e-GRO Alert

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Volume 14 Number 28 June 2025

Strategies and Guidelines for Herbicide Application During Outdoor Fall Crop Production

Effective weed management in outdoor mums and fall floriculture crop production requires proactive removal strategies, integrated weed control, and when necessary, careful herbicide application to protect surrounding sensitive plants from injury.

Weed management remains one of the most persistent challenges in outdoor floriculture crop production, especially for garden mums and other fall ornamentals grown in containerized systems (Fig. 1). Over the past decade, I have observed that significant weed pressure is frequently present both around and within gravel (Fig. 2) or weed barrier-covered container pads (Fig. 3). While some operations are highly proactive and maintain weed-free conditions from the beginning to the end of the crop cycle (Fig. 4A–B), others struggle with persistent weed problems (Fig. 5). Weeds are frequently observed growing out of the drainage holes of containers (Fig. 6) and from the exposed substrate surface before the plant canopy has fully covered the container surface (Fig. 7). These weeds compete with crops for water, nutrients, and light, reducing plant quality and marketability. As the crop grows and the canopy fills in, some weed pressure is reduced, but early-season

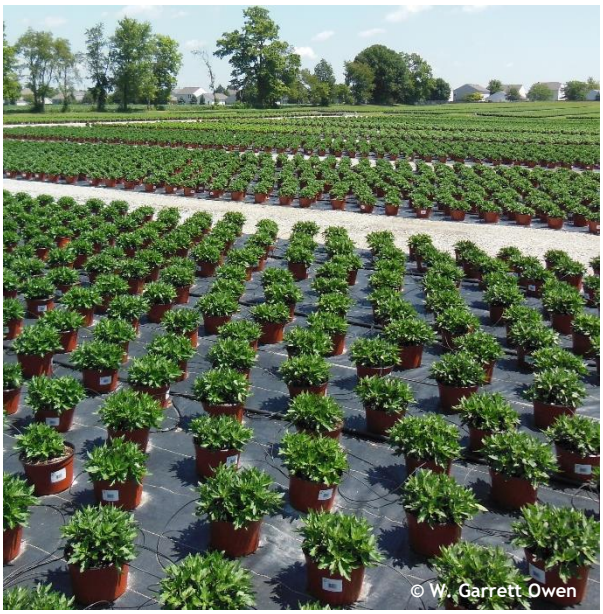

Figure 1. Outdoor production containerized garden mums grown on woven black groundcover and free of weeds. Photo by: W. Garrett Owen, OSU.

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Figure 2. A gravel container pad infested with nostoc. Photo by: W. Garrett Owen, OSU.

Figure 3. Container pad with persistent weed problems. Photo by: W. Garrett Owen, OSU.

