

# COMMERCIAL PECAN SPRAY GUIDE FOR INSECTS AND DISEASES

Will Hudson, Extension Entomologist and Paul Bertrand, Plant Pathologist

## FUNGICIDE SCHEDULE

TIME OF APPLICATION	PEST	PESTICIDE	AMOUNT PER ACRE	INSTRUCTIONS AND REMARKS
<b>PREPOLLINATION</b>				
PREPOLLINATION SPRAYS ARE CRITICAL FOR CONTROL OF EARLY SCAB AND DOWNY SPOT ON <u>ALL</u> PECAN VARIETIES.				
Apply every 10 - 14 days from bud break through nut set (mid-May or casebearer time)	Scab Downy Spot	Enable	4 oz.	DO NOT USE ELAST ON MOORE, VAN DEMAN, BARTON OR SHAWANEE. Do not use Elast with foliar zinc treatments. Do not use any surfactant with Elast. Do not use Elast full season.  Each co-pack is intended to treat 5 acres.  DO NOT use more than three applications of Headline or Stratego.  If using Enable alone prepollination, do not use tank mixes of Super-Tin with either Orbit or Enable postpollination.  Each Co-Pack is intended to treat 5 acres.  If using Enable or Propimax alone prepollination, do not use mixes containing either Orbit, Enable or Propimax postpollination.  <b>DO NOT</b> use any surfactant with this mix.
		+	+	
	Elast F	2.5 oz.		
		Orbit 45WP / Super-Tin 80WP Co-Pack	-----	
		or		
		Headline	6-7 oz.	
		or		
		Stratego	10 oz.	
		Enable 2F	8 oz.	
		or		
	Enable/Agri Tin Co-Pack	-----		
	or			
	Propimax EC	4 - 6 oz.		
	or			
	TPTH <sup>1</sup>	½ rate <sup>2</sup>		
	+	+		
	Elast 400F <sup>3</sup>	25 oz.		
FUNGICIDE SPRAYS IN JUNE AND JULY ARE CRITICAL FOR CROP PROTECTION. AN APPLICATION THE FIRST WEEK OF AUGUST WILL PROVIDE PROTECTION (14 - 21 DAYS) UNTIL SHELL HARDENING IN MOST VARIETIES MOST SEASONS.				
In orchards where any nuts have any amount of scab by mid-June or in orchards where 10% or mor of the nuts have any amount of scab by early July, the following measures should be taken.				
<ol style="list-style-type: none"> <li>1. The interval between fungicide sprays should not exceed 14 days until shell hardening.</li> <li>2. On varieties with a summer growth flush, the spray interval should be closed in so that no more than 10 days pass from the onset of the growth flush until a fungicide spray is made. Desirables begin a growth flush the last week in June in most of southwest Georgia.</li> <li>3. If the 5-day forecast shows a high probability of a tropical depression or frontal system that will bring several days of rain, close in the interval to have as much acreage as possible treated within 7 days of the storm.</li> </ol>				

<sup>1</sup>TPTH is available as Super-Tin 80WP and Agri Tin 80WP.

<sup>2</sup>The half rate of TPTH is based on the number of undivided soluble packs that will give a minimum of 3.75 oz. of Super-Tin 80WP or Agri Tin 80WP per acre . DO NOT use less than 3.75 oz. of Super-Tin or Agri Tin in this tank mix.

<sup>3</sup>Elast 400F is a flowable formulation of Dodine.

**COMMERCIAL PECAN SPRAY GUIDE FOR INSECTS AND DISEASES (continued)**

TIME OF APPLICATION	PEST	PESTICIDE	AMOUNT PER ACRE	INSTRUCTIONS AND REMARKS
<b>POST POLLINATION</b>				
Nut set to shell hardening apply every 10-21 days as needed, or by Au-Pecan.	Scab	TPTH	7.5 oz.	
		or		
		Elast 400F	50 oz.	<b>DO NOT</b> use any surfactant with Elast. <b>DO NOT</b> use Elast full season.
		or		
		TPTH +	½ rate +	<b>DO NOT</b> use any surfactant with this mix.
		Elast 400F	25 oz.	
Scab, Powdery Mildew		Enable/Agri Tin Co-Pack	-----	<b>DO NOT</b> use Orbit/Super-Tin, Enable/Agri Tin or Enable + Elast if either Enable or Propimax was used alone pre-pollination.
		or		
		Orbit/Super-Tin Co-Pack	-----	For optimal control of nut scab, mix an additional package of TPTH with the Orbit/Super-Tin co-pack. When used with Orbit, the minimum amount of TPTH should be 5 oz per acre.
		or		
		Enable 2F +	4 oz. +	<b>DO NOT</b> use any surfactant with this mix.
		Elast 400F <sup>2</sup>	25 oz.	
		or		
		Stratego <sup>3</sup>	10 oz.	<b>DO NOT</b> make more than three total applications of Stratego and Headline.
Powdery Mildew		Sulfur	4-6 lb.	If powdery mildew begins to develop combine sulfur with fungicide used for scab control. Do not add sulfur to Elast.
Zonate Leafspot		TPTH	half-full rate	If extended wet periods indicate possibility of zonate leaf spot, use Topsin plus a full-rate of TPTH. In groves where scab fungus resistance to Topsin does not occur, use a half-rate of TPTH with Topsin. <b>DO NOT USE TOPSIN ALONE.</b>
		+		
		Topsin-M 70WSB	1 lb.	
<b>POST POLLINATION</b>				
After shell hardening.	FUNGICIDE COVERAGE FOR CROP PROTECTION IS NECESSARY TO SHELL HARDENING. BEGINNING IN EARLY AUGUST MONITOR FOR SHELL HARDENING AND ADJUST FUNGICIDE NEEDS ACCORDINGLY. Leaf diseases can occur in August and September. These can be treated as needed with the aid of an effective scouting program.			
Leaf Disease Scab		Enable/AgriTin Co-Pack	-----	
		or		
		Orbit/Super-Tin Co-Pack	-----	
Zonate Leafspot Leaf Disease		Topsin-M 70WSB	1 lb.	<b>DO NOT USE TOPSIN IN CONSECUTIVE APPLICATIONS FOR LEAF DISEASE CONTROL.</b>
Phytophthora Shuck & Kernel Rot		TPTH	Full rate (7.5 oz.)	A treatment is advised in orchards with a history of this problem (primarily Houston, Peach, and Macon Counties) when wet weather and temperatures <86°F occur between shell hardening and shuck split.

