WORKSHOP REPORTS
Workshop Summary:
Is Classical Biological Control a 20th Century “Old Science” Paradigm that is Losing its Way?

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Workshop proposal

For years most countries accepted the benefits of biological control as given, leading to facilitated inside lanes through the regulatory maze. “Successes” led to many passionate disciples over science rationalists. Bioc ontrol targets continue to be selected on assumptions of good value with little direct evidence. Even when successful, biocontrol has rarely delivered environmental benefits that have been measured. Money flow is still healthy, but is arguably being directed against less impactful targets. Lack of science rigour exposes the field to attacks from an increasing number of critics as values change. A global change driven counter-revolution is underway on the dichotomy of hate between natives and aliens. Will climate change undermine even currently successful biocontrol outcomes? Meanwhile negative direct and indirect impacts of biological continue to fuel dissent. Nowhere is this issue hotter than in Hawaii where “invaders” have massively increased biodiversity, make up nearly all the biomass and create whole new ecosystems. This workshop will entertain a panel discussion around the future for classical biological control of weeds. Does it need to change its paradigm in response to changing societal values, if so can it reinvent itself?

Introduction

Scientists engaged in weed biological control are all advocates of the discipline and so what they say about the benefits of biological control in the public arena can be seen as a value judgement and won’t be considered as objective or impartial. Historically, biological control has been, at least implicitly, supported by government agencies, because of the recognised accrued benefits against agricultural pests and weeds. The views of government in developed countries are changing, however, with growing scientific and public concerns about environmental degradation from biological invasions and the increasingly recognised risks from introducing exotic organisms. The recognised historical agricultural benefits compared to the small realised risks (off-target direct and indirect impacts) may be quickly forgotten when biodiversity faces increasing pressures from alien invasive species and as government departments responsible for environmental protection become
increasingly involved in weed biological control implementation. Furthermore, weed biological control is now more a tool for the management of environmental weeds (weeds affecting biodiversity, habitat integrity, ecosystem processes and services) than for agricultural weeds. Use against environmental weeds has grown because the impacts of such weeds are perceived as often even more substantial (e.g. ecosystem "transformers") than simple economic costs from agricultural weeds. The new problem here however is one of perception, because the impacts of environmental weeds cannot be measured in straight economics. Their impacts can be hard to quantify. When biological control is increasingly used against targets where the impacts might be considered qualitative or subjective, then its use can increasingly be questioned too. It is critically important that a target weed for a biological control program has clear and undisputable negative impacts against which the program can be evaluated in the future.

As an applied science, biological control lives and dies based on its acceptance by its stakeholders and society. It requires good government and community support. There are still many countries in both the developed and developing world where the use of weed biological control has not achieved public acceptance and is not being applied (i.e. most of Europe, Asia and South America). In countries where biological control is both practiced and accepted, scientists may be taking their stakeholders for granted (e.g. seen just as funding sources for their science) when they should be engaging and encouraging them as objective public advocates for the discipline. After a long history, it could be argued that to sustain the discipline, weed biological control is also starting to work on more second tier targets as all the “world’s worst weeds” have already been tackled. Second tier can mean not just weeds where the impacts are hard to quantify, minor or more doubtful, but also weeds for which some sectors of the community perceive benefits from them. Where potential benefits are less explicit, the argument for introducing an exotic potentially beneficial biological control agent may meet greater resistance. Similarly, even if a control program successfully eliminates the environmental weed target, there may be no measureable biodiversity or ecosystem service benefits, only weed replacement. Biological control may be moving on to targets where the value of the approach will be more vulnerable to criticism, if strong independent advocates are lacking.

Community, government and even scientific perceptions of the harmful impacts of alien invasive plants may also be changing. Firstly, most legislation relating to the importation and release of exotic biological control agents only considers risks not benefits, being largely based on International Plant Protection Convention import risk assessment protocols. Where governments accept the importation and release of biological control agents, this is because of an implicit but not legislative government acceptance of the potential benefits. This allows for a rapid change in attitude in a society that is becoming increasingly risk averse. The rapid decline in recent biological control agent release permit approvals in the USA may be testament to this. Scientific evidence for non-target direct and indirect impacts following the introduction of ineffective agents helps change the risk perception against biological control. Certain scientific and community groups also consider certain elements of an alien flora are beneficial, where, for example they provide habitats or an ecosystem service not provided by the indigenous flora (e.g. forests on islands). These arguments are backed up with the lack of evidence that exotic plants cause extinctions.

Biological control can also be accused of being “an old science paradigm” by science agencies wishing to invest in new state of the art approaches. Biological control can be viewed as a “service from science” discipline and as such should be fully funded by stakeholders. This can lead to declining public investment in infrastructure and programs as public good science. Biological control is also not practiced yet in the context of climate change, in the way other types of natural resource management (NRM) are (e.g. carbon storage). Both target selection and the likely ongoing benefits from successful biological control may change, if future climates are considered in the decision making. Classical biological control won't be considered as “leading edge” if it fails to adopt new techniques and approaches and consider drivers of global change.

