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Biological Control Workgroup Notes

CAL-IPC Symposium

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Following brief introductions, Ray Carruthers opened the session with an overview of some biocontrol issues, and then outlined the purpose to develop an action plan for CAL-IPC as it relates to existing, new or needed biological control projects. Ray asked the group to brainstorm projects of interest and Cal-IPC needs. In an effort to present the material discussed in this workgroup in a usable manner, the following notes are arranged by topic in alphabetical order.

Arundo

- Alan Kirk reported that Arundo biocontrol is in the exploration phase. Current areas being investigated in Asia are in Nepal and India, and in Europe from Turkey to Spain. In Montpellier, France they have found 6-8 organisms that have an effect on Arundo at some point in its life cycle. There is need to look in other areas between India and the Mediterranean (e.g. Iran, Iraq, Pakistan). It is difficult in these areas since Arundo is heavily used by local inhabitants. Labs in Greece and Rome are also looking in other places in the Mediterranean.
- Preliminary observations indicate that what look like large impenetrable stands of Arundo in Asia and Europe, are not. Many dead canes are present in the stands that limit their growth and spread. This may be attributable to four different organisms: a fly, a hymenopteran, a scale insect, and a mite. The mite seems to interact with a fungus to cause other damage and also a fly may interact with the fungus as well. There is need for taxonomists to work on identifying these organisms to the species level, as well as a geneticist to determine the genetics of different Arundo populations. Alan Kirk stated that based on preliminary observation there is a good chance that decrease in size of stands and spread of Arundo can be achieved. He added that it is unlikely that biocontrol alone will be able to eradicate Arundo, but it may work in conjunction with other methods, through a general decline in the competitive nature of the Arundo.
- Tim Widmer reported that his lab is looking for agents that specifically attack 1) the Rhizome (would be the best but not found yet) 2) the growing point (an agent has been found) and 3) the leaves (an agent has been found). There is need to look in North Africa and the Middle East for more possible agents, as well as further study into a rust found in China and Japan. A rust fungus found on Phragmites spp. could be a possibility, but Tim did not know the details. The fungus associated with mites or a fly needs to be studied further as does the fungus associated with a hymenopteran carrier. Tim also noted that there is a nematode known to attach the banana rhizome but has been not studied in Arundo. Alan Kirk added that there is a subterranean aphid that may work on the Arundo rhizome, but safety may be an issue.

Cape Ivy

- Ray Carruthers reported that the Albany, CA and South Africa labs are working on this project. Exploration over the past five years has revealed two prospective biocontrol agents: 1) a Tephridid fly that attacks the growing point, creates a gall and results in decreased growth, and 2) a Lepidopteran that bores into the stem causing stem mortality beyond the

boring point. Lab studies indicate that these agents may be effective. Some challenges of doing large-scale studies overseas is that natural predators of the agent are present. This next year, ARS hopes that these agents will be ready to go to the TAG for approval. The main concern with Cape Ivy is its movement inland.

Funding for European labs and other biocontrol research

- Walt Decker asked about the limitation of the European labs, and if there is a need for more coordination between research and other interests in biocontrol. Ray Carruthers replied that these issues have been discussed for years. The primary factor is funding for the European labs. Because they have no congressional representation and that foreign currency exchange rates fluctuate, they are primarily funded by special interests. These labs have good facilities but tend to be understaffed especially with regard to technical support. All research done in these labs are linked to US applications, not just in California, but in all states.
- In terms of the flow of funds from US interests to the European Labs, the general consensus was that the current system is working. Ray Carruthers pointed out that while the USDA is unable to allocate funds directly overseas, they can be involved with directing other funds raised by individual interests into overseas research efforts. Alan Kirk mentioned the success of the whitefly biocontrol project was instrumental in getting a biocontrol program in the US, and was an example of coordination between domestic and overseas labs. He noted that in this case, as involvement in a project increased, so did funding. His concern is that too many projects dilute funding. He suggests that focusing efforts on the completion of fewer projects would be a better way to use limited resources.
- Jim Johnson asked about the state of funding for biocontrol in general. Group members felt that there is a need for interested parties to keep pressure on the Feds to maintain and increase funding. Currently, some projects are being cut while others are seeing increased funding. This is a function of funding coming from add-on legislation supported by sympathetic legislators. It was further explained that the funding for USDA labs abroad get support from the USDA, but do not have the same level of legislator support as domestic labs. Ray encouraged anyone to visit both foreign and domestic ARS labs and report back to their agencies to gain additional domestic support for the programs at these sites.
- Ray Carruthers commented on the importance of organizations such as Cal-IPC and others in their efforts to keep biocontrol research going on. Even though specific projects may be resource-limited, the overall direction of biocontrol research is ready to boom. Many successful projects are currently underway and others may soon follow as interest in invasive weed species is at an all time high.
- Ray Carruthers mentioned that a new facility at UC Davis is being constructed that will be able to house researchers needing plant pathogen quarantine facilities and entomological labs. He estimates the cost for using the facility will be approximately \$20,000 per year.

Red Sesbania (*Sesbania punicea*)

- Tom Dudley reported that agents from Argentina have been successful in S. Africa in controlling red sesbania. He asked if we could use the South Africa experience and data to

address US infestations. Ray Carruthers replied that success abroad supports efficacy but and safety but does not directly ensure it in domestic systems. Currently the fastest agents can be ready to release is about four years. Part of this process is conducting extensive safety studies and having them reviewed by the APHIS Technology Advisory Group (TAG) prior to being able to release the agent. Except for extreme cases, we need to do this research domestically since safety is a very key issues in making biological control releases. Due to lack of political support, the USDA does not have the authority to take on a red sesbania project at this time.

