# CWSS Research Update and News

*Information on Weeds and Weed Control from the California Weed Science Society*

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# CWSS—Research Update and News—November 2026

## Message from CWSS President

**CWSS Members,**

The 2027 CWSS conference in Monterey is just around the corner. During my time as President, I've learned that it truly takes a village to make these conferences happen.

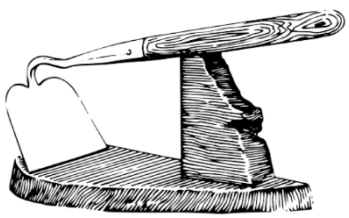
I want to extend a sincere thank you to the crew over at PAPA for doing an outstanding job every year coordinating the hotel arrangements and securing CEU approvals. Without their hard work, this conference would not be the success that it is.

Looking back to when I first came on as secretary and worked my way up through the ranks, I can say this has been a great experience for anyone looking to get involved with the California Weed Science Society and connect with wonderful people throughout the industry.

Being on the board has opened my eyes to the various segments within weed science across California. Whether your focus is on landscape weeds, industrial vegetation management, aquatics, or production farming, there are many opportunities for the upcoming generation to build a rewarding career in this field. I encourage anyone interested in getting involved to reach out to any of our board members.

**I look forward to seeing everyone at the conference in a few months!**

**CWSS President**
**Jason Robbins**



# Cut the Guesswork: A Smarter Approach to Invasive Weed Control with WeedCUT

Tom Getts, Chris McDonald, & Scott Oneto
University of California, Cooperative Extension

Have you ever wondered what the best way to get rid of a weed is? Are you looking for a variety of methods to control weeds? Welcome to the Weed Control User Tool, or WeedCUT. WeedCUT is an online decision support tool specifically focused on helping land managers and land owners find and compare effective control methods for invasive weeds in natural areas and other non-crop settings. Users can browse information on biological, non chemical, and chemical control, as well as learn more about specific application techniques. Where the tool really shines, is that a user can select any of the nearly 300 invasive species on the California Invasive Plant Council's Inventory, such as barbed goatgrass, shortpod mustard, kochia, tamarisk, stinkwort or castor bean, to see effectiveness rankings of control methods. The information presented in WeedCUT is data-driven, and was developed with input from experts and long-term practitioners in weed management across California to provide a reliable source of practical information.

One of the challenges for weed control professionals is figuring out what tools can work where. The decision support tool in WeedCUT allows the user to input different types of plant or site characteristics to customize their weed control options. The tool includes 11 plant characteristics such as plant type (annual, perennial), plant form (grass, forb, shrub, etc.), vegetative reproduction, rate of spread, and/or flowering period. The user can also input 9 different types of site characteristics, like slope, habitat, patch size, and/or disturbance tolerance. The plant and/or site characteristics will then show what techniques are most effective on that specific site. The user can select, for example, a perennial grass with a short seed life, in a 1 acre patch, near a road, with rocky soils in a grassland. The user interface will output a list of non-chemical and chemical weed management techniques that fit that criteria and rank the strategies based on their effectiveness. Using these results the practitioner can compare these results with local knowledge experts and implement a strategy they think will meet the project goals.



WeedCUT includes a wealth of information on management techniques. It includes 21 different non chemical management techniques, including scuffle hoeing, grazing, mowing with heavy equipment, and much more. Written by forty six experts, each of these techniques has a detailed best management practices (BMP) guideline, starting off with a summary of what it works best on, cost, and an overview of hazards, followed by an in depth dive on how these techniques can be used in natural areas. The non-chemical BMP's give detailed in depth reviews on specifically how to use the tool for effective and optimal management, tips, and how the tool can be effectively combined with other techniques. These BMP's are written to be easily accessible for all land managers, and have lots of information that would benefit even the most experienced weed control professionals.

