August 2021 CGRFA-18/21/11.2

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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 11.2 of the Provisional Agenda

Eighteenth Regular Session

27 September – 1 October 2021

SUSTAINABLE USE AND CONSERVATION OF MICROBIAL AND INVERTEBRATE BIOLOGICAL CONTROL AGENTS, AND BIOSTIMULANTS

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I. INTRODUCTION

1. The Commission on Genetic Resources for Food and Agriculture (Commission) at its Seventeenth Regular Session adopted its Work Plan for the Sustainable Use and Conservation of Microorganism and Invertebrate Genetic Resources for Food and Agriculture (Work Plan).[1] The Work Plan addresses micro-organisms and invertebrates as functional groups and foresees that two of these groups will be addressed at each forthcoming session of the Commission. For the current session the Work Plan foresees addressing pollinators, including honey bees, and biological control agents (BCAs) and biostimulants.[2]

2. Under the work plan, the Commission addresses each of the functional groups on the basis of:

- a summary of the status and trends of conservation, use and access and benefit-sharing, based on previous work of the Commission, existing literature and, as appropriate, an open survey that 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.[3]

3. In response to the Work Plan, FAO coordinated the preparation of the *Draft study on sustainable use and conservation of microbial and invertebrate biological control agents, and biostimulants* (draft study) by a number of expert authors.[4] The present document, drawing on the draft study, presents an overview of the current state of BCAs and biostimulants and their management, summarizes the state of relevant policies and legal instruments, identifies gaps and needs and seeks the Commission's guidance as to how work in this area should be advanced.

II. BACKGROUND

4. Microbial and invertebrate BCAs provide vital services to food and agriculture, reducing the impact of pests and diseases, expenditure on pesticides and threats to the environment and to human health. With the current crisis of biodiversity loss, the use of BCAs as a biodiversity-friendly alternative to pesticides is becoming increasingly significant and requires a lot more attention at all levels, including research, education and training, funding and policy-making.

5. Microbial and invertebrate BCAs were taken for the purposes of the draft study to comprise micro-organisms and invertebrates "that induce an action against target organisms that cause harm to humans or their resources."

6. Four categories of biological control can be distinguished:

- natural biological control: the suppression of populations of harmful species by living organisms (or viruses) that occurs without deliberate intervention by humans for this purpose;
- conservation biological control: an approach encompassing a diverse set of practices that aim to improve existing levels and activity of natural enemies with the final goal of reducing the negative effects of harmful species;
- classical biological control: the deliberate importation, release, and establishment of natural enemies into areas where they did not previously exist to reduce non-native invasive pest populations to less-damaging levels; and
- augmentative biological control: an approach in which natural enemies of pests or antagonists of pathogens are mass-reared under controlled conditions and released with the aim of temporarily suppressing pests and diseases.

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[1] CGRFA-17/19/Report, paragraph 95.
[2] CGRFA-17/19/Report, *Appendix E*, paragraph 14.
[3] CGRFA-17/19/Report, *Appendix E*, paragraph 7.
[4] CGRFA-18/21/11.2/Inf.1.

7. Microbial and invertebrate BCAs provide natural biological control services in all the sectors of food and agriculture. They are used to control weeds and invasive species in a range of terrestrial and aquatic agroecosystems, including croplands, grasslands, forests, fisheries, and fish farms and their surroundings. However, deliberate use of microbial and invertebrate BCAs specifically against the pests and diseases directly impacting production is largely restricted to the crop (including forage crop) and forest sectors.[5]

8. The draft study attempts to provide an overview of the state of adoption of each of the various categories of biological control (where they involve microbial and invertebrate BCAs) and discusses constraints to further adoption.

9. Natural biological control is, by definition, not adopted by humans, but it plays an important role in production systems throughout the world, as illustrated for example by the occurrence of pest outbreaks following the elimination of natural enemies through the inappropriate use of pesticides. Information on the role BCAs play in reducing pest populations can be used to adjust the recommended threshold pest density at which pesticides should be applied.

10. For conservation biological control, it is difficult to draw conclusions regarding the current state of adoption because of a lack of documentation. However, there is evidence that it is increasing, although uptake has been slow, especially in developing countries. There are examples of successful implementation in a variety of production systems in different parts of the world. However, research has been concentrated in Europe and North America. Constraints to further adoption include knowledge gaps. Successful implementation requires good knowledge of the targeted agroecosystems. While this is sometimes available, it is very location-specific. Guidance on the implementation of conservation biological control is improving, but there is a need to strengthen research on the ecology of relevant species and the impacts of specific management practices.

