University of Idaho
College of Agriculture

Cooperative Extension System
Agricultural Experiment Station

Current Information Series No. 894

Chalky Spot Damage to Lentils

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A serious seed-quality problem known as chalky spot develops in lentils grown in northern Idaho and eastern Washington in some years. Seeds with chalky spot have pitted, craterlike depressions in their seed coats. Injured areas usually appear discolored and chalky (Fig 1).

Lygus bugs feeding on developing lentil pods and seeds have been identified as the primary cause of chalky spot. Stink bugs can cause chalky spot occasionally.

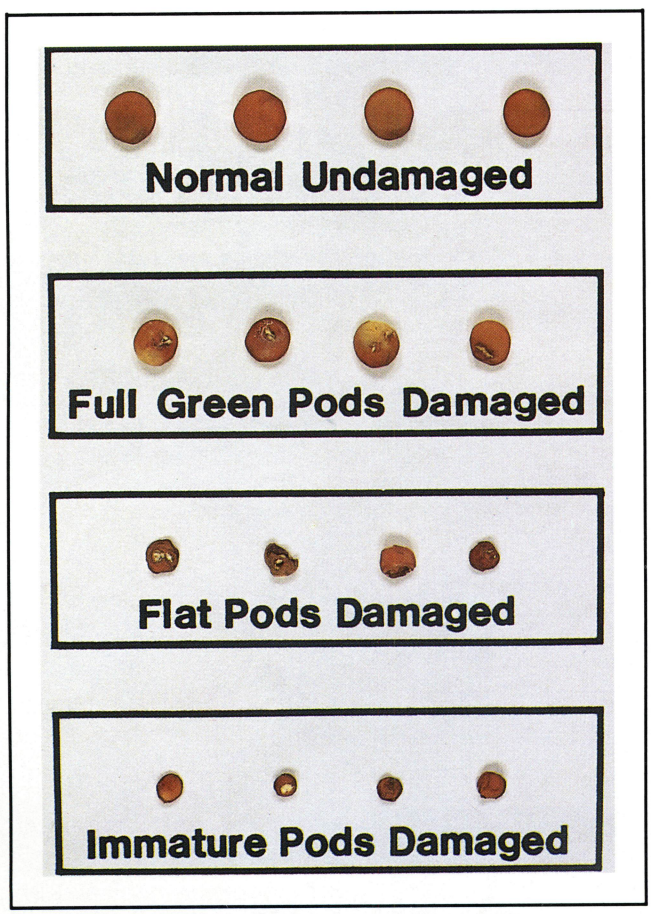

Fig. 1. Lygus-bug-damaged pods at harvest showing pods that were damaged while immature and at later growth stages.

Fig. 2. Lygus bug adult.

Fig. 3. Lygus bug nymph.

Fig. 4. Stink bug adult.

Seed lots with chalky spot on more than 3.5 percent of seeds are downgraded by grain inspection to "sample grade," and their seed market value is discounted. Damaged seeds cannot be separated from good seed. They are smaller, and they can deteriorate faster in storage, have poorer germination and produce abnormal seedlings.

Insect description

Adult lygus bugs (Fig. 2) are about ¼ inch long and about ⅛ inch wide. They are somewhat flattened. The tips of their wings bend downward, and they have a small, yellowish triangle in the center of their backs. Nymphs are wingless immatures (Fig. 3). They cause more damage than the adults because they feed more often.

Adult stink bugs (Fig. 4) are shield-shaped and range in color from green to brown. They are approximately ½ inch long and ⅜ inch wide. Stink bug immatures are wingless and smaller than the adults.

Both lygus bugs and stink bugs feed with piercing-sucking mouthparts. During feeding, they inject toxic saliva into the seed, causing the feeding area to die. The dead area forms a depression then a shrunken lesion that develops into chalky spot (Fig. 1).

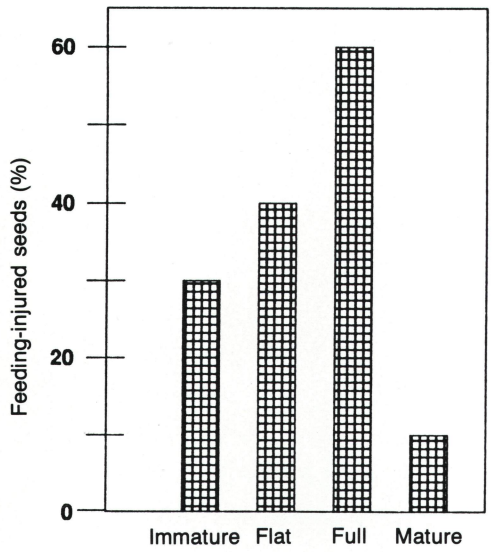

Fig. 5. Feeding injury in lentils exposed to lygus bugs and stink bugs at various pod developmental stages. (Results are from a laboratory study by the authors.)

