

## **Insect pests damaging *Lotus corniculatus* L. flowers and seeds in Uruguay.**

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Many insects feed on *Lotus corniculatus* foliage in Uruguay. Some of them can sporadically cause severe defoliation; such is the case with some cricket species, especially under dry weather conditions. In general, plants overcome the damage and insecticide control is not frequent.

When birdsfoot trefoil fields are planned for seed harvesting, two insect species become a major problem, because of the rapid increase of its populations during the flowering period and the behavior and feeding habits of both species that complicate the early detection of the attack. They are *Epinotia aporema* (Lepidoptera: Tortricidae), a bud borer, and the seed chalcid *Bruchophagus platypterus* (Hymenoptera: Eurytomidae).

*Epinotia* larvae bore into the flowers sticking them together, while feeding on the reproductive structures. The seed chalcid adults lay the eggs into the pods, one per seed, and the larvae feed on the cotyledons completely destroying the newly formed seed. Damage of both species can be easily oversight and, in addition to this, the use of chemical control is limited for the dependency from pollinators in order to achieve the best yields.

Damage assessments of these insect pests were carried out at INIA La Estanzuela for several years. The results help in designing strategies for the management of the pests.

### **Seed chalcid fly**

*Bruchophagus platypterus* (Walker)  
(Hymenoptera: Eurytomidae)

Three different species of chalcids damage the main forage legume species around the world. Their appearance, behavior and habits are similar but the insect – host plant relationships are very specific (Table 1).

**Table 1.** Seed chalcid species and the plant they parasitize.

Host plant	Seed chalcid species
red clover	<i>Bruchophagus gibbus</i> Boheman
birdsfoot trefoil	<i>Bruchophagus platypterus</i> (Walker)
alfalfa	<i>Bruchophagus roddi</i> Gussakovskii

Carámbula (1981) reported the three species present in Uruguay. The high number of adults of *Bruchophagus platypterus* (the chalcid species that attacks birdsfoot trefoil) worried farmers in the 1981/82 season (Etcheverry and Morey, 1982). It has also been reported damaging *Lotus tenuis* in Argentina with a range of incidence between 0 – 24% (Mujica, 1987). The species damaging alfalfa was first reported in the country at La Estanzuela in the 1967 season by Pritsch (1967), causing losses he estimated in as much as 20 – 30%. In the season 1970/71, Castells had found one of the chalcids in *Medicago polymorpha* var *confinis* seeds (Etcheverry and Morey, 1982).

They are minute wasps, around 1.5 – 2.5 mm. Their size is related with the size of the seed they parasitize, a bit larger the one that attacks red clover than the species in birdsfoot trefoil. It is difficult to see them without a lens, and it is also difficult to observe their damage. The larvae have chewing mouthparts.

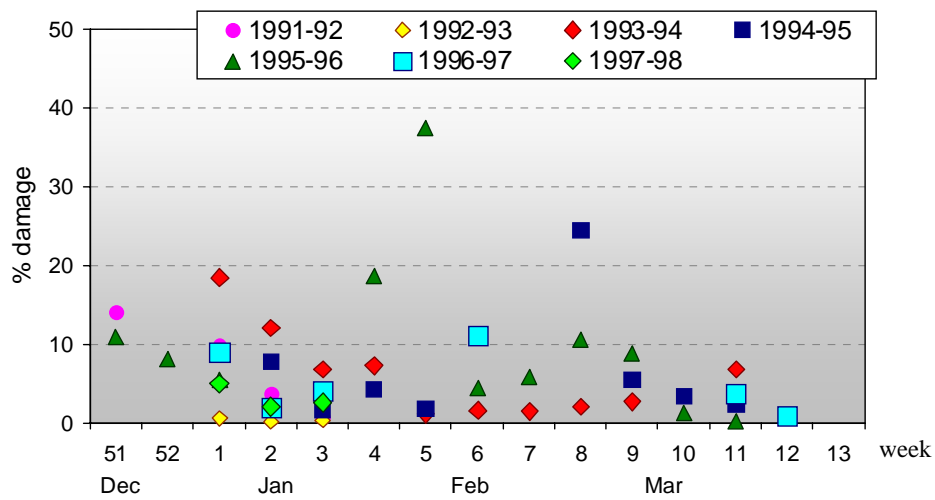
At the beginning of the spring the adults emerge from seeds of the previous season that are in the soil. They look for recently pollinated flowers and deposited their eggs in the newly formed seed, one egg per seed. The larvae live inside the seed feeding on the cotyledons, so that when the healthy seeds mature, in the attacked seeds there is just a larva inside the teguments (Figure 1; Batiste, 1967). The developing period is the same of the seed, being shorter as the season progress (Ahring et al., 1984). There are three or four generations per year. In the field the only symptoms of the attack are small holes in the mature pods, and a yield lower then expected.