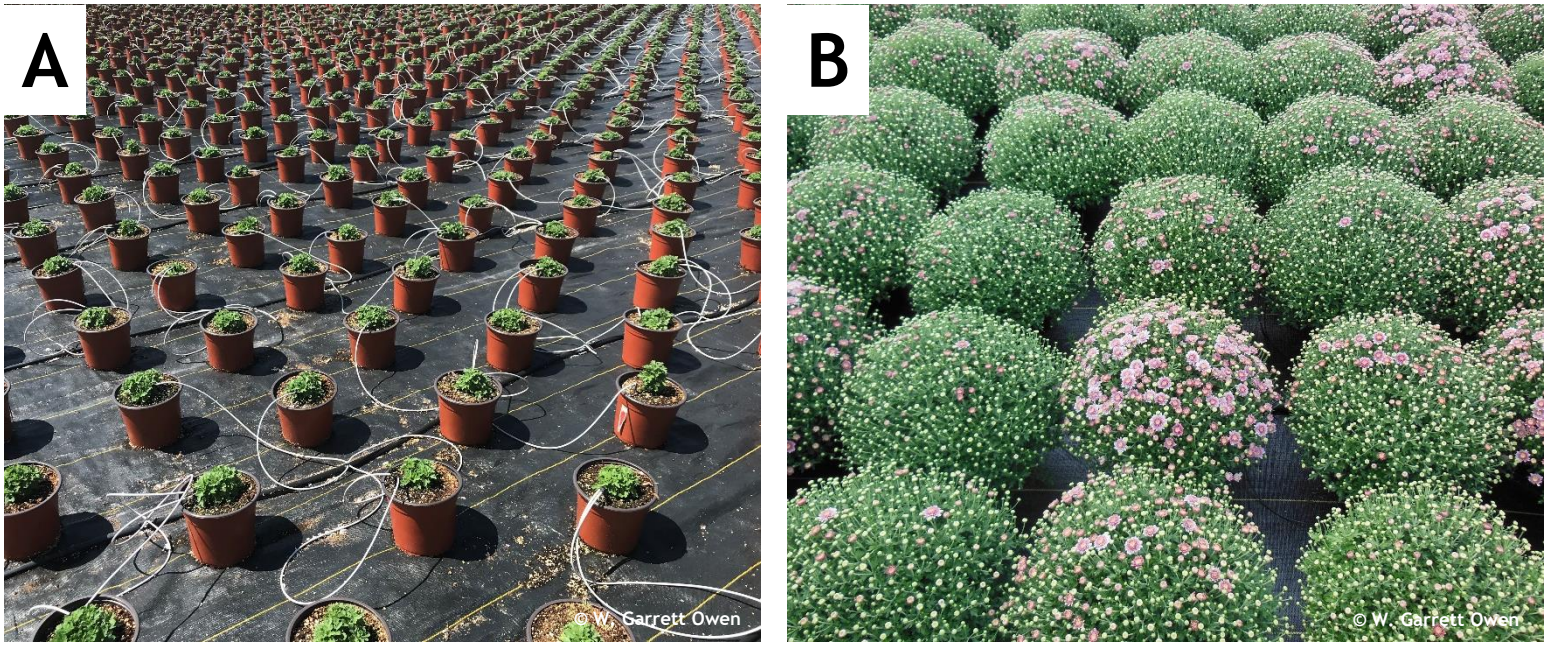

Figure 4. Example of a greenhouse operation that was proactive and maintained weed-free conditions from the beginning (A) to the end (B) of the fall garden mum crop production cycle. Photos by: W. Garrett Owen, OSU.

weed competition can have lasting impacts on plant vigor and uniformity. Given these challenges, many growers turn to herbicides as a primary tool for weed control, but this approach is not without its own set of risks and management considerations.

Many growers default to herbicides for weed control (Fig. 8); while these can be effective, I have observed localized herbicide injury in outdoor fall garden mums, with symptoms including distorted, cupping, and upward curling leaves (Fig. 9), stunted plant growth (Fig. 10), leaf and meristem chlorosis (yellowing; Fig. 11), and death (necrotic) of apical meristems (Fig. 12). These symptoms are often the result of herbicide drift, volatilization, or accidental overspray, and highlight the need for careful herbicide application and proactive weed management. The challenges posed by both weed

competition and herbicide injury reinforce the importance of a comprehensive, integrated approach to weed management. This article provides general guidance and strategies for implementing the best management practices that protect both outdoor-grown floriculture crops and sensitive plants in the surrounding production area, support crop quality, reduce labor costs, and help prevent the spread of weed seeds, contributing to overall improved production efficiency and crop uniformity.

Weed Management Control Strategies

Proactive Weed Removal

Hand removal of weeds is a foundational and proactive strategy for effective weed management in greenhouse and outdoor container production (Fig. 13). Regular and timely hand weeding, especially when weeds are small, is highly effective at reducing the weed seed bank and is particularly important in areas where chemical herbicides must be minimized or avoided. Although labor-intensive, early and consistent hand weeding prevents weeds from becoming established, reduces the need for more intensive interventions later in the season, and helps minimize the risk of herbicide injury to sensitive crops. This approach supports overall crop health and uniformity, which is especially valuable for high-value floriculture crops and helps maintain a clean production environment that enhances the effectiveness of other weed control methods.

Sanitation Practices

Maintaining good sanitation is essential for minimizing weed pressure in production areas. This involves inspecting and weeding new plant material before transplanting, as well as removing weeds from gravel (Fig. 14) or container pads, non-crop areas, and surrounding surfaces.

Figure 5. Example of a greenhouse operation that struggled with persistent weed problems. Photos by: W. Garrett Owen, OSU.

Figure 6. Weeds growing from drainage holes of outdoor container-grown fall garden mums. Photo by: W. Garrett Owen, OSU.

Figure 7. Example of outdoor-grown celosia early in the crop production cycle with exposed substrate surface and an emerging weed. Photos by: W. Garrett Owen, OSU.

Figure 8. Example of a greenhouse grower that used an herbicide to control weeds at the transition zone between gravel and an outdoor container pad. Photo by: W. Garrett Owen, OSU.

Regular scouting throughout the production environment helps identify weed species early and select the most effective control methods, with special attention paid to gravel pads and other non-crop areas that can serve as reservoirs for weed seeds and quickly spread infestations. By keeping the entire production area clean, growers can significantly reduce the risk of new weed problems and enhance the effectiveness of other weed control strategies.