11. For classical biological control, despite the widespread existence of pest problems that could potentially be addressed via this approach, and numerous examples of successes in various parts of the world, adoption has largely been restricted to a few relatively wealthy countries. The situation may, however, slowly be changing, with greater interest in the approach developing in Africa (outside South Africa, where it is already well established), South America and Asia, particularly China. Classical biological control programmes are usually government-led "public good" initiatives.

12. Constraints include declining investment, specifically a lack of financial support for multi-year programmes and projects, a declining number of scientists specializing in the approach, aging and oversubscribed infrastructure (e.g. quarantine facilities), and increasing regulatory hesitancy over perceived risks. The latter issue has slowed adoption in recent years.

13. Augmentative biological control is largely a commercial activity. The worldwide market for biological control products (including semiochemicals and natural products in addition to BCAs *per se*) was EUR 3.6 billion in 2019. Adoption in developed countries is primarily in protected cropping of vegetables, fruits and ornamental species. However, use on open-field crops is growing, with successful examples in vineyards, horticulture and arable crops (maize). In developing countries, the approach has been successfully adopted in sugarcane and maize production. It is also widely used in fruit, vegetable and ornamental production, but mainly where this is for the European and North American markets. There are some examples of augmentative biological control solutions developed for use by smallholders.

14. Constraints include inappropriate regulatory measures, associated in part with a lack of knowledge among legislators. There is also a need to ensure that augmentative biological control is embedded in sustainable production systems that incorporate disease-resistant crop varieties, practices such as crop rotation and good soil management that support plant health, and landscape features that provide habitat resources for BCAs.

[5] "Cleaner fish" such as wrasses are used to control lice in aquaculture, and poultry are used to control ticks in livestock production (see Background Study Paper No. 66 REV.1). However, these BCAs are vertebrates rather than invertebrates or micro-organisms. Use of micro-organisms in disease control in aquaculture shows some promise but remains largely at research level. The same is true for the use of fungi to control livestock ticks.

15. Biostimulants have been defined as “fertilising product[s] the function of which is to stimulate plant nutrition processes independently of the product’s nutrient content with the sole aim of improving one or more of the following characteristics of the plant or the plant rhizosphere: (a) nutrient use efficiency, (b) tolerance to abiotic stress, (c) quality traits, or (d) availability of confined nutrients in the soil or rhizosphere”. In the context of changing consumer preferences for organic and other sustainably produced foods, and changes in laws and regulations related to the use of chemical fertilizers and pesticides, the market for biostimulants is steadily increasing. It is estimated to have been USD 2.6 billion in 2019 and is projected to reach USD 4.9 billion by 2025. Microbial biostimulants include primarily plant growth-promoting rhizobacteria and arbuscular mycorrhizal fungi.

III. STATUS, TRENDS AND THREATS

16. A lack of data makes it difficult to make firm statements about the status and trends of microbial and invertebrate BCAs. However, it is well recognized that they face a variety of threats, and there are widespread reports of declines of insect populations in general in many agroecosystems.

17. In the case of natural biological control and conservation biological control, the presence of the species that supply biological control services depends on multiple factors. However, it is clear that the intensification of agriculture, with larger fields, reduced field margins, elimination of weeds, intensive soil preparation and use of chemical pesticides (herbicides and insecticides), has a negative effect on BCA diversity and population levels. Without remedial measures, such as the establishment of refuge areas of habitat, it is possible that many BCAs are being eliminated from large areas and that species, and especially local strains, are at risk of local or global extinction. Climate change is an exacerbating factor.

18. In the case of classical and augmentative biological control, the species involved may be rare in their areas of origin and potentially at risk from drivers such as land-use change and climate change. It is also likely that such drivers are leading to local and potentially global extinctions of wild BCAs whose potential value in biological control programmes has never been considered.

IV. THE STATE OF MANAGEMENT

19. “Management” is taken here to include the various activities involved in the use and conservation of BCAs, i.e. in implementing conservation, classical and augmentative biological control (including breeding, mass-rearing and related activities) and in minimizing the loss of the BCA diversity needed to supply pest-control services now and in the future, including the BCA diversity that supplies natural biological control.