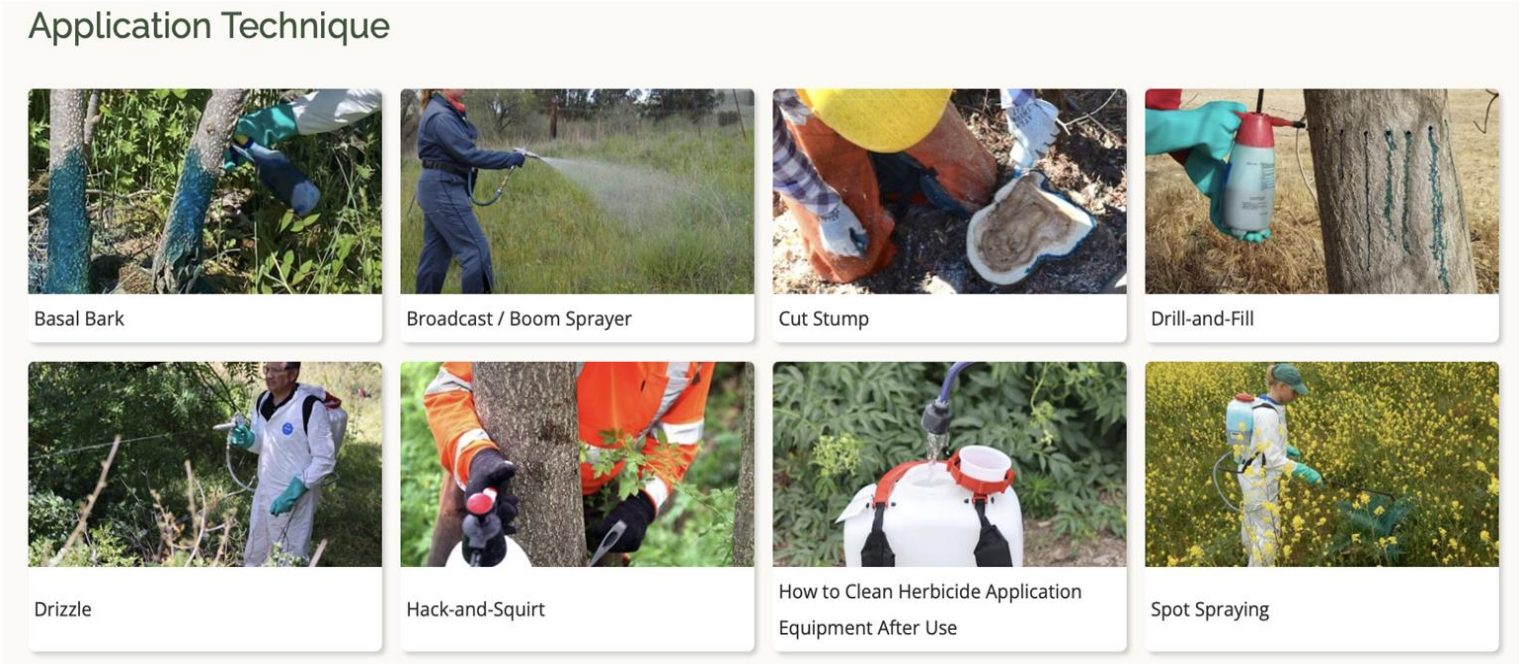
WeedCUT's biological control BMP's were written by senior experts in classical biological control. It is a comprehensive source of information for 20 different weeds, and the multiple biological control agents that have been released to control them. Information on the biology of the agents and how they work to suppress the weed species is covered, as well as the effectiveness of the agents. Followed by a step by step guide on how to employ the agents, special tips to ensure they establish, and finally how to get and successfully move the agents around the state (if permitted). WeedCUT is a centralized database for learning about the history and effectiveness of biological control in the state.



*Example of biological control agent on knapweed. Photo: Baldo Villegas CDFA.*

If information about herbicides is needed, WeedCUT's 18 chemical control BMP's help users learn more about using specific herbicides to control non-crop weeds. They are laid out in the same format as the non chemical techniques, but are written for a specific active ingredient, providing practical information to help new and experienced applicators. While labels provide safety, legal and some efficacy information, label sections on non-crop control are often quite short. These BMPS are meant to be used in conjunction with the label, to provide more information about how to maximize the effectiveness of the applications while limiting non-target impacts to other plants, cultural sites, and sensitive resources. WeedCUT is built on the principles of integrated pest management, and the chemical BMP's are also the best place to find information about how these herbicides can be used in conjunction with non-chemical techniques, or other herbicides to achieve vegetation management objectives.

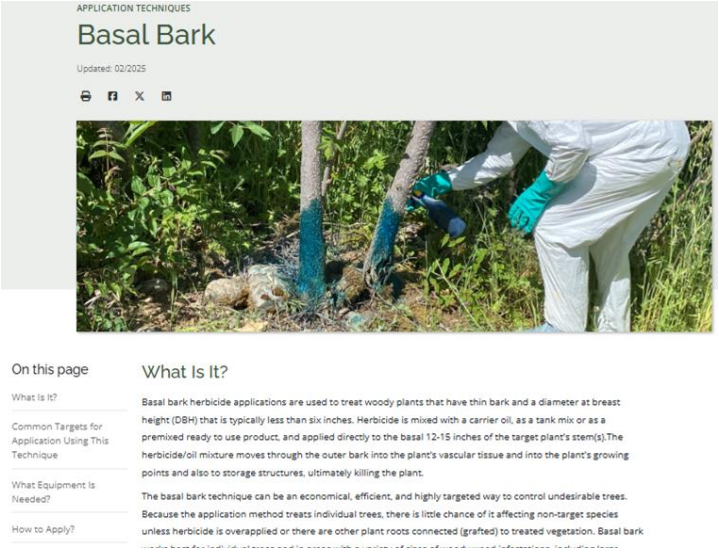
For land managers who need more details about application techniques, or for information to train crews, there are nine different application technique BMP's including spot spraying, basal bark, low volume drizzle, and sponge applications. There are many ways to apply herbicides and altering application techniques can increase effectiveness and selectivity. Each BMP is a wealth of information about what the application technique is, how to use it, specific targets or types of weeds that are often controlled, and most importantly how to calibrate for each technique. Calibration sections for each technique will provide math examples and easy to follow worksheets to help applicators who have never calibrated before.




*Examples of herbicide application techniques covered in WeedCUT*

Weed CUT's functions can be combined to improve IPM or just as importantly to justify why certain methods will not be used on a site or weed. In addition, in the about section of the website, there is a list of tips and principles to help you succeed in your projects. With interest in land management and herbicides increasing with the public, WeedCUT provides a data backed means of building an IPM program. For example, with many of the non chemical techniques effectiveness is dependent on the biology of the plant, timing of treatments, or requirements of the site. Treatments will have different effectiveness based on the project, a small patch will be easily controlled with hand tools, but large patches are not and may need the use of machinery or herbicides. These outputs can be very useful when communicating with people who do not work regularly in vegetation management, and may not understand why managers are choosing the techniques they use. It is an incredible tool for comparing which techniques can work on your sites.