Hawaii was a perfect place to hold a workshop to debate the external perceptions of the discipline. Alien species dominate the biota on these islands and generate new ecosystems and services not
present before their arrival. Many of them are valued for this and are used as food sources by the Hawaiian community. In Hawaii the benefits and risks of biological control have always been strongly debated as there have been contentious historical programs against snails and insect pests. Furthermore, recent proposed releases of biological control agents in Hawaii against strawberry guava (*Psidium cattleianum* Sabine) have raised perhaps the highest level of public contention around any biological control program in recent years, with local opposition on one Hawaiian island having attracted some political support, while other islands in the archipelago remain supportive. Debate at the workshop was encouraged around some proposed options for the future for the biological control scientific community:

**Focus on the science** – as long as the science is of the highest calibre leading to maximised successful weed control, the community will see and accept the benefits and future funding will flow.

**Become our own lobbyists** – In the policy arena, abandon an independent scientist or “trusted advisor” role and actively stimulate debate around the benefits of biological control.

**Engage the community** – Enable communities to take ownership of, and advocate for programs by building and supporting local knowledge about the impacts of weeds and the benefits of biological control.

**Change our science** – continuously seek to apply modern scientific approaches (e.g., genetics, genomics, and bioinformatics) and considerations, like climate change, to the discipline.

It will be a fine line for scientists to present the scientific evidence of the benefits of their discipline without slipping into an advocacy role.

**Panel member comments**

**Simon Fowler** (Landcare Research, NZ): Despite some countries showing reduced commitment, New Zealand is in the golden age for weed biological control. Stakeholder and government support of the projects is the highest it has ever been as is the number of programs showing signs of success. There is sufficient funding for the science to develop in a number of new ways that are allowing many ecological questions to be addressed about risk assessment, release strategies, impacts of targets and biodiversity benefits of successful control. Evaluation is also underway for a number of projects and has considered non-target impact assessment. New Zealand also has a highly efficient regulatory process in place for assessing and approving biological control agents for release and so the times between permit submission and approval and the rate of agent approval is faster than in other countries. With regards to the effects of climate change, a recent assessment suggests such impacts on future target status and the ongoing success of existing projects appears likely to be unaffected as changes to the New Zealand climate are not expected to be high relative to other regions.

**Martin Hill** (Rhodes University, South Africa): South Africa too is bucking any apparent trend in skepticism around classical biological control. The Working for Water Programme and the value the leaders of this put in biological control as a cheap and effective approach to long-term weed management in South Africa is inspirational. This provides the ongoing support and development of the discipline in South Africa. While biological control still competes with other NRM activities for funding it holds its own and attracts its justifiable share. Universities and the Plant Protection Research Institute work in effective collaborations across a number of programs and are as good as ever in terms of delivery of agents and research outputs. The regulatory arrangements for obtaining release permits in South Africa are also not prohibitive at this stage. The regulations are under review at the moment and this affords the South Africa biological control fraternity to have significant inputs. The challenge for South Africa weed biological control is the effective implementation and post-release evaluation that shows the environmental benefits of the science.

**Keith Warner** (Santa Clara University, USA): Recent issues have arisen in Hawaii around a critical reaction by an individual with a capacity to influence debate to the proposed biological control of strawberry guava. This reflects diverging
perspectives between the practitioners and advocates of biological control and the community at large. If, as a result of such high profile opposition, members of the public become more suspicious of biological control, it risks becoming orphaned as a discipline from other NRM strategies and, as such, losing its public licence to operate in some regions. The budget investment by biological control in public engagement and communication is insignificant relative to its importance to the success of the practice. Public engagement and communication will be important in the US, as in other countries, in the long-term. Programs and their stakeholders need to identify and develop public figures in the community as champions and advocates and be prepared to engage in public debate about both the risks and the benefits of this management approach.

Peter McEvoy (Oregon State University, USA): Biological control programs need to target greater interactions with university scientists to sustain the ongoing science rigour of the discipline to make sure the science outputs are of the highest quality, addressing contemporary science priorities and understanding. University collaborators have the freedom, through funding more targeted to addressing fundamental research questions, to more comprehensively address the mechanistic underpinning of successful and unsuccessful biological control systems. Universities keep the ideas flowing and can test non-target direct and indirect and community level impacts and benefits. Universities, and the generations of young scientists they cultivate, provide the knowledge market that will keep the practice of classical biological control as not only a successful tool for managing weeds, but a recognised manipulative approach to push forward ecological understanding about biological invasions, species interactions and evolutionary processes. Furthermore biological control of weeds, arthropods, and other organisms should be more closely allied, because when disciplines become isolated they are less likely to be successful.