<sup>1</sup>TPTH is available as Super-Tin 80WP and Agri Tin 80WP.

<sup>2</sup>Elast 400F is a flowable formulation of Dodine.

<sup>3</sup>Do not make more than three consecutive applications of Stratego. Do not use Stratego postpollination if Headline was used prepollination.

# COMMERCIAL PECAN INSECT CONTROL (BEARING TREES)

Will Hudson, Extension Entomologist

## Orchard Survey Procedures

Insect and mite infestation levels should be estimated at least weekly based on thorough orchard sampling. Sample trees in all segments of each orchard. A good method is to sample every fourth tree in every fourth tree row (about 10% of the trees). Sample each major cultivar represented in the orchard. Sample a minimum of 10 terminals per tree. Check all the compound leaves and the nut clusters on each terminal. Check as high in the tree as possible. Foliar pest counts should be made on compound leaves surrounding the nut clusters. Nut clusters should be inspected carefully for the presence of pests or damage. Hickory shuckworm and pecan weevil populations should be monitored by survey traps and knockdown sprays or a combination of these methods.

PESTICIDE	AMOUNT PER ACRE	PEST, TIMING AND REMARKS
<b>PHYLLOXERA</b>		
Endosulfan 3EC (Thiodan, Phaser) or chlorpyrifos 4E (Lorsban, Chlorphos)	1 qt.	Treat trees with a recent history of heavy infestation and surrounding trees. Apply at budbreak with the first prepollination spray. A second prepollination application may be required.
Provado 1.6F	2 pts.	
Provado 1.6F	3.5 ozs.	
<b>SPITTLEBUGS</b>		
Provado 1.6F	3.5 ozs.	Spittlebug infestations are easily recognized by the white, frothy masses on terminals or nut clusters. Definite thresholds have not been established. Chlorpyrifos is also labelled.
<b>PECAN NUT CASEBEARER</b>		
chlorpyrifos 4E (Lorsban, Chlorphos) or Endosulfan 3EC (Thiodan, Phaser) or Imidan 70WP or Intrepid 2F or Spintor 2SC or Dimiln 2L	1 ½ pts.  1 qt.  1 ½ lbs.  4 to 8 ozs.  4 to 10 ozs.  8-16 ozs.	Light infestations causing occasional damage do not require control in normal crop years. The most serious damage usually occurs in mid May. <u>Adult emergence should be monitored with pheromone traps.</u> Place traps in orchards by mid April. Begin sampling for nut casebearer in the first week of May. Pay particular attention to orchards not under a spray program the preceding year and orchards with a recent history of nut casebearer problems. <u>Spray when 3% of the nut clusters have casebearer eggs and/or damage.</u> Try to time sprays to stop injury before more than one nut per cluster is infested. Make a second application one week later if infestations are heavy. Additional applications may also be needed for second generation nut casebearers in mid June. Several pyrethroid insecticides, including Ammo, Asana, and Fury are labeled for nut casebearer control. It is suggested that they not be used for control of first generation nut casebearers (in May) to avoid aphid exposure to these materials and to conserve beneficial insect populations. (see Special Considerations section.)
<b>MITES</b>		
Kelthane MF or Dicofol 4E or Vendex 50W	1 ½ qts.  1-1 ½ qts.  1 lb.	Mites, especially the pecan leaf scorch mite, are normally late season pests. Mite damage appears as brown, scorched areas on the undersides of leaflets. Scorched areas begin at the leaflet midribs then spread out toward leaflet margins. Mites often build up on low limbs in the shaded, interior portions of trees then spread rapidly up and out. <u>Treat when mites and damage are evident on foliage of low limbs (25% of the leaf samples).</u> For heavy infestations, repeat the application in 5 to 7 days. For best results, Vendex should be applied before mites and damage are heavy.

