Perennial Vine
Competition and Control

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Introduction

Perennial vines are serious weed pests of cultivated crops in Mississippi (5). Two common perennial vines found in the Delta and elsewhere in the state are redvine (*Brunnichia ovata* (Walt.) Shinners) and trumpet creeper (*Campsis radicans* (L.) Seem.) (4). Less common but also present are honeyvine milkweed (*Ampalamus albidus* (Nutt.) Britt.), maypop passionflower (*Passiflora incarnata* L.), and redberry moonseed (*Cocculus carolinus* (L.) DC). These are all dicots in different families, but with many common features as weeds in our crops. Each is deciduous, woody, and capable of regeneration from deeply positioned rootstocks in cultivated fields. Redvine (see drawing on page 6) seems to be confined mainly to fine textured soils (4, 5), but trumpet creeper (see drawing page 5 and cover) and other perennial vines apparently are not restricted to soil type for their habitat. They occur in all crops and situations in cultivated agriculture in Mississippi, although flooding may limit interference in rice.

These perennial weeds, when present, may not measurably interfere with crop yield to any large extent (8). In a 3-year study on redvine in cotton, Hurst et al. (8) were not able to show an effect on cotton yield. Others (2, 9, 10, 12) have reported on efforts to control these vines but have not reported the interference effect of these vines. The implication of their reports is that they do interfere with cultural practices and harvest operations.

Herbicides and techniques for control of these perennial vines are limited (2, 3, 8, 9, 10, 11, 12, 13). Few methods or herbicides have been found that will control the weeds, and even fewer have sufficient selectivity to be used in a crop situation. The phenoxy and dicamba (3) have some activity on these plants, but are lacking in crop selectivity at the rate required for control. Glyphosate (10, 14) has also been found to be effective on these weeds, but has virtually no crop selectivity.

A method that has been suggested to achieve control without consequent crop injury is to apply the herbicide (dicamba or glyphosate) to a fallowed field or other situation when the crop is not present or will not be harmed (2, 3, 8). In such a scheme, the herbicide (dicamba or glyphosate) is applied after harvest, or, in the case of cotton (*Gossypium hirsutum* L.) (8), after defoliation but before a killing frost has occurred. In soybean, however, harvest of the crop removes most of the weed foliage and there is little left for the herbicide to interact with. Unless there is time for the vegetation to regrow between harvest and frost, such a scheme has little chance of success in soybean. Applying the herbicide to mature soybean is not labeled. Preplant applications of dicamba result in crop injury, while application of glyphosate to these weeds in the spring is generally not successful (10).

Our objective was to determine if a natural population of perennial vines, including redvine, trumpet creeper, redberry moonseed, maypop passionflower, and honeyvine milkweed, could be controlled using potential technology (dicamba in the fall), and, if so, if the control would have any effect on crop yield.

Materials and Methods

General

The study was conducted during 1983-1987 on a Tunica clay (clayey over loamy, montmorillonitic, nonacid, thermic, Vertic Haplaquept) near Stoneville, MS. Two adjacent areas were designated for the dual experiment; one for dryland, non-irrigated production, and one for irrigated production. All plots were eight 40-inch rows, 100 feet long. The design was a split plot with three treatments and four replicates in both the irrigated and non-irrigated experiments. Data for each crop were analyzed separately for each year and each irrigation regime.

The main plots were three rotation cropping schemes, while the sub-plot was with or without dicamba. The three rotations were continuous cycles of (1) wheat-soybean doublecropping; (2) corn followed by wheat-soybean doublecropping; and (3) grain sorghum followed by wheat-soybean doublecropping. The experiment began Oct. 7, 1983, when dicamba was applied at 2.0 pound ai/acre for control of a natural population of perennial vines consisting of redvine, trumpet creeper, honeyvine milkweed, redberry moonseed, and maypop passionflower. Ten days after treatment, the land was prepared for planting. Corn and sorghum plots were bedded and left over winter. Southern Belle wheat was planted Oct. 18, 1983, at 90 pounds/acre in the wheat-soybean doublecropping treatment. Only the untreated wheat
plots were harvested since this rate of dicamba adversely affects wheat.

Conventionally accepted cultural practices that promote high production expectations were utilized for each crop each year. Cultivar selection, seeding rate, fertilization, and pest control were applied as required for high yields. The only essential difference between the two experiments was the use of irrigation in the irrigated experiment. A full weed control program was effectively used, but the herbicides generally do not have an effect on the perennial vines. Table 1 lists the herbicides used each year.


