

HOARY CRESS BIOLOGICAL CONTROL CONSORTIUM

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INFO UPDATE 2

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Dear hoary cress controllers,

We had an excellent start with our efforts to develop a comprehensive biological/integrated control program for hoary cresses in North America. Since our meeting in Coeur d'Alene in March 1) CABI Bioscience and USDA ARS EBCL developed a collaborative agreement on foreign exploration efforts, 2) the Wyoming Biocontrol Steering Committee and the Idaho State Department of Agriculture through the University of Idaho provided \$65,000 for foreign exploration efforts at the CABI Bioscience Centre, 3) CABI conducted field surveys in 10 countries at more than 100 sites and identified already a number of promising biocontrol agents (all weevils), 4) the University of Idaho received a \$160,000 competitive USDA grant to conduct pre-release studies on combined effects on insect feeding and grass competition on hoary cress suppression, 5) the University of Idaho submitted two additional proposals for pre-release studies to USDA (\$107,000 and \$295,000, respectively), and 6) the University of Idaho continued to develop a 5-year strategic plan.

All elements of the project that are outlined in the strategic plan have been addressed with the exception of the economic analysis of the problems. However, we are currently contacting experts for those studies in the western United States and hope to get them interested in a respective study.

In order to keep our program at this fast pace we have to continue to provide funding for the foreign exploration efforts at CABI Bioscience in Switzerland. Therefore, I would like to ask all off you to consider providing funds for this effort.

REQUEST FOR FUNDING SUPPORT

Staff at CABI Bioscience have already identified four potential biocontrol agents during their first year of research. This is exciting news but it also means that investigations will require more funds in 2002 because they need to start investigations on the biology and host-range of those biocontrol agents.

In 2001, the Wyoming Biocontrol Steering Committee and the Idaho State Department of Agriculture through the University of Idaho provided \$65,000 for their efforts. For 2002 CABI provided a work program and a budget (documents are attached along with this Info Update) for \$102,310. Even if the State Department of Agriculture and the Wyoming Biocontrol Steering Committee should be able to increase their financial support we need your help! Please consider to join the effort and provide financial support for foreign exploration work in 2002.

Any amount, whether it is \$1000 or \$10,000 would be greatly appreciated. You can contact me any time at markschw@uidaho.edu if you need information on whom to contract or where to send money. Whatever requirements administrators in your

institutions or agencies have, we are sure that we can accommodate their contractual requirements.

The more consortium members provide small amounts of funds, the easier it will be for all of us to achieve our goal to get efficient biocontrol agents into the country for the control of hoary cresses! I am looking forward to hearing from you.

CABI BIOSCIENCE WORK IN 2001

Between the beginning of May and the end of June 2001, nearly 100 sites in 10 countries were sampled, i.e. Armenia, Austria, Denmark, France, Germany, Hungary, Rumania, Russia, Switzerland, and Turkey. Whenever possible, a standardized sampling procedure was followed, including 30 random sweep net samples for adult insects, 30 randomly collected plants, 2-3 plants as herbarium material, and leaves of 5-15 plants each for molecular taxonomical studies. In addition, qualitative site characteristics, such as habitat, soil type, and exposure were recorded. Adult insects collected were frozen, pinned, and are currently being sent to taxonomists for identification. Plants collected were measured (shoot height, base diameter) and dissected. Immature stages found during dissection of plants or feeding externally were tried to be reared through to the adult stage and are also being sent for identification. To facilitate processing of the vast amount of data we collected during plant dissections, a database was developed, and data are currently being entered.

Apart from *Cardaria draba*, samples of *L. boissieri*, *Lepidium propinquum*, and one from *L. latifolium* were taken in Armenia. The majority of adult insects collected were flea beetles (e.g. *Phyllotreta* spp.) and weevils (e.g. *Ceutorhynchus*). Plants at most sites showed signs of external and/or internal herbivore damage, and all plant parts (roots, shoots, leaves, flowers, seeds) were attacked. The majority of larvae mining internally were found in the shoots and in root galls. All species that have been reared through so far are Curculionidae. A complete list will be provided in the Annual Report. Insect species that were reared from *C. draba* with potential as biological control agents due to records of their restricted host range include the shoot-mining weevil *Ceutorhynchus merkli*, and the seed-feeder *C. turbatus*. We also reared the root gall forming weevil *Ceutorhynchus* sp. near *pleurostigma* (now: *C. assimilis!*), and sent larvae for DNA-analyses to the USDA ARS EBCL laboratory in Montpellier, France. In addition, *C. draba* plants were found, which were attacked by the gall mite *Aceria draba* in Hungary. Two further weevil species with biocontrol potential, *Ceutorhynchus cardariae*, and *Baris semistriata* were collected from *Cardaria* in the Caucasus. *Ceutorhynchus cardariae* is morphologically very similar to *C. merkli* and assumed to also mine in the shoots of *Cardaria* spp., while larvae of *B. semistriata* are suspected to develop in the root and root crown.

