

Corn Weed Management in Tall Fescue Sod

William W. Witt, James R. Martin, and Charles H. Slack
University of Kentucky

Introduction

Tall fescue (*Festuca arundinaceae* Schreb.) has been planted as a desirable forage grass throughout much of the Mid-south for many years. More recently, it was the primary species planted into the Conservation Reserve Program (CRP) acreage because of its ability to establish quickly and provide an excellent ground cover to prevent soil erosion. Within the next few years, some of the acreage will be brought into production as the current CRP contracts end. Most of the acreage taken out of production in Kentucky and surrounding states is subject to erosion from the intense storms frequently encountered during the spring. Therefore, as these fields go back into production, it is desirable to utilize conservation tillage practices, such as no-tillage, to establish the desired crop.

No-tillage corn production into tall fescue sod has been practiced in Kentucky for more than 30 years. Atrazine plus paraquat and atrazine plus simazine plus paraquat became the grower standards in the late 1960's and early 1970's, and usually provided 100% control of the tall fescue sod and greater than 85% control of giant foxtail, smooth pigweed, and most other small-seeded annual weeds. In the late 1970's and early 1980's, combinations of atrazine plus alachlor or metolachlor were commonly used, particularly where annual grasses such as large crabgrass and fall panicum were a problem. In the past 2 years, we have compared low rates of glyphosate to paraquat in combination with various residual herbicides. Glyphosate or paraquat combined with atrazine provide comparable control of the tall fescue.

While control of tall fescue is relatively easy, consideration of other items that affect weed management should be considered. Species such as brambles, trumpet creeper, and eastern red cedar are examples of troublesome weeds present in CRP land that may be difficult to control in a growing crop. These species may be easier to control before planting the crop. Multiple herbicides and multiple applications may also be needed. Mowing is also an option that should be considered. A primary tillage operation might be useful from a weed management standpoint, but since most of the CRP acreage is erodible, tillage would be suggested only in rare cases.

The renewed interest in planting corn into a tall fescue sod in land coming out of the CRP program caused us to examine historical data and to initiate additional research to answer some of the questions being received.

Methods and Materials

In this paper, rates for atrazine are expressed as a liquid because of the widespread use of AAtrex 4L@ and other liquid atrazine formulations. Some of the early research reported in this paper was conducted with Atrazine 80WP; however, for ease of discussion these rates have been converted to liquids.

Similarly, Princep 4L@ is used for all formulations of simazine. We have not observed any difference of tall fescue control with any of the various herbicide formulations. Likewise, Gramoxone Extra 2.5S is used because it is the paraquat formulation available today. The research reported in this paper, except for the data from the 1990's, was conducted with Paraquat 2S. These amounts are presented in pints of Gramoxone Extra 2.5s for ease of comparing treatments across years. Therefore, for ease of discussion, herbicide rates are given in either pints or quarts and herbicide formulations currently available to growers.

Data in this paper were collected over a 27-year period at the University of Kentucky. All studies were conducted on experiment stations near Lexington or Princeton. In all studies, field corn was planted into a tall fescue sod with a no-tillage planter. The sod had been established for at least 5 years in all instances. Herbicide treatments were applied to small plots, generally 2 or 4 rows wide by 30 to 50 feet in length. The various herbicides were applied with flat fan nozzles. Unless otherwise indicated, all Gramoxone Extra treatments were applied in 25 gallons of water per acre and included X-77, a nonionic surfactant, at 0.25% vlv. These treatments were applied immediately after planting. The Roundup treatments were applied in 10 gallons of water per acre and were made 7 days before corn planting, unless otherwise indicated.

Control of tall fescue and weed species was evaluated on a 0 to 100 scale, with 0 being no control and 100 being weed free. Control evaluations were made 4 and 8 weeks after planting or treatment and at harvest.

Results and Discussion

Atrazine was used alone to control tall fescue before the introduction of Gramoxone Extra in the late 1960's. The atra-

William Witt, Department of Agronomy, University of Kentucky, N-106 Agri. Sci. Bldg., Lexington, KY 40546 (Phone: 606-257-1823; Fax: 606-323-1952; E-mail: wwitt@ca.uky.edu). James R. Martin and Charles Slack, Department of Agronomy, University of Kentucky, Lexington.

zine was applied 3 or 4 weeks before corn planting. This early preplant application was necessary because it took that long for the atrazine to be leached into the root zone and kill the tall fescue. At least 3 qt/A of atrazine 4L were required to kill the tall fescue (Table 1). The addition of Gramoxone Extra allowed the grower to use less atrazine. Results of UK

Table 1. Tall fescue control 8 weeks after treatment (WAT) with atrazine and atrazine combinations in 1967.

Treatment ¹	Amount/Acre	Control 8 WAT (%)
Atrazine 4L	2 qt	13
Atrazine 4L	3 qt	80
Atrazine 4L	4 qt	98
Atrazine 4L + Gramoxone Extra 2.5s	2 qt 0.8 pt	100
Atrazine 4L + Gramoxone Extra 2.5s	3 qt 0.8 pt	100

¹Atrazine used in this experiment was an 80WP formulation. The quantities were converted to an atrazine formulation currently available to farmers.

*Gramoxone Extra was applied with nonionic surfactant at 0.25% v/v.

Table 2. Tall fescue, giant foxtail, and smooth pigweed control over a 4-year period with Atrazine 4L at 2 qt/A and Gramoxone Extra 2.5s at 0.8 pt/A plus nonionic surfactant at 0.25% v/v. Control ratings were made 8 WAT.

