raise awareness and strengthen the knowledge and understanding on the importance of micro-organisms and invertebrates to ecosystem functions, resilient and sustainable production systems, food security and nutrition;

iii) promote the uptake of micro-organisms and invertebrates in local, national, regional and international policies and policy development processes for the sustainable use and conservation of biodiversity for food and agriculture and their sustainable management; and

iv) strengthen the collaboration between FAO and other relevant international organizations and initiatives to mobilize expertise of relevance to the sustainable use and conservation of micro-organisms and invertebrates and identify areas of mutual interest.

(b) The challenges of assessing/managing micro-organisms and invertebrates

12. Although their important role in the provision of ecosystem services and their importance to food and agriculture is widely recognized, information on the diversity, function and distribution of micro-organisms and invertebrates is uneven and in many cases very limited and fragmentary. Moreover, as confirmed by the revised draft Report,

[22] IPBES (2016). The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. S.G. Potts, V. L. Imperatriz-Fonseca, and H.T. Ngo, (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany.

[23] More information available at: www.ipbes.net/deliverables/3a-pollination.

the importance of micro-organisms and invertebrates to food and agriculture is neither adequately reflected in the funds that are committed to related research, nor in relevant policies and decision-making processes.

13. The taxonomic and functional diversity of micro-organism and invertebrate species significantly contrasts with species in the plant, animal, forestry and fisheries sectors. The latter encompass relatively few species for which the taxonomy tends to be well-understood. As a result of this, "sectoral" species, breeds and varieties can be managed differently and conservation strategies can, for example, be single-species based. This species-by-species approach faces serious practical difficulties in the case of micro-organisms and invertebrates given the sheer number of species, the enormous taxonomic and ecological variety of these organisms and, consequently, the human and financial resources such an approach would require.

(c) Focussing on functional groups of micro-organisms and invertebrates

14. Management strategies for micro-organisms and invertebrates relying on a holistic framework that focusses on ecosystem functions and services they contribute to and on management practices favouring their conservation and sustainable use might therefore be more efficient and effective, in particular for micro-organisms and invertebrates managed within production systems, than strategies focussing on the organisms themselves.

15. The draft work plan, as given in *Appendix I*, therefore proposes to address micro-organisms and invertebrates as functional groups, as identified by the Commission at its last session and taking into account the Commission's previous work on them: pollinators, in particular honey bees; soil micro-organisms and invertebrates; biological control agents; microorganisms of relevance to ruminant digestion; and micro-organisms of relevance to food processing and agro-industrial processes.[24]

16. In light of the recent activities and developments at global level with respect to soil biodiversity[25] and pollination,[26] the Commission may wish to seize the momentum and address these groups first. However, the Commission could also decide to consider further functional groups, such as micro-organisms and invertebrates used as dietary components of both human food and animal feed, including harvestable fungi. Macroinvertebrates forming a significant proportion of aquaculture and fisheries production would be excluded from this functional group as they are covered in SoW AqGR, whereas aquatic micro-organisms not covered in the SoW AqGR (microalgae and zooplankton) could be included.

17. Moreover, the draft work plan suggests to address one functional group per Commission session. Aiming to address all micro-organisms and invertebrates at once might be overambitious in view of the limited human and financial resources available. It is also important to note that different functional groups require very different expertise.

(d) Main activities

18. The revised draft Report and submissions by Commission Members to the draft Report and in response to Circular State Letter C/CBD-7 highlight the need to:

[24] CGRFA/16/17/Report, paragraph 79.

[25] E.g. preparation of the Global Soil Biodiversity Atlas prepared by the European Commission Joint Research Centre and the Global Soil Biodiversity Initiative; commitments of the Global Soil Partnership and its Intergovernmental Technical Panel on Soils (ITPS) to promoting soil biodiversity; strategic alliance between FAO and the Global Soil Biodiversity Initiative, including a planned international symposium in 2020.

[26] E.g. publication of IPBES' thematic assessment on pollinators, pollination and food production.

- Establish national baselines, in particular for soil micro-organisms, invertebrates and pollinators;
- Improve the knowledge of the functions of micro-organism and invertebrate species within and around production systems;
- Assess the impact of management practices on the sustainable use and conservation of micro-organisms and invertebrates and on the ecosystem services they deliver and identify and validate those practices that are found to be most conducive;
- Integrate the sustainable use and conservation of micro-organisms and invertebrates into existing policies and planning processes at local and national levels and incorporate these processes into national accounting and reporting systems; and
- Strengthen and formalize partnerships and improve the exchange and sharing of knowledge and best practices related to the conservation and sustainable use of micro-organisms and invertebrates.

