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# RESPONSE OF SOD-SEEDED ANNUAL CLOVER TO HERBICIDE RESIDUE

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## SUMMARY

Experiments were conducted at Overton, Texas to determine the optimum rate and application date of several herbicide formulations applied to warm-season perennial grass (WSPG) pastures when annual clovers are sod-seeded in the fall. Picloram, dicamba, and triclopyr based herbicides were evaluated in combination with arrowleaf and subterranean clover. No permanent damage or stand loss was noted on either clover exposed to dicamba or triclopyr residue. Damage and stand reduction of clover was minor due to picloram + 2,4-D applied at 1 or 2 pints/ac at least 140 days prior to planting. Subterranean clover was more sensitive to picloram than arrowleaf.

## INTRODUCTION

Intensive management of warm-season perennial grass (WSPG) pastures often involves chemical weed control and sod-seeding of cool-season annual clovers. These practices, used in combination, can be incompatible due to susceptibility of annual clovers to herbicide residue. An earlier study was conducted in 1984 at the Texas A&M University Agricultural Research and Extension Center at Overton to determine optimum application dates and rates of picloram + 2,4-D (1:4) and dicamba + 2,4-D (1:3) applied to bermudagrass sod for establishment and production of sod-seeded clovers (Smith, 1986). Clovers evaluated were arrowleaf (*Trifolium vesiculosum* Savi.), crimson (*T. incarnatum* L.), subterranean (*T. subterraneum* L.), and white (*T. repens* L.). No stand reduction or permanent damage was noted on any clover due to dicamba residue. Picloram, at 1 and 2 pints/acre, applied at least 90 days prior to clover planting caused little permanent damage to arrowleaf, white, or crimson clover. Subterranean clover is more sensitive to both herbicides. Minor permanent damage and 10% stand reduction was noted at one pint/acre of picloram + 2,4-D (1:4) applied 120 days prior to clover planting. Damage and stand reduction of subterranean clover by picloram residue increased with rate and later application dates.

This experiment was redesigned and repeated in 1987 to investigate low rates and early application dates of picloram and to determine methods that allow the use of picloram-based herbicide formulations in combination with sod-seeding of annual clovers. Triclopyr is another herbicide with potential for weed control on WSPG pastures. Effects of triclopyr rates and application dates on stand

establishment and growth of annual clovers overseeded on WSPG pastures were also investigated.

The research objective was to determine optimum rate and application date of picloram + 2,4-D (1:4), dicamba + 2,4-D (1:3), and triclopyr + 2,4-D (1:2) for use on WSPG pastures in combination with fall sod-seeding of annual clover.

## PROCEDURES

Picloram + 2,4-D (1:4) [Grazon P+D] and dicamba + 2,4-D (1:3) [Weedmaster] at 3 rates, applied at 6 dates to a bermudagrass sod were evaluated in all factorial (2x3x6) combinations for effect on stand establishment and growth of arrowleaf and subterranean (sub) clover. Triclopyr + 2,4-D (1:2) at two rates, applied at 6 dates to a bermudagrass sod was evaluated for the same parameters. Treatment combinations are described in Table 1. Treatment combinations were arranged in a randomized complete block design with three replications. Herbicide treatments were applied 50, 80, 110, 140, 170, and 200 days prior to clover planting. Arrowleaf and sub clover were imposed on this arrangement in a split block design. Clover was sod-seeded October 21, 1987. Stand and damage ratings were noted on day 14, 50, 173, and 220, post-planting.

## RESULTS AND DISCUSSION

The main effects of clover species (C), herbicides (H), rates (R), and application dates (D), and the interactions CxH, HxR, and HxD were significant ($P < 0.01$) sources of variation in the stand and damage ratings of both sub and arrowleaf clover. Arrowleaf clover was less susceptible to the herbicide residue effects than subterranean clover. This confirms results of previous research.