Workshop discussion

The proposed issue for discussion that biological control is potentially “losing its way” as a public supported cutting-edge science discipline, appeared overly pessimistic to the participants based on the response of panel members. Clearly New Zealand and South Africa have ‘never had it so good’ even if resources or public support for classical biological control are more in abeyance in countries like Australia and the USA. However, it was acknowledged that complacency, and lack of focus on the needs of both the scientific and the wider community could put continuation of that public support at risk. The broader discussion at the workshop addressed the following issues.

Biological control and broader NRM activities. It was suggested that biological control has been poor at integrating its activities into broader NRM efforts and so has failed to gain broad recognition by the wider NRM community. This has become much more significant now biological control is focussed on environmental weeds where the NRM impacts are broader and more complex. For example, purple loosestrife control in the USA was successful, but failed to clearly define a NRM aim beyond weed reduction. There was no clear native community that it had displaced in many areas, and the effects of the changes in loosestrife densities (and increased control agent abundance) on other aspects of the community (e.g. water plants) remains poorly explored. The necessity to more effectively integrate biological control into broader NRM strategies stems from it targeting only one species when many sites suffer from multi-species invasions. Nonetheless the program had been of value for educating the community about biological control (school agent rearing programs), and understanding also has increased around the threats posed by invasive plants.

Community engagement. There was recognition amongst the Hawaiian delegates at the workshop that community acceptance of biological control for recent activities had been assumed, based on historical perceptions, and that the response around the strawberry guava biological control program had been completely unexpected in scale and intensity. This has necessitated a “road show” to try and expose the issues to a wider sector of the community. Future programs will need to be more proactive in investing in public discussions and engagement before programs are initiated and use
historical successes and the benefits obtained from them to attract champions and present convincing arguments. Past successful programs are quickly forgotten in the public psyche. This was particularly true in a state, like Hawaii, where the majority of the biota is exotic and the indigenous community has learnt to adopt and use exotic organisms for the benefit of their community and culture.

Declining relevance of classical biological control of weeds. One of the reasons for the decline of funding for weed biological control in some countries (e.g. Australia), has been that the agencies now responsible for allocating government investments are not agencies that have traditionally managed or understood the historical benefits from, and the need for, sustained investment in weed biological control. As such, weed biological control project proposals, are perhaps judged against less relevant criteria. As funding cycles drop to less than three years, this presents a tighter timeframe for projects to deliver outcomes. Expensive ongoing biological control programs are assessed against a broader array of novel ideas that target a shorter time frame for delivery. It behoves the weed biological control scientific community to work with stakeholder groups to champion the sustainable support of biological control programs. In other jurisdictions (e.g. the USA) problems relate less to investment and more to complex regulatory processes. Decision making for biological control agent releases can become the responsibility of single individuals, who make judgements based on not just the advice of an independent advisory panel, but also their individual perceived levels of risk aversion. A lack of a collective approach leads to less objective decision making and fewer release permits. Again the solution is greater engagement between stakeholders, the public and the regulators to define the value proposition through understanding the likely benefits relative to the risks.

Conclusions

As is often the case, support for biological control projects waxes and wanes and does so quite independently between countries. At the moment some countries are in the trough while others are at the crest. These positions will change in both directions. Certainly in terms of weed control success, biological control of weeds programs are now probably more successful historically (proportion of targets controlled) than they have ever been, so the benefit arguments for sustained funding should be easy to generate. But the world is changing and along with it societal values. The biological control fraternity cannot lock themselves away and assume that attitudes to their work will remain unchanged. In this workshop the issues around the acceptability and support levels for weed biological control were explored and it was certainly widely recognised that investment in public engagement around the discipline, and continually finding ways to ensure the public are supportive, will forever be as critical to its survival as the need to ensure that this science too is the best it can be.
Workshop report:
The Nagoya Protocol on Access to Genetic Resources under the Convention on Biological Diversity

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The Convention on Biological Diversity (CBD)'s access and benefit sharing (ABS) protocol was agreed at the tenth Conference of Parties to the CBD at Nagoya, Japan, in October 2010, and is now known as the Nagoya Protocol (UN 2010). The Nagoya Protocol is an agreement between the countries of the CBD as to how access and benefit sharing of genetic resources (including all biological control agents or BCAs) will be handled in future. Put at its simplest, the protocol provides a framework for the country receiving the genetic resources being required to pay forms of 'royalties' to the exporting country, for example, as a proportion of the financial benefits gained. However, Article 8 'Special Considerations' of the Nagoya Protocol also states:

In the development and implementation of its access and benefit-sharing legislation or regulatory requirements, each Party shall:

(a) Create conditions to promote and encourage research which contributes to the conservation and sustainable use of biological diversity, particularly in developing countries, including through simplified measures on access for non-commercial research purposes, taking into account the need to address a change of intent for such research;

(b) Pay due regard to cases of present or imminent emergencies that threaten or damage human, animal or plant health, as determined nationally or internationally. Parties may take into consideration the need for expeditious access to genetic resources and expeditious fair and equitable sharing of benefits arising out of the use of such genetic resources, including access to affordable treatments by those in need, especially in developing countries;

(c) Consider the importance of genetic resources for food and agriculture and their special role for food security.

