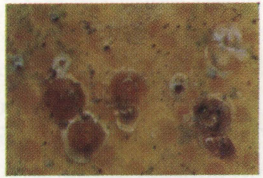


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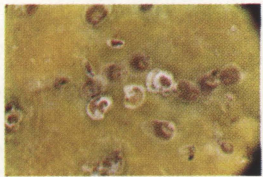


Brown Soft Scale



California Red Scale

TEXAS GUIDE



Chaff Scale

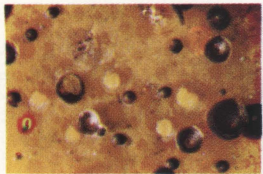
FOR CONTROLLING *and Diseases* PESTS ON CITRUS



Purple Scale



Glover Scales and
Purple Scales (top)



Florida Red Scale

TEXAS GUIDE FOR CONTROLLING PESTS ON CITRUS

James A. Deer*

Natural populations of beneficial insects play an important role in the control of certain citrus pests in Texas. However, commercial artificial introduction of predaceous or parasitic insects in the state has not significantly reduced harmful pest infestations. Effective and economical control of citrus pests depends on proper selection and timely chemical applications.

CHEMICAL APPLICATION

Dusts

Dust trees when the air is calm and the temperature is 75° to 90° F. Use 50 to 80 pounds of dust per acre on mature trees. Blow the dust from two sides. The degree of control is determined by the completeness of coverage and the type of pesticide used.

Sprays

Spraying is more effective than dusting and is the only practical control method for scale insects. Make post-bloom application on the basis of pests in the grove.

Spraying is costly, and thorough coverage of all tree parts is necessary. In dilute spraying, apply 1 gallon of liquid per foot of tree height. If concentrate spraying is used, be sure that the same amount of actual pesticide per acre is applied. Air blast sprayers should be pulled at a maximum speed of 1 mph for scale control. Spreader-stickers may be added to spray mixtures of wettable powders to prolong their effectiveness in case of rain soon after application.

Oils

Improper use of oils has resulted in adverse effects to trees, such as excessive leaf drop, twig dieback and reduction in fruit sugars. Tangerines and tangelos are more susceptible to oil damage than grapefruit and oranges; reduced oil rates should be used on these types of citrus.

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To properly mix oils in a spray tank, add petroleum oils when the water level reaches the agitator shaft. Add other chemicals when the tank is two-thirds to three-fourths full. Continue agitation until the tank is empty to prevent separation of petroleum oils and other chemicals. *Do not apply oils to drouth-stricken trees.* Do not use oil when relative humidity is 30 percent or lower. Oil sprays applied during the fall may delay grapefruit maturity, interfere with coloring of early harvested fruit and increase cold injury. *Do not apply oil and sulfur in combination or within 30 days of each other.*

Table 1. Gallons of oil spray concentrate per 500 gallons of spray mixture.

Percent shown on label	Gallons of actual oil needed to make	
	1% mixture	1.6% mixture
97-99	5	8
80-84	6	10

Table 2. Recommended specifications for citrus spray oils.

50% distillation temperature	440° ± 10°
Temperature spread for 10%-90% distilled	Max. 80
Unulfonatable residue	Min. 92%
Pour point	Max. +20

PRECAUTIONS WHEN USING CHEMICALS

Insecticides are poisonous and should be used with caution. Keep pesticides in the original containers and store them out of the reach of children, irresponsible persons and livestock. Empty pesticide containers and "left-over" spray materials should be disposed of promptly and properly. Some materials, especially the organophosphorous-type compounds, are extremely toxic; protective clothing and equipment should be worn when these are used.

Follow closely all precautions and safety rules on the label. Avoid pesticide drift to adjoining crops. Observe closely the minimum waiting period between application and harvest to avoid prohibited pesticidal residue levels in the harvested fruit and potential poisoning of picking crews.

Indiscriminate use of insecticides or acaricides is wasteful and may lead to increases in pest insect populations if the natural enemy balance is seriously disturbed. Do not apply chemicals unless they are needed.

Heavy infestations of false spider mites may occur following repeated use of certain organophosphate materials.

Pollination by honey bees and native bees is required for maximum production of certain plant varieties. Every effort should be made to select materials, time applications and use recommended rates to avoid a reduction in pollinator populations.

Specific information on the selection, application method and timing of the treatment that will most adequately meet individual grove requirements is available from your local county Extension agent.

APHIDS

Aphids occasionally cause damage before and during the bloom period on oranges, tangerines or tangelos. Only affected trees should be treated. Build-ups will commonly be noted on new foliage. Damage is more likely to occur on young trees. Malathion, demeton, azinphosmethyl (Guthion[®]), phosphamidon, dimethoate and Meta-Systox-R[®] may be used effectively according to manufacturers' directions. More than one application may be required.

ANTS

Ants that infest citrus trees may interfere with parasites and predators which feed on certain pests. Also, ants may spread insects which produce the "honeydew" on which sooty mold develops. Controlling ants may reduce spray costs by allowing natural predators and parasites to reduce pest populations. As of July 1, 1976, the use of 10 percent heptachlor or 10 percent chlordane dusts or granules for individual mound treatment has been suspended by the U.S. Environmental Protection Agency. Agency actions to suspend the use of chlordane and heptachlor for ant control in citrus occurred on December 24, 1975. Chlordane or heptachlor produced before July 29, 1975 and packaged in containers bearing a label indicating a use for ant control in citrus may be used in accordance with label instructions until the supply is exhausted. Currently there are no suitable alternative ant control pesticides available.