20. In the case of invertebrates, species used in classical or augmentative biological control are maintained through use, both via mass rearing in captivity and via various interventions to ensure that released populations flourish in the areas targeted. Populations maintained in this way are generally not in need of conservation in the sense of interventions to address the threat of extinction. However, as noted above, wild source populations may be threatened and require interventions to protect them. It can be assumed that these populations benefit from *in situ* conservation efforts targeting biodiversity in general in the areas where they are found, but there is little indication that protecting them is a specific objective in any conservation programmes.

21. Similarly, micro-organisms are not generally given any specific consideration in *in situ* conservation strategies, in part because knowledge gaps (an estimated 99 percent of micro-organism species remain undescribed) make it difficult to plan activities targeting them and to monitor impacts. When conservation activities, such as establishing protected areas or introducing biodiversity-friendly management in agriculture, are implemented, it is assumed, or hoped, that micro-organisms, including any that act as BCAs, will benefit along with other components of biodiversity in the areas targeted. Conservation biological control involves interventions to encourage the presence of BCAs in and around production systems. Given that, as noted above, BCAs face various threats, including from unsustainable farming practices, it can be assumed that these interventions contribute to conservation objectives. However, broader conservation measures (i.e. beyond the context of conservation

biological control at production-system level) may be needed to address threats to the species concerned.

22. Many micro-organism BCAs are maintained *ex situ* for research or for use. In some cases, they are put into secure long-term storage. However, strains are often lost, for example because of inappropriate storage methods or because research programmes end. Strains that are used commercially are, clearly, maintained while these activities continue. However, there is no overall coordination, and comprehensive information on the range of organisms maintained is not available. Attempts have been made to address this information gap at an international scale, for instance via CABI's BioProtection Portal,[6] which provides information on registered BCA products (micro-organisms and invertebrate BCAs, natural substances and semiochemicals) across 15 countries.

23. Public service collections have been established to provide access to microbial strains, including strains used for biological control, for example the more than 803 collections listed by the World Data Centre for Microorganisms.[7] Collection organizations are working to improve capacity and coordination. When scientific papers on microbial BCAs are published, editors often advise that the strain on which the research has been based should be deposited in a public collection. However, this is usually not mandatory. At present, the status of *ex situ* collections is highly uneven across the world, and in particular between developed and developing regions. For example, Africa's 18 World Data Center for Microorganisms-registered collections hold fewer than 18 000 strains, whereas Europe by comparison has a total of more than 1.1 million strains held in 256 collections. Efforts are needed both to increase the coverage of *ex situ* conservation programmes and to obtain a better overview of what micro-organisms are included in existing programmes, and the potential these have for use in biological control and as biostimulants.

24. While mass rearing of invertebrate BCAs is widespread, genetic improvement of such populations remains largely confined to research. The amount of time involved, the high levels of knowledge required and the availability of the option of importing new strains have in the past limited interest in practical application of genetic improvement, although this may now be changing.

25. Artificial selection has proved successful at the research level. Studies have tended to focus on insecticide resistance, but selection has been successfully implemented for traits such as developmental diapause (relevant for BCA storage), fecundity and host adaptation. Trade-offs are identified as the biggest problem and it has been suggested that there is a need for selection regimes that are closer to natural conditions. Options such as genomic selection and combining breeding populations (to increase genetic diversity and potentially deliver hybrid vigour) have attracted some interest. For genomic selection, challenges include the small size of the organisms and the difficulty of recording phenotypic traits in the field. Manipulating the microbiome of BCAs [8]is another approach that has received some attention. Genetic modification of insect BCAs has been repeatedly suggested, but is not considered likely to become common.

26. Conventional methods exist to modify the genome of selected micro-organisms (e.g. mutation, conjugation, transduction, selective breeding, hybridization and adaptation by serial passage through hosts or gradual modification of the environmental parameters).[9] Although not widespread, it is also possible to use genetic engineering techniques to improve the performance of BCAs.[10]

27. Challenges to the further progress in the field of genetic improvement of BCAs include regulatory restrictions and knowledge gaps, including a lack of available information on the genetic diversity of populations potentially targeted for genetic improvement.

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[6] www.bioprotectionportal.com

[7] http://gcm.wdcm.org/datastandards

[8] See also CGRFA-18/21/6/Inf.1.

[9] Arora, R. & Shera, P. 2014. Genetic improvement of biocontrol agents for sustainable pest management. In *Basic and applied aspects of biopesticides* (Sahayaraj, K., ed) pp. 255-285, Springer.