COMMERCIAL PECAN INSECT CONTROL (continued)

PESTICIDE	AMOUNT PER ACRE	PEST, TIMING AND REMARKS
<b>YELLOW APHIDS</b>		
<u>FOLIAR APPLICATIONS</u>		
Asana XL (.66EC) or Ammo 2.5EC or Mustang or one of the above pyrethroids plus (+)	4.8 to 14.5 fl. oz. 3 to 5 fl. oz. 2.82 to 4.3 fl. oz.	Yellow aphids may be present in orchards throughout the growing season. Populations are usually highest in April-May and again in August-September. In early season, do not treat yellow aphids if they are the only insect problem. Rely on beneficial insects to suppress early season populations. <u>After July 1</u> , treat if numbers exceed an average of <u>20 compound leaf</u> based on a thorough random sample of terminals from trees throughout each orchard. In prolonged dry periods, lower, chronic aphid populations may require treatment to prevent the build-up of unacceptable levels of honeydew and sooty mold. WEEKLY SCOUTING IS VERY IMPORTANT IN TIMING APHID SPRAYS, ESPECIALLY IN LATE SEASON.
chlorpyrifos 4E (Lorsban, Chlorphos)	1½ pts.	Where pyrethroids (Ammo, Asana, Fury) have been used extensively in the past, it will probably be necessary to combine them with an organophosphate material such as chlorpyrifos.
DiSyston 8EC or Provado 1.6F	¾ pt. 3.5 to 7 fl. oz.	It is suggested that pyrethroid materials (Asana, Ammo, Fury) not be used, alone or in combination, in early- or mid-season applications. It is also suggested that pyrethroid materials not be used in more than two consecutive sprays at any time (See Special Considerations Section). Where rate ranges are given, use the lowest effective rate.
pymetrozine (Fulfill) or thiamethoxam (Centric)	4.0 oz. 2.0 to 2.5 oz.	Two Provado applications at 10 - 14 day intervals may be required. Allow 10 or more days between applications, Scout orchards and retreat if necessary. Addition of an organophosphate insecticide to low rate Provado sprays will assist in black aphid control and resistance management. It is also suggested that foliar applications of Provado not be used in orchards receiving a soil application of Admire.
<u>SYSTEMIC (SOIL) APPLICATIONS</u>		
Temik 15G - <u>Dripline Band</u> <u>Application</u> ( <u>Single Early Season</u> <u>Application</u> -before May 15) or ( <u>Split Application</u> )	33 to 50 lbs. 17 to 33 lbs.	Temik is a granular systemic insecticide for soil application. It may be applied in a single application before nut set (May 15), or in a split application with the first application prior to nut set followed by a second application in mid summer (not later than July 15). It should be applied in a 4- to 6- foot band along the dripline on both sides of each tree row. Spread the granules uniformly and immediately work into the soil <u>or</u> shank granules 2 to 3 inches into the soil on 12-inch centers. If a single application is used, it should be made in the second week of May. If split applications are used, the first should be made in early May and the second in early July.
Application 1. (Prior to May 15) + Application 2. (Prior to July 15) or	17 to 20 lbs.	Apply by shanking into soil adjacent to emitters of the drip irrigation lines (within 6-10 inches of line). Do not apply after July 15.
Temik 15G - <u>Emitter</u> <u>Adjacent</u> <u>Application</u> ( <u>Single Application</u> May 1 to July 15)	17 lbs.	Note: It is important to get the material into the areas wetted by the emitters.
(Split Application) 1. During Period May 1 - May 20 - followed by - 2. Mid-Season (before July 15)	17 lbs. + 8 lbs.	
or Admire 2F	16 to 32 fl. oz.	Admire can be applied through a trickle irrigation system, as an emitter spot application, or as a shanked-in emitter adjacent application. <u>See label for complete details</u>
		<b>Apply Admire between May 15 and July 15.</b> Apply only to orchards where trickle irrigation has been established for at least five years.

