EFFECT OF SEED BURIAL DEPTH ON WILD OAT CONTROL WITH SOIL-APPLIED HERBICIDES

Sushmita Sharma, Albert Adjesiwor
Department of Plant Science, University of Idaho

INTRODUCTION

Wild oat (*Avena fatua*) is one of the major weeds in small grain production system in the Pacific Northwest. Managing wild oat is challenging because of its seed dormancy, persistence, and ability of buried seeds to remain viable for extended periods (Sharpe et al., 2023). Wild oat seeds can become buried at different depths due to tillage, natural movement of soil and seeds, and crop residues. One of the management strategies for controlling buried seeds is the use of preemergence herbicides (Maqbool et al., 2020). These herbicides work best when emerging seedlings come into contact with the herbicide treated soil. Therefore, the depth at which wild oat seeds are buried can affect the efficacy of preemergence herbicides and the level of wild oat control.

OBJECTIVE: Determine the efficacy of preemergence herbicides as influenced by wild oat seed burial depth.

HYPOTHESIS: Wild oat control by preemergence herbicides varies with seed burial depth.

MATERIALS AND METHODS

Conducted at the University of Idaho Kimberly Research and Extension Center, Kimberly, ID in 2025 and 2026.

Greenhouse Study (Figure 1)

Design: 3 × 6 factorial arranged in a Randomized Complete Block Design (RCBD).

- ***Factor A (Herbicide):*** triallate(560 g ai/ha), ethalfluralin(1120 g ai/ha), untreated
- ***Factor B (Seed burial depth):*** 0, 0.64, 1.27, 2.54, 5.08, and 10.16 cm.

Field Study Design: Split-block design (Figure 2).

- ***Main plot (Herbicide):***triallate(560 g ai/ha), ethalfluralin(1120 g ai/ha), pyroxasulfone(146.1 g ai/ha), untreated
- ***Subplot (Seed burial depth):*** 0, 0.64, 1.27, 2.54, 5.08, and 10.16 cm.

Herbicide Application

- Herbicides were applied within 24 hours after wild oat seeds were planted.
- Irrigation was applied after herbicide treatment to facilitate herbicide incorporation.

Data Collection

Visible control: 14 and 28 days after spraying.
Aboveground biomass: 28 days.

Data analyzed using ANOVA in R (version

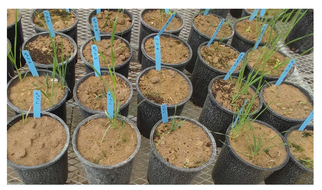


Figure 1: Greenhouse experiment



Figure 2: Field experiment

RESULTS AND DISCUSSION

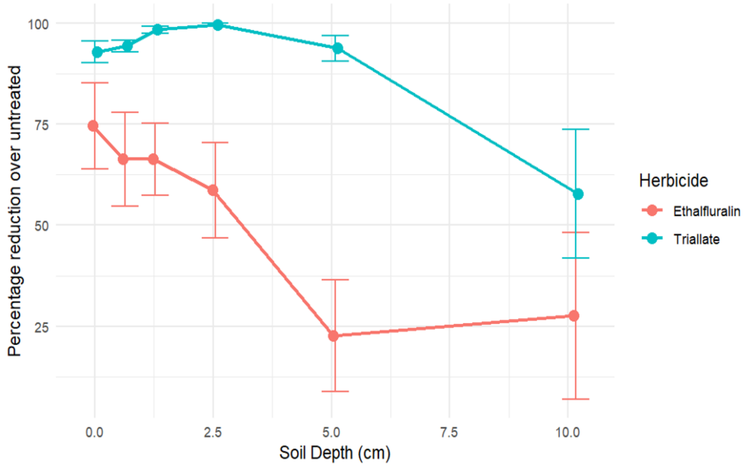


Figure 3: Percentage biomass reduction relative to the untreated control in the greenhouse experiment. Error bars represent the standard error (SE).

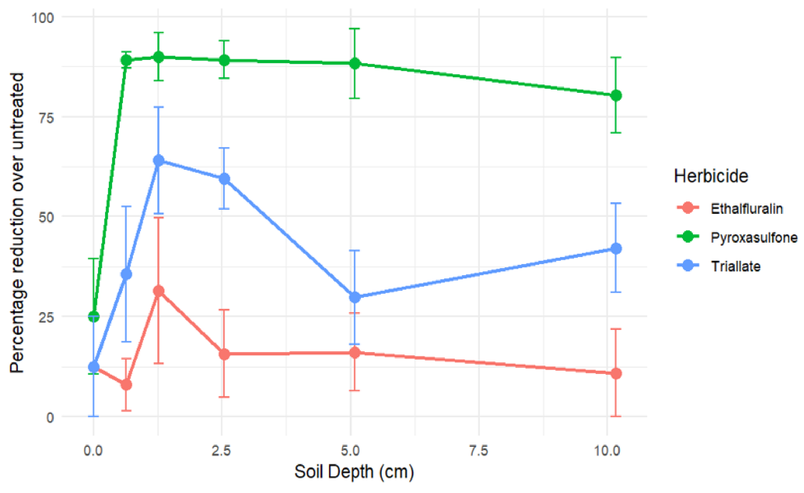


Figure 4: Percentage biomass reduction relative to the untreated control in the field experiment. Error bars represent the standard error (SE).

Greenhouse Experiment (Figure 3):

- Triallate provided consistent biomass reduction (90-100%) at 0 to 5 cm depths
- Efficacy of triallate declined beyond 5 cm depth (<55%)
- Ethalfluralin control declined from ≈75% at the soil surface to 25% at 5 cm
- At 10 cm, ethalfluralin provided only ≈25% biomass reduction

Field Experiment (Figure 4):

- Pyroxasulfone provided consistent biomass reduction (80–90%) across 0.5–10 cm soil depths
- Triallate showed variable efficacy, with 64% reduction at 1.5 cm and <50% at deeper depths (>5 cm)
- Ethalfluralin provided low biomass reduction (<35%) compared to untreated across all depths

CONCLUSION

- Herbicide efficacy was influenced by seed burial depth, with responses varying among herbicides
- Pyroxasulfone maintained greater efficacy across burial depths
- Triallate and ethalfluralin showed greater variability and reduced control at deeper burial depths
- Wild oat seeds on the soil surface and those deeply buried may escape control from preemergence herbicides.

FUTURE RESEARCH

- Investigate the effect of soil type and texture on herbicide movement and efficacy
- Evaluate the influence of soil moisture on herbicide activation, movement, and wild oat emergence from different burial depths

REFERENCES

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- Maqbool, M. M., Naz, S., Ahmad, T., Nisar, M. S., Mehmood, H., Alwahibi, M. S., & Alkahtani, J. (2020). The impact of seed burial depths and post-emergence herbicides on seedling emergence and biomass production of wild oat (Avena fatua L.): Implications for management. *Plos one*, *15*(10), e0240944.

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