LIFE HISTORIES AND HOST SPECIFICITIES
OF THE ECHIUM FLEA BEETLES
LONGITARSUS ECHII AND L. AENEUS
[COL. CHRYSOMELIDAE]

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Two halticine flea beetles, Longitarsus echii KOCH and Longitarsus aeneus KUTSCH, occurring on the boraginaceous plant Echium plantagineum L. in the western Mediterranean region are potential biological control agents in Australia where the plant has become a weed (PATERSON’s curse). The adults of both species feed by making “shot holes” in the leaves. The larvae of both species attack the roots of Echium, those of L. echii feeding more centrally in the root than those of L. aeneus which attack the outer cortex and rootlets. Both species are univoltine. The host restrictions of both flea beetles as adults and as larvae were tested using the criteria already established for the Echium leaf miner Dialectica scalariella ZELLER (WAPSHERE & KIRK, 1977). This testing established that it would be safe to introduce the 2 insects into Australia for the biological control of E. plantagineum and they are now under quarantine.

Echium plantagineum L. (Boraginaceae) is a pasture weed (PATERSON’s curse) in the milder, heavier rainfall areas of the Mediterranean climatic regions of south-eastern and south-western Australia. The plant originates from climatically similar areas of Mediterranean Europe and North Africa. Here, 2 of the most common insects attacking Echium spp. are the halticine flea beetles Longitarsus echii KOCH and Longitarsus aeneus KUTSCH. The life histories and specificities of these potential biological control agents of E. plantagineum are discussed.

MATERIALS AND METHODS

The life histories of both species were followed in detail in the field, around Montpellier, France and in lesser detail in natural situations in Portugal and Morocco. Infested populations of E. plantagineum and Echium vulgare L. were examined during several years and complementary observations were made on caged attacked plants in the laboratory and greenhouse.
The host restriction of the 2 halticines was determined by exposing a series of plants under laboratory conditions to both adults and larvae separately. As no plants of the family Boraginaceae are major crops in Australia the testing program was designed to determine if the 2 species were restricted to Echium and a few other Boraginaceae and to demonstrate safety by exposing selected plants considered susceptible to attack by adults and larvae of both insects. These were selected by using the criteria established by WAPSHERE & KIRK (1977) for the testing of Echium leaf-miner Dialectica sclariella ZELLER, another insect occurring on boraginaceous plants.

The selection criteria and plant species tested are basically similar to those exposed to D. sclariella (WAPSHERE & KIRK, 1977). The main difference between the plants exposed to D. sclariella and to these 2 Longitarsus spp. is that only 1 plant, Linum usitatissimum L. (Linseed or Flax), was selected under the category E, plants attacked by related insects. This is the only major crop plant on which a Longitarsus species, Longitarsus parvulus PAYK. is recorded as a pest (BONNEMAISON, 1962; BALACHOWSKY, 1966). The selection criteria and plant species tested were as follows:

(A) Species closely related to Echium plantagineum : Boraginaceae : Echium plantagineum L. (control), Echium vulgare L. Echium italicum L., Anchusa azurea MILL., Borago officinalis L., Cynoglossum cheirifolium L., Buglossoides arvensis (L.) JOHNST, Heliotropium peruvianum L., Myosotis alpestris L.


(B) Species not widely cultivated in the Mediterranean region : Myrtaceae : Eucalyptus sp. ; Pinaceae : Pinus radiata DON. ; Proteaceae : Macadamia ternifolia F.V. Muell. ; Leguminosae : Acacia sp.

(C) Species which for eco-climatic reasons would not have been exposed to L. echii or L. aeneus :

(a) Cold climate plants
Cannabaceae : Humulus lupulus L. ; Graminace : Secale cereale L.

(b) Tropical and sub-tropical plants
Leguminosae : Glycine hispida MAXIM., Arachis hypogaea L. ; Graminace : Oryza sativa L., Sorghum bicolor L., Saccharum officinarum L. ; Malvaceae : Gossypium sp. ; Musaceae : Musa sapientum L. ; Caricaceae : Carica papaya L.

(D) Species of importance in Australia, the entomological fauna of which is poorly known in Europe :
Leguminosae : Trifolium subterraneum L., Medicago littoralis RHODE. ; Graminace : Phalaris tuberosa L.

(E) Species of related cultivated plants other than those listed above attacked by insects of the genus Longitarsus : Linaceae : Linum usitatissimum L.

ADULT TESTING

Adults of both L. echii and L. aeneus occur together on Echium plants in late winter and early spring in southern France and were collected together at the time from the field.

PORTEVIN (1934) used size as a principal taxonomic character to separate species amongst groups of similarly coloured Longitarsus, but his key does not include L. aeneus. MOHR (1962) used genitalia and size amongst other characters to separate the