Based on the protocol, each country will prepare its own legislation and regulations. If it is accepted that biological control is non-commercial research, simplified measures for access and benefit sharing should facilitate biological control research. Furthermore, the use of biological control to address emergencies and the needs of food and agriculture should also be facilitated.

However, in practice, a lot will depend on the actual national legislation and regulations put in place by each country, and there is still a risk that biological control is not considered in this process. Some countries may see this as an opportunity to receive substantial payments for biological control agents, while others may inadvertently make it unnecessarily difficult or impossible to access biological control agents. The biological control community in each country has been encouraged to make its inputs into the national legislation and regulation process to encourage the facilitation of biological control along with other non-commercial research activities, e.g., relating to taxonomy, ecology and conservation (Cock et al., 2010; van Lenteren et al., 2011).

Nevertheless, we have already heard of delays of up to four years trying to get permits issued for export of BCAs, while the whole biological control process seems to be indefinitely blocked in some South American countries. What can we do about this and how can we manage this issue?

This workshop was attended by only a few people, mostly from New Zealand and Australia although there were attendees from Chile, Argentina, Hawaii and North America. Questions and comments were made during the workshop about: why is there...
a problem, how can we avoid any problems in the future, who has a problem now, what is the reasoning behind ABS? It was stated by more than one attendee that so far no country had refused to issue a permit to collect or export indigenous species. The process for applying and receiving these permits had taken years, in some cases, but a permit had still eventually been issued by the exporting country. Currently agreements and permits with South American countries to collect and export genetic resources as potential biological control agents have been particularly difficult to obtain.

Australia is calling for national comment on the protocol (presumably they have not yet ratified it). It apparently comes into force after 50 countries ratify it and this is expected in 2012. Possibly other countries are also calling for comment and this may be one forum to get any concerns raised. See http://www.environment.gov.au/biodiversity/science/access/biological-diversity.html

The NZ government is not planning to ratify at the moment until some issues are clarified. See http://www.mfat.govt.nz/Foreign-Relations/1-Global-Issues/Environment/7-Species-Conservation/geneticres.php

The Nagoya protocol has the potential to make the present situation worse when it comes into force. The access and benefit sharing scheme will pose major problems for us all if it does not take into consideration the non-commercial beneficial role of biological control in environmental and agricultural systems. It was agreed at the workshop to seek further information from our own countries about the protocol. Secondly we agreed to send out a survey to conference delegates seeking information from them. This was aimed to give us an idea of how many of us know about the protocols and how many of us are affected by them.

Thus, a link to a 12 question anonymous survey was sent out via Surveymonkey.com to all 204 delegates of the conference and 56 responses were received from people representing 12 countries. Of those who responded almost 60% were unaware of the Nagoya Protocol. Of the remainder, when asked what they thought the impact would be on biocontrol, all believed it to be negative through delay or regulatory controls whilst a quarter mentioned the financial compensation aspect.

When asked if they were worried about the possible impacts, 47% of respondents were worried and 49% didn't know, but 45% had experienced delays or refusals to make biocontrol agents available on ABS grounds, most often citing trouble with securing survey/collection permits. Seventeen countries were listed as having been difficult to gain access and exporting from, with Argentina dominating (Table 1).

Around a quarter of respondents said that ABS issues had prevented them from starting or continuing biocontrol projects and 32% said that ABS issues would influence their choice of biocontrol project and/or survey country in the future. A further 62% responded that ABS issues may influence their choice.

Regarding the respondees’ understanding of their host country’s regulations for import and export of BCAs the results to the three questions are summarised below in Table 2. It is interesting to note that with all questions some representatives from the same country contradicted their colleagues so there is a lack of understanding even amongst experts.

When asked about financial recompense 38% said that they thought their countries would pay a share of the anticipated benefits in order to have access to a BCA but when asked whether their country would support shared scientific activities with a BCA source country, this figure rose to 92%.