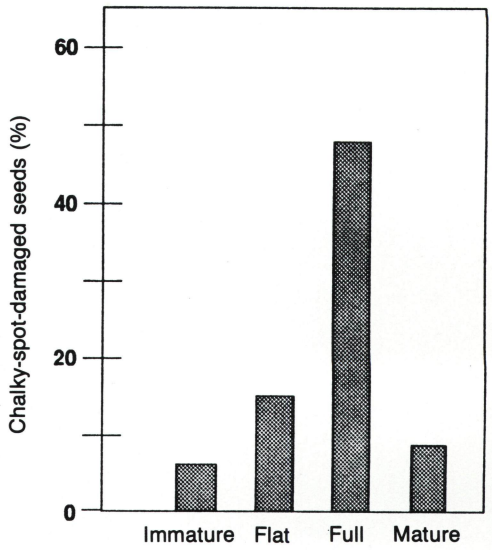

Fig. 6. Chalky spot damage in lentils exposed to lygus bugs and stink bugs at various developmental stages. (Results are from a laboratory study by the authors.)

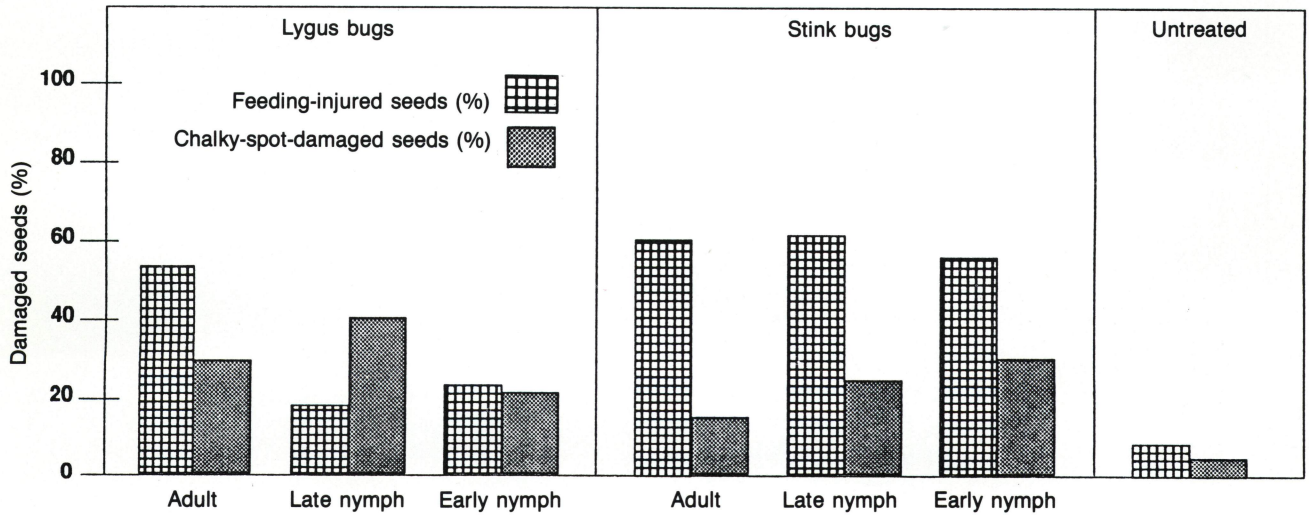

Fig. 7. Lentil damage by lygus bugs and stink bugs at various insect developmental stages. (Results are from a laboratory study by the authors.)

Historical crop losses

Crop losses due to chalky spot have fluctuated among production regions and from year to year. In some years, such as in 1982, damage in northern Idaho and eastern Washington has been negligible. The more typical situation occurred in 1979 when 17 percent of harvested fields produced sample grade thresher-run lentils. In 1980, more than 30 percent of harvested fields near the Clearwater and Snake river breaks produced sample grade lentils, while fewer than 10 percent of fields in the drier, more westerly areas of the region produced sample grade lentils. A disaster struck in 1983 when more than 51 percent of fields harvested in northern Idaho and eastern Washington produced sample grade lentils, and some individual fields exceeded 45 percent chalky-spot-damaged seed.

Factors influencing chalky spot

We cannot accurately predict where and when chalky spot damage will appear in a particular field or locality. However, the amount of chalky spot in lentils is directly related to the lentil variety and its developmental stage (Figs. 5 and 6), to the number and developmental stage of the lygus bugs and stink bugs (Fig. 7) and to the duration of the infestation.