Tens of thousands of people have been using WeedCUT to learn more about specific non-chemical, biological, and chemical control techniques, to learn about which techniques work on specific weed species and site characteristics, and how to combine treatments to build an IPM program. The decision support tool also has the ability to select individual species to prioritize which control techniques could be effectively used. And while WeedCUT is focused on invasive weeds in natural areas, these weeds also often are problematic on rangelands, roadsides, disturbed areas and adjacent to crops, so there are broad uses. We invite you to try the tool and learn more about which techniques could be used in your situation. Feedback on the tool is welcome and can be sent to info@cal-ipc.org (with the subject line "WeedCUT").




*Example of a herbicide application technique.*

QR Code for WeedCUT
WeedCUT link: https://weedcut-new.ipm.ucanr.edu/

# Expanding Postemergence Herbicide Options for Horseweed and Hairy Fleabane Management in California Almond Orchards

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## Introduction:

Effective postemergence weed management in any cropping system depends on the crop, herbicide selection, application timing, and the growth stage of target weeds. Horseweed (*Erigeron canadensis* L.) and hairy fleabane (*Erigeron bonariensis* L.) are two problematic broadleaf weeds in California's perennial cropping systems, particularly orchards and vineyards. Both horseweed and hairy fleabane species are well adapted to disturbed agricultural environments and exhibit characteristics that contribute to their persistence and spread, including prolific seed production, wind-mediated dispersal, and extended emergence periods. Seedlings typically emerge during fall and winter, followed by bolting in spring, when plants become increasingly difficult to control with postemergence herbicides. Herbicide resistance has become a significant challenge in managing these species. Repeated reliance on glyphosate in orchards, vineyards, and non-crop areas has contributed to the selection and spread of resistant populations. Population genetic studies have documented multiple independent origins of glyphosate resistance in both species throughout California's Central Valley (Okada et al., 2013, 2015). Subsequent research confirmed widespread glyphosate resistance and identified populations resistant to both glyphosate and paraquat (Moretti et al., 2016). Resistance to additional herbicides, including 2,4-D in hairy fleabane and cross-resistance to diquat in both species, further restricts available chemical control options (Moretti et al., 2021). These findings highlight the importance of integrated weed management strategies that combine timely applications, effective herbicide mixtures, diversification of modes of action, and prevention of weed seed production.

Florpyrauxifen-benzyl (Hulk®), registered in 2025 for use in almonds, citrus, and stone fruits, provides an additional postemergence option for broadleaf weed management. Classified as a WSSA Group 4 synthetic auxin herbicide, florpyrauxifen-benzyl disrupts normal plant growth, resulting in epinasty, abnormal development, and eventual plant death in susceptible species. Its low volatility relative to 2,4-D offers greater flexibility in application timing, including a 60-day preharvest interval. Although florpyrauxifen-benzyl belongs to the same herbicide group as 2,4-D, differences in herbicidal activity and weed susceptibility warrant evaluation under field conditions.

The objective of this study was to evaluate the efficacy and rate of weed control provided by florpyrauxifen-benzyl, applied alone or in tank mixtures with conventionally used herbicides such as glufosinate or glyphosate, against established horseweed and hairy fleabane in California almond orchards. Its performance was compared with commonly used postemergence herbicide programs to assess its potential role in integrated weed management.

## Materials and Methods:

Field trials were conducted during May-August 2025 and April-June 2026 in an established almond orchard at the University of California Shafter Research Farm, Shafter, California. The primary target weed species were horseweed and hairy fleabane. Other weed species observed at the experimental site included yellow nutsedge, evening primrose, and annual grasses. Volunteer almond seedlings were also abundant in both years. At the time of herbicide application, average weed height was approximately 10 inches in 2025 (11.5 inches for hairy fleabane and 10 inches for horseweed), compared with approximately 6 inches for both species in 2026. Weed pressure was substantially lower in 2026 than in 2025 (*Fig. 1 a, b*).

The experiments were arranged in a randomized complete block design (RCBD) with four replications. Herbicide treatments were applied during the last week of May 2025 and April 2026 using $CO_2$-pressurized backpack sprayer equipped with a 5-ft handheld spray boom. The sprayer was calibrated to deliver 20 gallons per acre (GPA). In the treated tree row, a 5-ft-wide strip was sprayed on both sides of the berm. Ammonium sulfate (AMS) at 5% (v/v) and methylated seed oil (MSO; Contingent) at 1% (v/v) were included in all herbicide treatments in both years.



***Figure 1.*** *Hairy fleabane and horseweed infestation at the time of application in 2025 (a-Top), and 2026 (b-Bottom).*

The earlier application in 2026 was intended to target weeds at a smaller growth stage, as several weeds in 2025 had exceeded the recommended application height specified on the herbicide labels, potentially reducing treatment efficacy. In 2025, treatments included florpyrauxifen-benzyl (Hulk®) at 16 and 21 fl oz/acre, along with tank mixtures of Hulk® + glufosinate (Rely 280), Hulk® + glyphosate (Roundup PowerMAX 3), glufosinate + glyphosate, and saflufenacil (Treevix) + glyphosate.

An untreated control was also included. Based on the 2025 observations, the treatment structure was modified in 2026 by eliminating the lower Hulk® rate (16 fl oz/acre) and including standalone applications of glufosinate and glyphosate to evaluate their individual impacts on weed control. The higher Hulk® rate (21 fl oz/acre) was retained based on its performance in the preceding year and label recommendations by the manufacturer. Herbicide treatments and application rates for both years are presented in *Tables 1 and 2*.