19. In line with this analysis, the draft work plan suggests to address each of the functional groups by:

- summarizing the status and trends of their conservation and use, based on previous work of the Commission, existing literature and, as appropriate, an open survey which may also compile best practices with respect to their sustainable use and conservation;
- mapping of regional and international organizations and other institutions most relevant for the functional group and identifying strategic areas of possible collaboration; and
- identifying, upon consultation with the Commission's relevant Working Group(s), gaps, needs and possibilities for the Commission and its Members to address them.

(e) Partnerships

20. The draft work plan suggests that it be implemented in partnership with organizations involved in the sustainable use and conservation of micro-organisms and invertebrates. Partners, such as the Secretariat of the Convention on Biological Diversity, the Consultative Group on International Agricultural Research, the Centre for Agriculture and Biosciences International (CABI) and the International Organisation for Biological and Integrated Control (IOBC), should be involved in specific activities of the work plan whenever relevant.

(f) Timeline

21. The draft work plan proposes that the Commission addresses one functional group per intersessional period. This would imply that the Commission would consider at its Eighteenth Regular Session (2021) the first functional group identified.

22. The work plan foresees its review at regular intervals, for the first time at the Commission's Nineteenth Regular Session (2023). At this stage, the Commission could, in the light of lessons learnt or new developments, change the order in which it wishes to address functional groups of micro-organism and invertebrate genetic resources or modify some of the activities to be carried out with regard to each of the functional groups.

III. GUIDANCE SOUGHT

23. The Working Group is invited to review and revise, as appropriate, the draft work plan for the sustainable use and conservation of micro-organisms and invertebrates, as provided in *Appendix I*, in particular the list of functional groups identified and the order in which they should be considered by the Commission.

APPENDIX I

DRAFT WORK PLAN FOR THE SUSTAINABLE USE AND CONSERVATION OF MICRO-ORGANISM AND INVERTEBRATE GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Micro-organisms and invertebrates are the most numerous and diverse groups of organisms on earth. They play important roles at all stages of the food value chain. Since 2007, the Commission's Multi-Year Programme of Work recognizes the important contribution of micro-organisms and invertebrates to the provision of ecosystem services, sustainable agriculture and food security.

Under the Commission's guidance, targeted assessments of various micro-organisms and invertebrates and of their contributions to food and agriculture have been prepared.

Objectives

This work plan aims to:

i) consolidate the Commission's activities and processes relevant to the sustainable use and conservation of micro-organisms and invertebrates, and to plan in a coherent and consistent manner future activities in this area;

ii) raise awareness and strengthen the knowledge and understanding on the importance of micro-organisms and invertebrates to ecosystem functions, resilient food production systems, food security and nutrition;

iii) promote the uptake of micro-organisms and invertebrates in local, national, regional and international policies and policy development processes for the sustainable use and conservation of biodiversity for food and agriculture; and their sustainable management; and

iv) strengthen the collaboration between FAO and other relevant international organizations and initiatives to mobilize expertise of relevance to the sustainable use and conservation of micro-organisms and invertebrates and identify areas of mutual interest with a view to strengthen collaboration in these areas.

Functional groups of micro-organisms and invertebrates

The Commission will address the following functional groups of micro-organisms and invertebrates at its forthcoming sessions, as follows:

CGRFA-18	Pollinators, in particular honey bees
CGRFA-19	Soil micro-organisms and invertebrates
CGRFA-20	Organisms used as dietary components of food/feed
CGRFA-21	Biological control agents
CGRFA-22	Food processing and agro-industrial processes
CGRFA-23	Micro-organisms of relevance to ruminant digestion

Main activities

The Commission will address each of the functional groups on the basis of:

- a summary of the status and trends of their conservation and use, based on previous work of the Commission, existing literature and, as appropriate, an open survey which may also compile best practices with respect to their sustainable use and conservation;
- a mapping of regional and international organizations and other institutions most relevant for the functional group and the identification of strategic areas of possible collaboration; and
- an analysis of the gaps and needs and possibilities for the Commission and its Members to address them.

Partnerships

This work plan will be implemented in partnership with organizations involved in the sustainable use and conservation of micro-organisms and invertebrates.

Review

This work plan will be reviewed and revised, as appropriate, at the Commission's Nineteenth, Twenty-first and Twenty-third sessions.