Abstracts: Theme 3 – Risk analysis

stems of bridal creeper at any growth stage. In Australia, the optimum conditions for rust infection (at least 8 hours of leaf wetness; 16–20°C) are common during the cool months in winter-dominant rainfall areas where bridal creeper occurs. The rust produces a large number of dormant teliospores throughout the growing season of bridal creeper which allow its survival during the dry summer months, when the host foliage is dead, and the initiation of a new disease cycle the following season. The abundance of bridal creeper growing in dense patches in Australia favours the rate and extent of disease epidemics. However, the rust has been relatively slow at dispersing between bridal creeper patches. An extensive redistribution program has consequently been established to manually disseminate the rust to most bridal creeper infestations across southern Australia.

Biological control of weeds program, Parana, Brazil; problems and progress in current research on Brazilian weeds in Parana State

J.H. Pedrosa-Macedo
Centro de Ciencias Florestais, DECIF–SCA, Universidade Federal do Parana, Av. Lothario Meissner, 3400, 80.210-170 Curitiba, Paranã, Brazil, Laboratorio Neotropical de Controle Biologico de Plantas

Investigations on the arthropod natural enemies attacking various native Brazilian species of Senecio and Tecoma stans are being conducted. Insects are being studied to determine their potential for biological control of Senecio, Tecoma stans and other toxic plants in pasture situations. Cattle deaths have been attributed to various toxic plants in these genera. For example, in the state of Rio Grande do Sul, the loss of cattle due to consumption of Senecio spp. is estimated to cost US$7.5 million annually. In 2002, faunal surveys of toxic plants in the genus Senecio and on Tecoma stans were initiated. The remaining projects are all cooperative research projects with foreign universities studying the natural enemies of Brazilian plants species that have become pests elsewhere in the world, including Brazilian pepper (BP) – Schinus terebinthifolius. The impact caused by Pseudophilothrips ichini on BP has been quantified, but the tests must be repeated. Other BP natural enemies are being studied. Five potential biological control agents have been selected for strawberry guava and preliminary studies on their biology and host range are being done. Four agents against BP have been identified, and currently two of them are under study for their biology, host range and impact on the plant. The toxicity of the BP sawfly has been tested in a preliminary test with cattle. Exploratory studies on Tibouchina herbacea natural enemies have been continued with special efforts on Anthonomus partiarius biology and host-range tests. The identification of the main candidate agent for Solanum mauritianum has been confirmed and nine Solanaceae species are being used in field tests.

The use of molecular taxonomy in the exploration for a cold-hardy strain of the tansy ragwort flea beetle Longitarsus jacobaeae (Coleoptera: Chrysomelidae)

Kenneth P. Puliafico,1 Jeffrey L. Littlefield,1 George P. Markin2 and Urs Schaffner3

1 Entomology Department, 333 Leon Johnson Hall, Montana State University, Bozeman, MT 59717, USA
2 USDA Forest Service, Forestry Science Laboratory, Bozeman, MT 59717, USA
3 CABI Bioscience, Delémont, Switzerland CH-2800

An extensive infestation of tansy ragwort, Senecio jacobaea L. (Asteraceae), in north-western Montana has renewed the search for a cold-hardy strain of the tansy ragwort flea beetle Longitarsus jacobaeae (Waterhouse) (Coleoptera: Chrysomelidae). Early reports suggested that Swiss flea-beetle populations
were pre-adapted to colder winters than those collected from the Mediterranean regions of Europe. Our comparison of the two strains’ phenotypic characteristics in the field also indicated that the Swiss populations are better suited for the biological control of *S. jacobaea* in continental climates. Using mitochondrial DNA sequencing techniques, we identified five Swiss populations as con-specifics of the Italian strain of *L. jacobaeae* collected from three populations in Oregon. Species identification utilized diversity in the cytochrome oxidase I and II and tRNA leucine genes. Variability in the cytochrome oxidase subunits was particularly informative for investigations of variability within and among *L. jacobaeae* populations. The *L. jacobaeae* populations were genetically distinct from the cryptic sister species *L. flavicornis* (Stephens), with 16 to 25 nucleotide substitutions between species. Parsimony analysis using two distantly related *Longitarsus* species helped elucidate the differences between *L. jacobaeae* and *L. flavicornis*. In rooted phylogenetic trees, the distant out-groups clearly illustrated the recent genetic divergence of the sister species that was predicted by their morphological and behavioural similarities. The use of mtDNA sequencing provided an accurate and quick method for the verification of our *Longitarsus* species, especially in cases where traditional identifications based on morphological characters may be uncertain. With the positive verification of Swiss flea-beetle populations as *L. jacobaeae*, releases were made in autumn 2002 for tansy ragwort control in Montana.

**Will further exploration find effective biological control agents for *Hydrilla verticillata***?

M.F. Purcell and J.A. Goolsby

USDA–ARS Australian Biological Control Laboratory (ABCL), c/- CSIRO Entomology, Meiers Road, Indooroopilly, Queensland 4067, Australia

The submersed aquatic plant *Hydrilla verticillata* (Hydrocharitaceae) is native to Australia, Asia and central Africa, and was introduced into the United States in the early 1950s. It has now greatly expanded its range from Florida to Delaware on the east coast and westward to Texas and California. Hydrilla forms dense mats at the water surface, impeding water flow. It causes extensive environmental, economic and recreational problems. Herbicidal and mechanical controls have been ineffective and very expensive. Biological control is considered to be the long-term solution. Following worldwide surveys for biological-control agents, many phytophagous insects were found, though few were selected as agents due to their low specificity, availability or impact. The four insects released in the US, two leaf-mining *Hydrellia* flies (Ephydridae) and two *Bagous* weevils (Curculionidae), are yet to provide adequate control, and new agents will be needed if biological control is to be successful. In Florida, hydrilla has now invaded over 40% of water bodies, and recently it has become a serious problem in the Rio Grande Valley, Texas. For this reason there has been a renewed interest in finding new agents. Previous surveys for agents in Southeast Asia were limited. Within that region, the plant is rarely problematic, with excessive growth occurring only in disturbed or artificial water bodies. It usually grows as part of a balanced aquatic ecosystem, often improving water quality. Natural enemies appear to keep hydrilla under control, and new surveys are being undertaken in this region as well as unsurveyed areas of Australia. After initially assessing the impact and biology of insects already released in the US, research is focusing on determining the efficacy of specific agents that have fully aquatic lifecycles. Genetic characterization techniques, which were not available when the original surveys were conducted, are also being employed to identify new herbivores.