Flame Weeding for Gravel Pads

Flame weeding is an effective non-chemical method for managing weeds on gravel pads, using heat to quickly kill weed seedlings without the need for herbicides (Fig. 15). This technique is best suited for gravel or other paved surfaces where weeds are exposed and can be targeted without causing damage. However, it should not be used on woven groundcover, as this can cause burns and material damage (Fig. 16.). When integrated into a broader weed management program, flame weeding helps reduce reliance on chemical herbicides and provides an additional tool for maintaining weed-free conditions in non-crop areas.

Chemical Control

General herbicide use in container production requires careful consideration to ensure effective weed control while minimizing risks to crops and the environment. Growers should always select herbicides that are labeled for ornamental plant use and registered in the US state where they intend to apply them. Always follow label instructions regarding application rates, timing, and safety precautions. Proper calibration of application equipment is essential to deliver accurate doses and reduce off-target

Figure 9. Example of an outdoor-grown fall garden mum displaying herbicide injury symptoms including distorted, cupping, and upward curling leaves. Photos by: W. Garrett Owen, OSU.

Figure. 10. Example of an outdoor-grown fall garden mum displaying stunted growth because of herbicide injury. Photo by: W. Garrett Owen, OSU.

movement. Environmental factors such as wind speed, temperature, humidity, and substrate conditions must be monitored to prevent herbicide drift and volatilization, which can cause injury to sensitive plants. Rotating herbicide modes of action is important to prevent the development of herbicide-resistant weed populations. Additionally, selecting herbicides based on the weed species to control and crop tolerance helps maximize efficacy and crop safety.

Accurate record keeping is essential for tracking herbicide applications, weather conditions, and any observed effects on crops; maintain detailed records of the product name, application rate, date, time, weather conditions, and any crop response. Regular scouting and detailed record keeping together support timely interventions, regulatory

compliance, troubleshooting, and the prevention of future issues. Growers should also prioritize early detection and response to herbicide injury by routinely inspecting treated areas and adjacent crops for signs such as distorted growth, leaf cupping, or necrosis. Prompt corrective action minimizes crop loss, and suspected injury should be documented and reported. Finally, stay informed and comply with all legal and regulatory requirements, including buffer zones, restricted entry intervals, and state and federal regulations.

Pre-Emergent Herbicides

Pre-emergent herbicides are a valuable tool for preventing weed establishment in container production. For best results, apply them before or soon after liners are transplanted and established, and after any existing weeds have been removed. Always follow label instructions for crop safety, application rates, and timing. Rotating pre-emergent herbicide modes of action helps prevent herbicide resistance. Selecting the appropriate pre-emergent herbicide based on the weeds present and crop tolerance is critical for maximizing efficacy and minimizing crop injury. Proper calibration of application equipment and consideration of environmental conditions, such as substrate moisture and temperature, further enhance performance. Growers should monitor treated areas for signs of weed breakthrough or herbicide injury and adjust management as needed to maintain effective control and crop safety.

Post-Emergent Herbicides

Post-emergent herbicides are used to control weeds that have already emerged. Effective application requires careful timing to target weeds at susceptible growth stages while minimizing crop injury. Growers should select herbicides

