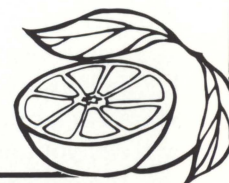


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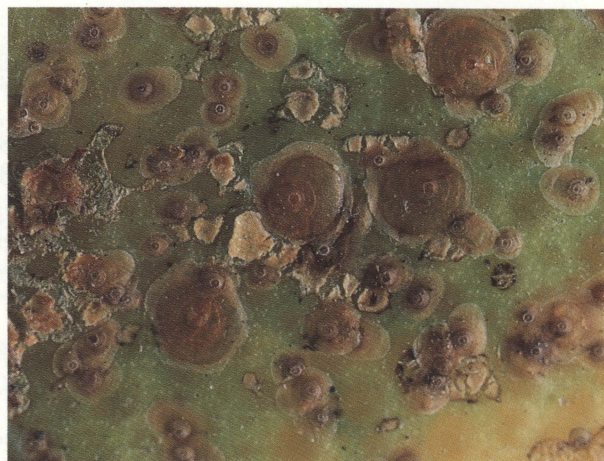
Texas Citrus Scales

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Armored scales and soft scales are potential pests of Texas citrus. Both types extract plant fluids causing leaf discoloration and leaf drop, death of small twigs and failure of fruit to color properly. Biological control has been highly effective for many species of scales.

Armored scales differ from soft scales in several ways. First, the "covering" of armored scales, which is made of body secretions, can be separated from the insect's body. Also, soft scales can secrete honeydew, whereas armored scales do not. The honeydew secreted by soft scales can support growth of black sooty mold, which can affect the photosynthetic ability of leaves. Armored scales attach to a plant surface a few days after hatching, lose their legs and antennae and become stationary, although the males undergo a mobile (flying) stage. In contrast, soft scales are not permanently attached to the tree and remain capable of



California Red Scale

movement throughout their lives. The table below compares a few identifying characteristics for the armored scales of Texas citrus.

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Characteristics for identifying the common armored scales on Texas citrus.

Scale name	Mean length or diameter of scale covering (mm)	Scale covering		Scale body
		Shape	Color	Color
Chaff	1.5	Circular to elongated	Brownish to gray	Purple to off-white
California red	2.0	Circular	Red	Yellow
Florida red	2.0	Circular	Reddish brown	Yellow
Glover	2.3	Long and narrow	Purplish brown	White to purple
Purple	2.3	Oyster (broad and tapering)	Purplish brown	White



California Red Scale

Diaspididae: *Aonidiella aurantii* (Maskell)

Adult females have a circular armored cover, light reddish in color with a dark center. Males have covers that are somewhat elongated. Females can give birth to two or three crawlers per day, averaging 100 to 150 during their lifetime. After birth, crawlers move about the tree canopy in search of a suitable location. As they begin feeding and developing, a cover forms from wax secretions and molted skins.

Several generations occur per year with each requiring approximately 60 days, depending on temperature. California red scales feed on fruit, leaves, twigs and branches with piercing-sucking mouthparts. Plant tissue is damaged as a result of plant fluid removal and injection of toxic substances. California red scales may cause yellowing of leaves, leaf abscission and overall decreased tree growth. Young trees may be killed as a result of California red scale feeding.

Chaff Scale

Diaspididae: *Parlatoria pergandii* (Comstock)

Chaff scales are the most widely distributed and abundant armored scales found on Texas citrus. This scale can cause serious problems to the fruit by virtue of its ability to prevent degreening of the peel surrounding the scale when natural color change occurs, or when degreening is induced. The resultant green spots render the fruit unsuitable for fresh markets.

The armored covering of this insect is oblong or irregularly round and is usually brown to gray in color. Scales are often located in depressions on fruit or along midribs on leaves. The females, eggs

and crawlers are purple. Color and shape of the covering help distinguish this scale from others.

Purple Scale

Diaspididae: *Lepidosaphes beckii* (Newman)

The adult female's covering is brownish purple in color, elongated and usually comma-shaped. The cover of the male is similar in color to the female, but is much shorter and slenderer. The crawlers are very small, less than 0.25 mm, and are pearly white in color. Three or more generations may occur each year.

Purple scales infest citrus leaves, fruit and bark, preferring shady or protected areas. Damage is similar to that caused by chaff scales: feeding results in chlorotic spots followed by leaf and fruit drop. After degreening, green spots may remain on the fruit where scales were present, resulting in fruit quality downgrading or rejection.

