NC STATE UNIVERSITY

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ORCHARD-FLOOR MANAGEMENT IN PECANS

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The objective of this leaflet is to briefly discuss orchard floor management options in pecan orchards along with herbicide considerations, and potential herbicides. It should be used as a guide for producers making orchard floor management decisions.

Introduction

One of the best management strategies for a pecan orchard floor is to use a grass alley with a vegetation-free strip in the tree row out to the dripline of the trees. This vegetation-free strip can be established and maintained with herbicide as described below. The permanent grass sod between the tree rows will minimize soil erosion, increase soil aeration and permeability, and support equipment movement through the orchard during wet weather. The vegetation-free strip will help to minimize soil moisture and nutrient competition of grasses in the alley with trees, resulting in optimum tree and nut growth. The vegetation-free strip may help minimize tree damage or loss from voles during the dormant season.

It is best to avoid mechanical cultivation, which can injure tree roots and increase the potential spread of crown gall in established orchards. The likelihood of injury resulting from close mowing and disking around trees, often called "tractor blight," is also reduced with the use of a herbicide based weed management program. Thus, a weed management program using herbicides is recommended in an established pecan orchard.

When planting new pecan orchards in a site with a grass cover, take a soil nutrient sample. If the soil has an acceptable pH (6.0 to 6.5) and nutrient status based on the soil test, mark tree rows and spray the tree rows with a non-selective postemergence herbicide such as glyphosate, paraquat, or glufonsinate (Rely). If the soil test indicates a low pH and/or other nutrient deficiencies the best option is to apply the required nutrients and then deep till to incorporate the fertilizer to a depth of 18 inches (if possible), the primary rooting zone for pecans.

Herbicide Considerations

To insure proper herbicide use, always read the manufacturer's label before application. All statements on the manufacturers label take precedence over any recommendations in this publication.

It is important that herbicide application equipment be properly calibrated to insure that herbicides are applied at the correct rate. If you have questions about calibrating your sprayer, contact your county agricultural agent with the Cooperative Extension Service.

Remember that herbicides are applied as a directed spray along each side of the tree row. Flat fan nozzles are the most widely used spray tip for applying herbicides. They

provide excellent spray coverage of weeds and come in several sizes with capabilities to apply a range of spray volumes. Some nozzle manufacturers make flat fan nozzles that minimize spray drift. Investing in such spray nozzles decreases the likelihood of off target herbicide movement.

It is advisable to apply white paint to the bottom 2 to 3 ft of the tree trunk of newly planted trees prior to applying herbicides. Painting the tree trunks reduces the potential for herbicide injury, especially postemergence herbicides. This can be accomplished by dipping a car wash mitt (wear rubber gloves underneath the mitt) in white latex paint and rubbing up and down the tree trunk until it is completely painted.

Several herbicides are registered for use in pecans. Some are preemergence herbicides that control weeds that have not emerged and others are postemergence herbicides that control emerged weeds. Preemergence herbicides control germinating weed seeds but do not usually give acceptable control of emerged weeds. However, some herbicides (i.e. Karmex) will control weeds both preemergence and postemergence. Rainfall is needed to properly activate preemergence herbicides. Rainfall within 7 to 14 days after application will activate most herbicides; however, best control results when water (rain or irrigation) occurs within a few days. The desired amount of time for rainfall after application varies with herbicide. Refer to the manufacturers label for specific information.

Postemergence herbicides control emerged weeds. Postemergence herbicides are most effective in controlling actively growing weeds. Weeds under stress from drought or from mowing may not be adequately controlled by postemergence herbicides. If weeds are stressed from drought, herbicide application should be delayed until one or two days after adequate rainfall and weeds are no longer wilting from drought. If weeds have been mowed, wait several days to allow regrowth before applying herbicides. Symptoms of herbicide activity may not be noticeable for up to 14 days after application when using systemic herbicides like glyphosate. Effects of paraquat or 2,4-D amine are noticeable within 1 to 3 days. Some postemergence herbicides require the addition of a surfactant or crop oil to improve herbicide activity. Remember, surfactants and crop oil differ from one another and may not be interchangeable.