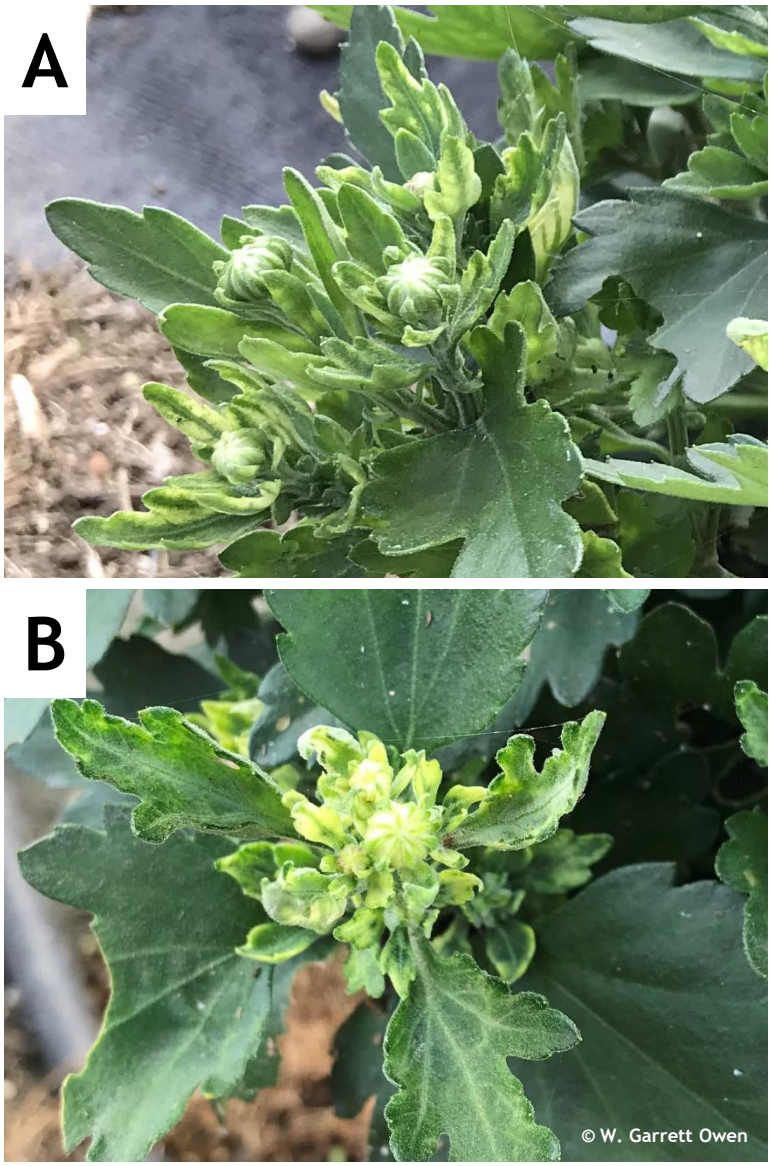

Figure 11. Example of an outdoor-grown fall garden mum displaying leaf (A) and meristem (B) chlorosis (yellowing) because of herbicide injury. Photo by: W. Garrett Owen, OSU.

Figure 12. Example of an outdoor-grown fall garden mum displaying apical meristem death (necrotic) because of herbicide injury. Photo by: W. Garrett Owen, OSU.

based on weed species present and crop tolerance and always adhere to label instructions for rates and application methods. Using low-drift nozzles and shielded sprayers helps reduce off-target movement and drift. Avoid applications during windy conditions or temperature inversions to prevent volatilization and damage to sensitive plants. Rotating herbicide modes of action is essential to prevent resistance development. Regular scouting and monitoring for herbicide injury and weed control efficacy allow timely adjustments to management practices.

Integrated Weed Management (IWM)

Integrated weed management combines multiple control strategies such as hand removal, sanitation, flame weeding, and chemical control methods to reduce reliance on any single method and lower the risk of resistance. Integrated weed management also involves rotating herbicide modes of action and integrating cultural practices to further reduce weed pressure and support long-term success in outdoor mums and fall floriculture crop production.

A successful IWM program requires growers to assess their unique production environment, weed species, and labor resources to develop a tailored, multi-pronged approach. By prioritizing early intervention and combining both chemical and non-chemical methods, IWM helps maintain weed-free conditions while minimizing environmental impact and promoting crop health (Fig. 17). Regular evaluation and adaptation of weed management strategies allow growers to respond to changing weed pressures, herbicide resistance patterns, and evolving best management practices, ensuring continued effectiveness and profitability throughout the production cycle.

Figure 13. An example of a greenhouse operation that removed weeds by hand. Photo by: W. Garrett Owen, OSU.

Figure 14. Example of a greenhouse operation that removed weeds and debris from the growing area, highlighting effective sanitation practices. Photo by: W. Garrett Owen, OSU.

Figure 15. Example of flame weeding equipment at a greenhouse operation. Photo by: W. Garrett Owen, OSU.

Figure 16. Example where a flame weeding torch burned and melted the black woven groundcover when trying to remove weeds from a container pad. Photo by: W. Garrett Owen, OSU.

Figure 17. Example of a successful integrated weed management program that has helped maintain weed-free conditions during fall floriculture crop production. Photo by: W. Garrett Owen, OSU.

Figure 18. High-quality and weed free fall garden mums ready to be shipped to a retail garden center. Photo by: W. Garrett Owen, OSU.

Effective weed management in outdoor mums and fall floriculture crop production relies on a proactive, integrated approach that combines hand removal, sanitation, flame weeding, and careful use of both pre- and post-emergent herbicides. Careful selection and application of herbicides, in accordance with label instructions and state regulations, are essential to minimize risks to sensitive crops and the environment. Early detection of herbicide injury and regular scouting support timely corrective action and regulatory compliance. By adopting these best management practices and continuously evaluating and adapting strategies to changing conditions growers can achieve consistent, high-quality production while reducing labor costs and mitigating the spread of weed seeds for improved crop uniformity and long-term profitability (Fig 18).

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