### Arrowleaf clover

No permanent damage or stand losses were noted on arrowleaf clover exposed to dicamba or triclopyr residue (data not shown). Damage ratings (scale of 0-9 with 0 = no damage and 9 = dead plant) of arrowleaf due to picloram residue were related directly to rate of herbicide applied and inversely related to the number of days from herbicide application to planting. Effects of rate and application date of picloram + 2,4-D on arrowleaf clover are shown in figure 1.a and 1.b. The 2-pint rate (0.6 lbs a.i./ac) of picloram + 2,4-D (1:4) applied to sod 140 days (June 1) before planting arrowleaf resulted in a damage rating of 0.67 and a stand rating of 92.6% compared to 4.0 and 81.6% for the 110 day application (July 1). Only minor damage and stand reduction were noted on arrowleaf exposed to

4 pints/acre of picloram + 2,4-D (1:4) if the herbicide was applied at least 140 days prior to clover planting.

**Subterranean clover**

No permanent adverse effects were noted on sub clover due to residue of dicamba or triclopyr (data not shown). Damage and stand reduction of sub clover was minor due to residue from picloram + 2,4-D applied at 1 or 2 pints/acre at least 140 days prior to planting (figure 1.c and 1.d). The 2 pint/acre rate of picloram + 2,4-D (1:4) applied 110 days prior to sub clover planting resulted in sharp increases in damage score and stand reduction compared to the 140 day herbicide application.

**References**

Smith, G. R. 1986. Herbicide residue damage to sod-seeded clovers. Forage Research in Texas. TAES CPR-4499. p. 51-53.

This publication reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and Federal agencies before they can be recommended.

TABLE 1. HERBICIDE TREATMENTS APPLIED TO BERMUDAGRASS SOD

| Treatment no. | Herbicide | Rate | Application dates |
|---|---|---|---|
| | | lbs a.i./acre | |
| 1 - 6 | picloram + 2,4-D | 0.06 + 0.25 | April - September |
| 7 - 12 | picloram + 2,4-D | 0.12 + 0.50 | April - September |
| 13 - 18 | picloram + 2,4-D | 0.25 + 1.00 | April - September |
| 19 - 24 | dicamba + 2,4-D | 0.125 + 0.375 | April - September |
| 25 - 30 | dicamba + 2,4-D | 0.25 + 0.75 | April - September |
| 31 - 36 | dicamba + 2,4-D | 0.50 + 1.50 | April - September |
| 37 - 42 | triclopyr + 2,4-D | 0.25 + 0.50 | April - September |
| 43 - 48 | triclopyr + 2,4-D | 0.50 + 1.00 | April - September |

