Control of insect pests is necessary for successful commercial production of holly. Feeding by the holly bud moth and holly leaf miner causes damage to leaves. Scale insects excrete "honeydew" on which a sooty mold develops. Damage by any of these insects makes holly unmarketable.

Not all holly pests are present in all areas of the state or in all orchards. The number and timing of sprays needed will depend on the species present in a given orchard. The holly bud moth and holly leaf miner are the most serious pests. Once these insects become established, annual controls are likely to become needed, especially if there are infested, unsprayed trees nearby. Scale insects may never appear in an orchard. Their spread is erratic.

Identification of Common Holly Pests

Holly Bud Moth

Holly bud moth eggs hatch into caterpillars about the time new growth of holly starts. They feed on the new growth and web together newly developing leaves. The mature caterpillars are grey-green in color and about one-half inch in length. After completing one feeding, larvae drop to the ground to pupate. Adults emerge in late May and June to lay eggs singly on holly leaves and twigs. There is only one generation each year.

Holly Leaf Miner

The holly leaf miner is the larval stage of a fly smaller but not unlike the housefly in appearance. Adults fly eggs under the scale cover in the spring and die, but the scale remains on the twigs to protect the eggs. The eggs hatch in July, and the scale "crawlers" move out into the leaves for the first time. In fall the "crawlers" move into the bark to complete their development.

Soft Scale on Holly

Brown soft scale

Brown soft scale is the most common scale found on holly. The honeydew or excrement it produces is the medium for the development of a sooty mold that renders holly unsightly and unmarketable. Young scale "crawlers" are present under the adult female scale in early July. Because females produce offspring over an extended period, a great variation in sizes of scale will be present on Holly leaves at any one time. There is about one generation per year in Oregon.

Cottony Camellia Scale

This soft scale infests only holly and camellia in Oregon. It may be found in mixed infestations with brown soft scale but is distinguished from it by the presence of white cottony masses which surround the eggs and persist for months after the eggs have hatched. Cottony camellia scale are of uniform size and single time period.

Lecanium Scale

Lecanium scale is a turtle-shaped soft scale. Adults lay eggs under the scale cover in the spring and die, but the scale remains on the twigs to protect the eggs. The eggs hatch in July, and the scale "crawlers" move out into the leaves for the first time. In fall the "crawlers" move into the bark to complete their development.

Armed Scale on Holly

Armored scales are quite different from soft scales in that they have a hard protective shell over the top of the body. The holly scale is the principal armored scale found on holly. The females are about one-eighth inch in diameter, flat, and brown with a small yellow spot in the center. Eggs are present under the scale cover in June and July but some of these may not hatch until August. Scale "crawlers" move to a feeding site on the leaves where they settle down permanently. This is in contrast to the soft scales which remain mobile throughout their lives. Holly scale "crawlers" are most susceptible to control in late summer.

Holly Insect Pest Control

Insecticides may be applied at several times of the year to control holly insects, but the best control is obtained when timing coincides with the most susceptible stage of the pests' development. In most well-managed orchards, a single prebloom spray will be the only application needed unless there are nearby unsprayed trees infested with holly leaf miner.

Holly and holly pests reach similar developmental stages at different times in coastal climates versus Willamette Valley climates at higher elevations, or as one proceeds north in the state. Timing is therefore related
to seasonal development of the holly trees rather than to calendar dates.

**Prebloom spray**

This spray is applied during the relatively short period (10-14 days) between the beginning of leaf growth and the opening of blossoms. This spray will control the holly bud moth and the leaf miner. It must be applied annually where these two insects are present. The seriousness of these pests will depend upon the proximity of unsprayed holly trees outside sprayed orchards. This spray should prevent the establishment of scale insects. Use Diazinon for this spray.

**Postbloom spray**

A postbloom spray may be necessary to obtain satisfactory control of the leaf miner, depending on the degree of effectiveness of previous prebloom sprays as well as uncontrolled sources of leaf miner in the area. The need for a postbloom spray depends upon the individual grower's experience with his own orchard. The postbloom spray will control the brown soft scale and the cottony camellia scale. It is also the spray of choice to control these two scale insects in orchards where holly bud moth and leaf miner are not a problem. Use Diazinon or carbaryl.

**Late summer spray**

This late summer spray (August) will rarely be necessary if there has been a regular program of prebloom spraying. This spray will control lecanium which is in the egg stage at the prebloom spray period but is exposed as "crawlers" in August. It also will kill other soft scales and holly scale which is most easily controlled in late summer. Use Diazinon or carbaryl.

**Insecticide Use Precautions**

The insecticides suggested in this publication are effective when properly timed and applied and are not highly toxic to warm-blooded animals. However, all insecticides should be used with caution. They should not be spilled on skin or clothing. Gloves and protective clothing are recommended. Insecticides should be applied downwind and never in high wind conditions. Children, pets, and livestock should not be permitted in the spray area.

Insecticides should be stored separately from foodstuffs or feeds and held in secure storage. Rinse empty containers two or three times and use the rinse water in the spray operation. Empty, rinsed containers should be rendered unfit for subsequent use and disposed of in such a way that waterways will not be contaminated.

**Insecticides**

<table>
<thead>
<tr>
<th>Insecticides</th>
<th>Amount per 100 gallons of water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diazinon</td>
<td>3 lbs.</td>
</tr>
<tr>
<td>50% wettable powder</td>
<td></td>
</tr>
<tr>
<td>48% emulsifiable</td>
<td></td>
</tr>
<tr>
<td>Carbyral (Sevin)</td>
<td>2 lbs.</td>
</tr>
<tr>
<td>50% wettable powder</td>
<td></td>
</tr>
</tbody>
</table>

Avoid spraying during bloom, for most insecticides are deadly to bees. Since the onset of bloom may vary within orchards because of varietal differences, exposure, or other factors, use Diazinon rather than carbaryl (Sevin) for the prebloom spray. Bees should be protected because berry-set depends on these beneficial insects. Do not move honeybees into orchards prior to bloom; otherwise, they will seek out suitable blooming plants in the area and may ignore holly blossoms later. It is often necessary to cut competitive blooming vegetation before bringing in honeybees. Diazinon and carbaryl (Sevin) are compatible with the fungicide combination Nabin plus zinc sulfate used to control holly diseases. The insecticides suggested have been used for years on holly without evidence of plant injury or objectionable residue at cutting time.

**Insecticides for Holly Insect Control**

Do not experiment with entire orchards. Safe use is intelligent use. Never apply chemicals unless the results are predictable. Testing insures predictability. Follow label directions.

**INSECTICIDES FOR HOLLY INSECT CONTROL**

THIS PUBLICATION IS OUT OF DATE. For most current information: http://extension.oregonstate.edu/catalog