Stink Bug on Pears

habits of pest studied to find a control program which may include sprays, clean culture, host plant eradication

Arthur D. Borden and Harold F. Madsen

The consperse stink bug—*Euschistus conspersus* Uhler—caused considerable loss of pears at harvest during the past two fruit seasons.

It attacked mainly Bartlett pears in orchards in El Dorado, Placer, Sacramento, Lake, Mendocino, and Tuolumne counties. It also damaged other fruits such as apricots, peaches, plums, and apples; and vegetables such as beans, tomatoes and sweet corn.

Biological studies and control experiments with several insecticides are under way in infested orchards. A better understanding of the habits of the pest and of the effectiveness of spray chemicals will aid the work to prevent the injury caused by the stink bug.

The insect belongs to the family *Pentatomidae* which are medium to large, broadly oval or shield-shaped plant feeding bugs. The adult consperse stink bug is about 3/8" long, pale brown, covered with small black spots on the back and with larger black spots on the legs; yellowish or green on the underside; with orange to red antennae. It is winged and can fly considerable distances.

The bug feeds on a wide range of plants in and adjoining infested orchards. In the Sierra foothills it was observed to feed on mustard, dock, milkweed, plantain, several wild grasses, malva, horehound, and other cover crop plants.

In uncultivated areas adjoining infested orchards the bugs feed on wild blackberry, mullein, thistle, willow, wild grasses, and plantain. In the early spring they were more numerous on the weeds of the cover crop in the orchard, and then gradually spread to the succulent plants in the adjoining areas. As the weeds in the uncultivated areas dried out, there was a migration back to the fruit trees and the more succulent cover crop in the orchard.

Seasonal History

The adult stink bugs overwinter under trash on the ground. In one pear orchard, after removing the weeds and top litter, an average of 17 adult bugs per square yard of ground surface were collected.

In 1951, spring activity of the adults started about blossom time—early April at Placerville. They fed on and deposited their egg masses on the green cover crop plants.

The overwintering adults, as they come out of hibernation, feed mostly on cover crop plants though some attack the young fruit from the calyx period on. The damage to the fruit is not as great as when attacked by the first summer generation of adults.

The egg masses deposited by the bugs which had come out of hibernation were found mostly on the cover crop, though some eggs were deposited on the foliage of the pear trees. The eggs are small, white at first, barrel-shaped, with a ring of tiny spines around the upper edge. The eggs are deposited, in clusters from seven to 21 per mass, on most any smooth surface. They turn pinkish before hatching. Parasitized eggs usually are grayish to black.

The amount of parasitism of the eggs increases as the season advances. Three, and possibly four, species of egg parasites have been reared and are being identified.

The incubation period of the egg depends on temperature, and takes from five days during the warmest weather to 25 days under cooler conditions.

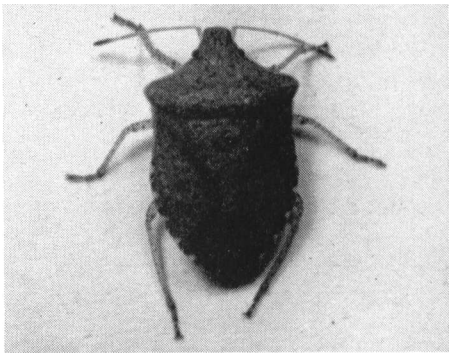
Upon hatching the nymphs cluster on or near the empty egg masses. Feeding of the nymphs from the second to the fifth stage is almost entirely on cover crop plants. Nymphs apparently can not develop on pear fruit or foliage but must find the more succulent food of the cover crop. Fifth instar and adult bugs were found feeding on pear and other fruits.

Adults of the first generation reach maturity late in June through early July. The bugs are active and fly from plant to plant during the warmer part of the day. Many adults migrate from plants outside the orchard to the fruit trees and cover crops. It is this generation which attacks the maturing fruit and causes most of the damage, particularly on fruit of the marginal rows of trees.