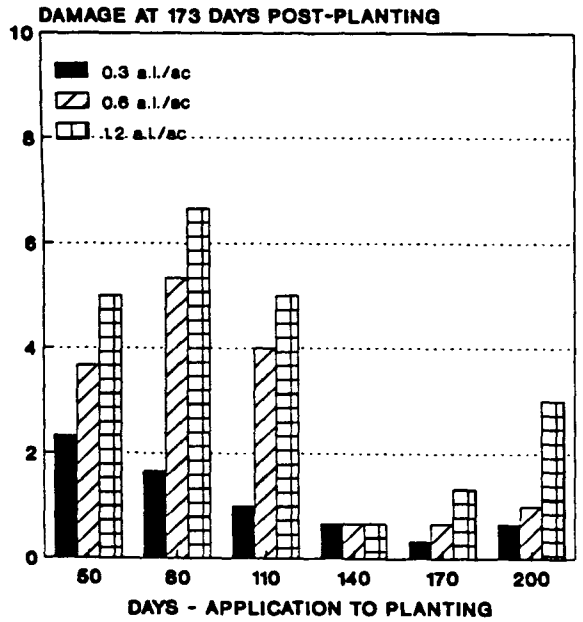


FIG. 1.a EFFECTS OF PICLORAM + 2,4-D RESIDUE ON SOD-SEEDED ARROWLEAF CLOVER

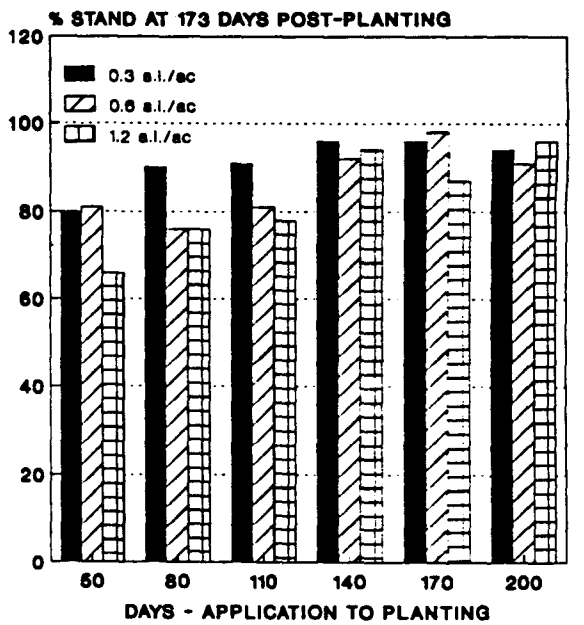


FIG. 1.b EFFECTS OF PICLORAM + 2,4-D RESIDUE ON SOD-SEEDED ARROWLEAF CLOVER

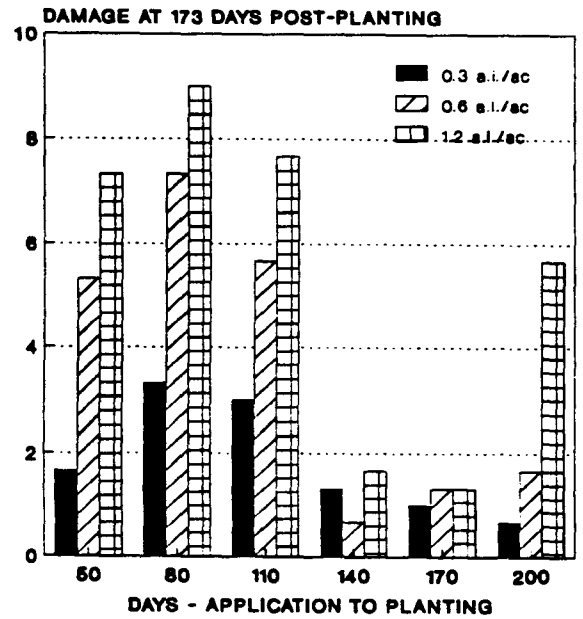


FIG. 1.c. EFFECTS OF PICLORAM + 2,4-D RESIDUE ON SOD-SEEDED SUBTERRANEAN CLOVER

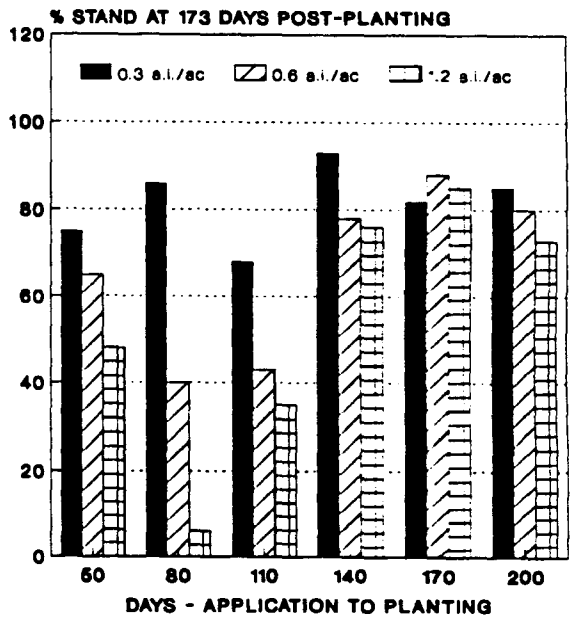


FIG. 1.d. EFFECTS OF PICLORAM + 2,4-D RESIDUE ON SOD-SEEDED SUBTERRANEAN CLOVER