

## Residue removal during winter wheat harvest reduces Italian ryegrass in the following spring wheat crop

Mark Thorne and Drew Lyon

Winter wheat chaff and straw left on the ground after harvest can influence soil moisture and affect subsequent field operations. Furthermore, crop residues on the soil surface can affect Italian ryegrass (*Lolium perenne* L. ssp. *multiflorum* (Lam.) Husnot) germination, seedling survival, and herbicide control in subsequent crops. This study examined the effect of direct baling of winter wheat residue at harvest on Italian ryegrass density and control in the following spring wheat crop.



Figure 1. Italian ryegrass seedlings visible in spring following direct baling of winter wheat residue the previous year.

During the 2018 winter wheat harvest, a combine towing a large baler collected and baled all residue (straw and chaff) in a 10-acre area on the WSU Cook research farm near Pullman, WA. Wheat residue in an adjoining area of the field remained in place. A paired-plot randomized complete block trial consisting of four 30- by 130-ft strips, each split into two 15- by 130-ft subplots, was flagged in each area. In April 2019, Italian ryegrass density was assessed in each plot. Spring wheat was direct-seeded on May 6, 2019 in both the baled and non-baled areas. Subplot treatments consisted of Zidua® (pyroxasulfone), applied at 2 oz/A rate post-plant pre-emergence (Table 1), and no applied Zidua. In June, all plots were treated with Huskie® at 15 oz/A plus Affinity BroadSpec® at 1.0 oz/A for broadleaf weed control. Just prior to the spring wheat harvest, percent Italian ryegrass canopy cover was estimated in four 1-m<sup>2</sup> areas in each subplot strip to assess Italian ryegrass control.

Table 1. Application and soil data.

Location	Cook Farm, Pullman, WA
Application date	May 15, 2019
Rotation phase	spring wheat
Italian ryegrass stage	pre-emergent
Air temperature (F)	61
Relative humidity (%)	61
Wind (mph, direction)	3, SW
Cloud cover (%)	10
Soil temperature at 8 in (F)	58
Soil pH	5.3
Soil organic matter (%)	3.7
Soil texture	Thatuna silt loam

Prior to spring wheat seeding, ryegrass density averaged 405 plants/ft<sup>2</sup> (4353 plants/m<sup>2</sup>) and there was no difference in density between the baled and non-baled areas (data not shown); however, in the non-baled area the residue cover had to be pulled away to get an accurate count of Italian ryegrass seedlings. In the baled area, the seedlings were more visible and exposed (Figure 1). Winter wheat residue cover was nearly 100% in the non-baled area, but bare soil and



Figure 2. Left photo shows non-baled winter wheat residue. Photo on the right shows winter wheat residue, and Italian ryegrass seedlings, after direct baling during winter wheat harvest.

Italian ryegrass seedlings were visible in the baled area (Figure 2) leaving them more exposed and susceptible to a pre-plant glyphosate application (data not shown).

Prior to the spring wheat harvest, Italian ryegrass averaged 74% canopy cover in non-baled plots with no Zidua (Table 2). Plots that were baled and had no Zidua averaged 21% cover, but were not different than the non-baled plots with Zidua that averaged 12% cover. The least amount of Italian ryegrass was seen in the baled plots with Zidua, which averaged only 2% canopy cover (Table 2).

It is apparent that removing winter wheat residues exposes more soil and may reduce surface moisture that promotes Italian ryegrass germination for a longer period during the early crop growth period. Furthermore, removing crop residues increased control from glyphosate applied pre-plant and increased Zidua efficacy applied post-plant, pre-emergence. Winter wheat residue removal may be one strategy for Italian ryegrass control.

Table 2. Italian ryegrass canopy cover in spring wheat

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Field	Herbicide*	Italian ryegrass** (% canopy cover)
Non-baled	none	74 a
Non-baled	Zidua	12 bc
Baled	none	21 b
Baled	Zidua	2 c

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\*Zidua applied at 2 oz/A post-plant, pre-emergence.

\*\*Numbers followed by the same letter are not different ( $P_{value} \leq 0.05$ ).