A good weed management program for pecans consists of a post harvest preemergence herbicide application in combination with a non-selective postemergence herbicide (paraquat or glufosinate) to control emerged weeds. The fall preemergence herbicide application will provide winter annual weed control into spring. When residual weed control from the fall application gives out, and emerging weeds get 3 to 4" tall apply a non-selective postemergence herbicide (glyphosate, paraquat, ***or*** glufosinate) with a preemergence herbicide for residual weed control of summer annual weeds. Throughout the summer and especially prior to harvest, postemergence herbicides may be needed to control escaped weeds. Continued use of the same herbicide or herbicides with the same mechanism of control over several years may lead to resistant weeds. Whenever possible, rotate herbicides with different mechanisms of control. If you have questions about how to do this, contact your county agricultural agent with the Cooperative Extension Service.

It is important that orchards be scouted monthly to determine the weed species present. Scouting allows early identification of difficult-to-control weeds which may help prevent them from establishing in the entire orchard. If difficult weeds are noticed for the first time in an orchard, they need to be removed before they produce seed. This can be done by hand removing or spot treating with a non-selective postemergence herbicides. If weeds are mature and have produced seed, remove the weed from the orchard when damp to prevent seed being spread in the orchard. Scouting also gives growers an opportunity to know what weeds are not currently being controlled by their weed management program so that adjustments in this program can be made in the future. Another aspect growers should consider is the potential for weeds located around the borders of the orchard to infest it. Weeds in these areas produce seed which will find there way into the orchard for germination in the future.

Preemergence Herbicides
Newly Planted and Established Orchards

Chateau 51 WDG (flumioxazin), 6 to 12 oz/acre. Chateau provides preemergence control of annual broadleaf and grass weeds. Trees established less than 1 year **MUST BE** protected from contact with the spray

solution using a non-porous wrap or waxed container. **DO NOT** apply more than 6 oz/acre per application to pecan trees established less than 3 years on soils having a sand and gravel content over 80%. **DO NOT** apply Chateau within 1 year of pecan harvest. Chateau is very effective when an initial application (6 to 8 oz/acre) is applied in the fall or spring and a second application (6 to 8 oz/acre) is applied when control from the initial application begins to fail. **DO NOT** apply a sequential application within 30 days of the initial application. Chateau should be tank mixed with glyphosate, paraquat, or Rely for non-selective postemergence weed control.

Devrinol 50-DF (napropamide), 8 lb/acre. Preemergence control of annual grasses and some broadleaf weeds. Devrinol 50-DF may be applied to newly planted trees as well as established orchards. Apply in early fall through late spring. For best results, **rainfall or irrigation is needed within 24 hours** of application for activation. **DO NOT** apply within 35 days of harvest. Apply in a spray volume of 30 to 100 gal/acre. Devrinol 50-DF may be applied in combination with glyphosate, oxyfluorfen, Karmex DF, paraquat, Rely, or simazine.

Goal 2XL, Galligan, or OxiFlo (oxyfluorfen), 5 to 8 pt/acre. Preemergence control of broadleaf and some grass weeds in non-bearing and bearing pecans. Applications can be made after final harvest until bud swell in the spring. Use a minimum spray volume of 40 gal/acre. **DO NOT** apply oxyfluorfen after bud swell or before harvest is complete. **DO NOT** apply more than 8 pt/acre in one season. Oxyfluorfen may be applied in combination with Devrinol 50-DF, glyphosate, Karmex DF, Solicam 80DF, Oryzalin, paraquat, or simazine.

Prowl 3.3 (pendimethalin), 2.4 to 4.8 qt/acre or **Prowl H_2O**, 2 to 4 qt/acre . Preemergence control of annual grasses and small seeded broadleaf weeds. Prowl may be applied after transplanting once soil has settled around the roots. Apply in a 10 gpa or more. Tank mix with paraquat or glyphosate for control of emerged weeds. Use in non-bearing plantings **ONLY**. **DO NOT** apply within one year of harvest. Tank mix with glyphosate, paraquat or Rely for non-selective postemergence weed control.

Solicam 80DF (norflurazon), 2.5 to 5 lb/acre. Controls annual grasses and some broadleaf weeds preemergence. Solicam will suppress nutsedge. Multiple applications can be made within the same year as long as the total quantity of Solicam does not exceed the maximum recommended rate for that crop and soil texture. Solicam rate is soil texture dependent (see label for specific rates for specific soil textures). Rainfall is needed within 4 weeks of application for proper activation. **USE ONLY** on trees planted at least six months and in a minimum spray volume of 20 gal/acre. **DO NOT** apply Solicam 80DF when pecans are on the ground at harvest. Solicam may be applied in combination with glyphosate, Karmex DF, oxyfluorfen, paraquat, Rely, oryzalin , or simazine.