[10] Lovett, B. & St Leger, R.J. 2018. Genetically engineering better fungal biopesticides. *Pest Management Science*. 74 (4): 781-789.

28. Regarding breeding of arbuscular mycorrhizal fungi used as biostimulants, classical breeding or genetic transformation to obtain populations with stable, desirable traits is currently impossible due to the specific characteristics of fungal genetic systems.

V. THE STATE OF POLICIES AND LEGAL INSTRUMENTS

29. The management of BCAs is affected by a variety of different policies and legal instruments at global, regional and national levels. These can operate both as enablers and disablers of effective action.

30. Key international legal frameworks include the International Plant Protection Convention. The Convention's Commission on Phytosanitary Measures develops and adopts International Standards for Phytosanitary Measures (ISPMs), which are recognized by the World Trade Organization as the basis for trade-related phytosanitary measures. Though these standards are not legally-binding, they can inform the development of countries' phytosanitary policy. ISPM 3 relates to the export, shipment, import and release of biological control agents.

31. The Convention on Biological Diversity and its Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol) address access to genetic resources and the fair and equitable sharing of benefits derived from them. ABS laws implementing the Nagoya Protocol, in particular, may impact on the management of BCAs.

32. Other relevant international instruments include the Stockholm Convention on Persistent Organic Pollutants, which although it does not relate specifically to BCAs, recognizes the importance of environmentally sound alternative forms of pest control, and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, which aims to promote shared responsibility, cooperation and information exchange in international trade of hazardous chemicals, including several pesticides, again does not relate directly to biological control, but does urge its parties to share information and to engage in public awareness-raising regarding the availability of alternatives that are safer for human health or the environment.

33. Many countries have laws and policies in the fields of plant and environmental protection that address aspects of the use of BCAs, such as import procedures and registration of BCAs for use.

34. Intergovernmental collaboration, adherence to international regulations and efficient use of research facilities can all be important enablers of classical biological control. The draft study argues that harmonization and simplification of legal frameworks, as well as improvements in the efficiency of procedures for assessing the benefits and risks of biological control relative to alternatives such as pesticide-based approaches, could increase the adoption of biological control products.

35. The draft study notes that conservation biological control can potentially contribute to meeting a range of policy objectives across the fields of agricultural development and biodiversity conservation, and the need for joined-up approaches that exploit potential synergies and involve a range of stakeholders, as well as for awareness-raising among policy-makers on the benefits conservation biological control can deliver.

36. Numerous policy levers can potentially be exploited to promote more widespread adoption of biological control. Options noted in the draft study include both soft (e.g. certification schemes, food safety labelling) and hard policy measures (e.g. conditional financial assistance). It further notes that crop insurance schemes can potentially help reduce the tendency to opt for strategies based on heavy use of pesticides.

37. As noted above, biological control strategies are relevant to a wide range of policy goals, but they are often not mainstreamed into relevant policy frameworks. Potentially relevant policy areas referred to in the draft study include science, technology and innovation, education for stakeholders in

the agri-food system[11], food safety, climate change, occupational health and safety, trade and post-COVID 19 recovery.

38. Where regulatory procedures for plant biostimulants are concerned, the revised European Union (EU) Fertilising Products Regulation (2019/1009), is expected to be applied in EU member states in 2022. Several countries in Europe, as well as Brazil, Canada, India, South Africa and the United States of America, have regulations related to biostimulants.

39. Access and benefit-sharing (ABS) regulations may impact the use of BCAs for research and development. The draft study indicates that obstacles encountered by researchers and practitioners include complicated access procedures and lack of institutional capacity for enabling compliance with ABS rules. It indicates that another common issue is that different countries have different criteria for determining which uses of genetic resources trigger ABS obligations. The draft study stresses that free multilateral exchange across the global network of professionals has been a key element of biological control practice and that it needs to be given due attention in the development and implementation of ABS measures, potentially via simplified procedures or exemptions for exchanges occurring for biological control purposes.

40. The debate emerging around "digital sequence information" (DSI) may have additional implications for the use of BCAs.[12] Taxonomic identification of BCAs and target pests by means of morphological or molecular analyses is a crucial step in biological control projects.