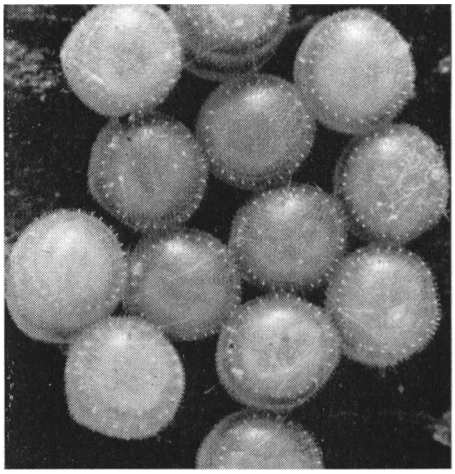
The adults feed around the stem end of the pear and prefer clusters of fruit probably because of the protection afforded. A single bug may injure a large number of fruit as it moves about in the orchard.

Egg masses of the second generation were found from July through early August at Placerville on the cover crop, on the litter covering the ground, and on the foliage of the pear trees.

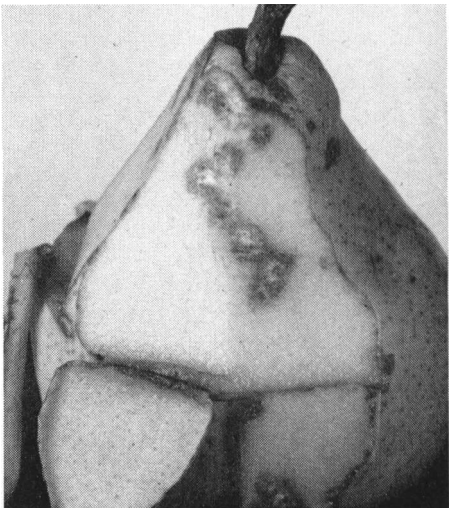
Continued on page 12



Adult stink bug, *Euschistus conspersus* Uhler.



Parasitized egg mass of the consperse stink bug.



Pear fruit with skin removed to show damage resulting from the feeding punctures of the consperse stink bug.

STINK BUG

Continued from page 7

Some nymphs from these eggs matured to adults early in September but the majority of the bugs of this generation was still in the nymphal stage by mid-September. Very few adults or nymphs were found on the few plants which were still succulent outside the orchards. Probably some late injury to the fruit was caused by adults of this second generation. No egg masses were found in September.

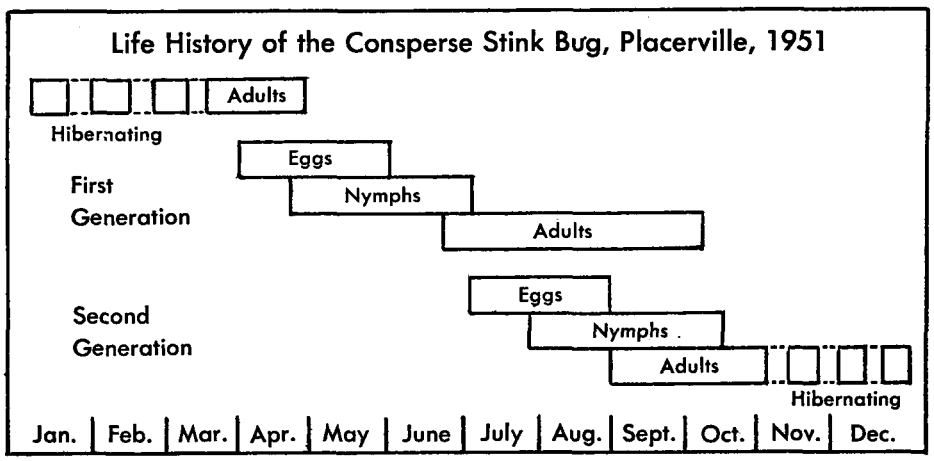
Some adults of the first generation may blend with adults of the second generation to go into hibernation as fall approaches.

The injury on maturing pears does not necessarily show on the skin of the fruit unless attacked severely, in which case a dimpling of the skin surface is observed.

By peeling back the skin of the fruit at the stem end of the pear the white corky injured tissues can be seen. These areas turn brown when exposed to the air, and the injured fruit is unfit for fresh market or canning. Most of the injury is usually found in the region of the neck of the pear but may extend more than half way down from the stem end. The injured tissues from each puncture are usually about ½" deep.