***Table 1:*** *Herbicide treatments and rates in year 2025.*

| TRT # | Herbicide | Active Ingredient | Rate (fl oz/acre) |
|---|---|---|---|
| 1 | Untreated | - | - |
| 2 | Hulk | Florpyrauxifen-benzyl | 16 fl oz/a |
| 3 | Hulk | Florpyrauxifen-benzyl | 21 fl oz/a |
| 4 | Hulk + Rely 280 | Florpyrauxifen-benzyl +Glufosinate | 21 fl oz/a + 48 fl oz/a |
| 5 | Hulk + Roundup Powermax 3 | Florpyrauxifen-benzyl +Glyphosate | 21 fl oz/a + 48 fl oz/a |
| 6 | Rely 280 + Roundup Powermax 3 | Glufosinate + Glyphosate | 82 fl oz/a +96 fl oz/a |
| 7 | Treevix + Roundup Powermax 3 | Saflufenacil + Glyphosate | 1 oz/a + 48 fl oz/a |

***Table 2:*** *Herbicide treatments and rates in year 2026.*

| TRT # | Herbicide | Active Ingredient | Rate (fl oz/acre) |
|---|---|---|---|
| 1 | Untreated | - | - |
| 2 | Hulk | Florpyrauxifen-benzyl | 21 fl oz/a |
| 3 | Hulk + Rely 280 | Florpyrauxifen-benzyl +Glufosinate | 21 fl oz/a + 48 fl oz/a |
| 4 | Hulk + Roundup Powermax 3 | Florpyrauxifen-benzyl +Glyphosate | 21 fl oz/a + 48 fl oz/a |
| 5 | Rely 280 | Glufosinate | 82 fl oz/a |
| 6 | Roundup Powermax 3 | Glyphosate | 48 fl oz/a |
| 7 | Treevix + Roundup Powermax 3 | Saflufenacil + Glyphosate | 1 oz + 48 fl oz/a |

Weed control was visually assessed as percent control relative to the untreated plots at two-week intervals following application. Ratings of 0-100% weed control were taken in each plot by individual weed species and overall weed control. Data was analyzed in SAS at a level of 0.05 level and means were separated using the Fisher's Least Significant Difference test. Evaluations continued through eight weeks after treatment (WAT) in 2025 and six WAT in 2026. The shorter evaluation period in 2026 reflected substantially lower weed pressure and insufficient remaining weed populations for reliable assessments beyond six WAT.

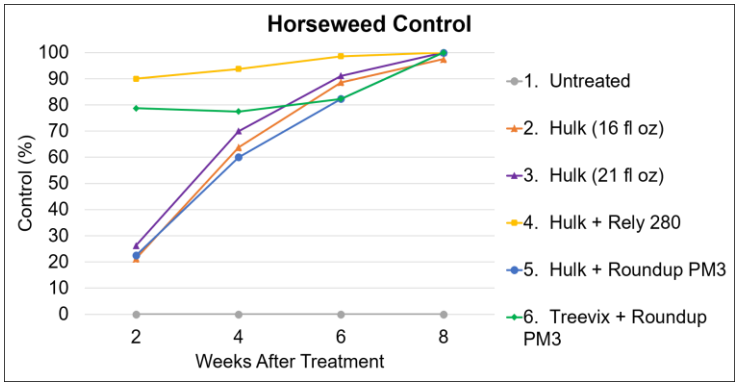
## Results and Discussion:

Herbicide efficacy varied between horseweed and hairy fleabane following application. In 2025, treatments containing glufosinate (Rely 280) provided the most rapid initial control of hairy fleabane, exceeding 85% at two WAT, compared with 79% control from saflufenacil (Treevix) + glyphosate (Roundup PowerMAX 3). In contrast, florpyrauxifen-benzyl (Hulk®), applied alone or in combination with glyphosate, provided less than 30% control at two WAT. However, control with Hulk® treatments progressively increased, exceeding 90% by eight WAT. The Hulk® + Rely 280 combination provided the fastest (*Fig. 3*) and most consistent response, achieving 100% hairy fleabane control at eight WAT. Although some plants treated with Hulk® alone remained green at the final evaluation, they exhibited herbicide injury symptoms without observable regrowth, indicating slower expression of herbicidal activity compared with glufosinate-containing treatments.

