# MANAGING ANNUAL ITALIAN RYEGRASS WITH PREHARVEST APPLICATIONS

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## OBJECTIVE:

The spread of Italian ryegrass has often been attributed to scattering of weed seed with combines during wheat harvest. Limited observations indicate that Italian ryegrass matures slightly later than wheat. If this observation holds true, the use of Roundup Ultra as a preharvest treatment after wheat seed are physiologically mature but before maturity of Italian ryegrass may help limit viability of Italian Ryegrass seed.

This project was conducted to evaluate Italian ryegrass and wheat seed viability following the use of Roundup Ultra applied and Gramoxone Extra as preharvest treatments at different timings to two wheat varieties of different maturities. Roundup Ultra at 2pt/A is labeled for applications after the hard-dough stage of wheat grain (30% or less moisture) at least 7 days before harvest. Gramoxone Extra is NOT registered as a preharvest treatment in wheat but was included in this study for making comparisons with Roundup Ultra.

## METHODS:

The wheat varieties chosen for this study were Clark and Pioneer 2540.

According to the 1998 Kentucky Small Grain Variety Trials Progress Report, Clark reaches the heading stage about 5 days earlier than Pioneer 2540. Wheat was planted in a conventional tillage system in an Italian ryegrass infested area on October 13, 1998 at the University of Kentucky Research and Education Center. Wheat stand counts were recorded on October 28, 1998. A total of 110 units of nitrogen/A was applied as a split treatment with 50 units/A applied on February 22, 1999 and 60 units/A on March 26, 1999. The preharvest treatments were applied at various times during the drying of wheat with a $CO_2$ back-pack sprayer. Roundup Ultra at 2 pt/A was applied in a spray volume of 8 GPA. Gramoxone Extra at 2 pt/A plus nonionic surfactant at 0.25% v/v were applied in a spray volume of 17 GPA.

The intended moisture levels used for timing the preharvest treatments were designated as 40% (physiological maturity), 30% (maximum moisture based on Roundup Ultra label), and 20% (acceptable moisture level for machine harvesting). Wheat seed moisture was measured using the oven dry method. The time required for this method was nearly one day, consequently, the rapid maturing conditions in 1999 made it impossible to apply all of the preharvest treatments according to the target seed moisture levels.

**RESULTS:**

Natural drying process was approximately 3 to 6 days earlier for Clark than for Pioneer 2540. Clark seed moisture measured 56.8 % on June 4, 39% on June 5, and dropped to 20.6% on June 6. By the time moisture levels were determined, the intended target levels of 40% and 30% for Clark had already passed. Similar problems were encountered for Pioneer 2540 at the 30% level.

None on the preharvest treatments affected the germination of wheat seed. The germination results ranged from 85 to 90 % for Clark and from 83 to 86 % for Pioneer 2540.

The germination of Italian ryegrass was 97% for seed collected from the nontreated check plots for both Clark and Pioneer 2540. The preharvest applications of Roundup Ultra at 2 pt/A did not appear to affect the germination of Italian ryegrass, even at the earliest application made to Clark on June 6. The percent germination of Italian ryegrass seed ranged from 91 to 97% for the Roundup Ultra preharvest treatments made during the period between June 6 through June 16, 1999.

All preharvest applications of Gramoxone Extra at 2 pt/A plus nonionic surfactant at 0.25% significantly reduced Italian ryegrass seed germination when compared with the nontreated check. The Italian ryegrass seed germination from the Gramoxone Extra ranged from 12 to 19% for applications made to Clark during the period of June 6 through June 8. The germination results ranged from 25 to 75% for Gramoxone Extra applications made in Pioneer 2540 plots during June 9 through June 16.

One observation worth noting from this study was the impact that Italian ryegrass had on wheat growth. Fall wheat stands were uniform and

averaged approximately 31.5 plants/ft$^2$ for both Clark and Pioneer 2540. The Italian ryegrass population was extremely dense in portions of the study and severely limited growth of wheat during late winter and spring. A rating of percent ground cover occupied by wheat on July 8 was used to reflect the affect Italian ryegrass had on biomass of wheat. The biomass ratings were highly variable and were not affected by the preharvest treatments. Although both varieties were affected by competition, there was a definite trend indicating that Pioneer had less biomass and may be more prone to competition from Italian ryegrass than Clark.

## SUMMARY:

Preharvest applications of Roundup Ultra appear to be relatively safe to wheat when applied according to label directions. Although Roundup Ultra may aid in managing selected weeds, it is unlikely that it will reduce the viability of Italian ryegrass seed. Gramoxone Extra can reduce the viability of Italian ryegrass seed, particularly when applied to a short season wheat variety that allows for earlier applications. It is important to note that Gramoxone Extra is currently not registered as a preharvest treatment to wheat.

## ACKNOWLEDGMENTS:

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**TABLE 1. VIABILITY OF SEED COLLECTED FROM WHEAT AND ITALIAN RYEGRASS AND WHEAT BIOMASS FOLLOWING PREHARVEST APPLICATIONS OF ROUNDUP ULTRA AND GRAMOXONE EXTRA IN CLARK AND PIONEER 2540**

**(PRINCETON, KY 1999)**

| Variety | | Wheat Moisture | | Preharvest | Seed Germination [2] | | Wheat |
|---|---|---|---|---|---|---|---|
| | Date | Intended % | Actual % | Herbicide Treatment[1] | Wheat Germ % | Italian Ryegrass % | Biomass [3] % |
| Clark | 6/6 | 40 | 20.6 | Roundup Ultra | 85 | 97 | 29 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Gramoxone Extra | 88 | 13 | 24 |
| | 6/7 | 30 | 20.4 | Roundup Ultra | 90 | 91 | 46 |
| | | | | Gramoxone Extra | 86 | 12 | 33 |
| | 6/8 | 20 | 10.13 | Roundup Ultra | 85 | 95 | 29 |
| | | | | Gramoxone Extra | 88 | 19 | 49 |
| | | | Nontreated Check | | 88 | 97 | 34 |
| Pioneer 2540 | 6/9 | 40 | 37.2 | Roundup Ultra | 88 | 96 | 19 |
| | | | | Gramoxone Extra | 83 | 25 | 4 |
| | 6/10 | 30 | 22 | Roundup Ultra | 86 | 95 | 9 |
| | | | | Gramoxone Extra | 86 | 45 | 13 |
| | 6/16 | 20 | 10 | Roundup Ultra | 84 | 97 | 23 |
| | | | | Gramoxone Extra | 86 | 75 | 9 |
| | | | Nontreated Check | | 86 | 97 | 13 |
| | | | | | NS | 11 | 31 |

[1] Roundup Ultra at 2 pt/A was applied in a spray volume of 8 GPA. Gramoxone Extra at 2pt/A plus nonionic surfactant at 0.25% were applied as tank mixture in a spray volume of 17 GPA.

[2] Wheat and Italian ryegrass seed were hand collected on 6-29-99 for germination tests conducted by UK Regulatory Services.

[3] Biomass ratings were made on 7-8-99 and represent visual ratings of percent ground cover occupied by wheat.