There were plenty of suggestions about how to overcome any ABS issues, by far the most common was the importance of engaging local co-operators who operate at the appropriate level. Other suggestions included:

- Ensure free flowing communication
- Attempt to get higher level support for negotiations
- Make it worthwhile for the country involved
- Make it clear there are no profits to be made
- Reciprocal cooperation should be encouraged
- Establish treaties to facilitate mutual sharing
- Always go by the book

In conclusion, there are still many involved in weed biological control who are not aware of the
issues, but most anticipate that the export of BCAs will get more difficult. The experiences generated at the workshop were often of long term and sustained frustration at what were seen as unclear, ever changing but unavoidable obstacles. However, in some cases it seemed that the fault lay with the bureaucracy rather than the regulations or interpretation of the CBD. It would also seem that countries may be more willing to provide payments in kind through supporting collaborators’ research, training and equipment purchase than any pro-rata payment based on savings through biocontrol successes.

It is clear that biocontrol researchers have a challenge ahead as countries get to grips with the Nagoya protocol and its eventual application to classical biocontrol agents. It can only be hoped that common sense prevails and their use against environmental weeds, for which no direct profit is generated, is not hindered by the application of an instrument that was clearly not designed to prevent such mutually beneficial sharing of biodiversity.

References


Table 1. Countries survey respondees listed as difficult to access, or to export from

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of times cited</th>
</tr>
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<tbody>
<tr>
<td>Argentina</td>
<td>16</td>
</tr>
<tr>
<td>India</td>
<td>5</td>
</tr>
<tr>
<td>Brazil</td>
<td>9</td>
</tr>
<tr>
<td>Spain, Nepal</td>
<td>2</td>
</tr>
<tr>
<td>Canada, Madagascar, Cuba, Ecuador, Kenya, China (concern), Mexico, Thailand, Morocco, Algeria, Libya</td>
<td>1</td>
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Table 2. Summary of responses - host country’s regulations for import and export of BCAs.

<table>
<thead>
<tr>
<th>Is there any legislation or guidelines in your country regarding:</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>The importation and release of BCAs (excluding phytosanitary rules)?</td>
<td>92.0% (all 12 countries)</td>
<td>0.0% (0)</td>
<td>8.0% (4 countries)</td>
<td>50</td>
</tr>
<tr>
<td>The export of BCAs from your country?</td>
<td>36.0% (4 countries)</td>
<td>30.0% (7 countries)</td>
<td>34.0% (6 countries)</td>
<td>50</td>
</tr>
<tr>
<td>Imported BCAs meeting ABS requirements of the source country?</td>
<td>26.0% (7 countries)</td>
<td>8.0% (3 countries)</td>
<td>66.0% (9 countries)</td>
<td>50</td>
</tr>
</tbody>
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Workshop Report: Wild Gingers (*Hedychium* spp.)

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The *Hedychium* J. Koenig spp. workshop, chaired by Djami Djeddour from CABI-UK, aimed to update interested parties on the biocontrol research carried out on these weed targets to date and highlight opportunities to grow the current consortium ahead of the presentation on the topic.

The three most invasive species, *H. gardnerianum* Shepard ex Ker Gawl. (Kahila garland-lily or Kahili ginger), *H. flavescens* Carey ex Roscoe (awapuhi melemele; yellow ginger or cream garland-lily) and *H. coronarium* J. Koenig (awapuhi-ke‘oke‘o; gingerlily; white ginger; white garland-lily or butterfly ginger) have been the focus of an ongoing biocontrol initiative since 2008. Working in collaboration with national Indian institutes, permission to export natural enemies from the country of origin (East Indian Himalayas) were only acquired at the end of 2010 after a protracted bureaucratic process. A number of highly promising insect and pathogenic agents, including a highly specific stem mining fly (*Merochlorops dimorphus* Cherian) and a *Puccinia* rust, both on *H. gardnerianum*, have been identified and rearing studies/host range testing has been underway in the UK with a number of species for the current sponsorship consortium, The Nature Conservancy, Hawaii and Landcare Research, New Zealand.

The workshop was also intended to investigate ways in which the project could be tailored to meet the needs of other stakeholders, since the project has been run on minimal funds year to year. Whilst great potential has been identified, it is recognised that in order to progress the research, a greater financial investment needs to be made. *Hedychium gardnerianum* is a major threat to many subtropical forest regions of the world e.g. in South Africa, the Macaronesian Archipelagos (Azores, Madeira and Canary Islands) where it threatens endemic “Laurisilva” forests, La Réunion and Australia. In Hawaii, large areas of native rainforests are invaded and *H. gardnerianum*’s common name, Kahili ginger, named for the flower’s resemblance to the Royal feathered standards, exacerbates the mistaken perception that this is a beautiful, harmless, culturally entrenched Hawaiian plant.

