First Introduction of a Rust Fungus in Australia for the Biological Control of Skeleton Weed

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ABSTRACT

During the course of a recent study, the rust fungus, *Puccinia chondrillina,* that attacks skeleton weed, *Chondrilla juncea* (Compositae), in the Mediterranean region, was found to possess considerable biological control potential. The rust was cultivated on aseptically raised *C. juncea* plants, and uredospores were sent to Australia where skeleton weed is an important pest weed. The uredospores were found to be viable on arrival.

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The skeleton weed rust, *Puccinia chondrillina* Bubak & Syd., which attacks the composite *Chondrilla juncea* L. (Skeleton weed) is widespread in the Mediterranean region. A study which evaluated the potential of this rust as a biological control agent has now been completed and this communication discusses the introduction of this rust from Europe to Australia.

It has been shown that this macrocyclic monoecious rust damages all stages and all parts of *C. juncea* plants and is active under Mediterranean conditions throughout the year (2). Heavily attacked plants are either killed or placed under strong physiological stress to the extent that seeding is considerably reduced (5). It is perhaps the most effective biological control agent of *C. juncea* in Europe under climatic and other conditions closely similar to those of the major skeleton weed infestations in Australia (7, 8). It had also been shown by testing against a large number of cultivated plants and also against closely related members of the subfamily Cichoriaceae that the rust was specific to the genus *Chondrilla* (3, 4).

On these grounds, its introduction as a biological control agent was recommended to the Australian quarantine authorities, who accepted the recommendation.

The following routine was used to ensure that the uredospores of *P. chondrillina* sent from Europe to Australia were free of any contaminants and in particular were free of spores of the common *Chondrilla* powdery mildews, *Erysiphe cichoracearum* DC. and *Leveillula taurica* (Lév.) Arn. f. sp. *chondrillae* Jacz., and of the common parasitic fungus of rusts, *Darluca filum,* a form of which had frequently been observed in *P. chondrillina* sori in the Mediterranean.

Seedlings of *C. juncea* were raised under aseptic conditions. After washing the seeds in 2% solution of Tween 80, disinfecting with 10% aqueous solution of sodium hypochlorite for 20 min and washing in distilled water, they were placed on moist filter paper in sterilized petri dishes.

After germination, the seedlings were introduced into sterilized 3-liter conical flasks containing 3 cm of fine sand in the bottom and Heller's nutritive solution (6) at the rate of 25 ml/ 100 gm of sand. The flasks were plugged with cotton wool. These seedling cultures were placed under 40 W "daylight" fluorescent tubes for an 18-hr day length at a temperature of 22 C. Five or 6 wk later the aseptically grown seedlings were ready for inoculation.

Whilst the aseptic rearing was under way, *C. juncea* plants in 8- × 8-cm pots were inoculated with rust spores (3). After 5 days the inoculated leaves were surface-sterilized with a 5% aqueous sodium hypochlorite solution, washed and introduced individually into glass tubes and plugged with cotton wool whilst still attached to the plant. The tubes were supported well above the soil. The sori appeared after 10-12 days and the infected leaves remained in the tubes for a further 15 days until a plentiful supply of uredospores had been produced. These uredospores were then carefully collected in sterilized tubes and used to infect the aseptically reared *C. juncea* seedlings. The infected, aseptically grown plants produced sori and a plentiful crop of uredospores after a similar period of time. These uredospores were collected in glass vials and dispatched to C.S.I.R.O., Division of Entomology, Canberra, Australia, where they were found to be viable on arrival.

A brief account of the production of uredospores of *P. chondrillina* in Australia and, after their liberation, of the rapid and spectacular spread of this rust throughout the skeleton weed areas of Australia, together with information on the severe effects that it is producing has recently been published (1).

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