Tamarix

- Dawn Rafferty asked how many times Tamarix needs to be defoliated before it dies. Ray Carruthers responds that in cage studies, 2-3 years of defoliation was effective. In natural environments it is unclear due to movement of the beetle populations, and the possibility of incomplete defoliation in one or more years. Field studies are projected to help provide this information in 2004.
- Tom Dudley stated that he has observed the first generation of the agent skipping the target completely, but coming back to defoliate it later in the season. When asked if day length or predation was more likely the cause of this, Tom answered that thought that day-length was a better possibility. He further stated that other species may be better suited to target latitudes. Tom also stated that there is no issue of Willow Flycatcher habitat impact north of 38° Latitude.
- Caroline Cox asked if water regime control is necessary in conjunction with biocontrol. Ray responded that in some areas, such as Arizona, this is probably true. Other areas, however, can be revegetated without hydrological concerns. Ken Lair commented that in the South Western US, hydrology is a big deal and must be addressed in conjunction with any restoration plan. For example, on the in Las Cruces along the river, old levees had been breached to increase Willow Flycatcher habitat. Willows have become established in the channel as a result of this, and provides very good habitat at low water levels. However, the Bureau of Reclamation is concerned that when water levels rise, this new habitat will be impacted and mitigation will be necessary. As a result, these willows may be removed to prevent the need for mitigation.
- Ken Lair also stated that due to deep channel incision in areas with high Tamarix infestation, restoration to cottonwood and willows would be difficult for hydrologic reasons. Ray commented that for these reasons, agencies need to work together to address all aspects of a control/restoration project
- Larry Klaasen asked if the *Diorhabda* beetle will effect the Athel tree (*Tamarix aphylla*). Tom Dudley responded that *Diorhabda* will feed on it a little. Further there is evidence that *T. aphylla* and *T. ramosissima*. hybridization may affect its susceptibility to *Diorhabda*. Ray added that the process is designed to accept minimal Athel damage below a population control level. In some areas this is not acceptable like in northern Mexico. In these cases other agents are being studied. Results are expected within the next year.
- Ray stated that the original *Diorhabda* beetles are from China at a latitude similar to Wyoming. Now there are a total of seven strains that are adapted to lower latitudes. The main challenge for this agent is the synchronicity of the beetle life cycle with the target (a

diapause problem). Using *Diorhabda* beetles from Crete, over-wintering has been successful for populations in southern Texas. Again safety of the agent is of utmost importance and tests are proceeding to ensure that all strains used in the field have a combination of laboratory and field host specificity testing complete before open field releases are conducted.

Whitetop (*Lepidium spp.* / *Cardaria spp.*)

- Alan Kirk reported that there is a post-doc in Europe looking for organisms near Montpellier. A concern with this effort is that field observations are not consistent with the range of *Lepidium* described on available distribution maps. This discrepancy gives rise to the questions: Has *Lepidium* been controlled out of these habitats? Has some sort of environmental change caused change in the distribution of *Lepidium*
- Other work is being done to study a weevil (*Pseudorhynchus spp.*) that attacks the roots of *Cardaria*, and produces root galls. Cabbage and other Cruciferids do not seem to be affected.
- Tim Widmer pointed out the name change of *Cardaria draba* to *Lepidium draba*.
- Alan Kirk also noted that the Diamond-backed moth (*Plutella spp.*) might be effective; however safety is an issue since it is also an agricultural pest. A possible approach maybe to utilize a parasitoid to kill the agent prior to reaching the agricultural pest life stage. This was done with a biocontrol agent targeting kudzu.
- Ray Carruthers added that there are studies underway in the US and Australia investigating the genetics of similar agents. The similarity of some of these agents with native species is a complicating factor. The ultimate goal is to develop safe and effective agents with minimal non-target effects.
- Ken Lair asked about the issue of the increased occurrence of *Lepidium* in Owens Valley, CA after herbicide treatment of Tamarix. In response, Alan Kirk stated that there is an issue of too many targets, and proposed that by focusing on one target species at a time, we will get the work done better than trying to do too many projects at the same time.

Yellow Star Thistle

Marc Lee asked about our ability to assess dispersal and effect after release of the Yellow Star Thistle biocontrol agents. Ray responded that in hindsight, more could have been done in the original study/process to give us an idea of how we could do this. The synchronicity problem might be addressed by adding growth factors such as nitrogen to the target weeds in border areas to change their bolting time, or by developing a new agent with better synchronicity. This might allow population bottlenecks to be eliminated so that the natural enemy populations could be more effective later in the season. The current process of approving agents for release is more comprehensive and provides better data than that which was used for the Yellow Star Thistle agent. New agents are being studied.

Cal-IPC action items that resulted from this work group were:

1. Consider initiating a new Cal IPC Working group on Arundo biocontrol with the goal of gaining increased funding for foreign exploration at the European Biological Control Lab.
2. Continue high support for the International Broom Initiative to ensure that adequate funding is obtained for CSIRO, ARS and associated labs in California, Oregon and Nevada.
3. A potential disease of Ailanthus was observed in coastal California and ARS agreed to visit these sites in the spring and attempt to obtain isolates of any pathogen material that might be present.
4. Continue supporting Cape Ivy Biocontrol and speed any TAG petitions into the regulatory process.
5. Encourage the ARS European biological Control Lab to continue Lepidium spp. biocontrol investigations and to continue cooperation with ARS Reno in conducting genetic assessments of both native and introduced Lepidium spp.
6. Consider castor bean biocontrol in the future.

Notes prepared by Joel Buettner, Cache Creek Conservancy