Identifying potential opportunities to grow the consortium was at the heart of discussions and representatives from Hawaii’s Department of Land and Natural Resources, The Nature conservancy, Pacific Cooperative Studies Unit Coordinating Group on Alien Pest Species and Department of Agriculture as well as scientists from Landcare Research New Zealand and Agricultural Research Council in South Africa (PPRI) attended to provide their insight into the spread of the weeds, public perceptions of the problem and offer advice on likely test plant list requirements, particularly in the light of possible conflicts of interest a biological release may face from the public and horticultural trade in Hawaii. The general consensus was that in areas of dense monocultures, chemical and mechanical control are neither feasible nor environmentally sound and that in Hawaii management is largely confined to outlier populations to try to prevent further recruitment and spread. It was agreed that public awareness campaigns and highlighting the negative impacts that these plants have on all the Hawaiian Islands should be a concerted mission and pre-emptive strategy to any biocontrol release. Details of the project have been forwarded to all those in attendance to take forward to potential sponsors.

Please contact d.djeddour@cabi.org if you would like any more information on the project and/or are interested in becoming a partner or funder.
Workshop Report:  
Best Management Practices for Communication of Weed Biological Control  

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Introduction  

As we move into the 21\textsuperscript{st} century, biocontrol as a science faces an evolving social landscape. Previously, biocontrol was regulated very little if at all. Biocontrol was lumped with introductions of other organisms, typically vertebrates (mongoose, cane toads, weasels, stoats, etc.) that were not well thought out and often times the work of individuals or small groups without government oversight or regulation. This is no longer the case. Biocontrol as a science is more stringently regulated. Coupled with the digital media increasing the flow of information and awareness, the landscape has changed in which biocontrol practitioners must operate. Environmental awareness within societies, government mistrust, distrust of scientists, and scientists themselves further confound the process of taking a scientific project from the lab to the field. Effective communication strategies are necessary to move the science of weed biocontrol forward. Scientists from 5 continents presented their strategies to engage the public and various stakeholders. A few common themes emerged in the course of the discussion: target audience appropriate messaging with appropriate messengers to deliver the message; pragmatic re-branding of weed targets and even the science of biocontrol to improve shareholder acceptance; early and frequent engagement of shareholders; training of messengers to more ensure more effective communication skills by scientists to shareholder groups or other messengers; and careful use of language to move away from militaristic or aggressive language that can be off-putting to shareholders. This information can be distilled into the following recommendations for an effective communication plan.
The Target

The first step in an effective communication plan is to identify the right target species for control. “Right” can depend on many factors including, but not limited to, the likelihood of success, shareholder buy-in and acceptance (which could also translate into short or long-term funding of the project), the availability (or lack thereof) of other control methodologies, and the long-term potential for damage by the target. The target selection process should include some form of shareholder engagement. Shareholder engagement during the planning phases leads to cooperation based on mutual interest. This is the ideal situation from which to work on. Communication early and often is key to long-term project success and if possible should be considered before a project is even launched.

Communication Team and Strategy

Once a target is selected, an inter-disciplinary team should conduct an evaluation of the biological and socio-political issues surrounding the target and, once an agent(s) is selected, the agent itself. The team should include not only scientists, but also outreach and communication specialists to develop a cohesive communications strategy. The strategy should be viewed in part as marketing: the team is selling to shareholders what they need, something they do not already have, creating or increasing the awareness that a problem exists, and presenting solutions to the problem. A key element in defining the strategy is management of expectations—defining what “success” means and how that “success” will be measured. The public cannot be left with the perception that biocontrol will be a silver bullet. Instead, the public must leave with the idea that biocontrol is a tool for long-term, self-sustaining form of control against the target pest.

It is critical for scientists, as part of this program, to be media trained and prepared for speaking about their project. Although communication experts and outreach specialists should handle much of the communication, researchers have an essential role in the communication strategy.

Media training helps to mitigate communication issues typical of scientists. When scientists speak to the public, they need to communicate with different terms than they use with their scientific peers. When non-experts here terms such as “likelihood,” “possibility,” “relatively,” and “remote,” they infer that scientists are not confident in their own work or are unwilling to take definitive stands in support of their work. When speaking to the public scientists need to keep in mind the audience, i.e. what is appropriate in a scientific presentation is not appropriate for public engagement. This means simple and direct communication that relies heavily on images to drive the message home. Photos that compare before and after effects or the success of control projects are highly effective. Graphs and statistics are ineffective. Media training is essential help scientists address these common communication issues.

How scientists engage the public is also key. Media tends to “dull” everything and therefore speaking dramatically and enthusiastically increases the effectiveness in communicating a message. Humor not only entertains the audience but also adds a human side to the project. As a cautionary note, the media is always looking for a story and as a consequence is always looking for ways to put spins on stories. It behooves the scientist to be aware of what is happening around them—or to have a media specialist present that can manage the situation and if necessary mitigate any damage done.