PROGRESS ON TEST PLANT SPECIES LIST

Jeff Littlefield from the Montana State University, Bozeman, MT and Harriet Hinz, CABI Bioscience started to exchange information on test plant lists for hoary cress biocontrol agents. Jeff has already developed a fairly comprehensive and complete list. At UI, Jennifer Andreas compiled a complete list of all T&E species in the genus *Lepidium* and closely related genera. Dr. Linda Wilson contacted Brassicaceae specialists in the U.S. who are currently revising the Brassicaceae family. They informed us that 1) the tribal system that has been previously published would be invalid and that 2) the genus *Cardaria*

is not valid. The current *Cardaria* species will be *Lepidium* species, which has obvious consequences for the development of a test plant species list. The group of researchers working on the revision of the family use molecular techniques.

Linda will be paid for the coming 2 months to exclusively work on the test plant species list to assist Jeff Littlefield in the finalization of the document. In addition we would like to include perennial pepperweed (*Lepidium latifolium*) and dyers woad (*Isatis tinctoria*) as target weeds in the document. Since the test plant species lists for those 2 weed species would be similar, we would economize time and resources and we would only have to seek input and review from FWS and TAG once.

Tim Prather has already identified one rare *Lepidium* species in southern Idaho and we have access to material of this plant species for host range testing efforts.

We think, the preparation and submission of the suggested test plant species list to TAG has high priority and we hope to have a draft version of the document available before February 2002.

PRE-RELEASE STUDIES & WEED ECOLOGY

The University of Idaho received a \$24,500 grant from the Idaho State Department of Agriculture to start pre-release studies on habitat characterization and *Cardaria* species composition in Idaho and adjacent states. We collected and analyzed *Cardaria* samples in Idaho and studied species composition, plant architecture and herbivory. Aside from crucifer pests and polyphagous insect herbivores we frequently found a stem-mining weevil in the samples. The species was determined as *Ceutorhynchus erysimi*, an accidentally introduced European species that according to literature records is oligophagous. The main emphasis in 2001 was to check whether the sampling protocol, which was developed in collaboration with CABI Bioscience provides adequate data.

Jessica McKenney, a recent graduate from Springfield College, MA will join our team in early 2002. Jessica was trained during the past summer at the CABI Bioscience Centre and will do her Masters Project on this project. We would like to include *Cardaria* infestations in Wyoming and Montana in the survey work if there is interest.

In addition, we were awarded a competitive \$161,500 USDA CSREES NRI grant for pre-release studies. This grant will be used to fund a Masters and a Ph.D. student to study 1) the integration of plant competition and herbivory, 2) the effects of different types and intensities of surrogate herbivory, and 3) the competitive ability of hoary cresses along a natural moisture (slope) gradient. Again, we would be happy to collaboratively work with Wyoming, Montana, and other western states on these projects. We are currently seeking graduate student candidates for the pre-release studies.

Another proposal for \$107,500 was submitted to the on 3 December 2001 to complement ecological pre-release studies.

STUDIES ON MOLECULAR TAXONOMY

The University of Idaho would like to conduct molecular taxonomy study on hoary cresses. We teamed up with a colleague at UIs College of Natural Resources, Dr. Steven J. Brunfeld, an expert in molecular plant taxonomy and ecology. Steven was very excited about the research prospects and we have submitted a \$295,000 proposal to USDA on 17 December. This proposal suggests conducting research on the 1) separation of *Cardaria* genotypes, 2) genetic diagnostics of the three *Cardaria* species, 3) competitive

ability of each species or genotype and hybrids, 4) ecological/habitat preferences of the genotypes in North America, and 5) similarity between European, Asian, and North American genotypes. Since the proposal has been submitted to a competitive grant program, chances to be awarded are small. However, in case we will not be granted, the proposal will be resubmitted in 2002.

ECONOMIC IMPACT STUDY

The economic impact and cost/benefit analysis is the only part of the strategic 5-year plan that has not been tackled yet. During a recent USDA funded Biological Control Meeting, Tim Prather and I met with Karen Klonsky (University of California, Davis). Karen is currently trying to develop a cost-benefit analysis for a weed control project. Although we know that Karen is a highly demanded researcher, we would like to contact her to find out whether she would be interested in a collaborative project and development of a respective proposal.

I think, all in all we are in pretty good shape. Of course it is unclear at this point whether we will obtain more competitive funding for our ecological and/or genetic work. However, we are optimistic and with the funds that we already received we will be able to conduct a thorough analysis of the current problems and status quo of *Cardaria* in North America. We also hope that our research will prepare the basis for a truly integrated long-term management strategy for hoary cresses.

Again, please consider providing financial support for the foreign exploration program. If you have any question or suggestion, please feel free to contact me. I am looking forward to hear from you.

As always, best regards to you all,

Mark, Tim, and Linda

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