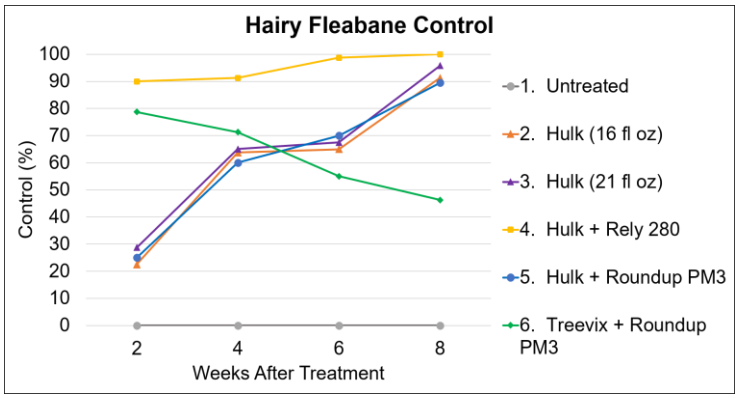


***Figure 3.*** *Hulk® standalone treatment in the foreground, Hulk® + Rely 280 in the back at 1 WAT.*

Horseweed was generally more susceptible to the evaluated herbicides than hairy fleabane. All herbicide treatments achieved greater than 95% horseweed control by eight WAT, demonstrating high efficacy across the evaluated herbicide programs. Differences among treatments were more pronounced for hairy fleabane, particularly regarding the extent of regrowth and sustained control. Hulk® treatments provided greater hairy fleabane control than the Treevix + Roundup PowerMAX 3 treatment at six WAT, with no observable regrowth in Hulk®-treated plots at that assessment. In contrast, substantial regrowth following Treevix + Roundup PowerMAX 3 resulted in reduced control at later evaluations. These observations suggest that florpyrauxifen-benzyl provides sustained suppression of both species, even when initial herbicidal activity is relatively slow.




***Graph 1.*** *Percent Horseweed control under all treatments in 2025.*

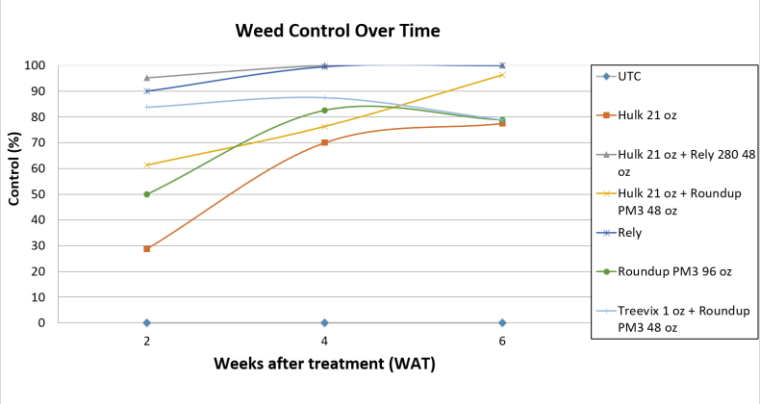



***Graph 2.*** *Percent Hairy Fleabane control under all treatments in 2025.*

The rate of herbicidal activity also appeared to depend on weed growth stage. Florpyrauxifen-benzyl exhibited slower activity against larger, established weeds, requiring several weeks to achieve high levels of control. However, observations indicated improved efficacy when applications targeted smaller horseweed and hairy fleabane plants at approximately the four- to five-leaf stage. Tank mixtures of florpyrauxifen-benzyl with glyphosate or glufosinate also improved treatment performance, particularly the rate of initial weed control.

The combination with glufosinate was especially effective in providing rapid burndown and sustained suppression. These findings emphasize the importance of application timing and appropriate tank-mix selection for optimizing postemergence efficacy.

In 2026, herbicide applications were initiated approximately one month earlier to target weeds at a smaller growth stage, following observations in 2025 that several plants had exceeded the recommended application height specified on herbicide labels. The reduced weed population also limited evaluations to six WAT. Treatments containing glufosinate (Rely 280 and Hulk 21 fl oz/a + Rely280) provided the highest levels of control (>90%) by two weeks after treatment (WAT), whereas others exhibited a more gradual response, similar to 2025. By six WAT, the highest-performing treatments achieved approximately 95–100% control, while several other treatments provided around 75–80% control. Glyphosate applied alone and Treevix plus glyphosate showed a decline in weed control, primarily due to regrowth in the treated plants at 6 WAT. Similar regrowth was observed were also observed in hairy fleabane in 2025.




***Graph 3.*** *Percent control of overall weeds in 2026.*

Overall, the findings demonstrate that florpyrauxifen-benzyl represents an effective additional postemergence herbicide option for managing horseweed and hairy fleabane in California almond orchards. Its slower initial activity against larger weeds highlights the importance of targeting early growth stages, while tank mixtures with glufosinate or glyphosate may improve treatment performance. The absence of observable regrowth in Hulk® treatments further suggests potential advantages for sustained weed suppression compared with treatments exhibiting greater initial activity but subsequent regrowth such as in Treevix. From an integrated weed management perspective, florpyrauxifen-benzyl may complement existing herbicide programs. Timely applications, integration of effective residual and postemergence herbicides, and prevention of weed seed production remain essential for long-term management.

## Acknowledgements:

The California Almond Board for funding this research study, Corteva Agriscience for donating some of the products used in this study. UC Shafter Research Farm and staff for allowing us to use the almond orchard to conduct this study, and Walter Martinez, Ag technician, UCCE Tulare for treatment applications.

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Okada, M., Hanson, B.D., Hembree, K.J., Peng, Y., Shrestha, A., Stewart, C.N., Jr, Wright, S.D. and Jasieniuk, M. (2013), Evolution and spread of glyphosate resistance in *Conyza canadensis* in California. Evol Appl, 6: 761-777. https://doi.org/10.1111/eva.12061

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Moretti, M. L., Sosnoskie, L. M., Shrestha, A., Wright, S. D., Hembree, K. J., Jasieniuk, M., & Hanson, B. D. (2016). Distribution of Conyza sp. in Orchards of California and Response to Glyphosate and Paraquat. *Weed Science*, *64*(2), 339–347. https://doi.org/10.1614/WS-D-15-00174.1.