41. The draft study stresses the limited scope for monetary benefit-sharing in biological control and suggests that awareness of non-monetary ABS arrangements for BCA should be raised among potential providers, holders and users of BCA. Potential options noted in the draft study include the participation of stakeholders from source countries in BC projects, including in field exploration, as well as exchange visits, student training, joint authorship of scientific publications and joint submission of proposals. The International Organization for Biological Control's (IOBC) Global Commission on Access and Benefit-Sharing has formulated a code of best practices for the use and exchange of invertebrate BCA genetic resources relevant for food and agriculture. The code covers, *inter alia*, information exchange on the availability of invertebrate BCAs, knowledge sharing through databases that document successes and failures, cooperative research to develop capacity in source countries, transfer of production technology to support small-scale economic activity, and a model concept agreement for scientific research and non-commercial purposes.[13] IOBC was established in 1955 as a global organisation affiliated to the International Council of Scientific Unions and promotes environmentally safe methods of pest and disease control. It is a voluntary organisation of biological-control workers.

VI. GAPS AND NEEDS

42. There are numerous knowledge gaps, resource limitations and legal, policy and institutional requirements that may impact the development of biological control as a management practice, and there are numerous threats to biological control agents. Key fields in which action is required include the following:

Addressing threats to BCAs and biostimulants and improving their conservation

43. Efforts to address threats to BCAs, and to a lesser extent biostimulants, and promote conservation measures for them are urgently needed. BCAs and biostimulants can be expected to benefit from generic actions that lead to improvements in the conservation of micro-organism and

[11] The agri-food system covers the journey of food from farm to table - including when it is grown, fished, harvested, processed, packaged, transported, distributed, traded, bought, prepared, eaten and disposed of. It also encompasses non-food products that also constitute livelihoods and all of the people as well as the activities, investments and choices that play a part in getting us these food and agricultural products. In the FAO Constitution, the term "agriculture" and its derivatives include fisheries, marine products, forestry and primary forestry products. See C 2021/LIM/4.
[12] See CGRFA-18/21/5.
[13] Mason, P.G., Cock, M.J.W., Barratt, B.I.P., Klapwijk, J.N., van Lenteren, J.C., Brodeur, J., Hoelmer, K.A. & Heimpel. G.E. 2017. Best practices for the use and exchange of invertebrate biological control genetic resources relevant for food and agriculture. *BioControl*, 63, 149–154.

invertebrate biodiversity in and around production systems. However, some specific priorities can be identified. With regard to *ex situ* conservation of BCAs, there is a need to support efforts to improve coordination among culture collection organizations. Capacity to store whole micro-organism communities (microbiomes) is opening new opportunities for *ex situ* conservation, and there is a need to ensure that micro-organisms BCAs and biostimulants are adequately included in initiatives in this field.

Promoting the sustainable use of BCAs and biostimulants

44. The potential of BCAs and biostimulants in food and agriculture remains underdeveloped, particularly in developing countries, where they could have a substantial impact in terms of productivity, reducing environmental degradation and improving occupational and food safety. Promoting uptake will require an enabling framework in terms of, inter alia, the state of knowledge, capacity, cooperation, policy and legislation. Despite progress at the research level, genetic improvement of BCAs has had little practical impact to date. Constraints related, *inter alia*, to knowledge gaps need to be addressed.

Addressing constraints to the exchange of BCAs and biostimulants

45. Exchange of BCAs, including at international level, is vital to the development and implementation of biological control practices. It is essential that policy- and decision-makers are fully aware of the need for exchange of BCAs and take the distinctive features of BCAs into account in the development/review and implementation of ABS measures. The Commission's ABS Elements provide a source of information on regulatory elements that ABS policy-makers may wish to consider in designing ABS measures for GRFA, including BCA.[14] Beyond measures at national level, the development of a multilateral framework specifically aimed at facilitating access to and use of BCAs and the sharing of benefits arising from their use has been proposed.[15]

Addressing knowledge gaps on BCAs and biostimulants and their management

46. Improvements to the management of BCAs and biostimulants require knowledge of their characteristics, their roles in the supply of ecosystem services, their risk status and distribution, the threats affecting them, techniques for their use and conservation, and the status and trends of the adoption of practices involving their use. Research on the management of BCAs and biostimulants can potentially be facilitated via capacity development, promoting access to data and information, developing or strengthening policy and legal frameworks, and promoting collaboration among researchers and between researchers and other stakeholders.

Improving capacity development for the management of BCAs and biostimulants

47. There is a critical lack of human and material resources for the identification and characterization of BCAs and biostimulants, especially those that provide natural or conservation biological control. Support for these activities needs to be stepped up, particularly in tropical and subtropical areas. Capacity to implement biocontrol strategies also needs to be strengthened.