Glover Scale

Diaspididae: *Lepidosaphes gloveri* (Packard)

The Glover scale is a pest almost always found in association with purple scale on citrus foliage and fruit. Also known as "long scale," this insect has a dark scale covering that is long and narrow, and not curved in shape as is the purple scale. The rate of reproduction of Glover scale rarely builds up to damaging levels in Texas. Parasitic wasps are often found associated with the insect.

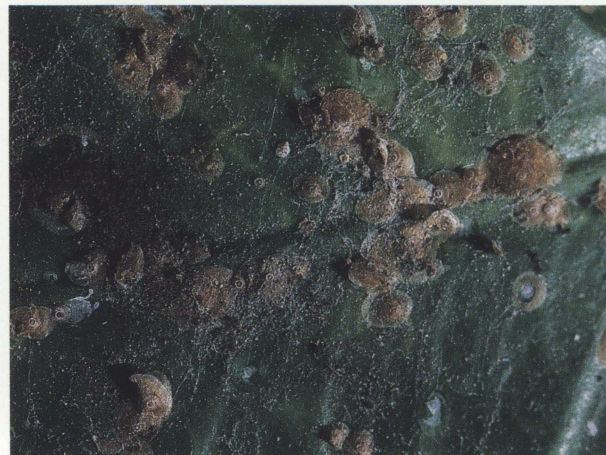
Florida Red Scale

Diaspididae: *Chrysomphalus aonidium* (L.)

The covering of the Florida red scale is dark brown or black with a conspicuous light brown nipple. The adult female's body is yellow. Crawlers



California Red Scale damage



Chaff Scale



Purple Scale

are bright lemon-yellow, oval in shape and very active, being able to move quite a distance before attaching. The life cycle of the Florida red scale can be completed in less than six weeks under warm conditions. Four to six generations occur in Texas per year.

Florida red scales generally cause yellow chlorotic spots when attacking leaves. Yellow spots may also appear at the feeding sites on fruit. The scales appear to prefer fruit over leaves in the summer and fall; therefore, the fruit may be heavily infested while the adjacent leaves are relatively free of Florida red scale. Unlike other armored scales on citrus, Florida red scales restrict feeding to foliage and fruit but do not attack twigs or limbs of citrus trees. Large populations of this scale may result in severe defoliation and decreased fruit production. Scales present on the fruit will render it unmarketable as fresh fruit.

Brown Soft Scale

Coccidae: *Coccus hesperidum* (L.)

This pest is generally the most important soft scale in Texas citrus. Adults are brown to pale yellow, mottled, oval and 2.5 to 4 mm long. Brown soft scales attack leaves, twigs and occasionally, the fruit. They possess a high reproductive potential. Brown soft scales are primarily serious in young groves where trees may die as a result of feeding and from the presence of sooty mold developing from scale infestations. Sooty mold grows on the "honeydew" secretions produced by the scales, resulting in decreased photosynthesis in affected leaves. Problems with brown soft scales have occurred in conjunction with the drift of



Florida Red Scale

parathion from cotton onto citrus. During most years, increases in populations appear in May, but increases vary according to weather conditions, the degree of parasitization and predation by beneficial insects, and the effects of certain pesticides used in the grove or in adjacent crops.

Barnacle Scale

Coccidae: *Ceroplastes cirripediformis* (Comstock)

Barnacle scales are a minor problem in Texas citrus. The six plates on the sides and one on the top distinguish these dirty-white (mottled with brown) wax scales. Additionally, the adult height almost equals its width. These scale insects have been well-controlled by beneficial insects in past years. There is some indication that pesticide-induced population increases can occur with this pest.



Brown Soft Scale



Cottony Cushion Scale

Cottony Cushion Scale

Margarodidae: *Icerya purchasi* (Maskell)

Adults measure about 1.2 mm long and are recognized by the reddish plate in front of their white-fluted egg sacs. These scale insects congregate along the midrib of leaves and on twigs. The young have red to brown bodies with black legs and antennae. Heavy infestations can cause decreased vitality of the tree, thus reducing fruit production.

Pest Occurrence Profile

Pests	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
California Red Scale				x	x	x	x	•	•	x		
Chaff Scale				x	x	x	x	•	•	x		
Purple Scale				x	x	x	x	•	•	x		
Glover Scale				x	x	x	x	•	•	x		
Florida Red Scale				x	x	x	x	•	•	x		
Barnacle Scale					x	x	x	•	•	•		
Brown Soft Scale				x	x	x	x	x	•	•	•	x

x Period of Normal Occurrence

• Damage Most Likely

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