**COMMERCIAL PECAN INSECT CONTROL (continued)**

PESTICIDE	AMOUNT PER ACRE	PEST, TIMING AND REMARKS
<b>BLACK PECAN APHID</b>		
SAME INSECTICIDES AS FOR YELLOW APHIDS or Dimethoate 4EC or Imidan 70WP or Provado 1.6F or pymetrozine (Fulfill) or thiamethoxam (Centric)	2/3 pt. 2 lbs. 7 to 14 fl. oz. 4 oz. 2.0 to 2.5 oz.	Black pecan aphids may cause damage as early as May but are usually a serious problem only in late season. Damage appears as yellow spots on leaflets. Damaged spots later turn brown and 2 to 4 damaged spots per leaflet can cause leaflet drop. Carefully check <u>all</u> compound leaves on 10 terminals per tree, on at least 10 trees per orchard for the presence of black pecan aphids. Prior to July 1, treat if 25% of terminals have 2 or more black aphids. After July 1, treat if 15% of terminals have more than one black aphid. Concentrate checks on susceptible cultivars such as Schley, Sumner and Gloria Grande. Be sure to check <u>all</u> compound leaves on each terminal examined.  (see remarks about Provado under yellow aphids.)
<b>Note:</b> Organophosphate insecticides such as Dimethoate, Lorsban, Imidan or DiSyston generally are more effective on black pecan aphids.		
<b>HICKORY SHUCKWORM</b>		
Intrepid 2F or Dimilin 2L	4 to 8 ozs. 8-16 ozs.	Shuckworms are active throughout the season but do not cause significant damage until June or later. Prior to shell hardening, larval feeding causes nuts to drop. After shells harden, feeding causes shucks to stick to the shells, reducing quality. If blacklight traps are used for monitoring, place two BLTS per orchard. Operate the traps at least 3 nights per week. <u>Treat when 7 or more moths are caught in any one trap or when 4 or more moths are caught in any trap for three consecutive trapping periods</u> Pheromone traps for hickory shuckworm are also being marketed. If pheromone traps are used, follow the directions which accompany the traps. If traps are not used and orchards have a history of shuckworm infestation, a spray should be applied in early June. In early August, 2 to 3 additional sprays should be applied. Initiate August sprays at half-shell hardening and repeat at 2 week intervals until shuck split if shuckworm activity continues. Chlorpyrifos and pyrethroids (Asana, Ambush, Mustang, etc.) applied for other pests will also control shuckworm. It is not necessary to spray in August if pecan weevil controls are applied. Please <u>note the Special Considerations section regarding the use of pyrethroid materials (Asana, Ammo and Cymbush).</u>
<b>PECAN WEEVIL</b>		
Carbaryl 80S (Sevin) or Carbaryl 4F (Sevin XLR) or Mustang	3 lbs. 4 to 5 pts. 2.82 to 4.26 oz.	Pecan weevil emergence may extend from July into October. Peak emergence is normally between August 10 and September 20. Emergence should be monitored in each infested grove with traps, knockdown sprays or a combination of these methods. Trees known to have a recent history of weevil problems should be selected for monitoring. If excessive nut drop results from pecan weevil feeding punctures before pecan shells begin to harden, spray at once. After pecan shells harden and nuts reach the "dough" or "gel" stage, treat when weevils emerge (especially following rains) and continue at 7 to 10 day intervals until emergence stops. <b>APHID OR MITE POPULATIONS MAY BUILD UP WHERE CARBARYL IS USED.</b> If these pests become a problem, apply aphicides or miticides as previously directed. It may be advisable to include an organophosphate material with Sevin sprays, especially if black pecan aphids are present. <b>Note:</b> the pyrethroids, (Asana, Ammo, Fury) as well as Imidan and Pennncap-M are labeled for pecan weevil control. If these materials are used for weevils, they can be expected to be most effective where weevil populations are low. They may be adequate to prevent feeding injury from weevils emerging prior to shell hardening but their use could be risky under heavy weevil pressure after nuts reach the gel stage and are subject to weevil oviposition. (See Special Considerations section).
<b>KERNAL FEEDING HEMIPTERANS</b>  (Stink bugs and Plant bugs)		
A complex of true bugs (stink bugs and plant bugs) attack pecan. They may be present in orchards all year but normally cause their most serious injury from late August through September. Prior to shell hardening, feeding injury causes nut drop. After shell hardening, their feeding causes black, bitter spots on the kernels, reducing quality. They can continue to feed, through the hardened shells, until nuts are harvested. The presence and numbers of stink bugs and plant bugs should be noted in surveys throughout the season. Special attention should be paid to the true bugs in late-season orchard surveys. Also, check for stinkbugs and plant bugs in pecan weevil knockdown sprays. It may be necessary to continue knockdown sprays to check for stink bugs even after pecan weevil emergence has ceased. <u>Treat when 1 stink bug is found per 40 terminals OR when 5 or more are found per knockdown spray on a sheet covering 20% of the area under a tree.</u> Sprays for these insects are difficult to time properly because the bugs move in and out of orchards. Close checking is required to detect damaging populations. No materials have consistently given excellent stink bug control, possibly due to the difficulty in timing sprays. <b>Pennncap-M</b> (2 to 4 pts./A) is labeled for stink bug or plant bug control. Ammo at 0.06 to 0.075 lb. active ingredient (a.i.) per acre and Imidan 70WSP at 2 lbs./acre have also given results. Please note the pre-harvest use restrictions of the products.		

**FIRE ANTS**

Fire ants have been known to protect pecan aphids by destroying beneficial insects in pecan orchards. Fire ants should be controlled or at least kept out of pecan trees. Lorsban 4E at 2 pts./Acre as a ground spray is labeled for fire ant control.