Surflan AS or FarmSaver Oryzalin (oryzalin), 2 to 4 qt/acre. Preemergence control of annual grasses and some broadleaf weeds. Apply in spray volume of 20 to 40 gal/acre. Oryzalin can be applied to newly planted pecans once soil has settled around the tree. Oryzalin can be applied in combination with glyphosate, oxyfluorfen, paraquat, Rely, Solicam 80DF, or simazine.

Established Orchards (Only)

Karmex DF (diuron), 2 to 4 lb/acre. Preemergence control of broadleaf and some annual grass weeds. The addition of a surfactant will result in control of small emerged weeds susceptible to Karmex DF. **USE ONLY** on trees established 3 years and on soils with at least ½% organic matter. Rate is soil texture dependent (see label for specific rates for specific soil textures). Apply in a minimum spray volume of 30 gal/acre. Karmex DF may be applied in combination with glyphosate, paraquat, or Rely for both preemergence and postemergence weed control. The addition of Solicam with Karmex will expand residual control of annual grass weeds.

Princep 4L; Simazine 4L (simazine), 2 to 4 qt/acre; **Princep Caliber 90; Simazine 90 WDG (simazine),** 2.2 to 4.4 lb/acre. Preemergence control of annual broadleaf weeds and annual grasses. **USE ONLY** on trees established for two or more years. Make late winter or early spring application for summer weed control or a fall application for winter weed control. Use a minimum spray volume of 20 gal/acre. **DO NOT** make more than one application per year or apply to gravelly, sand, or loamy sand soils. **DO NOT** apply when nuts are on the ground. Princep formulations may be tank mixed with glyphosate, paraquat, Rely, Solicam 80DF, or oryzalin.

Postemergence Herbicides

Basagran (bentazon), 1.5 to 2 pt/acre. Postemergence control of certain broadleaf weeds in **NON BEARING** pecans **ONLY**. For yellow nutsedge control, apply Basagran at 2 pt/acre when yellow nutsedge is 6 to 8 inches tall. Make a second application at the same rate 7 to 10 days later. Apply in a minimum spray volume of 20 gal/acre. Add 1 qt/acre of crop oil to the spray solution for best results. **DO NOT** apply more than 8 pt/acre in a 12 month period.

Fusilade DX (fluazifop), 1 to 1.5 pt/acre. Postemergence control of annual and perennial grasses. Multiple applications may be necessary for perennial grass control. Add 1 gal of crop oil per 100 gal of spray solution for optimum herbicide activity. Apply in a minimum spray mixture of 20 gal/acre for adequate coverage. Fusilade is rainfast within 1 hour of application. **DO NOT** apply more than 4.5 pt/acre/year or within 14 days of harvest.

Gramoxone Max (paraquat) 1.75 to 2.7 pt/acre. Postemergence control of broadleaf and small grass weeds. Add 1 pt of non-ionic surfactant or 1 gal of crop oil per 100 gal of spray solution for optimum weed control. Paraquat is rainfast in 30 minutes and may be applied in combination with most preemergence herbicides. **DO NOT** allow Paraquat to contact green bark or foliage or apply when nuts are on the ground. With young trees, use a shield around the base of the tree or apply with a shielded sprayer. Paraquat may be tank mixed with most preemergence herbicides for postemergence and preemergence weed control. *Paraquat is a **restricted-use pesticide***.

Weedar 64 and various generic formulations (2, 4-D amine), 2 to 3 pt/acre. Postemergence control of annual and perennial broadleaf weeds. Trees must be at least 1 year old. Apply in a minimum spray volume of 15 gal/acre. The use of a non-ionic surfactant may enhance weed control. 2, 4-D will not injure grasses, thus, can be applied to the grass sod for control of emerged broadleaf weeds. Avoid application near susceptible crops (see label for details). **DO NOT** use in sandy soil, allow contact with foliage, tree trunk, or roots. **DO NOT** apply during bloom or within 60 days of harvest. Some formulations may limit use to 2 pt/acre.

Poast (sethoxydim), 1.5 to 2.5 pt/acre. Postemergence control of annual and perennial grasses in pecans. Herbicide rate depends on grass species and size. Perennial grasses may require a second application of Poast 2 to 3 weeks after the first application when grasses resume growth after first application. Poast is rainfast in 1 hour. Apply in a spray volume ranging from 10 to 20 gal/acre. Add 1 gal of crop oil per 100 gal of spray solution for best results. **DO NOT** apply more than 7.5 pt/acre/year.

