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(Prepared by R. Lal, H. R. Rohilla, and M. El Bouhssini)

## Lima Bean Pod Borer

Lima bean pod borer, *Etiella zinckenella* (Lepidoptera: Pyralidae), is an important insect pest of several pulse crops, including lentil. It is also known as spiny pod borer or pea pod borer. It is an occasional pest of lentil but not of chickpea.

### Geographic Distribution

*E. zinckenella* is widely distributed in Africa, Asia, and Europe. It is also a serious pest in Australia, New Caledonia, Papua New Guinea, and the Solomon Islands and is present in Canada, Central America, the United States, and the West Indies.

### Host Range

Lima bean pod borer feeds on several leguminous species, especially cowpea, field pea, green gram, horse gram, lentil, lima bean, pigeonpea, and sunhemp.

### Nature of Damage

The presence of a hole on the pod surface, dry, light-colored frass, and webbing in the pod are indications of infestation. As a result of insect damage, the pods are poorly developed. Individual seeds have holes, and internal portions are gutted (Fig. 211). The pods are partially or completely consumed inside. Externally, the pods have a shrunken appearance and small surface punctures. Larvae generally feed on maturing pods. The lima bean pod borer population builds by the end of the season, when the temperature is high. The caterpillar is greenish or pinkish red with a yellow head. It moves violently when disturbed. The adults are small, brown, and active at night (Fig. 212). Infestations can be detected by the presence of small punctures on the surface of pods, and the larvae can be observed by splitting the pods.

### Life Cycle

The adult moths are 10–12 mm long with a wingspan of 22–28 mm. The forewings are brown gray with white anterior margins (Fig. 213). Mating takes place at night or in dark places, and the females lay eggs on young pods in clusters of two to 12. A female lays 47–178 eggs in 5–6 days. Eggs are laid

near the calyx of the flowers or on pods. The larva immediately bores into the pod and feeds internally. The larva attains a maximum length of 15 mm and is greenish with a brown line (Fig. 214). The larvae often move from one pod to another. The average egg, larval, prepupal, and pupal periods on lentil have been reported to be 5.4, 17.2, 2.3, and 13.8 days, respectively. The larvae enter diapause in winter. Pupation normally takes place in the soil, but it sometimes occurs in pods (Fig. 215). One generation is completed in about 4 weeks under favorable conditions, and there are three to five generations per year. The adults survive for 1 week, and the females live longer than the males.

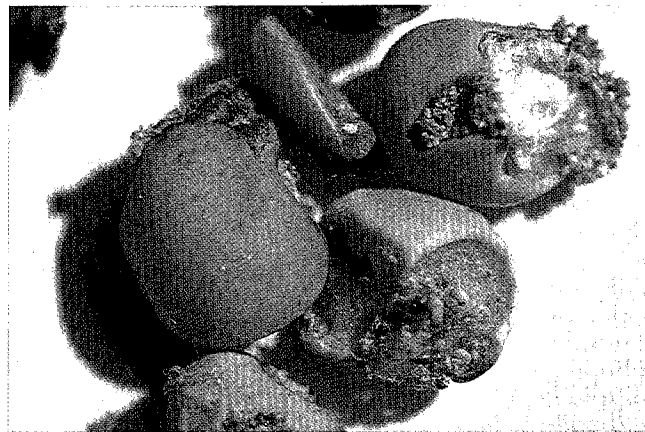


Fig. 211. Lentil seed damage caused by *Etiella zinckenella*. (Courtesy ICRISAT)

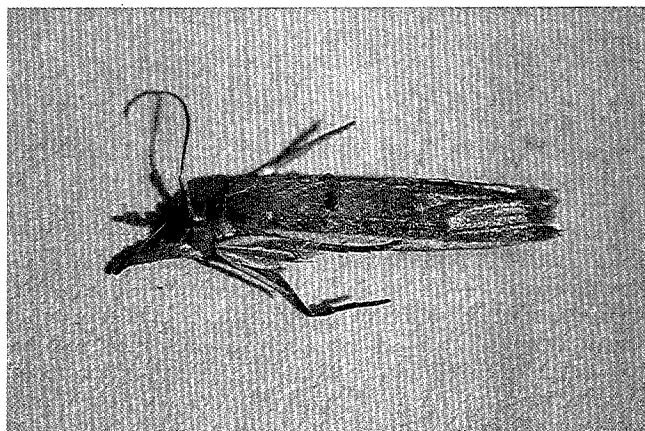


Fig. 212. *Etiella zinckenella* adult. (Courtesy ICRISAT)

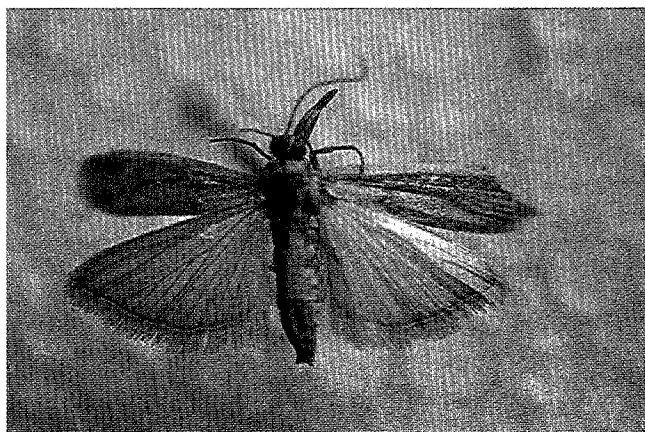


Fig. 213. Wing span and coloration of *Etiella zinckenella* adult. (Courtesy ICRISAT)

## Management

**Host plant resistance.** Host plant resistance can play a major role in reducing losses caused by *E. zinckenella* in lentil. Short-duration genotypes are more susceptible than medium- and long-duration genotypes. The line LH 90-39 is resistant, while LL 147 is tolerant to *E. zinckenella* damage. Lines P 927 and P 202 have been reported to be resistant and yield 53 and 44% more than L 9-12, respectively, under natural infestation.