**OTHER INSECT PESTS**

Pests such as pecan leaf casebearer, leaf miners, walnut caterpillar, fall webworm, pecan budmoth, nut curculio, shoot curculio, *Prionus* root borers and others may occasionally cause economic injury to pecan. Growers should be able to identify these pests and their damage. Color photographs of all pecan pests and their injury can be found in *Pecan Pest Management in the Southeast* (Univ. of Ga. Ext. Ser. Misc. Pub. No. 176), in the *Pecan Growers Handbook*. The publication is available at \$20.00 per copy from: Ag. Business Office, Conner Hall, The University of Georgia, Athens GA 30602. Specific controls for occasional pests not covered in this spray guide can be obtained from your local county agent.

**SPECIAL CONSIDERATIONS**

Alternative Formulations. Some pesticides listed in this publication are available in formulations other than the ones listed. If different formulations are used, apply an equivalent amount of actual toxicant per acre.

Pest Resistance and Chemical Use. The aphids and mites which attack pecan have demonstrated the ability to become resistant to insecticides applied for their control. The rate at which this resistance develops depends upon the chemical used, the frequency of use, the duration of use, and the rates used. Aphid and mite exposure to effective materials should be minimized to prolong the effective life of the chemicals. It is suggested that no insecticide be applied until it is absolutely necessary (this can be determined by thorough sampling) and that chemicals be alternated as much as possible. Minimizing pest exposure is especially important when using the PYRETHROID MATERIALS (Asana, Ammo, Fury). Pecan aphids have been shown to become resistant to pyrethroids very rapidly. It is suggested that pyrethroids be used: (1) only in late season (to lessen the number of aphid generations exposed); (2) only if other materials fail to adequately suppress aphids or other pests; (3) in combination with an organophosphate material; (4) in no more than two consecutive sprays, and; (5) not after the third week of September.

Supplemental Control Measures. Beneficial insects such as lady beetles and lacewings provide natural assistance in suppressing aphid and mite populations. Beneficials are of particular value in early season. Elimination of unneded early-season insecticide sprays conserves existing populations of beneficial insects and reduces the potential for severe aphid problems later in the season. The planting of leguminous cover crops in tree-row middles promotes the build up and retention of lady beetle populations in orchards. Crimson clover and Hairy vetch appear to be two of the best ground covers. If leguminous ground covers are planted, a herbicide strip should be maintained down each tree row and special attention should be paid to the increased water requirements that are likely to exist. Extraneous plant material resulting from the heavy growth of legumes must be removed or broken down prior to harvest or implementation of a program of row middle vegetation suppression (see Weed Control section).

# COMMERCIAL PECAN INSECT AND DISEASE SPRAY GUIDE FOR NON-BEARING TREES

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## FOLIAR SPRAYS

TIME OF APPLICATION	PEST	PESTICIDE	AMOUNT PER ACRE	INSTRUCTIONS AND REMARKS
<b>Bud Break</b> when first buds open.	Foliar disease	Enable 2F + TPTH or Orbit/Super-Tin (Co-Pack) +	7.5 oz.  4 oz. +	Spray sufficient gallonage for thorough coverage.
	Pecan bud moth	chlорpyrifos (Chlorphos, Lorsban)	½ rate  1-2 pts.	
	Hickory shoot curculio	Endosulfan 3EC (Thiodan, Phaser) or chlорpyrifos (Lorsban, chlorphos)	1 qt.  1 ½ -2 pts.	
<b>Cover Sprays</b> three weeks after bud-break spray and every 4-6 weeks as needed.	Foliar disease	Fungicide +	See above	Spray sufficient gallonage for thorough coverage.
	Pecan bud moth	chlорpyrifos (Chlorphos, Lorsban) or Endosulfan 3EC (Thiodan, Phaser) or Imidan 70WSP or Dimilin 2L	1-2 pts.  1 qt.  1 ½ lb. 8-16 ozs.	

## SYSTEMIC (TEMIK\*) APPLICATION

TIME OF APPLICATION	PEST	PESTICIDE	AMOUNT PER TREE	INSTRUCTIONS AND REMARKS
One to two weeks before bud break.	Pecan bud moth Pecan leaf phylloxera (Suppression)	Temik* 15G	5 to 20 ozs.	For newly transplanted trees, 1 to 5 years old. Apply as a side-dress to individual trees. Spread granules uniformly around trees and work into the soil to a depth of 2-3 inches.
During bud break or April 15 - May 15.	Aphids Mites			Use lower rates for younger trees.
* Temik is a highly toxic material and should be used ONLY by trained commercial applicators. Do not store or use Temik in or around the home or home garden.				