**Weed sampling**

Weeds were sampled in each plot prior to harvest, and sampling was similar to previous efforts (6). A visual estimate by species of percentage ground cover was obtained by randomly locating twenty 5.4 ft² quadrates in each plot. If a species was in the plot but not in any quadrate, then it was listed as present but no ground cover value was assigned. No weed estimates were obtained for the wheat crop.

**Statistical analysis**

Analyses for weed cover of the perennial vines were combined where appropriate. The standard error of the mean (SE) for each measured variable was calculated.

A combined analysis of variance over years was computed which considered the two experiments as separate locations. Since the plot assignment remained intact for the duration of the experiment, years are simply repeated measurements in the same experiment. As in separate locations, no statistical test can be made of the location (irrigation) effect. However, interaction effects involving irrigation are subject to F Test.

**Results and Discussion**

A combined analysis over years for the weed cover of perennial vines showed no effect of years or any interaction of any effect with years. Therefore, the data in Table 2 are presented as the mean over years of the combined experiments. Dicamba applied once in the fall of 1983 suppressed perennial vines for 4 years (Table 2). The suppression was not complete, nor was it equal in all crops. Soybeans with full canopies from irrigation or suitable dryland conditions had less perennial vine ground cover. In corn, there were more perennial vines, especially in the non-irrigated experi-

<table>
<thead>
<tr>
<th>Table 1. Herbicide application to the three wheat-soybean rotation crops.</th>
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</thead>
<tbody>
<tr>
<td><strong>Cropping System</strong></td>
</tr>
<tr>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Input</strong></td>
</tr>
<tr>
<td>Preemergence</td>
</tr>
<tr>
<td>Postemergence</td>
</tr>
<tr>
<td><strong>1984 Crop Year</strong></td>
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<tr>
<td>Preemergence</td>
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<tr>
<td>Postemergence</td>
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<tr>
<td><strong>1985 Crop Year</strong></td>
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<tr>
<td>Preemergence</td>
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<tr>
<td>Postemergence</td>
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<tr>
<td><strong>1986 Crop Year</strong></td>
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<td>Preemergence</td>
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<tr>
<td>Postemergence</td>
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<tr>
<td><strong>1987 Crop Year</strong></td>
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<tr>
<td>Preemergence</td>
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<tr>
<td>Postemergence</td>
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</tbody>
</table>

*All herbicides were used at the recommended label rate for the given crop and soil type.*
Table 2. Effect of dicamba on total weeds and perennial vines in the irrigated and non-irrigated experiments in the three crop systems averaged over 4 years.

<table>
<thead>
<tr>
<th>Irrigation</th>
<th>Dicamba&lt;sup&gt;b&lt;/sup&gt;</th>
<th>W-S&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Cropping System&lt;sup&gt;a&lt;/sup&gt;</th>
<th>C, W-S</th>
<th>S, W-S</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Total&lt;sup&gt;d&lt;/sup&gt;</td>
<td>Total (%)</td>
<td>PV</td>
<td>Total (%)</td>
</tr>
<tr>
<td>With</td>
<td>With</td>
<td>2.6</td>
<td>0.6</td>
<td>7.6</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Without</td>
<td>3.5</td>
<td>1.9</td>
<td>19.2</td>
<td>11.9</td>
</tr>
<tr>
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<td>With</td>
<td>5.7</td>
<td>3.3</td>
<td>15.2</td>
<td>9.7</td>
</tr>
<tr>
<td></td>
<td>Without</td>
<td>21.3</td>
<td>19.5</td>
<td>41.3</td>
<td>32.9</td>
</tr>
</tbody>
</table>

<sup>a</sup>Cropping Systems are: W-S = wheat-soybean doublecropping; C,W-S = corn followed by W-S; S, W-S = sorghum W-S.

<sup>b</sup>LSD for the difference between two dicamba means within a cropping system treatment and irrigation is 2.5 and 2.1 for total and PV, respectively.

<sup>c</sup>LSD for the difference between two treatment means within a dicamba treatment and irrigation is 3.0 and 2.5 for total and PV, respectively.

<sup>d</sup>Total is the total weed cover, PV is the perennial vine weed cover.

ment. This is probably related to the open canopy structure of the crop since a wide (40-inch) row spacing was used. Values for perennial vine ground cover in sorghum were intermediate between those for corn when irrigation was used.