Developing, strengthening or harmonizing policy and legal frameworks for the management of BCAs and biostimulants

48. National policy and legal frameworks for the management of BCAs and biostimulants are reported often to be weak or poorly implemented and might benefit from awareness raising among policy-makers or the provision of guidance on the development of policies and legislation.

[14] FAO. 2019. *ABS Elements: Elements to facilitate domestic implementation of access and benefit-sharing for different subsectors of genetic resources for food and agriculture – with explanatory notes*. Rome. (also available at http://www.fao.org/3/ca5088en/ca5088en.pdf).
[15] Background Study Paper No. 38, p.43.

Improving diffusion of knowledge on BCAs and biostimulants

49. Knowledge gaps are a significant constraint to improving the management of BCAs and biostimulants. As well as promoting research, there is a need to promote the diffusion of knowledge to those who need it. This might, for example, involve support for an online knowledge portal featuring items such as relevant national policy frameworks and metrics of biological control success or impact, or virtual communities of practice and associated multistakeholder innovation platforms (see below for more on networking). With regard to genetic improvement, options could include the development of tools such as a database on the genetic variation of populations potentially targeted for selection. Development of an inventory of BCAs and biostimulants used around the globe, including information on source countries, on countries, environments and production systems where they are used, and on target species, could be considered.

Improving cooperation and networking among those working on/with BCAs and biostimulants

50. Action in all the fields discussed above would benefit from improved cooperation and networking among stakeholders. Action in this regard might include, for example, supporting the establishment of networking platforms that facilitate the identification of expertise for country-level or regional initiatives, including in the case of classical biological control the identification of collaborators in the region of origin of invasive pests. Other options could include stimulating the establishment and operation of research incubators, innovation hubs and working groups covering different aspects of biological control.

Mainstreaming BCAs and biostimulants into biodiversity, environmental and agricultural policy and practice

51. The use and conservation of BCAs and biostimulants are relevant to many policy objectives and potentially affected by a range of different policies, including those in areas such as climate change, sustainable food systems, general biodiversity conservation (including restoration) and sustainable use, and One Health. There is a need to raise awareness of these links and to explore opportunities for mainstreaming the management of BCAs and biostimulants into such policies at all levels.

VII. BIOLOGICAL CONTROL AGENTS AND BIOSTIMULANTS IN THE WORK OF THE COMMISSION

52. The Commission, in its sectoral and cross-sectoral work, has frequently taken action to strengthen aspects of the management of components of biodiversity for food and agriculture − including characterization, *in situ* and *ex situ* conservation, genetic improvement and ABS − through, *inter alia*, overseeing the preparation of in-depth studies on technical and policy issues, promoting knowledge diffusion via publications and information systems, and developing policy instruments and guidance of various kinds. Its work has tended to focus particularly on the genetic level of biodiversity.

53. The Commission's work specifically on BCAs and biostimulants has, to date, remained largely at the level of reviewing information provided in publications such as Background Study Papers 38 and 47 and *The State of the World's Biodiversity for Food and Agriculture*. The draft study is available to the Commission at its current session. The ABS Elements, in their discussion of micro-organisms and invertebrate genetic resources, include some references to the use and exchange of BCAs.

54. As important components of "associated biodiversity", BCAs and biostimulants are covered by the Commission's draft policy response to *The State of the World's Biodiversity for Food and Agriculture*.[16] However, the draft needs and possible actions are mostly at a relatively general level and do not include specific references to the management of BCAs or biostimulants.

55. As referred to above, various aspects of the management of BCAs and biostimulants are currently being addressed, to varying degrees and in various forms, by other international bodies. Any

[16] CGRFA-18/21/7.2.

concrete steps the Commission might consider taking in this field would need to account for these ongoing actions, avoid duplication of work and ensure that cooperation and synergies are promoted.

VIII. GUIDANCE SOUGHT

56. The Commission may wish to:

i. take note of and provide comments on the draft study;

ii. request FAO to finalize and disseminate the study;

iii. request FAO to ensure that the findings of the study are taken into consideration in its work relevant to biological control agents and biostimulants;

iv. invite countries to promote the sustainable management of BCAs and biostimulants and to ensure they are given due consideration in relevant local, national, regional and international policies and policy-development processes; and

v. consider how it can respond to the findings and recommendations of the study, once finalized, and what follow-up actions are needed to ensure that the Commission and its Members continue to strengthen their work on BCAs and biostimulants.