

Titles of Project:**Evaluation of Novel Chemical Mowing Mixtures for Suppression of Fescue Ground Covers and Weed Control in Southeastern Small Fruits****Final Report****Grant Code 2011 E-03****Extension Proposal****Principal Investigator:**

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Objectives:

1. to evaluate herbicides for use in grape production at reduced application rates for suppressing growth of tall fescue (*Festuca arundinacea*) ground covers in vineyard row middles.
2. to find options for suppressing tall fescue growth that also provided control of key broadleaf weeds (e.g. dandelion, clover, plantain) in these areas.

Justification:

There are limited options for growers to manage tall fescue ground cover growth in small fruit production systems. Typically, ground covers are managed by mowing. Effective mowing can prevent or reduce damage from wildlife (voles), increase air circulation throughout the planting which can have a beneficial impact on disease control, lessen insect pressure and reduce certain weed populations (Toth et al. 2004). However, mowing is an expensive management option. The estimated cost of mechanical mowing in vineyards and orchards fluctuates

between \$72 and \$84 per acre per year, based on five mowings per growing season (Caprio et al. 2006). However, these costs do not reflect the volatility in fuel costs (E.I.A., 2012).

Ground covers can also be managed with applications of herbicides at reduced rates. These applications can reduce ground cover growth over time (Futch and Singh 2008). While glyphosate has been shown to successfully suppress tall fescue growth at 0.25 lbs/A, it can decrease ground cover stand density when applied at higher rates thereby creating an optimal environment for weed seed germination (Olsen 2008; McGourey and Elmore 2007). Additionally, reduced rates of glyphosate used for ground cover suppression will not effectively control emerged broadleaf weeds. Thus, weeds can outcompete the ground cover (that has been suppressed by glyphosate) creating a thick bed of vegetation.

Methodologies:

Studies were conducted at several locations from 2009 – 2012:

1. Univ. of TN Plateau Research and Education Center at Crossville, TN
2. Univ. of TN Highland Rim Research & Education Center at Springfield, TN
3. Univ. of TN Institute of Agriculture South Greenhouse Complex, Knoxville, TN
4. Three Sisters Vineyards, Dahlonega, GA
5. Richland Vineyards, Blaine, TN

Results:

A series of field and greenhouse studies were conducted from 2009 through 2012 to observe how herbicide mixtures would suppress tall fescue growth while also providing broadleaf weed control. In these studies, sethoxydim applied alone or in combination with glufosinate, glyphosate or carfentrazone provided the greatest suppression of tall fescue without injuring grape vines. However, no treatment combination provided commercially acceptable control of buckhorn plantain, dandelion or white clover by six weeks after treatment.

Follow-up research focused on evaluating additional herbicide combinations for suppressing ground cover growth while controlling broadleaf weeds. Herbicides used included sethoxydim, clethodim, oxyfluorfen, glyphosate, and rimsulfuron. These herbicides encompassed different modes of action and were all registered for preemergence or post-directed weed control in grape production. Improved broadleaf control and ground cover suppression was observed with mixtures of clethodim, glyphosate and oxyfluorfen compared to previous experiments. Rimsulfuron applications were also promising, but the rates used in the field study were far too low to provide adequate season-long control of broadleaf weeds.

Drought conditions in 2011 prevented the establishment of meaningful field trials. Field research was conducted in 2012 to evaluate mixtures of sethoxydim, oxyfluorfen, rimsulfuron and indaziflam (a new herbicide labeled for grapes). No statistical differences in ground cover

suppression or weed control were detected after application. Daily air temperatures exceeding 96 F for several weeks after herbicide treatment plus in excess of 11 inches of rainfall in July and August were factors impacting results.

Conclusions:

Several studies need to be conducted to provide greater understanding of the potential for these herbicide mixtures on ground cover suppression and broadleaf weed control. Research should evaluate multiple rates of clethodim, oxyfluorfen, rimsulfuron and glyphosate applied alone and in various combinations. Additionally, single application programs should be compared to those applying these materials more than one time per growing season as our studies did not exceed the seasonal maximum use rates allowed for each herbicide active ingredient. Lastly, additional active ingredients registered for use in vineyards such as bentazon, simiazine and flumioxazin should also be evaluated.

Impact Statement:

Preliminary research demonstrates the value of clethodim, glyphosate, rimsulfuron and oxyfluorfen mixtures for suppressing the growth of tall fescue while controlling key weeds in vineyards. Additional research is needed to further refine programs using these herbicide combinations in the field.

While this work did not allow identification of the ideal herbicide combinations and rates to accomplish long-term ground cover suppression and broadleaf weed control, it was promising enough to merit further consideration. If herbicides and timing could be identified that would provide consistent, significant reduction in ground cover control and broadleaf weed management, the savings in time and money to the grower would be substantial. Likewise, the positive impact on the environment in regards to the reduction in fossil fuel usage as compared to mowing would be desirable.

Literature Cited:

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Professional Presentation and Outreach of Research:

Northeastern Weed Science Society

“Evaluation of Reduced Rate Herbicide Applications for Chemical Mowing of Grasses and Broadleaf Weed Control in Grape Row Middles”

Southern Weed Science Society

“Evaluation of Herbicide Tank Mixtures for Weed Control and Grass Suppression in Grape Row Middles”

Univ. of TN Plateau Research and Education Center, Crossville, TN (at “Steak and Potatoes Annual Field Day”

“Evaluation of Herbicide Tank Mixtures for Weed Control and Grass Suppression in Grape Row Middles”

Univ. of TN Dept. of Plant Sciences Seminar

“Evaluation of Herbicide Tank Mixtures for Grass Suppression in Orchards”

Tennessee Horticultural Expo (presentation to be made Jan. 26, 2013)

“Vegetation Suppression in Small Fruit Crops”