Moretti, M.L., Bobadilla, L.K., Hanson, B.D (2021) Cross-resistance to diquat in glyphosate/paraquat-resistant hairy fleabane (Conyza bonariensis) and horseweed (Conyza canadensis) and confirmation of 2,4-D resistance in Conyza bonariensis. Weed Technol. 35: 554–559. https://doi.org/10.1017/wet.2021.11.

# Effect of water stress on walnut susceptibility to glufosinate trunk injury

Ryan Hill – Agronomy and weed science advisor, Tehama, Glenn, and Shasta Counties, CA, USA
Curt Pierce – Irrigation and water resources advisor, Glenn, Tehama, Colusa, and Shasta Counties, CA, USA

## Introduction:

Labels for glufosinate herbicides (like Rely, Forfeit, Lifeline, etc.) include very careful language to guide safe use in orchards. Reducing the risk of herbicide injury to trunk surfaces is an important target, especially in young orchards. Avoiding all herbicide contact with all parts of the tree, other than mature brown bark, is often recommended. Bark on the bottom portion of the trunk tends to experience high exposure to herbicide any time there is an application, and if this bark is not mature some other measure must be taken to protect the sensitive surface. This is usually done by some type of physical barrier, often a trunk guard. Most risk of injury is eliminated if these precautions are followed.

However, injury still occasionally occurs even when label requirements are followed. In 2025 a local grower reported trunk injury resulting from a glufosinate application in a mature walnut orchard. This orchard had been neglected. It was under-irrigated and had a robust population of weeds that the orchard's new owner had attempted to clean up. A glufosinate herbicide was used and, despite only contacting mature brown bark, the application resulted in severe trunk injury.

Previously, for experimental purposes, attempts had been made to injure young walnut trunks with glufosinate herbicide to discern general sensitivity of young members of this species. Very high rates were applied to newly planted bare root 'Chandler' walnuts and no injury was observed. So, this raises the question: Why would mature trees be so sensitive when the young trees in the experimental trial were so resilient to trunk injury? It is possible that a difference in plant-water status between the two populations was responsible for the discrepancy in symptoms.

In 2026 this hypothesis was addressed by applying herbicide to potted walnut trees at three increasing levels of water stress.

## Methods and results:

Potted 'Chandler' walnut trees were transplanted in 3-gallon pots in fall 2025 for use in spring 2026. Water limitation treatments were initiated on either June 4th or June 9th, 2026, and trees were sprayed with glufosinate herbicide on June 12th. Thus, water stress treatments involved either 0, 3, or 8 days without any water. Stem water potential (SWP) data was collected on June 11th at mid-day, revealing three categories of water stress: low (1.2 to 2.2 bars below baseline), moderate (3.7 to 7.7 below baseline), and high (8.7 to 16.7 below baseline). The herbicide treatment involved glufosinate (Rely 280) at 3.2% mixed with ammonium sulfate (Bronc Max) at 2% and sprayed to wet. This concentration of herbicide corresponds to the maximum label rate, 82 fl oz/A, if broadcast at 20 gallons per acre. Since the treatment was sprayed-to-wet, it was an off-label application, though a treatment pattern that is conceivably possible in a field planting through operator fault.

Each treatment combination was replicated with four trees and treatments were randomized. Half of the trees were sprayed and half were left untreated. The water stress treatments resulted in significant canopy defoliation, but a different form of injury developed in the trees treated with herbicide. Gumming occured on the trunk surface in some of the trees, but more consistently there were blackened tissues on the interior of the trunk just under the bark surface (*Fig. 1 and 2*).



***Figure 1.*** *The left of this image shows gumming on the surface of the bark, and the right shows the trunk cross-section. This individual was the only representative of the moderate water stress treatment that received an herbicide application that developed measurable injury symptoms. This individual's SWP read -10.5 bars when treated, approximately 3.7 bars below baseline – moderate water stress for a walnut tree.*