Appropriate messengers must be determined for different target audiences. The adage “don’t shoot the messenger” can, in this context, be re-phrased to “pick the wrong messenger and the messenger will shoot himself.” A messenger needs to be able to speak “the language” of the target audience. The approach of one person for all audiences will not work. A team must be defined as a part of the communication strategy to include high impact messengers that will resonate with different target audiences. The scientist must ensure these messengers understand the issues and see the need for the product. Trust must be built between scientist and messenger. If trust does not exist, the team will collapse and by extension so will the communication strategy.

It may be prudent as a part of the communication strategy to do some “rebranding.” Rebranding could include changing the name of the target. In Hawaii many weeds have been given Hawaiian derived or Hawaiian sounding names such as waiwi or waiawi (Psidium cattleianum Sabine), kahili ginger...
(Hedychium gardnerianum Sheppard) and maile pilau (Paederia foetida L.). These names create a socio-acceptance issue for control of the target species — an instinctive reaction can be anticipated because the naturalized weed targeted has become associated with the culture or the environment. Substituting skunk vine for maile pilau, for instance could work to good effect. In Brazil, rubber vine (Cryptostegia grandiflora R. Br.) is the target for the first classical weed biocontrol project in the country. It has been rebranded as “Devil’s Claw”. This rebranding is based on both the sociological demographics of Brazil and biological tendencies of rubber vine to grow over things, in this case tombstones. Re-branding should be well thought out as a case study of miconia in Tahiti highlights. Miconia was given the name “the green cancer” which was effective on one level but almost too effective as people became afraid of handling miconia for fear they might catch cancer themselves. The rebranding of biocontrol itself might also be considered. The words “control” and “agents” can strike a sinister tone and past associations with biocontrol, no matter how erroneous, can kill a project before it gets off the ground.

Roadblocks to Communication

There are typical roadblocks to secure shareholder support for weed biocontrol that any communication strategy should be prepared to address. These include: vertebrate introductions as examples of biocontrol, discomfort with the deliberate introduction of an alien species, and what happens when the introduced biocontrol agent eliminates the target species. Many of these communication roadblocks are best addressed not by scientists but by other messengers of the communication team. Furthermore, communication to address these misconceptions and public apprehension should be conducted on a consistent, sustained basis irrespective of the target weed or the proposed biocontrol agent.

Biocontrol has become synonymous with the release of vertebrates such as mongoose, cane toads, weasels and stoats. It does not matter to the public that individuals or special interest groups introduced these organisms with no regulatory oversight by the government—the perception is still there. In Hawaii, the public school system teaches that the mongoose was released as a biocontrol agent for the control of rodents. The logic of biocontrol is called into question as the target (rats) is nocturnal and the control agent (mongoose) is diurnal. To further compound the issue, the mongoose in Hawaii is a predator of bird eggs and is attributed to impacting native bird populations. In effect, the Hawaiian education system perpetuates the idea that biocontrol is bad. While the story of the mongoose’s impact on Hawaii is true, it’s introduction was not part of an organized biocontrol program but that of an individual. Countering these misconceptions requires consistent messaging that those “releases” were not part of a biological control program. It should, however, be assumed that attempts to dispel these myths and misconceptions will remain a constant battle with the public.

The concept of the releasing of a species to control another, i.e. releasing an alien species to control an alien/invasive species, presents a mental sticking point with some shareholder groups. Consistent messaging is needed for such issues and again highlights the need for early engagement with shareholder groups before a project even begins. Addressing this issue should focus on value: what would be lost by the target if action is not taken; the safety and long term sustainability of biocontrol; and the track record of weed biocontrol programs. This discomfort is linked in part with misconceptions of what biocontrol is. There may also be some latent cultural sensitivity on the part of introduction of an alien species as indigenous peoples have been displaced by foreign immigrants and subsequently have been disenfranchised from their own land. If speaking to indigenous peoples, cultural sensitivity over the alien issue is needed and again, appropriate messengers must be utilized as part of the communications strategy.

Probably one of the most difficult questions consistently posed regarding biocontrol can be summed up as: “what happens when X runs out of Y weed you’re trying to control?” Invariably this question is followed up with another equally difficult, if not more difficult question to answer, “will it evolve to attack something else?” It is easy to dismiss these questions as those of an uneducated shareholder base but this is not necessarily the case. The questions and concerns are legitimate and need
Words like “specificity” or “co-evolution” come to mind to address these questions. It is not as simple as that, the question needs to be answered in the context of the target group asking the question and again, the communication strategy must plan ahead for questions such as this.