**Natural enemies.** Several natural enemies have been reported to control *E. zinckenella* populations under natural conditions. These include *Bracon etiellae*, *B. pectoralis*, *Phan-*



Fig. 214. *Etiella zinckenella* larva. (Courtesy ICRISAT)

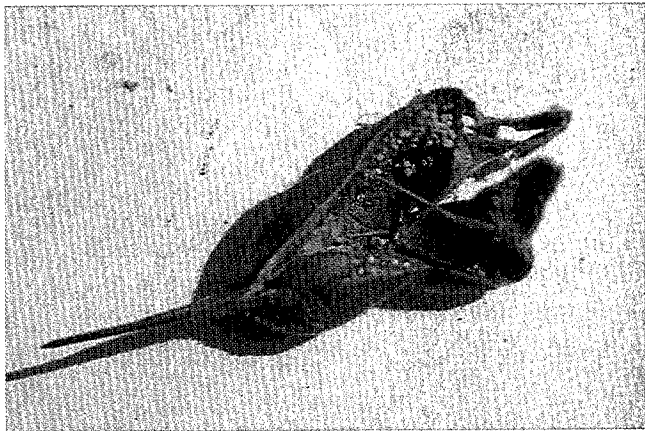


Fig. 215. *Etiella zinckenella* pupation in a lentil pod. (Courtesy ICRISAT)

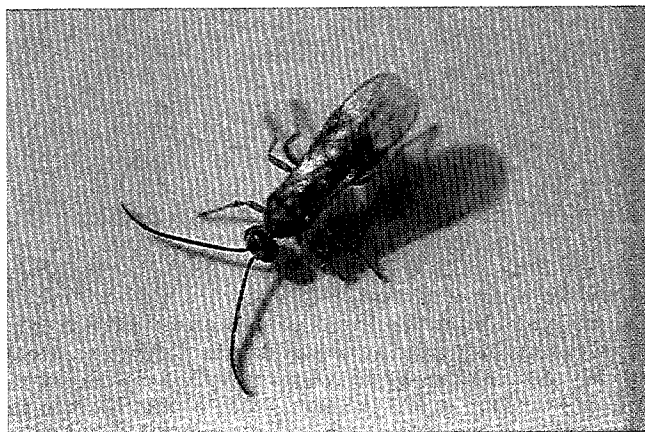


Fig. 216. *Tetrastichus* sp., a larval parasitoid of *Etiella zinckenella*. (Courtesy ICRISAT)

*erotoma planifrons*, *Pigeria piger*, *Phanerotoma hendecasisella*, *Exeristes roborator*, and *Tetrastichus* spp. (Fig. 216). However, there are no reports on the use of natural enemies for classical biological control of the lima bean pod borer.

**Chemical control.** *E. zinckenella* is an occasional pest of lentil, but insecticide application may be necessary under heavy infestation. Sprays of methidathion (0.5 kg a.i./ha), deltamethrin (38 g a.i./ha), or endosulfan (6 ml/L) at flowering and early pod setting have been reported to provide effective control of this pest. Abamectin 1.8% EC (1 ml/20 L),  $\alpha$ -cypermethrin 10% (1.5 ml/2 L), and cyhalothrin 2.5% (2 ml/2 L) have also been found to provide effective control.

**Integrated pest management.** Lima bean pod borer infestations quite often are low and do not warrant control. There is a positive relationship between moths caught in sweep nets during flowering and pod formation and seed damage. Therefore, rough predictions of damage and decisions to undertake control measures can be made on the basis of moth catches. Under heavy infestations, application of insecticides with a strong contact and systemic action may be effective. Cultivars that are less susceptible to the pod borer may be recommended for cultivation in areas where the pest is endemic.

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(Prepared by C. P. Srivastava and H. C. Sharma)

## Lygus Bugs

The tarnished plant bug, *Lygus lineolaris*, and the western tarnished plant bug, *L. hesperus* (Hemiptera: Miridae), are pests of lentil in the western United States. Feeding by lygus bugs produces depressed, chalk-colored lesions (chalky spot) on the lentil seeds. These bugs are pests of lentil throughout the Palouse area (eastern Washington and northern Idaho) in the United States. In years where pea aphid populations on lentil are very low, insecticides are not applied early, resulting in greater damage by the lygus bugs. Scouting for lygus bugs is critical to prevent damage to the crop. Close examination of the plants is the best way to see lygus bugs, which are present under the curly leaves of the lentil plants during the daytime and are rarely seen on the visible portions of the crop.

## Distribution

The tarnished plant bug, *L. lineolaris* (Fig. 217), is distributed in North America, Central America, and the Caribbean. The western tarnished plant bug, *L. hesperus* (Fig. 218), is restricted to North America. The European tarnished plant bug, *L. pratensis*, is distributed throughout Europe and Asia (Afghanistan, China, Persia, Turkey).

## Host Range

*L. hesperus* is a polyphagous pest on several crops and weeds. Alfalfa is the primary host, but sorghum is also an important host in the United States. *L. lineolaris* is polyphagous