The full pod stages appear to be more susceptible to chalky spot than the immature, flat or mature stages (Figs. 5 and 6).

In laboratory studies, late lygus nymphs (4th and 5th instars) produced the greatest amount of chalky spot, while adult lygus bugs produced the greatest number of damaged seeds (feeding injured + chalky spot damaged) (Fig. 7). Early stink bug nymphs (1st and 2nd instars) produced the greatest amount of chalky spot, but there was little difference in the overall damage produced by their various developmental stages (Fig. 7).

Sampling for lygus bugs and stink bugs

Sweep net sampling at the appropriate time can provide reliable estimates of lygus bug densities for determination of control actions in individual lentil fields. Lygus bugs usually start to arrive in lentil fields around bloom time (the first week of July), but the nymphs usually do not appear in large numbers until the crop has reached the green flat to full pod stages of development (near the first week in August). Sampling at bloom stage is used to predict the potential for population increases late in the season, when most crop damage occurs.

Late in the season, adults occur in lower densities and therefore are of less economic importance in damaging the crop. Late-season sampling is primarily for lygus bug nymphs, which are the dominant life stage in lentils at that time.

Stink bugs usually arrive late in the season just as the lentils start to turn yellow. They cause only minor damage, if any. During years when they migrate to fields early (green pod stage), damage can be expected (Fig. 7).

Economic thresholds

To reduce chalky spot, monitor individual fields for plant development. When the field is in bloom and podding has started, determine numbers of adult lygus bugs. Using a 15-inch-diameter sweep net, make 25 180-degree sweeps in at least five randomly selected places in each field. Sample anytime from mid-morning to early evening. Consider insecticide treatment if you capture an average of 7 to 10 adult lygus bugs per 25 sweeps.

If the field is weed-free or in an area with a history of chalky spot, the risk of lygus bug injury may be higher. Based on a higher risk, you may wish to consider insecticide treatment at a lower average number of adult lygus bugs per 25 sweeps.

A second insecticide application for lygus bugs should not be necessary most years. However, until control details are worked out, growers may choose to continue sampling for lygus bugs in mid- to late July and early August or until the plants are yellow and dry. Sample with a sweep net in at least five areas of the field during dry, warm and sunny afternoons from 2 to 6 p.m. and watch for lygus bug nymphs.

Consider a late-season insecticide treatment when you collect 15 or more lygus bug nymphs and adults per 25 sweeps and most pods are green and in the flat to full pod stages. If, in addition, harvest is likely to be delayed because of weather or shortage of equipment, use a late-season insecticide treatment to prevent the occurrence of excessive amounts of chalky spot. If most pods are lemon colored, an insecticide treatment will not be worthwhile.

Economic thresholds have not been determined for stink bugs or combined populations of lygus bugs and stink bugs.

Cultural control

Research conducted on three different harvesting methods indicates that harvesting technique can influence the percentage of the yield containing chalky-spot-damaged seeds. Fields that are either swathed green or direct cut green will yield fewer chalky-spot-damaged seeds than fields that are direct cut at crop maturity.

Chemical control

Dimethoate at 0.5 pound active ingredient per acre and Penncap-M at 0.5 pound active ingredient per acre are registered for lygus bug control in lentils. Dimethoate is a systemic insecticide. To be effective it must be applied to actively growing plants. Use it early when lygus bugs reach the economic threshold. It should control lygus until the plants start to turn yellow.

If plants are starting to turn yellow, use a contact spray of Penncap-M.

Dimethoate and Penncap-M are also used for aphid control in lentils. However, applications for aphid control early in the season cannot be expected to last long enough to provide lygus bug control later in the season.

No insecticides are registered for control of stink bugs in lentils.

Pesticide residues — Recommendations for use are based on currently available labels for each pesticide listed. If followed carefully, residues should not exceed the established tolerances. To avoid excessive residues, follow label directions carefully with respect to rate, number of applications and minimum interval between application and reentry or harvest.

Groundwater — To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.

Trade names — To simplify information, trade names have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

Insecticides for lygus bug control in lentils in northern Idaho.

Insecticide	Rate (active ingredient/acre)	Preharvest interval	Restrictions
dimethoate	0.5 lb	14 days	Do not graze or feed treated foliage.
Penncap-M	0.5 lb	15 days	Do not graze or feed treated foliage.*

*Use a minimum of 5 gallons water per acre.

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This publication was printed with funds provided by the American Dry Pea and Lentil Association, Idaho Pea and Lentil Commission and Washington Dry Pea and Lentil Commission.

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1,500, June 1991

50 cents per copy