## PECAN CHEMICALS: PRE-HARVEST INTERVALS AND OTHER RESTRICTIONS

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CHEMICAL	INTERVAL BETWEEN LAST APPLICATION AND HARVEST AND OTHER RESTRICTIONS
Admire	Apply to soil between May 15 and July 15. Apply only to orchards which have been established on trickle irrigation for at least 5 years. Do not apply more than 32 fl. oz. of Admire per acre per season as a soil application. Do not apply more than 0.5 lb. active ingredient of Admire or Provado per acre per season.
Ammo	21 days. Up to 0.8 lbs. a.i./acre per season may be applied prior to shuck split. Do not graze or feed cover crops.
Asana	21 days. Do not feed or graze livestock on treated orchard floors. Do not exceed 0.3 lbs. a.i. per acre per season. Do not mix with fungicides containing triphenyltin hydroxide.
Carbaryl	14 days. Do not apply more than a total of 15 qts. per season.
Centric	Do not exceed 5.0 oz./acre per season. Allow at least 7 days between applications. Do not apply within 14 days of harvest.
Intrepid	14 days. Do not graze livestock in treated areas or feed cover crops grown in treated areas. Do not apply more than 10 fl. oz./application or 64 oz. per season.
Dicofol	7 days. Applicators must be in enclosed cabs or cockpits.
Di-Syston*	Do not apply more than 3 times per season. Do not apply within 30 days of harvest. Do not graze under treated trees.
Dimethoate	21 days. Do not graze livestock in treated groves.
Elast F	Do not apply after shucks open. Do not graze treated areas.
Enable	Do not apply after shuck split or within 28 days of harvest. Do not apply more than 48 ozs. per acre. Do not graze treated areas.
Endosulfan*	Do not apply after shuck split. Do not graze livestock in treated groves. Do not exceed 2 applications per year or 4 qts. per acre per year.
Fury/Mustang	21 days. Do not apply more than 0.3 lbs. a.i./acre/season or after shuck split. Do not graze or cut treated cover crops for feed.
Imidan	14 days. Do not graze livestock in treated groves.
Kelthane	7 days. Applicators must be in enclosed cabs or cockpits.
Lorsban, Chlorphos	28 days. Do not allow livestock to graze in treated orchards. Make no more than 5 applications per season.
PennCap-M	Do not apply after shuck split. Do not graze within 15 days after application.
Provado	Do not apply more than 28 fl. oz. of Provado per acre per year. Do not apply more than a total of 0.5 lb. active ingredient of Provado or Admire per acre per season.
Sulfur	No time limitations.
Temik*	Do not make more than two applications per year. Do not allow livestock to graze in treated areas. Do not harvest forage or hay from treated areas. Do not harvest with 15 weeks of last application. Not for homeowner use.
TPTH	Do not use more than 45 ozs. (36 ozs. a.i.) of product per season. Do not apply after shucks begin to open. Do not graze dairy or meat animals in treated groves.
Vendex	14 days. Do not apply more than 2 times per season.

Do not graze livestock in treated groves where prohibited or until grazing restrictions have been met.

### WARNING

\*Di-Syston, Guthion, Temik and Endosulfan are highly toxic and should be applied ONLY by TRAINED OPERATORS.

## COMMERCIAL PECAN WEED CONTROL

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A. Stanley Culpepper, Extension Agronomist-Weed Science

USE STAGE/ HERBICIDE	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
	AMOUNT OF FORMULATION	LBS ACTIVE INGREDIENT	
<b>PREEMERGENCE</b>			
oryzalin (Surflan) 4 AS (Oryzalin) 4 AS	2 to 4 qt	2 to 4	Use on non-bearing and bearing trees for control of annual grasses and small seeded broadleaf weeds. Use low rate for short-term control (2 to 4 months); high rate for long-term control (8 to 12 months). <u>DO NOT</u> apply to newly transplanted trees until soil has settled and no cracks are present. Apply before annual weeds emerge in the spring or add paraquat, Rely, or glyphosate for control of emerged weeds.
diuron (Karmex) 80 DF (Direx) 4 L other brands	2 to 4 lb 1.6 to 3 qt	1.6 to 3.2	Use for control of annual broadleaf weeds and some annual grasses <u>only</u> under trees established in the orchard <b>at least 3 years</b> . Apply in spring before annual weeds emerge; if weeds are present, then include surfactant to improve contact activity. Make a single band or broadcast application as a directed spray. Use low rate on sandy loam soils. <u>DO NOT</u> use on sand, loamy sand, gravelly soils, or on exposed subsoils. <u>DO NOT</u> use on soils with less than 0.5% organic matter. Do not graze treated areas. Add paraquat, Rely, or glyphosate for enhanced control of emerged weeds.
simazine (Princep, Simazine) 90 DF (Princep, Simazine) 4 F	2.2 to 4.4 lb 2.0 to 4.0 qt	2 to 4	Use for control of annual broadleaf weeds and some annual grasses <u>only</u> under trees established for <b>at least 2 years</b> . Provides good control of annual ryegrass. Use low rates on sandy soils. <u>DO NOT</u> apply to gravelly, sand, or loamy sand soils. <u>DO NOT</u> apply when nuts are on the ground. Do not graze treated areas. Add paraquat, Rely, or glyphosate for control of emerged weeds.
oryzalin (Surflan) 4 AS (Oryzalin) 4 AS + simazine (Princep, Simazine) 80 W 90 DG 4 L	2 to 4 qt  +  2.5 to 5.0 lb 2.2 to 4.4 lb 2.0 to 4.0 qt	2 to 4  + 2 to 4	Use for broad spectrum annual grass and broadleaf weed control. Provides good control of annual ryegrass. Paraquat, Rely, or glyphosate may be used with this tank mix to enhance control of emerged weeds. See remarks and precautions for each product.
norflurazon (Solicam) 80 DF + diuron (Karmex) 80 DF (Direx) 4 L	2.5 to 5.0 lb + 2 to 3.8 lb 1.6 to 3 qt	2 to 4 + 1.6 to 3.0	Use for broad spectrum annual grass and broadleaf weed control <u>only</u> under trees established in the orchard for <b>at least 3 years</b> . Apply in the spring before annual weeds emerge. See remarks and precautions for each product.
pendimethalin (Prowl) 3.3 EC (Prowl H <sub>2</sub> O) 4 EC	2.4 to 4.8 qt 2 to 4 qt	2 to 4	NON-BEARING TREES ONLY. Control of annual grasses and broadleaf weeds such as pigweeds. Most effective when adequate rainfall or irrigation is received within 7 days after application. Do not apply to newly transplanted trees until ground has settled around roots.
norflurazon (Solicam) 80 DF	2.5 to 5 lb	2 to 4	Use for control of annual grasses, broadleaf weeds, and suppression of some perennials under bearing, non-bearing, or newly set trees. Apply to newly planted trees only after soil has settled around roots, at least 6 months after planting. Avoid contact with roots. Apply in the fall or early spring – fall applications control a broader weed spectrum than spring applications. Do not apply when nuts are on the ground at harvest. Use low rate on coarse-textured soils, higher rates on fine-textured soils. Make only 1 application per year. <u>DO NOT</u> graze treated areas. May tank mix with simazine or diuron for broader spectrum weed control. Add paraquat, Rely, or glyphosate for control of emerged weeds. Do not apply within 60 days of harvest.