### Damage assessment

The evaluations were made collecting mature pods in commercial fields from late December to March (since the beginning of the season to the last probable harvesting date). The sample included 90 umbrellas per date that were manually thrashed in the lab. Health and damaged seeds were sorted and counted. The damage was calculated as a proportion of total seed [damaged seeds/(damaged plus sound seeds)\* 100] (Pippolo, 1998; Alzugaray, *in press*). The results are shown in Figure 2.



**Figure 1.** Seed chalcid *Bruchophagus platypterus* adult emerged from *Lotus corniculatus* seed.

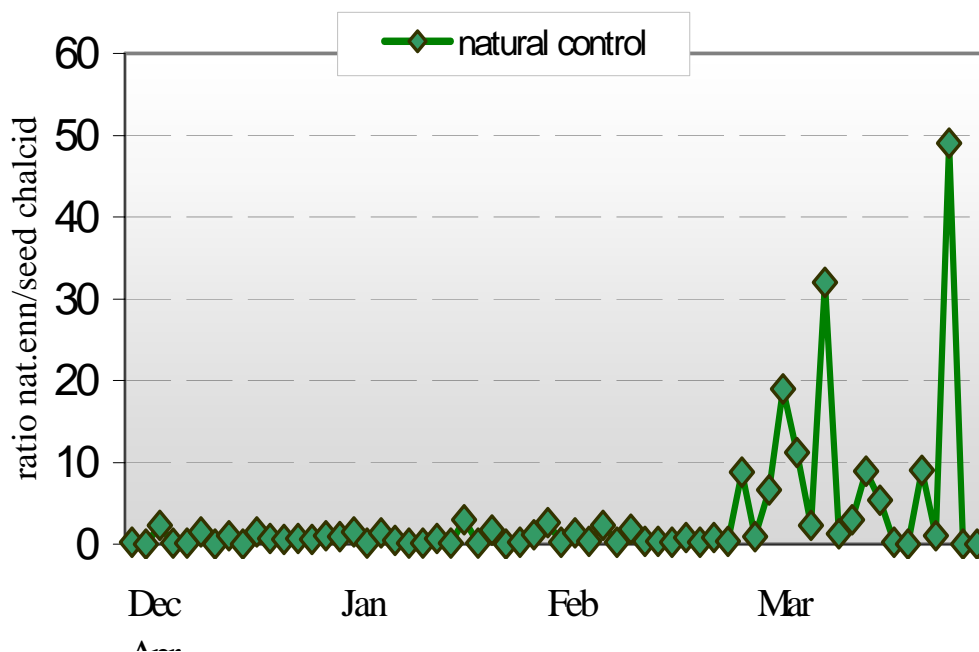


**Figure 2.** Seed chalcid (*Bruchophagus platypterus*) percent damage to *Lotus corniculatus* in successive seed production years at La Estanzuela (Colonia, Uruguay). Damage=[damaged seeds/(damaged plus healthy seeds)\* 100]. Week 52 – last week of december, Week 1 – first week of January

The damage caused by the seed chalcid to birdsfoot trefoil in Uruguay seems to be in a very stable situation. The damage exceeded the 20% only in a few occasions, being generally below the 10%. The explanation for this is the presence of another minute wasp that parasitizes the seed chalcid, diminishing its populations from one generation to the

following. The natural enemy has been identified as *Tetrastichus bruchophagi* (Hymenoptera, Eulophidae) (Alzugaray, 1991).

The population of the parasitoid has also been monitored and the relation parasitoid/seed chalcid can sometimes exceed the 10/1 ratio (Figure 3). The abundance of the parasitoid is evident at the end of the season.



**Figure 3.** Natural control of *Tetrastichus bruchophagi* on *Bruchophagus platypterus*, La Estanzuela, Uruguay, 1991 – 1999. Each point indicates the ratio natural enemy/seed chalcid adults emerged from the seed samples (After Alzugaray, *in press*).

### **Epinotia**

*Epinotia aporema* Wals.  
(Lepidoptera: Tortricidae)

*Epinotia aporema* larvae have been reported in Uruguay feeding on red clover, alfalfa, birdsfoot trefoil, soybeans, grain legumes, *Lotononis bainesii* and *Vicia* spp. (Bentancourt and Scatoni, 1989; Alzugaray, *in press*)

Its presence is known in Uruguay since the '70s as a pest of beans (Morey, 1972). It was in the '80s, when soybean area increased, that *Epinotia* became a problem in production systems with soybean and pastures.