The feeding punctures on apple, apricot, plums, and peaches are generally more obvious than those on pears.

Few of the spray chemicals tested the past season show promise against the stink bug. The control of the pest may ultimately be a combination of chemical control, clean culture in the orchards, and host plant eradication in adjoining areas. It is certain that the latter will play an important part in any control program.



A. D. Borden is Lecturer in Entomology and Entomologist in the Experiment Station, University of California College of Agriculture, Berkeley.

H. F. Madsen is Assistant Agriculturist and Extension Entomologist, University of California College of Agriculture, Berkeley.

WASTE

Continued from page 10

offered the pear molasses lost slightly during the 13-day period. These trials indicate that pear molasses is a satisfactory sheep feed when fed mixed with hay, but does not appear to be suitable for self-feeding at least when the remaining portion of the ration consists of hay only. The pear pulp with 20% pear molasses added appears to be a satisfactory sheep feed.

Palatability Test with Sheep

Ration	Lot I lbs.	Lot II lbs.	Lot III lbs.	Lot IV lbs.
Alfalfa hay	3	3	3	3
Cane molasses	½	1	..	..
Pear molasses	½	..	1	..
Pear pulp with 20% pear molasses	..	..	..	1
Average initial wt. (Apr. 1)	105	102	101	104
Wt. (Apr. 12)	104	109	104	114
Wt. (Apr. 19)	110	109	106	113
Wt. (May 1)	111	108.5	101	114
Average gain per sheep	6	6.5	0.0	10
Average daily gain per sheep	.20	.22	..	.34
Actual average feed per day				
Alfalfa hay	3.0	3.0	2.9	3.0
Cane molasses	0.35	0.74	..	..
Pear molasses	0.35	..	.49	..
Pear pulp with molasses	..	..	..	.92

Pear Pulp and Pear Molasses

From the data on feed required per 100 pounds gain—shown in the lower table on page 10—the replacement value of pear pulp and pear molasses were calculated by the following equations:

Pear Pulp

1. 143 pounds pear pulp equals 141 pounds of beet pulp minus 5 pounds barley, minus 5 pounds oat hay, minus 27 pounds alfalfa hay, minus 2 pounds molasses.
2. Substituting the total digestible nutrient value of the known feeds the result is: 101.5 — (3.95 + 2.5 + 14.0 + 1.1) = 80.0
3. 80.0 ÷ 143 = 56% estimated TDN value of pear pulp, a value about 78% that of molasses dried beet pulp.

Pear Molasses

1. 142 pounds pear molasses = 141 pounds cane molasses minus 5 pounds barley, plus 4 pounds oat hay, plus 38 pounds alfalfa hay.
2. Substituting TDN for the known feeds: 142 pounds pear molasses = 76.2 minus 3.9 plus 2.0 plus 19.75 = 94.0.
3. 94.0 ÷ 142 = 66% estimated TDN or about 120% of cane molasses have 54% TDN.

Using coefficients of digestibility from digestion experiments with cane molasses and applying these to the composition data, the calculated TDN value of pear molasses is about 62%. Thus the figures derived by two procedures are in essential agreement.

Pear pulp compared with beet pulp is high in lignin which is practically indigestible and usually depresses digestibility of the other nutrients. In this case the lignin probably comes largely from some pits of other fruits such as peaches which were included in small quantity and from the pit cells of the pears. This lignin would act as a diluent of other more digestible material whereas in most feeds the lignin encrusted cells probably more or less protect the contents from digestive enzymes.

Comparison of Cane and Pear Molasses Added to Alfalfa Hay

Molasses	Lot I Cane molasses lbs.	Lot II Pear molasses lbs.
Fed on hay		
Average initial wt.	144.9	144.6
Average wool wt. (29th day)	5.6	5.8
Average wt. (59th day)	152.0	149.5
Average gain per head	12.7	10.7
Average daily gain	0.21	0.18
Molasses		
Free choice, 13 days		
Average gain or loss for period	+4.9	—1.7
Average daily consumption of molasses	0.67	0.60

H. R. Guilbert is Professor of Animal Husbandry, University of California College of Agriculture, Davis.

W. C. Weir is Assistant Professor of Animal Husbandry, University of California College of Agriculture, Davis.

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