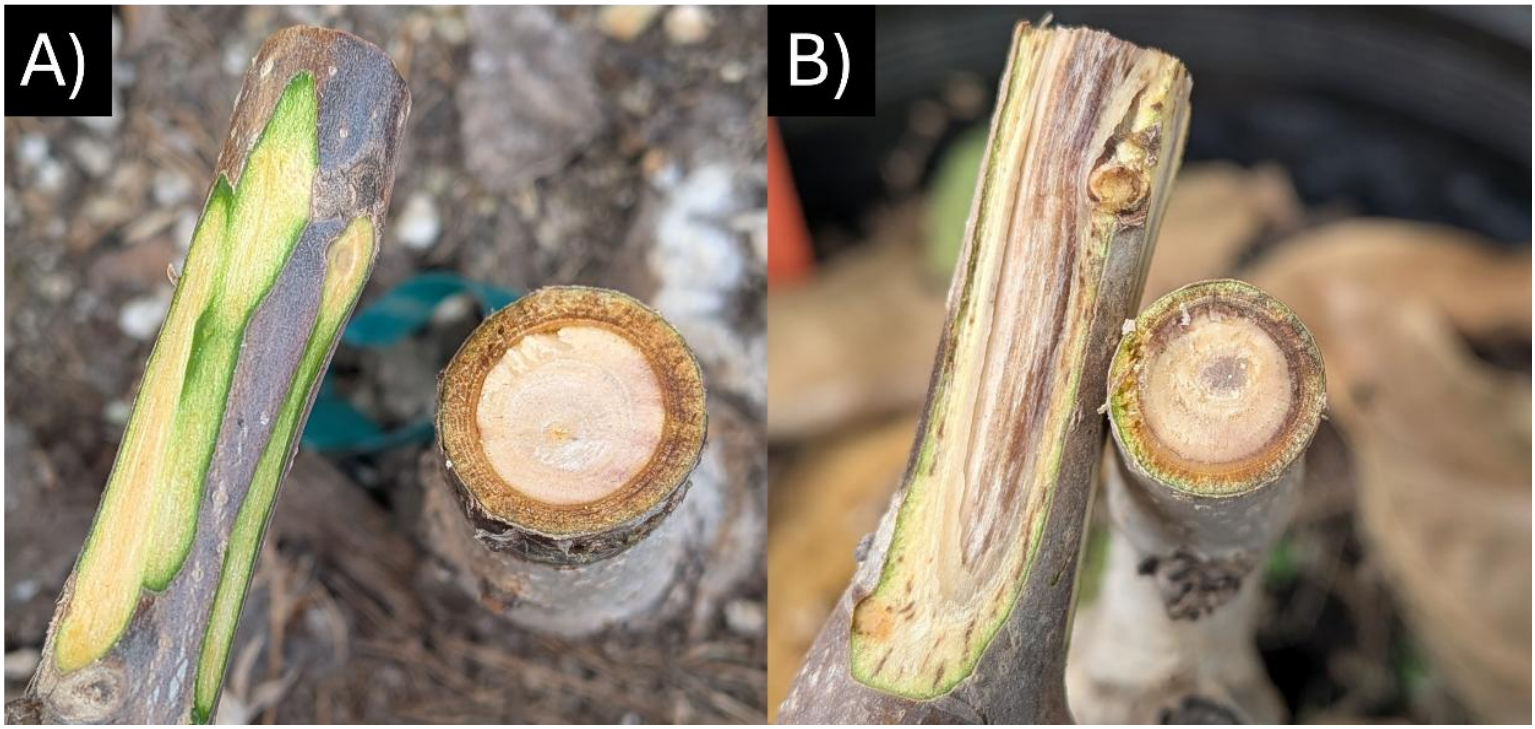



***Figure 2**: These two trees were both treated with glufosinate herbicide at the same rate (3.2% solution). **A)** This tree measured SWP at -8 bars, 1.7 bars below baseline and no apparent injury was incurred. **B)** This tree measured -23 bars, 16.7 bars below baseline, a severe level of water stress. Significant injury was apparent throughout the bark tissues.*

The injury observed beneath the bark was associated with herbicide applications and increasing levels of water stress. Figure 3 shows the percent of the bark circumference that showed blackened tissue, sectioned and measured 6 inches above the soil. The well-watered trees showed no injury. The moderately stressed trees showed sporadic injury (one out of four trees) and the severely water-stressed trees all showed injury symptoms. The untreated trees in each category also had no blackened tissues apparent on the bark or wood (*Fig. 3*).

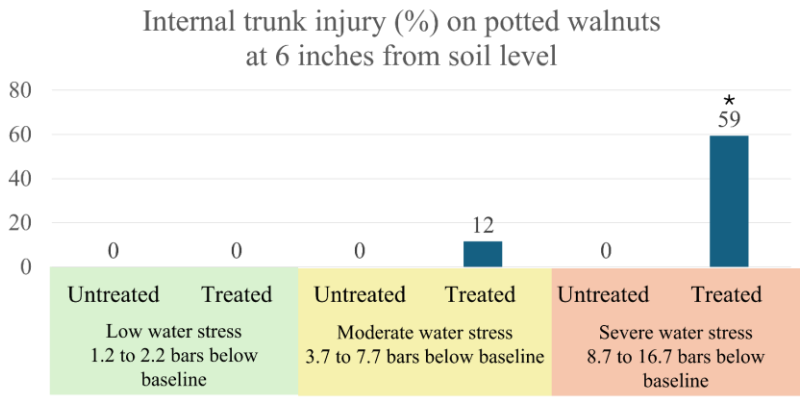



***Figure 3**: Internal trunk injury, measured as a percent of the cross-sectional circumference, across treatments.*

## Conclusions:

This trial shows a clear correlation between trunk injury from glufosinate herbicide and water stress in walnuts. This is the first report of this phenomenon with replicated experimental data, though circumstantial evidence pointing to the same conclusion has been observed in prunes and hazelnut as well. Potted trials do not accurately mimic field conditions, so further work ought to be done to more accurately define the risk of herbicide injury in water-stressed walnuts. This result is also limited to glufosinate, and it cannot be assumed that other herbicides will behave in the same manner.

# Keeping Alfalfa Clean: Managing Hairy Fleabane Between Cuttings

Giuliano Galdi
UCCE Agronomy and Weed Management Advisor – Merced, Stanislaus, and San Joaquin Counties

Keeping alfalfa fields weed-free is essential for producing high-quality hay. Weeds can reduce forage value, affect marketability and even create risks for livestock health. In California, where alfalfa production systems range from an average three cuttings in the Intermountain region to over seven in the low desert, successful weed management requires a combination of cultural practices, treatments during the dormant season, and timely in-season applications.

A vigorous alfalfa stand is the best tool for suppressing weeds. Proper planting timing, seedbed preparation, and early weed control help establish competitive stands. Once alfalfa is established, winter herbicide applications provide an important opportunity to control winter annual weeds before they affect the first cutting. However, summer annual weeds can still emerge, and managing them between cuttings can be challenging because growers must coordinate spraying with hay drying, baling, and removal.

