THE USE AND EXCHANGE OF BIOLOGICAL CONTROL AGENTS FOR FOOD AND AGRICULTURE

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EXECUTIVE SUMMARY

This report was prepared by the IOBC (International Organisation for Biological Control; www.iobc-global.org) Global Commission on Biological Control and Access and Benefit Sharing, with support from FAO (www.fao.org/) and CABI (www.cabi.org/). It sets out to summarise the past and current situation regarding the practice of biological control (BC) in relation to the use and exchange of genetic resources relevant for BC agents.

There are two main categories of BC. Classical BC is the introduction of a BC agent, usually from a pest's area of origin, to control the pest in an area where it has invaded. Once introduced, the BC agent will become established, reproduce and spread, and have a self-sustaining effect on

the target pest. Augmentative BC involves the production and release of BC agents, indigenous or exotic, into specific crop situations, where they cause mortality of the target pest, but are not expected to persist from one cropping cycle to the next.

Allowing access to BC agents for use in another country imposes no risk of liability to the source country. Local scientific knowledge about habitats, fauna and flora, can be helpful for locating suitable sites for surveys and collections. BC is a research-based activity that requires access to Genetic Resources (GR) but that is not expected to generate large monetary returns. It is not the practice in the BC sector to patent BC organisms.

1. The research process and opportunities for benefit sharing

Preliminary surveys for the target pest and its natural enemies will often need to be carried out in several countries. These surveys offer limited opportunities for financial benefit sharing, but benefit the source country through provision of training in survey methods, joint surveys, capacity building and information generated to better understand biodiversity. Specimens of pests and natural enemies would normally need to be exported for identification and taxonomic studies.

Detailed studies on natural enemies to assess their potential as BC agents must in part be carried out in the source country, while host-specificity studies involving plants or animals not naturally occurring in the source country would best be carried out in quarantine in the target country or in a third country. It is this stage of a biological control programme that provides great scope for collaboration, shared research and capacity building. In comparison, there is relatively little scope for routinely sharing research with the source country during the BC agent release stage.

In source countries, local partners are essential to carry out BC surveys and research. When added to the moral obligation in the spirit of ABS, there is a compelling case for local partnerships. Some of these local partners will become the leaders in developing BC options for their country in the future.

2. The implementers

Two main groups of producers are involved in augmentative BC: commercial and centralised. The former are independent companies who produce and sell BC agents to users. Such companies have mostly operated in developed countries, but new ones are increasingly common globally, particularly supporting cash crop production in middle-income countries. The centralised production units are government- or industry-owned and produce natural enemies for a particular niche, normally large-scale agriculture or forestry, which are either provided free or sold to users. In the case of classical BC, those who implement it are normally national agencies or programmes. Classical BC in developing countries is often carried out with the financial support of international development agencies and technical support of implementation agencies.

3. The benefits to users and their customers

In the context of agriculture and forestry, the main beneficiaries of classical BC are the farmers who have their pest problems reduced without necessarily actively using BC agents, which by spreading and reproducing naturally contribute to the public good. The reduced crop losses from pests lead to improved food security and improved livelihoods. Farmers in all parts of the world have benefited from this. Consumers also benefit from reduced use of pesticides, and hence less pesticide residues in food. Thus, classical BC is in the domain of public good, as the benefits

reach all who grow and benefit from the crop, without requiring them to make any intervention. The use of augmentative BC and classical BC enables producers to reduce pesticide use and residues to meet the high standards of profitable northern export markets, resulting in job creation amongst the growers and a very significant influx of foreign exchange in developing countries.

To make augmentative BC products available in developing countries it is necessary to establish mass-production facilities, which creates job opportunities. Also important is the creation or retention of jobs in agricultural production systems dependent upon augmentative BC or classical BC.

BC also addresses invasive alien species that are problems in agriculture, forestry and the environment. BC is an effective tool to tackle alien pest problems. Furthermore, BC is environmentally friendly and does generally not lead to a reduction of biodiversity which is often observed when chemical pesticides are used.

4. The extent of use of biological control

At least 7,000 introductions of BC agents involving almost 2,700 BC agent species have been made. The most widely used BC agents have been introduced into more than 50 countries. BC agents from 119 different countries have been introduced into 146 different countries. High-income countries have implemented classical BC the most and have also been the main source of BC agents. Low-income countries have contributed slightly more BC agents than they have received.

In augmentative BC, more than 170 species of natural enemies are produced and sold, but some 30 species make up more than 90% of the market worldwide. There is a trend in augmentative BC to first look for indigenous natural enemies when a new, even exotic, pest develops.

Once a BC agent has been used successfully in one country the opportunity has often been taken to repeat that success in other countries through redistribution of the BC agent. Developing countries have benefited from access to such tested BC agents because research and implementation was carried out by developed countries. For example, the work of developed countries with subtropical and tropical regions, e.g. Australia and the USA, has directly benefited developing countries in the tropics and subtropics. Usually BC agents for redistribution have been re-collected in the target country rather than the original source country.

5. Control of genetic resources and opportunities for profit

In the case of classical BC, a national or international research institute usually carries out the research, but once established, a BC agent ceases to be under its control. The agent breeds and ideally contributes effectively to management of the target pest. The BC agent will disperse to the geographic range limits to which it is suited, often including other countries. The classical BC ethos is to establish a free-of-charge public good. The sector has traditionally made no use of intellectual property rights to regulate access to, or use of classical BC agents. All knowledge generated is put into the public domain, and other countries are encouraged to take advantage of this new BC agent. Benefits to farmers, consumers, and the local economy, do not return to the research institute or development agency in monetary form.

