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# Alfalfa Seed Chalcid (Hymenoptera: Eurytomidae) Infestation Trials in Annual *Medicago*[1]

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ABSTRACT: We evaluated five annual *Medicago* species (*M. disciformis* DC., *M. rigidula* (L.) All., *M. ciliaris* (L.) Krocker, *M. rugosa* Des., and *M. rotata* Boiss.) as potential hosts of the alfalfa seed chalcid, *Bruchophagus roddi* (Gussakovsky), in growth chambers. A perennial, *M. sativa* L., was used as a susceptible control. The five annual species represented the four sections (Leptospirae, Pachyspirae, Intertextae, Rotatae) of the subgenus *Spirocarpus*.

In no-choice tests, all annual species were highly resistant to the chalcid. Ovipositor marks and larvae were found in some *M. rigidula*. The other annuals were uninfested. In a second test, we were unsuccessful in rearing adults from infested *M. rigidula*.

Although alfalfa plants resistant to the alfalfa seed chalcid, *Bruchophagus roddi* (Gussakovsky), have been identified, no resistant cultivars have been developed (Nielson and Lehman, 1980). Thus, plant breeders interested in developing insect resistance in alfalfas have been investigating interspecific crosses as a source of resistant genes (Nielson and Lehman, 1980).

Bolton (1962) indicated that three annual *Medicago* species (*M. aculeata, M. rugosa,* and *M. scutellata*) were attacked slightly by the alfalfa seed chalcid. *M. arabica, M. hispida,* and *M. tornata,* were listed by Burks (1957) as hosts of *B. gibbus*. Based on morphological and host data *B. gibbus* was later split into three species, the clover, trefoil, and alfalfa seed chalcids (Strong, 1962). Thus, the identification of the chalcid attacking those *Medicago* is not clear.

Annual *Medicago* species are in the subgenus *Spirocarpus* which, based on pod and seed morphology, is subdivided into four sections (Lesins and Lesins, 1979). We selected species from each section for testing as potential alfalfa seed chalcid hosts.

Table 1. Results of alfalfa seed chalcid infestation trials in several *Medicago* species.

| Species | Number of replications | Number of seeds | | | % seed infested |
|---|---|---|---|---|---|
| | | Exposed | With ovipositor marks | Infested | |
| *M. sativa* | 13 | 65 | 51 | 49 | 76.6 |
| *M. rugosa* | 7 | 12 | 0 | 0 | 0.0 |
| *M. rotata* | 16 | 43 | 0 | 0 | 0.0 |
| *M. ciliaris* | 16 | 61 | — | 0 | 0.0 |
| *M. disciformis* | 17 | 98 | 0 | 0 | 0.0 |
| *M. rigidula* | 16 | 97 | 5 | 4 | 4.1 |

MATERIALS AND METHODS: Five annual species (*M. disciformis* de Candolle section Leptospirae, *M. rigidula* (L.) Allioni section Pachyspirae, *M. ciliaris* (L.) Krocker section Intertextae, and *M. rugosa* Desrousseaux and *M. rotata* Boissier section Rotatae) were tested as possible hosts to the alfalfa seed chalcid. A susceptible perennial, *M. sativa,* was included in the tests as a control. The plants were maintained in a growth chamber at 28° ± 2°C and 18:6 LD photophase. The chalcids used in the tests were reared from field-infested alfalfa seed kept in cold storage. As needed, infested seed was removed from cold storage and incubated at room temperature. Adult emergence began about two weeks after incubation.

Infestation trials were conducted on the six *Medicago* species by placing cages (3.5 × 2.5 × 3.5 cm plastic snap boxes) over developing seed pods. The pod pedicel passed through a notch in the edge of the cage sealed by polystyrene foam. Five female chalcids were placed in the cage and allowed to oviposit. After two days, the chalcids and cage were removed. Each cage constituted a replication. The number of replications per *Medicago* varied (Table 1). One week later, the pods were dissected and the seeds examined for oviposition marks and larvae. Brewer et al. (1983) showed that alfalfa seed chalcid oviposition leaves dark marks that are visible on the seed surface.

A second trial was conducted using *M. rigidula* identified as susceptible in the previous test. Three plants of the test species with pods were placed in a 33 × 40 × 60 cm cage made of a wooden frame with glass sides and a screened top and bottom. A cloth sleeve allowed hand entrance into the cage. One hundred fifty mixed sex chalcids were introduced into the cage. Water was provided in a small flask with a cotton wick. The pods were collected as they matured and dropped from the plants. To allow chalcid development to adult, pods were not dissected until eight weeks after exposure to chalcid oviposition. At that time pods were examined for adults and larvae.

RESULTS AND DISCUSSION: The susceptible control had an infestation rate of 77%. In comparison, no larvae were found in seeds of any of the annual species, except for *M. rigidula* (Table 1). This species was attacked, as evidenced by larval infestation and ovipositor marks on the seeds. Since the seeds of *M. ciliaris* are black, it was not possible to see whether the dark oviposition marks were present.

Only *M. rigidula* was used in the second test. Eleven pods with a total of 32 seeds were collected from the exposed plants. Ovipositor marks were found on 18 of the seeds (56%) and 5 of those were infested (16%). Three of the larvae were dead when examined, but one of them may have been killed during dissection.

The lack of either ovipositor marks or infested seeds in four of the annual species indicates that they were probably not acceptable as hosts. Since Bolton (1962) reported a low rate of seed chalcid infestation in *M. rugosa,* there may be differences in strains within this species.

While small numbers of the *M. rigidula* seeds were infested, larval mortality was high. Thus, seed chalcid infestations of *M. rigidula* probably would not support an injurious field population.

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