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Effects of Glyphosate-Resistant and Glyphosate-Susceptible Italian Ryegrass (*Lolium multiflorum* Lam.) Extracts on Wheat Growth

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[Introduction]

Italian ryegrass (*Lolium multiflorum* Lam., IRG) is major winter forage crop in many countries, however it also functions as a troublesome weed that reduces the yields of wheat crops (*Triticum aestivum* L.). In IRG-wheat rotation systems, IRG residues emit allelopathic chemicals which reduce yields of subsequently planted crops. Thus, this study investigates how extracts from different biotypes of Italian ryegrass shoots and roots inhibit wheat growth at varying growth stages.

[Materials and Methods]

Effect of IRG extracts on wheat growth

Fifty days after sowing IRG in a greenhouse, 50 g of dried shoots and roots (cv. Gulf) were used to make extractions (water, boiled water, ethanol and fermentation). Bioassay experiments were then conducted in petri dishes with 9 cm diameters. We used wheat cultivars SWADV 3 and FILL 2018 for this study.

Effects of fermented IRG shoot and root extracts on wheat growth

Fermented IRG shoot and root extracts (accession. Gulf, PR-02) were made from greenhouse-grown IRG at the seedling stage (50 days after sowing, DAS), vegetative (80 DAS) and at harvest (120 DAS). In order to assess these extracts' potential for growth inhibition in wheat crops, a similar experiment was done with petri dish bioassays using the same method as described above. In addition, seeds of three glyphosate resistant biotypes (accession. PR-02, OR-6, NIGI) and three glyphosate susceptible biotypes (accession. Gulf, SF-S, 65) of IRG were sown in a greenhouse, grown until 50 DAS and then determined their allelopathic potential.

[Results and Discussions]

The shoot and root length of the wheat cultivars SWADV 3 and FILL 2018 were inhibited to a much greater degree in response to fermentation extracts as opposed to crops treated with water, boiled water, and ethanol extracts. However, there were no differences among water, boiled water, and ethanol extracts. Wheat shoot and root length was inhibited to a greater degree when crops were treated with shoot and root extracts of IRG made from seedling and vegetative stages IRG; harvest period extracts were less effective. Generally, wheat roots were more sensitive than wheat shoots in response to IRG extracts, regardless of extraction method. Wheat inhibition rates did not vary between glyphosate resistant biotypes (PR-02, OR-6, NIGI) and glyphosate susceptible biotypes (Gulf, SF-S, 65). Our results suggested that the allelopathic effects of fermented IRG residues might play a key role in the reduction of wheat growth.

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