In the case of augmentative BC, a company might survey for a useful new BC agent to control a particular pest. They research it and develop rearing, distribution and release methods at their own expense. The augmentative BC company then sells it to growers or other customers,

generating profits for the company. Farmers who paid for the BC agent benefit from effective pest control and improved yields, growing food without pesticides with implications for their own health, and the price they can obtain for their produce. The customers who buy the food are able to get healthy food at an acceptable price. It is not the practice in the augmentative BC sector to use patents for the control BC agents, so any one can collect and use the agents from nature. Augmentative BC companies may establish patents on rearing processes, but more usually handle this by keeping the relevant know-how secret.

Worldwide, some 30 larger commercial producers of augmentative BC agents are active, of which 20 are located in Europe. In addition to the larger producers, some 100 small commercial producers are active, employing fewer than five people. The total market for augmentative BC natural enemies at end-user level in 2008 was estimated at about US$100–135 million. With an average net profit margin of around 3–5%, the total commercial augmentative BC industry profit is under US$15 million per year. Augmentative BC is a small activity undertaken by small and medium-sized enterprises and with modest profits.

6. Regulation of introduction of biological control agents

Over the last 20 years, the introduction of BC agents has increasingly followed international or national legislation. ISPM3 (International Standards for Phytosanitary Measures No. 3) of the IPPC (International Plant Protection Convention) sets out the responsibilities of the different players, but does not address the issue of ABS.

Since the earliest days of BC, there has been a community of practice based on free multilateral exchange of BC agents, rather than bilateral exchange or defined benefit sharing agreements. Countries are both providers and users of BC agents. It has usually made good practical sense to collaborate with a research organisation in a (potential) source country, and as the need for more detailed risk and environmental impact assessment studies has grown, the need for collaborative research in the source country has grown. Conversely, there is a general trend for access to GR, including BC agents, to become increasingly restrictive, for a variety of reasons, including ABS regulations and, in the case of BC, phytosanitary legislation. The existing multilateral free exchange ethos and effective global networking of BC practitioners is a foundation that deserves special consideration with regards to ABS.

New legislation has been and is being introduced in some countries regarding access to GR. If legislation is not designed to accommodate BC, it becomes a very difficult and challenging process, for both international researchers and their national collaborators. In the short term, this legislation will remain in place and have to be complied with. There is a risk that new international ABS legislation not tailored to the needs of the sector will add another layer of regulation to the research, which is likely to slow the process.

The arrival of a new invasive alien pest in a country can be devastating. In such cases, there is an argument that an emergency response may be needed before irreversible harm is done. That emergency response could be classical BC. In such cases fast-track procedures for access to GR should be anticipated and facilitated.

7. User perspectives

The attitudes and views of BC players reflect a mixture of positions regarding ABS. Much of the classical BC community has been unaware of the potential of ABS to affect its activities, although the pragmatic need for a good local collaborator is recognised. However, there is now

growing awareness of ABS policies and the need for continued exchange of BC agents so that BC and the resultant public good will be guaranteed.

The implementers of classical BC have long been aware that classical BC does not bring them cash benefits. It is against the classical BC ethos, which is based on government and donor financing to create a free-of-charge public good. Furthermore, there is no pathway or mechanism to collect monetary benefits from the beneficiaries, such as smallholder farmers. For this reason, forms of non-monetary benefit sharing are appropriate, based around shared research activities and capacity building.

On the other hand, the augmentative BC community has been more aware of the issues, perhaps because augmentative BC does generate some modest commercial profits. Larger augmentative BC producers, such as members of the International Biocontrol Manufacturers Association (IBMA) and the Association of Natural Biocontrol Producers (ANBP), are willing to consider benefit sharing in the form of knowledge sharing, training, provision of natural enemies, and other ways. In the event that a natural enemy obtained from a source country becomes a commercially successful BC agent, some augmentative BC producers foresee that payment of 'royalties' to the country of origin might be possible, but if the industry had to pay for each natural enemy collected, they would anticipate not being able to continue with this type of work. On balance, these producers believe that shared activities and capacity building would be a more realistic approach, given the relatively small profits and profit margins in the augmentative BC industry.

8. Recommendations

ABS regulations should recognise the specific features of BC:

- Countries providing BC agents are also themselves users of this technology;
- Many BC agents are exchanged, but have little recoverable monetary value;
- Organisms are not patented, so can be used by anyone at any time;
- Classical BC information and to a degree augmentative BC information are publicly shared;
- There are societal benefits for all, such as environmental and public health benefits, and reduction in pesticide use;
- BC is widely used in both developing and developed countries, often using the same BC agents;
- Most use of BC relates to food and agriculture.

In view of these specific positive features, the following recommendations are made:

1. Governments should build on the existing multilateral practice of exchange of natural enemies for BC on a complementary and mutually reinforcing basis, which ensures fair and equitable sharing of the benefits of BC worldwide.
2. ABS regulations should encourage further development of the BC sector, by facilitating the multilateral exchange of BC agents.
3. Countries are encouraged to have a single point of contact to facilitate survey missions, provision of information, institutional linkages and taxonomic support, and provide advice on compliance with regulations for BC, including ABS.

4. ABS in relation to BC will normally be based on non-monetary benefit sharing, e.g. capacity building, shared research programmes and/or technology transfer, as already practised by many organisations and the augmentative BC industry.

5. A document describing best practices for ABS in relation to BC, including guidelines for joint research that are equitable but not restrictive, should be prepared and disseminated. BC organisations would be expected to follow these guidelines.

6. To improve transparency in the exchange of BC agents, mechanisms should be supported globally to establish and allow free access to database information on BC agents including source and target countries.

7. In the case of a humanitarian or an emergency situation for food security, governments should cooperate within FAO to fast track action in the exchange of BC agents.