COMMERCIAL PECAN WEED CONTROL (continued)

USE STAGE/ HERBICIDE	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
	AMOUNT OF FORMULATION	LBS ACTIVE INGREDIENT	
<b>POSTEMERGENCE</b>			
2,4-D amine (Various generic formulation) 3.8 SL	2 to 3 pt	1 to 1.4	DO NOT apply more than twice a year or within 60 days of harvest. Trees must be at least 1 year old. Do not allow spray to drift onto or contact foliage, fruit, stems, or trunks of trees. DO NOT apply to bare ground. DO NOT apply on light, sandy soils. Past research has shown concerns of <b>injury</b> when applying 2,4-D on sandy soils, immediately before a large rain and during early bud or leaf break. Extreme caution must be taken to avoid off target movement of 2,4-D. Certain crops, like cotton and vegetables, can be severely injured by 2,4-D drift.
bentazon (Basagran) 4 SL	1.5 to 2 pt	0.75 to 1.0	For use in NON-BEARING pecans only. Basagran will provide POST control of certain broadleaf weeds and yellow nutsedge. For yellow nutsedge control apply 2 pts to plants 6-8" tall. A second application 7-10 days later may be necessary. Include crop oil concentrate at a rate of 2 pt/A. Apply in spray volume of 20 to 30 gal/A.
MSMA (various brands) 6 lb/gal	2.67 pt	2	Use for annual grass and nutsedge control in <b>NON-BEARING</b> trees that will not be harvested for at least 1 year. Apply as a directed spray towards the base of the trees, avoiding contact with leaves and green stems. Provides good nutsedge control. Do not graze treated areas under trees. Several brands of MSMA are not labeled for this use, consult specific labels. Sequential applications may be necessary for controlling nutsedge or bahagrass.
fluazifop (Fusilade DX) 2 EC	8 to 24 fl oz	0.125 to 0.38	Use for control of annual and perennial grasses under bearing or non-bearing trees. Sequential applications will be necessary for control of perennial grass weeds like bermudagrass and johnsongrass. Low spray volumes (10 GPA) generally improve control. Add crop oil concentrate (1.0 qt/A). Make application to johnsongrass – 12 to 18 in. tall; bermudagrass – 3 in. tall or with 4 to 8 in. runners; annual grasses – 2 to 8 in. tall. Does not control nutsedge(s). Do not apply when harvestable nuts are on the ground. Do not graze treated area. Do not apply within 30 days of harvest.
sethoxydim (Poast) 1.53 EC	1.0 to 2.5 pt	0.3 to 0.5	Use for control of annual and perennial grasses. Sequential applications will be necessary for control of perennial grass weeds like bermudagrass and johnsongrass. Low spray volumes (10 GPA) generally improve control. Add crop oil concentrate (1.0 qt/A). Use low rate on annual grasses up to 6 in. tall; higher rates on larger annual grasses and perennial grasses. Does not control nutsedge(s). Do not harvest within 15 days of application.
clethodim (Select) 2.0 EC	6 to 8 fl oz	0.09 to 0.125	Use for control of annual and perennial grasses in <b>NON-BEARING</b> trees that will not be harvested within 1 year of application. Use higher rates and sequential applications for perennial grasses. As a non-ionic surfactant containing at least 80% active ingredient at a rate of 1 qt/100 gal of spray solution (0.25% v/v). Make application to johnsongrass – 12 to 18 in. tall; bermudagrass – 3 in. tall or with 4 to 8 in. runners; annual grasses – 2 to 8 in. tall. Does not control nutsedge(s).
halosulfuron (Sempra) 75 WDG	0.67 to 1.33 oz	0.032 to 0.063	For control of nutsedge, pigweed, radish, and cocklebur. Apply as directed spray under trees established for at least one year. Avoid contact of spray with trunk, stem, roots, or tree foliage. May apply up to 2 applications. Do not apply within 1 day of harvest. See label for rate restrictions related to soil texture.
paraquat (Gramoxone Max) 3 SL	1.75 to 2.7 pt	0.65 to 1	Use for broad spectrum, contact control of emerged weeds. Apply as a directed spray in at least 20 gallons of water with 1 to 2 pt surfactant/100 gal of spray mix or 1% crop oil concentrate (1 gal per 100 gal spray mix). Apply when annual weeds are succulent and 1 to 6 in. tall. <b>DO NOT</b> allow spray drift to contact foliage or green bark of trees since severe damage may occur. <b>DO NOT</b> allow animals to graze on treated areas. May be tank mixed with certain preemergence herbicides for effective residual weed control. <b>DO NOT</b> apply when nuts are on the ground.