Hairy fleabane (*Erigeron bonariensis*) is one example of this challenge. In 2026, a UCCE field trial evaluated several rates of an experimental herbicide combination, referred to here as Herbicide A + Herbicide B, alongside hexazione, hexazione plus diuron, linuron, and metribuzin.

The trial used a randomized complete block design with four replications and was conducted in Merced County. However, hairy fleabane pressure was low and unevenly distributed, limiting reliable comparisons among treatments. Most plants available for evaluation were also beyond the rosette stage, when they are generally more susceptible to herbicides.

## More control can mean more crop injury

The Herbicide A + Herbicide B combination showed a clear rate response: higher rates generally improved hairy fleabane control but also increased visual alfalfa injury.The herbicide A 1.02 + Herbicide B 0.77 lb/A rate provided approximately 80–90% control 14 days after treatment and maintained good control through harvest in the three evaluable plots. The highest rate provided 100% control in the single evaluable plot, but this limited observation should be interpreted cautiously. Higher rates also caused more pronounced chlorosis, stunting, and necrosis, with approximately 35–38% visual injury still observed at harvest (*Table 1*).

***Table1:*** *Phytotoxicity assessed at 7 DAT, 14 DAT, and at harvest. Ratings combine chlorosis, stunting and necrosis. Treatments are ranked based on phytotoxicity rate at harvest. Treatments with the same letters are not statistically significant (Tukey HSD, n=4, $\alpha$=0.05).*

| Treatment | 7 DAT | 14 DAT | Harvest |
|---|---|---|---|
| Herbicide A 1.84 lb/A + Herbicide B 1.39 lb/A | 70% A | 55% A | 38% A |
| Herbicide A 1.02 lb/A + Herbicide B 0.77 lb/A | 60% AB | 53% A | 35% A |
| Herbicide A 1.43 lb/A + Herbicide B 1.08 lb/A | 60% AB | 50% AB | 35% A |
| Hexazione 48 oz/A | 58% ABC | 43% AB | 28% A |
| Linuron 24 oz/A | 50% BCD | 48% AB | 25% AB |
| Herbicide A 0.61 lb/A + Herbicide B 0.46 lb/A | 38% D | 35% BC | 25% AB |
| Metribuzin 1.3 lb/A | 40% CD | 23% CD | 23% AB |
| Herbicide A 0.31 lb/A + Herbicide B 0.23 lb/A | 13% E | 13% DE | 10% BCD |
| Hexazione + Diuron 2 lb/A | 13% E | 10% DE | 8% CD |
| Untreated control | 0% E | 0% E | 0% D |

Among the commercial standards, hexazione provided good control of small fleabane (less than 2 inches tall), reaching approximately 80–100% control 14 days after treatment. Hexazione plus diuron also performed well on small plants but was less consistent on re-sprouted fleabane. Linuron provided moderate and variable suppression, while metribuzin provided poor control under the conditions of this trial.

Forage dry matter percentage did not differ significantly among herbicide treatments, indicating that the treatments did not measurably affect forage moisture content at harvest (*Table 2*). Therefore, dry matter yield was estimated using the overall average dry matter percentage of 31.5% across all treatments to provide a consistent basis for comparison. Based on this calculation, the untreated control produced significantly greater dry matter yield than linuron and all Herbicide A + Herbicide B treatments, whereas metribuzin and both hexazione and hexazione + diuron treatments generally maintained yields statistically similar to the untreated control. These results suggest that differences in estimated dry matter yield were primarily associated with differences in fresh forage production rather than changes in forage dry matter percentage.

***Table2:*** *Alfalfa dry matter yield using an average dry matter percentage of 31.5%. Treatments with the same letters are not statistically significant (Tukey HSD, n=4, $\alpha$=0.05).*

| Treatment | DM Yield (ton/A) | |
|---|---|---|
| **Untreated Control** | 1.80 | A |
| **Metribuzin 1.3 lb/A** | 1.73 | A B |
| **Hexazione + Diuron 2 lb/A** | 1.70 | A B |
| **Hexazione 48 oz/A** | 1.66 | A B |
| **Linuron 24 oz/A** | 1.64 | B |
| **Herbicide A 1.02 lb/A + Herbicide B 0.77 lb/A** | 1.63 | B |
| **Herbicide A 0.31 lb/A + Herbicide B 0.23 lb/A** | 1.60 | B |
| **Herbicide A 1.84 lb/A + Herbicide B 1.39 lb/A** | 1.59 | B |
| **Herbicide A 0.61 lb/A + Herbicide B 0.46 lb/A** | 1.59 | B |
| **Herbicide A 1.43 lb/A + Herbicide B 1.08 lb/A** | 1.58 | B |

## Timing is everything

Herbicides were applied after the second cutting, two days after bale removal, when alfalfa regrowth had already reached approximately 3–4 inches. This illustrates the challenge of fitting herbicide applications into a busy harvest schedule. Delays can allow fleabane to grow larger or re-sprout, potentially reducing control and increasing the temptation to use higher rates.

The main takeaways are straightforward: establish a competitive alfalfa stand, take advantage of the dormant-season weed-control window, and treat hairy fleabane while plants are small whenever possible. Increasing herbicide rates may improve suppression, but crop safety and forage yield must remain part of the decision.

Because weed populations were low and uneven, these findings are preliminary rather than a definitive ranking of treatments. Additional trials under higher and more uniform hairy fleabane pressure will help clarify herbicide performance and crop-safety tradeoffs.

# CWSS Research Update and News

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