has been run annually since 1993 and will continue while there is a demand. Participants have been sponsored by the Australian Centre for International Agricultural Research, the Crawford Foundation, GTZ, the United Nations Development Program, the Commonwealth Science Council and the South Pacific Commission.

A European programme for the biological control of weeds in crops: objectives and present status

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Based on a Swiss proposal, a concerted European research programme on Biological Control of Weeds in Crops officially started in February 1994. The main objectives of this COST action (European Co-operation in the Field of Scientific and Technical Research) are to: (i) co-ordinate present national and European activities in the field of biological weed control; (ii) initiate new research projects in Europe; (iii) elaborate a general protocol for biological weed control in Europe; (iv) strengthen basic research for a better understanding of herbivore/pathogen-weed interactions; and (v) propose realistic solutions for the biological control of target weed species of economic importance. At present, five principal weed species in European crops, that are economically important and suitable targets for biological control, have been selected for detailed studies. These are: (i) *Amaranthus* species (Amaranthaceae) (*A. retroflexus* L., *A. hybridus* L., *A. cruentus* L. and *A. bouchonii* Thell.); (ii) *Chenopodium album* L. (Chenopodiaceae); (iii) *Convolvulus* spp. (*C. arvensis* L. and *C. (Calystegia) sepium* L.) (Convolvulaceae); (iv) *Senecio vulgaris* L. (Asteraceae); and (v) *Orobanche* spp. (Orobanchaceae). Five working groups were constituted, centred around these five target-weed complexes. Presently, eleven European countries (Belgium, Denmark, Germany, Croatia, Italy, Hungary, Netherlands, Slovakia, Spain, Switzerland, United Kingdom), representing some 25 institutions, have joined this COST action, extending over an initial five-year period. Workshops and Working Group meetings are being held at least once per year and the results are summarized in Annual Reports.

Impact of *Apion ulicis* (Coleoptera: Apionidae) on gorse, *Ulex europaeus* (Fabaceae), in an agricultural habitat in Chile

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The efficacy of the seed weevil, *Apion ulicis* The efficacy of the seed weevil, Apion ulicis Forster, a biological control agent of the weed gorse, *Ulex europaeus* L., was examined under field conditions in southern Chile from 1990 to 1993. The purpose of the study was to assess gorse seed-production and colonization in the presence or absence of the bioagent in an agricultural habitat. It was hypothesized that *A. ulicis* might significantly impair weed spread and invasiveness and that it might act in a synergistic manner with plant competition to affect gorse

population dynamics. Seed production and seedling colonization of gorse was significantly reduced by the insect under conditions of plant intra- and inter-specific competition. A synergistic weevil-plant competition effect during early gorse spread from the parental seed source was demonstrated. The insect also significantly affected the gorse seeds in the soil but seed-bank depletion was influenced more by plant competition.

Virulence of heterokaryons of *Fusarium oxysporum*

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Selection for increased virulence in *Fusarium oxysporum* is hindered by its lack of sexual recombination. In most organisms, genetic variability can result only from the sexual cycle. Nonsexual reproduction results in the procreation of individuals that are genetically identical to a single parent. This lack of sexual recombination can be overcome by the formation of heterokaryons and subsequent parasexual recombination. Pathogenic strains of *F. oxysporum* were isolated from papaver plants from Russia, Colombia, Thailand and the United States of America. Nitrate-utilization mutants were selected from representative isolates and paired on media containing nitrate as a sole nitrogen source. The virulence of resulting heterokaryons on host- and non-host species was determined and compared with the virulence of the parent isolates. Heterokaryons were screened for parasexual recombination by isolation of individual macroconidia and determination of nitrate utilization.

Phytoflagellates (Trypanosomatidae: Mastigophora): the pathogenicity of new plant diseases and their potential as biological control agents

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Phytoflagellates (Phytomonas: Trypanosomatidae) were described in plants of the families Euphorbiaceae and Asclepiadaceae at the beginning of the century. Since the 1930s, several acute diseases, which are connected with trypanosomatids, were registered in agricultural plants, notably, coffee, cassava, coconut, oil palm, tomatoes and many fruits. Bugs serve as vectors. Recently 13 species in the genus *Phytomonas* and many undetermined trypanosomatid flagellates were described from 10 families of plants. Representatives of *Phytomonas* species were found in Europe, India, Africa and America. During the last decade we have found phytoflagellates in Asclepiadaceae in central Asia, Caucasus and Israel. So the genus *Phytomonas* is widespread. It is likely that the milkweeds are the oldest plant-hosts of *Phytomonas* species. The association between non-milkweed plants and *Phytomonas* species are new parasite-host systems that usually are less common and very pathogenic. Therefore, it is reasonable to expect *Phytomonas* species to be useful as biological control agents of non-milkweed plants that are weeds.