COMMERCIAL PECAN WEED CONTROL (continued)

USE STAGE/ HERBICIDE	BROADCAST RATE/ACRE		REMARKS AND PRECAUTIONS
	AMOUNT OF FORMULATION	LBS ACTIVE INGREDIENT	
<b>POSTEMERGENCE (cont.)</b>			
glufosinate (Rely) 1 L	3 to 6 qt	0.75 to 1.5	Use for broad spectrum control of emerged weeds and grasses, both annuals and perennials. Apply as a directed spray in high spray volumes on non-bearing and bearing trees. Possesses contact and limited systemic activity, but does well on wild brambles and perennial grasses. Does not have soil residual activity. <b>DO NOT</b> contact foliage or green bark.
glyphosate acid (numerous brands) 4 SL Roundup Ultra Max 5 SL Roundup Weather Max 5.5 SL	1 to 2 qt 0.8 to 1.6 qt 11 to 46 fl oz	1 to 2	Use for broad spectrum control of emerged weeds, both annuals and perennials. Apply as a directed spray on bearing and non-bearing trees. <b>DO NOT</b> allow spray to contact foliage, suckers, or green bark of trees. Use low rate for control of annual weeds less than 12 in. tall. Refer to product label for rates to control specific perennial weeds. Repeat applications may be made. Some glyphosate formulations require the addition of an adjuvant. Do not allow glyphosate to contact bark or leaves. <u>Try to avoid applications in late summer and fall.</u> Trees are more sensitive to glyphosate during that time. Allow at least 3 days between last application and harvest.
<b>ROW MIDDLE VEGETATION SUPPRESSION</b>			
glyphosate acid (numerous brands) 4 SL Roundup Ultra Max 5 SL Roundup Weather Max 5.5 SL	2 to 16 fl oz 1.5 to 6.5 fl oz 1.3 to 5.85	0.06 to 0.5 0.06 to 0.25 0.06 to 0.25	Use for vegetative suppression in row middles. Apply 1 to 2 weeks after full green-up of bahiagrass or bermudagrass, or after grass has been mowed to a uniform height of 3 to 4 in. Rates should vary depending on vigor of vegetative growth and canopy of the grove, with the higher rates for more vigorous grass stands where less shade occurs. Low spray volumes (10 GPA) improve control. See respective labels for surfactant requirements. Sequential applications can be made to maintain growth suppression and prepare the orchard floor for mechanical harvest. Allow a minimum of 21 days between the last application and harvest.

## FOLIAR ZINC SPRAYS FOR BEARING PECAN TREES

Darrell Sparks, Horticulturist

**Do not apply foliar zinc unless there is a history of zinc deficiency in the orchard or if leaf analysis suggests a need.**

TIME OF APPLICATION	MATERIAL	AMOUNT PER 100 GALLONS	INSTRUCTIONS AND REMARKS
All fungicide (scab) sprays through mid-May	Zinc Sulfate + Urea (feed grade) or Potassium Nitrate or Formulated Zn sprays (NZN-NuZinc Tracite 10% and many other trade names)	2 lbs.  4 lbs.  FOLLOW LABEL DIRECTIONS	Do not concentrate. Use only at the dilute rate.  Zinc compatible with pesticides recommended on pecans.
First Cover Spray	Same as above		

## FOLIAR ZINC SPRAYS FOR NON-BEARING PECAN TREES

Tom Crocker, Extension Horticulturist

TIME OF APPLICATION	MATERIAL	AMOUNT PER 100 GALLONS	INSTRUCTIONS AND REMARKS
All pesticide sprays (scab and insects) through mid-August	Zinc Sulfate + Urea (feed grade) or Potassium Nitrate or Formulated Zn sprays  (NZN-NuZinc Tracite 10% and many other trade names)	2 lbs.  4 lbs.  FOLLOW LABEL DIRECTIONS	Do not concentrate. Use only at the dilute rate.  Zinc compatible with pesticide recommended on pecans.