J. Aquat. Plant Manage. 31: 222-224

New Frontiers in Biocontrol[1]

I. W. FORNO,[2] AND A. F. COFRANCESCO,[3] Co-chairs

ABSTRACT

This workshop was designed to give a perspective on new areas being examined in biological control of aquatic plants and to stimulate a discussion on how these new technologies could be integrated into current management practices. Five presenters provided brief discussions on the following subjects:

1. HISTORICAL PERSPECTIVE ON BIOCONTROL OF AQUATIC PLANTS WITH INSECTS

Dr. Ted Center presented a summary of aquatic weeds introduced into the United States and exotic insects used for classical biological control. These operations in many cases have been successful; however, additional control methods are still needed.

The need for greater interagency involvement/collaboration and the need for additional funding were discussed. Local, state, and Federal agencies need to participate in supporting research efforts, and increased communication between organizations is essential for an effective program. Dr. Center stressed the need to integrate control strategies, and emphasized that research on the use of current and new technologies in combination needs to be aggressively pursued. It was noted that about 20 million exotic plants are imported annually through Florida (Miami) with the risk that further undesirable aquatic plants will "escape" into Florida.

2. HISTORY OF BIOLOGICAL CONTROL OF AQUATIC PLANTS WITH PATHOGENS

Dr. Edwin Theriot reported that to date there has been no successful use of mycoherbicides for aquatic weeds and researchers need to expand the ways in which endemic pathogens can be utilized. Mycoherbicide development has been limited by technology development and funding and,

[1]This paper is a summary of a workshop held in conjunction with the International Symposium on the Biology and Management of Aquatic Plants, July 1992.

[2]Commonwealth Scientific Industrial Research Organization, Division of Entomology, Indooroopilly, Queensland, Australia.

[3]U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS 39180-6199.

further, the industrial or commercial sector is hesitant to market a product that is restricted in its effect (i.e., attacks only one aquatic weed). Companies feel this is not a cost-effective approach due in part to the costly registration requirements of mycoherbicides and the small size of the potential market.

3. ENDEMIC PATHOGENS FOR CONTROL OF AQUATIC PLANTS

Dr. Judy Shearer noted that the development of effective formulations encounters the same problems faced by manufacturers of aquatic herbicides (*i.e.*, contact time and retention rates needed to produce effects). There is a need to develop formulation technology of mycoherbicides specific for the aquatic environment rather than trying to adapt terrestrial technology to aquatic systems. Approval for field release of a mycoherbicide by the Environmental Protection Agency (EPA) and state agencies may not automatically ensure approval by the USDA-Animal, Plant and Health Inspection Service (APHIS). At present, APHIS does not have a standard set of rules which apply to all applicants, but rather each application is handled on a per case basis. Aquatic plant control achieved in laboratory experiments is not always reproducible in the field. Experimental results obtained from inoculation of aquatic plants raised in greenhouse conditions and grown in small confined units such as columns or aquaria may be unreliable indicators of field effectiveness of a biocontrol agent. Costs of producing experimental mycoherbicides put constraints on the size and number of field plots. The destructive nature of collecting biomass samples in the aquatic environment dictates the need for new technologies for assessing the effect of the mycoherbicide on target species.

4. PATHOGEN QUARANTINE FACILITY AT FREDERICK, MD

Dr. Bill Bruckart reported that over half of the major weeds in the United States are introduced species. The USDA-ARS research facility at Frederick, MD is the only quarantine facility in the continental United States which evaluates pathogens for weed control. The facility has 10,000 sq ft in containment: 7,500 sq ft under glass and the remainder includes laboratories, growth chambers and dew chambers. Although three clear advantages (low maintenance, long-term impact and cost effectiveness) characterize the use of classic biocontrol pathogens, there is a reluctance by regulatory authorities to introduce them. Authorities have to be convinced that the organism is safe, which requires extensive testing and evaluation, and legal and safety issues of introducing pathogens have to be addressed in a uniform manner.

5. THE RELEASE OF EXOTIC PLANT PATHOGENS IN AUSTRALIA

Dr. Wendy Forno noted that conflicts of interest regarding the control of a weed should be resolved before a program is started. In Australia, the "Biological Control Act of 1984" allows for a biological control authority to order a public inquiry if the issue of biological control of a weed is controversial. If the inquiry concludes that control should proceed, or if the authority concludes than an inquiry is unnecessary, the weed can be made a "declared target" which gives legal authority to proceed with the program. It should be standard practice to consider the use of pathogens as well as insects for classical biological control of weeds. It is cost-effective to contract a mycologist and an entomologist to work together in the initial surveys for agents attacking the target weed. It is desirable that these persons have a good botanical background in the family to which the weed belongs. It may be possible to employ a local mycologist to sample for pathogens and thus determine the seasonality of occurrence.

The importation of biological control agents into Australia, or to commence screening agents overseas, requires a carefully prepared document on the candidate insect/pathogen, and the proposed list of plants (80^{+}) to be tested. Approval must be granted by the Australian Quarantine Authority and the Australian National Park and Wildlife Service before the program can proceed. Australia is committed to using pathogens as classical biological control agents. Some have been introduced, others are under host specificity testing and still others are under preliminary investigation.

CONCLUSIONS/SUGGESTIONS

Regulatory authorities in the United States need to be convinced that the classical use of pathogens for biological control of weeds is a safe and effective method.

In new projects, a mycologist and an entomologist should be involved in the exploratory phase of the project.

In old projects, there is a need to revisit native ranges of aquatic weeds and look for pathogens which may be specific and damaging. This is because much of the exploratory work for biological control of aquatic weeds was carried out before pathogens had such a high profile in classical biological control.

Worldwide, \$10 to \$12 billion are spent annually on investment in irrigation. Aquatic weed problems threaten the viability of this investment, particularly in developing countries where the use of herbicides is often undesirable and the cost is prohibitive. Successful technology for biological control of aquatic weeds is essential to ensuring a sustainable investment in water use.

There is a world need for control of aquatic weeds. There are projects where countries such as Australia and the United States can share research and development costs of control technology because they have the same weed problem. Results could be transferred with the technology to developing countries where aquatic weeds threaten agricultural production.

There is a need to evaluate the success of biological control of aquatic weeds as it relates to cost. An economist may be the best person to advise on the proper procedure for documenting the value of biological control.

Australia and the United States are committed to collaboration on biological control of floating aquatic weeds. Australia is currently involved in transferring the technology developed to countries in Southeast Asia, Africa and the Pacific basin.