Ground cover from the total weed spectrum (including the perennial vines) was different between dicamba treatments and among crops (Table 2), but this was totally a reflection of the dicamba effect on the perennial vines (data not presented). Corn had significantly more weeds than the other two crops, as was noted for the perennial vines in Table 2. These weed cover values were taken just prior to harvest and may not accurately reflect the interference value for corn. Many of the perennial weeds in corn were reaching their full effect at corn harvest time (mid-August), while the other crops were still green and fully canopied. There was no suggestion that the dicamba had a residual effect on weed control other than its effect on the perennial vines noted in Table 2.

Dicamba was not equally effective on vine species (Figure 1). Redvine was apparently reduced more (but not significantly) than trumpet creeper. Since this was a natural population, the distribution of the vines was not uniform over the study area. However, redvine was more prevalent over the whole study than the other vine species. Perennial weeds tend to grow in small concentrated areas making statistical calculations and conclusions difficult. Even so, the data are conclusive that dicamba can effectively result in vine suppression.

In 1984, there was no effect of dicamba treatment on yield of any crop (Table 3). In 1985, when all rotations were in the soybean sequence, there was an apparent advantage for the dicamba treatment, especially in the irrigated and non-irrigated corn, wheat-soybean system. Without irrigation the average advantage was 5 bushels/acre and with irrigation it was 4 bushels/acre. In 1986, only yield of corn was affected by the dicamba application, with 7 and 11 bushels/acre increases in the non-irrigated and irrigated experiments, respectively. In 1987, a soybean sequence year, the dicamba-treated plots had higher yields than the untreated plots by 1.5 bushels/acre in the non-irrigated and 6.5 bushels/acre in the irrigated experiments. Interestingly, the soybean yield differences in the continuous wheat-soybean doublecrop treatment are lower than those in the rotated treatment in either the irrigated or non-irrigated experiments of any year. This suggests that in order to more efficiently determine yield differences, the system should not be under any other yield limiting factor. Rotations, early planting, and irrigation are known to improve soybean yield (7).

Cultivar and hybrid selection varied throughout the experiment from year to year in each of the crops. These results were not intended to compare years with each other, but rather to develop agronomic performance information with the best possible current-

![Graph](image-url)

**Figure 1.** Comparison of vine suppression achieved for 4 years following application of dicamba for control of redvine and trumpet creeper.

![Graph](image-url)
selections. We feel that any comparisons of treatment effect would be valid with any high performing cultivar or hybrid. We have no information to suggest that cultivar or hybrid selection had any effect on the yield performance comparison between dicamba-treated plots in any year. The corn hybrid was changed to get a better selection for the clay soil, and to get the most current hybrid possible. This was also true for the sorghum hybrid and wheat cultivar selections.

For the soybeans in 1984, 1985, and 1986, we used Maturity Group VI cultivars since this was the conventional practice. Soybeans planted after wheat require a late maturing cultivar to develop sufficiently to produce a good yield. We used different cultivars, but they were within the same maturity group. In 1987, we changed to a Maturity Group V cultivar. Our thinking was that this would allow us the time in the fall to harvest the soybeans and plant wheat or prepare a seedbed for the corn or sorghum. Also, the performance of the chosen cultivar was adequate for this situation. Again, our results are not to be compared over years but within a year.

These results suggest that any effect that the vines have on crop growth and yield is not consistent over time even with the similar levels of vine presence. This has been the finding of others who have investigated the effect of perennial vine presence on crop yield (8). Any recommendation concerning the use of this herbicide for control of the vines should be mindful of the apparent inconsistencies in yield response. However, the cost of having the vines present and the effect on harvest efficiency and quality of the harvested product (foreign matter or moisture) has not been documented. Lack of documentation has not deterred producers, however. Vine presence does adversely affect field operations. We have experienced vine-clogged combines and difficulties in cultivating as well, but have no data on any of these factors. Vines in fields are unsightly, can affect field operations to an unknown extent, and can affect yields, especially in soybeans that have a high yield potential, such as following corn or sorghum with irrigation. All of these factors should be considered when contemplating an attempt to control these weeds.

**Literature Cited**


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Drawing of redvine (Brunnichia ovata (Walt.) Shinners).
Drawing of trumpet creeper [Campsis radicans (L.) Seem].
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