Select 2EC or Arrow (clethodim), 6 to 8 fluid oz/acre. Postemergence control of annual and perennial grasses in **NON-BEARING** pecans **ONLY**. If grass pressure is heavy or grass is at maximum grow stage use the high rate. Perennial grasses may require a second application of **clethodim** 2 to 3 weeks later when grasses resume growth after the first application. The addition of 1 pt of non-ionic surfactant per 50 gal of spray solution is necessary for optimum herbicide performance. Clethodim is rainfast in 1 hour. Clethodim should be applied in spray volume ranging from 5 to 40 gal/acre. **DO NOT** apply more than 68 fluid oz/acre with in the same year.

Rely (glufosinate), 3 to 6 qt/acre. Non-selective herbicide for postemergence control of broadleaf and some grass weeds. Rate is dependent on weed species and size (see label for details). Because thorough spray coverage is import when applying Rely, use in a minimum spray volume of 20 gal/acre. For best results apply to weeds that are actively growing. **DO NOT** allow Rely to contact desired foliage or bark. **DO NOT** apply within 14 days of harvest. **DO NOT** apply more than 18 qt of Rely per acre in a 12 month period. Rely may be tank mixed with Karmex DF, Solicam 80DF, oryzalin, Devrinol 50-DF, oxyfluorfen, or simazine for postemergence and preemergence weed control.

Roundup WeatherMax (glyphosate), 22 to 44 fluid oz/acre**; various generic glyphosate formulations,** 1 to 4 qt/acre. Non-selective herbicide for postemergence control of broadleaf and grass weeds. Difficult to control perennial weeds may require a second application in order to obtain acceptable control. Apply in a maximum spray volume of 30 gal/acre. **DO NOT** harvest within 3 days of application. **DO NOT** allow glyphosate to contact foliage or green bark. Extra precautions should be taken to prevent contact with the leaves when applying Roundup Ultra in late summer and fall. Broadcast applications of glyphosate are discouraged after July 15 because of increased injury potential. Glyphosate may be tank mixed

with Karmex DF, oxyfluorfen, Solicam 80 DF, oryzalin, or simazine for postemergence and preemergence weed control.

Suggested Tank Mixtures

Simazine + Solicam + paraquat or glyphosate or Rely
Simazine + Surflan + paraquat or glyphosate or Rely
Karmex + Solicam + paraquat or glyphosate or Rely

Chemical Suppression of Sod Strip

One option to reduce mowing of the sod-strip is to apply sub-lethal rates of herbicides to the grass in the sod-strip. This practice is frequently called chemical mowing and can suppress growth of grass for 6 to 8 weeks minimizing the number of mowings in the orchard.

Roundup WeatherMax and generic glyphosate formulations (glyphosate), or **Poast (sethoxydim),** see label for rate information. Treatment will suppress perennial grass sod and rate is dependent upon herbicide formulation and grass species being suppressed. In general, applications should be made 1 to 2 weeks after full greenup or after growth resumes. Sequential applications can be made if regrowth occurs and injury and stand reduction can be tolerated. **DO NOT** apply glyphosate after seed head emergence.

Other Orchard Floor Management Strategies

The management system described above with a sod drive alley and a vegetation-free strip in the tree row is an ideal system to use when establishing and maintaining a pecan orchard. However, the decision on how to manage the orchard is a business decision and can be very difficult when land is limiting and cash flow is a problem. Other potential strategies exist when land is limiting or cash flow is required which are described below.

Livestock Grazing

Another orchard floor management strategy that is frequently used is to graze livestock under the pean trees. Although this strategy initially appears to be a good way to utilize the land under the trees it is not encouraged because of potential long range negative impacts. Some of the negative impacts are the limited options available for weed, insect, and disease control, animal waste deposited on the orchard floor, compaction of the soil in the orchard under the trees, and injury to young developing trees as well as the crown of mature trees.

Intercropping Systems

Intercropping is another strategy that is being used in many commercial pecan orchards in the Southeast. Intercropping is the practice of planting another crop with pecans to provide an early cash flow and/or to maximize the land investment. Typical intercrops range from vegetables, grass hay, small grains, or fruit trees. A typical intercrop system in Georgia combines peaches and pecans. As the peach trees productivity starts to decline they are removed and the pecans are bearing nuts. There are disadvantages with intercropping systems. Disadvantages with this system include damage from cultivation and harvest equipment with annual crops, competition of another crop with pecans for nutrients and moisture, and compatibility of pesticides with both crops. Hopefully this publication has given you an overview of the different strategies used to profitably manage pecans. If you have further questions contact your local county agricultural agent with the Cooperative Extension Service for assistance.