The Evolution of Communication

As we are thoroughly ensconced in the 21st Century, communication has completed an evolution of sorts. So called “traditional” methods of communication (print media, television and radio) are giving way to digital media consumption and the dissemination of information through social media outlets. Digital and social media has evolved into a powerful tool that is underutilized by communication teams for the biocontrol of weeds. At times faced by agency restraints, scientists are not necessarily in a position to exploit the use of the public’s evolving media consumption base. Meanwhile, these same digital media outlets allow anyone to have a voice and can be effectively used to mobilize people for or against a particular viewpoint to great extent. In light of this, it behooves the communication team to have a digital or social media strategy to promote the program and to engage the public. A well-executed social media campaign can be extremely effective but thus far has been under utilized.

The Language of Communication Strategies

Language in relation to biocontrol has always taken an aggressive slant. Words such as “Control,” “agent,” “defoliator,” all are aggressive and militaristic in nature. It is not unusual to have a phrase such as “a biological control agent to attack the weed reducing it’s capability...” while the statement is accurate, it does not necessarily engender by-in with shareholder groups. Phrasing and metaphors that are in line with healing or restoration are much more effective. A biological control program is not aimed to “attack” a weed but to “restore balance,” “mitigate the effects of,” or “manage the impacts of” a weed. The goal of a program is to “manage” or “conserve” the resources we have, to be “good stewards of the land” or to provide a “legacy” for future generations. Aggressive language creates a greater divide between scientists and the shareholder. Passive or healing language creates bridges and therefore is a more effective communication model to follow.

Conclusions

The science of biological control of weeds has reached a nexus point of sorts. Faced with in some cases more stringent regulations, budgetary constraints and moving projects from in the lab to in the field, communication is a key element each of these dilemmas. Engagement at every level through effective communication strategies can be a project game changer. The strategy must include a team of individuals working early and often with shareholders, scientists trained to work with the media, messengers appropriate to different shareholder groups, preparing for foreseeable obstacles and barriers to obtaining by-in, utilizing digital and social media while integrating language that bridges gaps between groups.

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Scholarly resources to inform biocontrol communication strategies


to Talking with the Media: Practical Advice from the Union of Concerned Scientists. Rutgers University Press, Piscataway, New Jersey.
Workshop Summary:
Biological Control of Fireweed: Past, Present, and Future Directions

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Workshop proposal

Fireweed (common name in Australia and Hawaii) is in the genus Senecio (Asteraceae) from KwaZulu-Natal in South Africa. Two very closely related almost indistinguishable species are serious invasive and toxic weeds affecting livestock in grazing lands; Senecio madagascariensis Poir. is the weed in Australia, Hawaiian Islands, Argentina, Colombia, Brazil, Venezuela, Uruguay, and Japan, while Senecio inaequidens DC. (1837) is the species very widely distributed in Europe. Chemical and mechanical control measures are not effective or economically viable, and in Australia and Hawaii classical biocontrol is thought to be the only long-term solution. The workshop will address the weed status in various countries, review biocontrol efforts, and finding ways to enhance collaboration between researchers.

Workshop summary

This workshop was targeted around the attendance of affected ranchers from Hawaii so they would have an opportunity to understand the state of fireweed biological control in Hawaii and globally. It was attended by ranchers, state pest control officers, scientists from the Hawaiian Department of Agriculture working on fireweed biocontrol, other US biocontrol scientists and International scientists with experience in fireweed management. This included Terry Olckers (University of KwaZulu-Natal) who works on fireweed in its native range in KwaZulu-Natal in South Africa. About 25 people attended.

In the first section of the workshop three ranchers presented the problems that they are having with fireweed on Hawaii. This included the extent of the spread, the difficulties of control and the economic loss to their businesses. They fully supported the development of biological control for fireweed in Hawaii. A lively debate about the fireweed problem in Hawaii ensued.

In the second section Mohsen Ramadan (HDA) presented the state of his research into potential biological control agents for fireweed in Hawaii. This included an overview of where fireweed comes from, a summary of his various exploratory trips to look for fireweed biological control agents and a presentation of all the species of interest he has found to date. He finished by presenting the risk assessment and host specificity testing work he has recently completed on the arctiid moth Secusio extensa (Butler), which has led to an application for release of this agent being submitted to APHIS. The ranchers were very pleased to meet Mohsen and asked him several questions about his work.

The third section was a lively debate about the likelihood of success of biological control of fireweed with many in attendance highly supportive of it as a
target based on past successes against similar weeds. This debate was led by George Markin (retired, ex-USFS) and Rachel McFadyen (retired, ex-DEEDI Australia) as staunch supporters. It finished with some discussion of existing work underway as part of the Australian fireweed biological control program presented by Andy Sheppard and Terry Olckers.

The final section of the workshop considered the process around the approval and release permit application of Secusio extensa in Hawaii. Neil Reimer (HDA) presented where the regulatory process was with APIS and that, while there had been delays, a decision about the release permit was expected soon. Neil and Darcy Oishi (HDA) then led a discussion around how the ranchers might work with HDA and assist in lobbying indirectly USDA should this be necessary if the decision to release be delayed further.