Year	Tall Fescue	Giant Foxtail (% control)	Smooth Pigweed
1978	100	82	88
1979	95	100	100
1980	100	100	100
1981	100	92	100

Table 3. Tall fescue, giant foxtail, and smooth pigweed control over a multi-year period with Atrazine 4L at 1.5 qt/A, Princep 4L at 1.5 qt/A, and Gramoxone Extra 2.5s at 0.8 pt/A plus nonionic surfactant at 0.25% v/v. Control ratings were made 8 WAT.

Year	Tall Fescue	Giant Foxtail (% control)	Smooth Pigweed
1978	100	82	88
1979	95	100	100
1980	100	100	100
1981	100	92	100
1993	100	95	90
1994	100	95	95

research in 1967 indicated that Gramoxone Extra combined with 2 qt/A of atrazine 4L killed tall fescue as well as 3 or 4 qt/A of atrazine 4L used alone (Table 1).

Tall fescue sods that have been established for several years often have only a few weed species that emerge and become a serious problem during the first season of corn. Two of these species that occur in Kentucky are giant foxtail and smooth pigweed. However, in subsequent years, many other weeds will emerge as the sod decomposes.

Many growers in Kentucky have used only atrazine and Gramoxone Extra to kill tall fescue, giant ragweed, and smooth pigweed. Greater than 80% control of all species can be expected (Table 2). A combination of atrazine, Princep, and Gramoxone Extra controlled these species similar to atrazine plus Gramoxone Extra (Table 3). The primary advantage of Princep was that it added a longer duration of giant foxtail control.

There has been an increased interest in using Roundup to control tall fescue in the past few years. Our initial tall fescue control with Roundup was at rates of 2 to 3 qt/A per acre using 25 to 40 gpa as a carrier volume. These data were collected in the 1970's and early 1980's. Since that time, it has been shown with numerous species that Roundup rates of 1.5 qt/A or less will provide excellent control at carrier volumes of 10 gpa or less. With this in mind, we conducted two studies in 1994 to: (1) evaluate Roundup at 1.0 and 1.5

Table 4. Tall fescue control with Roundup in 1994. All treatments included a nonionic surfactant at 0.5% v/v and were applied at 10 gpa 7 days before corn planting.

Treatment ²	Amount/Acre	Control 4 WAP (%)	Control At Harvest (%)
Roundup 4S	1 qt	89	95
Roundup 4S + Ammonium Sulfate	1 qt 0.5%	96	98
Roundup 4S + 2, 4-D LV4	1 qt 1 Pt	90	98
Roundup 4S + 2,4-D LV4 + Ammonium Sulfate	1 qt 1 Pt 0.5%	91	98
Roundup 4S	1.5 qt	99	99
Roundup 4S + Ammonium Sulfate	1.5 qt 0.5%	98	100
Roundup 4S + 2, 4-D LV4	1.5 qt 1 Pt	96	100
Roundup 4S + 2,4-D + LV4 + Ammonium Sulfate	1.5 qt 1 Pt 0.5%	99	99
LSD(.05)		5	36

¹The ammonium sulfate used was Cayuse® and was applied at 0.5% v/v.

²All treatments received Bullet 4L0 at 4 qt/A immediately after corn planting.

³Visual control rating were made 4 weeks after planting (4 WAP) and at corn harvest.

qt/A, with and without various additives, and (2) determine if mowing before herbicide application helped or hindered tall fescue control and corn growth.

Tall fescue control 4 weeks after planting was slightly increased with the addition of ammonium sulfate to Roundup at 1.0 qt/A compared to Roundup alone at 1.0qt/A. The control from Roundup at 1.0 qt/A plus ammonium sulfate was equal to that of Roundup alone at 1.5 qt/A (Table 4). At corn harvest, tall fescue control was equal among all the treatments.

Mowing the tall fescue to a height of 6 inches 2 weeks before application slightly enhanced tall fescue control with Roundup at 1.0qt/A at the 4 weeks after planting evaluation (Table 5). Mowing did not change tall fescue control with Roundup at 1.5 qt /A or Gramoxone Extra at 1.6 pt/A. Tall fescue control at the time of corn harvest was excellent for all treatments.

Corn stands were significantly greater in plots that were mowed compared to plots that were not mowed (Table 5). Mowing appeared to have the greatest impact on corn stands in plots treated with Gramoxone Extra. Mowing may have improved corn stands by changing the habitat of rodents or other pests that feed on corn seed and emerging corn plants.

Our results over the years have shown that atrazine, or another triazine herbicide, in combination with Gramoxone Extra or Roundup, is needed to provide consistent tall fes-

cue control. It is our opinion that corn would be the crop of choice in most of the CRP fields since corn can be established under no-tillage conditions and has been shown to provide yields equal to those obtained under tilled conditions.

Table 5. Effect of mowing in combination with Roundup or Gramoxone Extra on tall fescue control and corn stands. All Roundup treatments were applied at 10 gpa 7 days before corn planting and all Gramoxone Extra treatments were applied at 25 gpa immediately after planting. All treatments were applied with a nonionic surfactant at 0.5% vlv.

Treatment ¹	Amount/ Acre	Mowing	Control ³ 4WAP	Harvest	Corn ³ Stand
			Control ³ (%)		(No/A)
Roundup 4S	1 qt	No	95	96	10,963
Roundup 4S	1 qt	Yes	99	100	17,887
Roundup 4S	1.5 qt	No	98	100	14,956
Roundup 4S	1.5 qt	Yes	98	100	20,909
Gramoxone Extra 2.5s	1.6 pt	No	100	100	5,570
Gramoxone Extra 2.5s	1.6 pt	Yes	100	100	18,151
LSD(.05)			2.6	NS	3,380

¹All treatments received Atrazine 4L at 1.5 qt/A plus Dual Do at 1 qt/A immediately after corn planting.

Visual control ratings were made 4 weeks after planting (WAP) and at corn harvest.

Corn stands were determined 6 weeks after planting.