Texas leaf-cutting ants sometimes defoliate citrus trees. These ants can be controlled with methyl bromide if the colonies are not near trees. Mirex 450® cutting ant bait may be used at any location and is very satisfactory.

MEALYBUGS

Mealybugs, which have reached damaging proportions in some sections during recent years, present unusual control problems. This pest sets up between fruit, under buttons and in other sheltered locations, where it excretes large amounts of honeydew. The honeydew causes thick coatings of sooty mold to build up. The developing mealybug remains under these coatings, making it difficult to control with insecticides. It is most vulnerable in the spring when populations are low and the crawlers and early stages are exposed.

NUTRITIONAL SPRAYS

Nutritional sprays are compatible with most of the pesticides recommended in this guide. Do not use in combination with petroleum oils. Nutritional sprays are not generally recommended unless a specific problem is apparent. For additional information see "Guide for Citrus Production in the Lower Rio Grande Valley," or contact your local county Extension agent.

Table 3. Concentrations of pesticide materials.

Material	Percent	Type*	Pounds per gallon
Chlorobenzilate	45.5	E.C.	4
Ethion	46.5	E.C.	4
Kelthane	42	E.C.	4
Delnav	47	E.C.	4
Guthion	22.2	E.C.	2
Malathion	56	E.C.	5
Trithion	79.1	E.C.	8
Systox	26.2	E.C.	2
Meta-Systox-R	25	E.C.	
Petroleum oils			
Neutral copper			
Sevin	80	W.P.	
Zineb	75	W.P.	
Sulfur		W.P.	
Cygon	30.5	E.C.	2.67
Supracide	24.4	E.C.	2

*E.C.—emulsifiable concentrate; W.P.—wetttable powder.

Table 4. Spray program.

Post-Bloom Application (Apply before fruit are ½ inch in diameter)				
Pest	Pesticides (listed alphabetically)	Concentrate per 500 gal. water	Application to harvest interval (days)	Remarks
Rust Mite	Carzol®	10 oz.	7	Carzol may cause increase in certain armored scale populations. Not labeled for limes or tangelos.
	Chlorobenzilate	1½ to 2 pt.	0	Do not apply Delnav within 90 days of previous application. May cause armored scale build-up. Do not repeat within 4 months on lemons or limes.
	Delnav® (dioxathion)	2 qt.	0	
	Ethion®	1¾ pt.	21	Do not apply Ethion within 90 days of previous application.
	Guthion® (azinphosmethyl)	1 to 1½ gal.	7 or 28	Seven days to harvest with one application of Guthion, 28 days with two. Limited to two applications per fruit year.
	Kelthane® (dicofol)	2 qt.	7	Do not apply to grapefruit after July 1. Do not use sulfur with oil or within 30 days of oil spray. Zineb is unsatisfactory under heavy infestations.
	Trithion® (carbophenothion)	1¾ pt.	0	
Wettable sulfur	25 lb.	0		
Zineb	5 lb.	0		
Texas Citrus Mite	Delnav® (dioxathion)	2 qt.	0	Do not apply Delnav within 90 days of previous application. May cause armored scale build-up. Do not repeat within 4 months on lemons and limes.
	Ethion®	1¾ pt.	21	Do not apply Ethion within 90 days of previous application.
	Guthion® (azinphosmethyl)	1 gal.	7 or 28	Seven days to harvest with one application of Guthion, 28 days with two. Limited to two applications per fruit year.
	Kelthane® Trithion® (carbophenothion)	5 pt. 1¾ pt.	7 0	Do not apply to grapefruit after July 1.
False Spider Mite	Chlorobenzilate	1½ to 2 pt.	0	
	Kelthane® (dicofol)	2 qt.	7	
	Wettable sulfur	25 lb.	0	
Mealybugs	Guthion® (azinphosmethyl)	1 gal.	7 or 28	Seven days to harvest with one application of Guthion, 28 days with two. Limited to two applications per fruit year.
Summer Application				
Armored Scale	Supracide® (methidathion)	5 to 8 pt.	14	Only for oranges and grapefruit.
	Oil	8 gal.	0	Do not use oil if humidity is below 30 percent.
Rust Mites Texas Citrus Mites False Spider Mites	Use same materials as post-bloom.			Do not use Trithion after July 1.
Brown Soft Scale	Oil + Sevin® (See Table 1 if other than 97 to 99 percent oil is used.)	8 gal. + 1½ to 3 lb.	5	Do not use oil if humidity is below 30 percent. Do not use Trithion after July 1.
	Guthion® E.C. (azinphosmethyl)	1 gal.	7 or 28	Do not use Guthion E.C. with oil. Use limited to two applications per fruit year.
Fall Application				
Rust Mites Texas Citrus Mites False Spider Mites	Use same materials as post-bloom.			
Armored Scales	Control only under emergency conditions.			Use of oil delays degreening. Do not apply within 30 to 60 days of harvest. Do not use oil if humidity is below 30 percent.
Brown Soft Scale	Guthion®	1 gal.	7 or 28	Use same precautions as with oil.
	Sevin®	5 lb.	5	

Table 5. Dust program.

Pest	Pesticides (listed alphabetically)	Concentrate per 500 gal. water	Application to harvest interval (days)	Remarks
Rust Mites Texas Citrus Mites	Use 50 to 80 lb. sulfur dust.			

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

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