The adults are small moths ca. 10 mm long (Figure 4). They lay the eggs on the foliage. The larvae with chewing mouthparts feed on leaf and flower buds, sticking the folioles together (Figure 5). The life cycle takes 35 – 40 days depending on the temperature (Table 2). It is a pest of alfalfa, red clover and birdsfoot trefoil as well as grain legumes such soybeans.

**Table 2.** *Epinotia aporema* life cycle at temperatures between 21 - 24°C (Morey, 1972)

	<b>Days</b>
pre – oviposition	2
egg	5
larva	14 – 20
pupa	14 – 15
total	35 - 42



**Figure 4.** Adult female of *Epinotia aporema*.



**Figure 5.** Field symptoms of the attack of *Epinotia aporema* in *Lotus corniculatus* flowers (left damaged, right healthy flower).

**Damage assessment**

Full developed larvae (5<sup>th</sup> instar) were individually caged and offered a known number of flowers. Damage was assessed after 4 days as the number of flowers completely destroyed over the total offered.

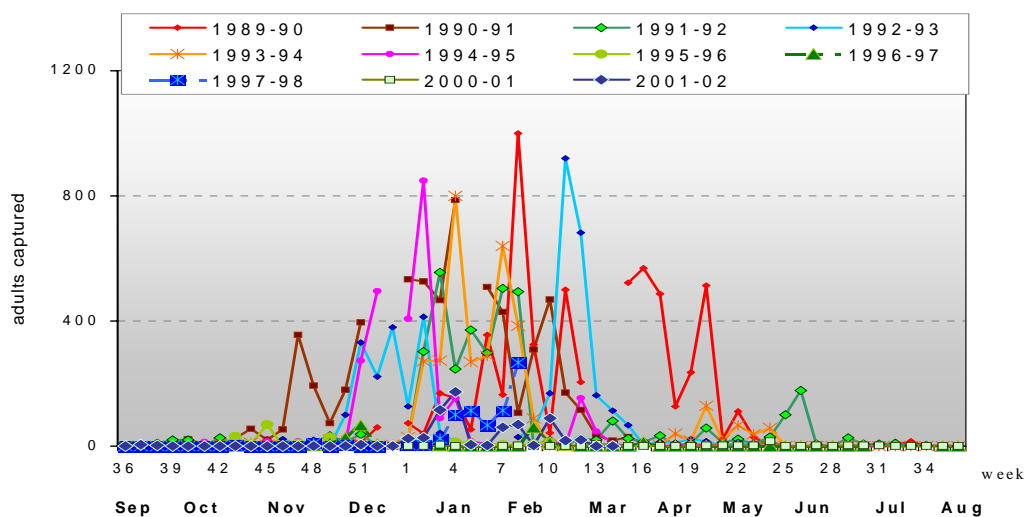
The results indicate that a 5<sup>th</sup> instar larva feeds an average of 2.2 lotus flowers per day, within a range of 1.5 to 3.5 flowers. An estimated population of 150 larvae per m<sup>2</sup> would

destroy 375 flowers per day and in 10 days 3750 flowers of 5000 that can be assumed per  $m^2$  (Alzugaray, *in press*). This is a very conservative assumption because it is frequent to find more than a larva per umbella inside the case they form while sticking flowers and leaves.

### Population fluctuations

Populations of *Epinotia* adults have been recorded weekly since 1989 at INIA La Estanzuela using a black light trap. The curves can be observed in Figure 6. From the point of view of seed harvesting, it does not have the same meaning to register an important capture of adults in November (first flowering) than in February, when the seed may not be harvested.

The relation between adult captures and larvae populations in the field was surveyed making plants sampling and counting larvae in the buds. The results confirm that, once the adult captures in the light trap increase, there is a period of two weeks to get prepared for high larvae populations in the field (Zerbino and Alzugaray, 1998). On these bases the use of physiological insecticides can be recommended, using light trap data as a warning.



**Figure 6.** Weekly captures of *Epinotia aporema* adults in black light trap, La Estanzuela, 1989-2002. (Modified from Zerbino and Alzugaray, 1998)

### Final comments

Both insect species, the seed chalcid and epinotia, damage the *Lotus corniculatus* seed crops, attacking directly the reproductive structures of the plants. The early detection of the attacks is seldom successful and in both cases the control of the pest presents actual difficulties.

It is important to realize that both species occur simultaneously, at flowering time, and that any measure to control one of them will affect the other insect situation. Chemical sprays to control epinotia damage would probably endanger the natural control that maintains the seed chalcid populations in the level of sporadic problem.

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