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Features from your Advisors

Table of Contents

Weather Events Exacerbate Herbicide Injury to Peppers in California’s Low Desert Growing Conditions

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Field Visit: We responded to a field call and launched an investigation into determining the possible cause(s) of pepper transplants exhibiting necrotic, chlorotic, and scorching symptoms in a field few weeks after transplanting in fall 2025. Upon arrival and from our initial observations, we noticed symptoms distributed throughout the entire field (Fig. 1). Our initial observation suggests that uniform distribution of symptoms was characteristic of abiotic factors (weather events and/or pesticide injury) than that of biotic factors such as diseases or insect pests, where the symptoms would be random and irregular (Tjosvold and Koike, 2015). Affected plant samples were sent to service labs to run disease diagnostics and pesticide residual tests to determine the cause(s).

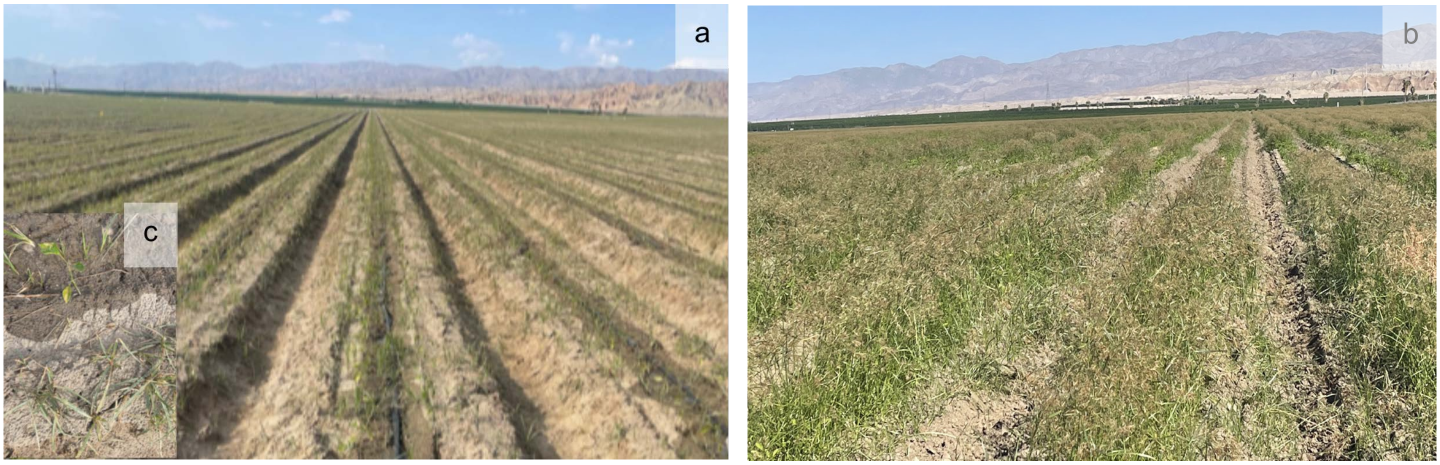

Figure 1. Pepper field a) on the day of field visit on September 4, 2025, b) seven weeks later October 13, 2025, and c) a closer view of symptomatic pepper and nutsedge plants.

Field observation of symptomatic plants: On pepper leaves, we noticed necrosis along midribs and veins of mature leaves and scorching of young leaves (Fig. 2a), chlorosis on mature leaves (Fig. 2b), and inward curling of edges or cupping appearance and scorching of mature leaves (Fig. 2c). We observed that nutsedge, a dominant weed in the field, was expressing similar symptoms but recovered fairly quickly and smothered the peppers (Fig. 1b).

Disease diagnosis: Plant disease diagnostics tests were performed on transplant samples collected both from the field (transplanted) and trays (not transplanted). The logic was that the transplants from both sources would yield positive results for pepper pathogens if introduced from nursery or only field transplants would test positive if the field was already infested the pathogens. The disease diagnostics test results from both sources returned negative for pepper pathogens.

Figure 2. Pepper transplants exhibiting symptoms ranging from a) necrosis along midrib and veins, b) chlorosis on mature leaves, c) inward curling or cupping and scorching of leaves, and d) pepper and nutsedge recovering from possible pesticide injury.

Foliage symptoms, and root and stem or vascular tissues were negative for any pepper pathogens. The pathology tests concluded that symptoms observed on pepper plants could be associated with abiotic factors. With these negative pathology test results, the next logical step was to test for pesticide residues on the plants expressing the symptoms.

Table 1. Plant disease diagnostics results of pepper plant tissue samples collected from the field and transplant tray.

Source	Tissue tested	Results	Conclusion
Field sample – transplanted	Leaf	Negative	Cause is likely abiotic factors
	Stem	Negative	
	Root	Negative	
Tray sample – not transplanted	Leaf	Negative	
	Stem	Negative	
	Root	Negative	

Pesticide residual test: Pepper plants exhibiting necrosis, chlorosis, and scorching symptoms were tested for pesticide residues to determine foliar concentrations on transplants (Table 1). Foliar concentrations of three insecticides (chlorantraniliprole, cyantraniliprole, and methoxyfenozide), three fungicides (flutriafol, penthiopyrad, and pydiflumetofen), and two herbicides (s-metolachlor and glyphosate) were higher than the limit of quantification (LOQ = 0.010 mg/kg; Table 2). Glyphosate was also detected on nutsedge foliage at concentrations above LOQ. Although the field was treated with oxyfluorfen and halosulfuron herbicides, foliar concentrations were below the detectable limit.

Table 2. Pesticide residue results showing concentrations higher or equal to limit of quantification (LOQ = 0.010 mg/kg) on pepper leaves. Oxyfluorfen and halosulfuron have levels lower than LOQ and are included for comparison purpose.

Active ingredient	Pesticide type	Concentration (mg/kg)	
		Pepper leaf	Nutsedge leaf
Chlorantraniliprole	Insecticide	3.380	-
Cyantraniliprole	Insecticide	37.100	-
Methoxyfenozide	Insecticide	0.016	-
Flutriafol	Fungicide	0.168	-
Penthiopyrad	Fungicide	0.216	-
Pydiflumetofen	Fungicide	0.044	-
Glyphosate	Herbicide	0.900	2.830
S-Metolachlor	Herbicide	0.032	-
Oxyfluorfen	Herbicide	<0.010	-
Halosufuron	Herbicide	<0.010	-

S-metolachlor is recommended to be applied in a way that gives thorough soil coverage while minimizing contact with the crop leaves (Smith and Daugovish, 2016). This application is intended to control germinating and emerging weeds and will not control weeds that are already established. Glyphosate provides good annual weed control and some suppression of perennial weeds such as nutsedge (Smith and Daugovish, 2016). Control of perennial weeds improves with late summer or fall applications during non-crop periods when perennials are actively growing. Insecticides (chlorantraniliprole, cyantraniliprole, and methoxyfenozide) and fungicides (flutriafol, penthiopyrad, and pydiflumetofen) if applied under standard agricultural practices and labeled application rates, phytotoxicity on peppers is unlikely (Koike and Davis, 2016; Natwick and Aguiar, 2016).

Conclusions: Based on our field observation, pathology tests, pesticide residual testing, and factoring in weather conditions at the time, it is likely the necrosis, chlorosis, and scorching symptoms observed were due to herbicide injury and most likely exacerbated by storm events that occurred around the time of herbicide application in late August. Coachella Valley experienced storms with rain, wind, and flash flooding on August 25, 2025. NBC Palm Springs reported that the storms resulted in significant localized impacts and temporary disruptions. These late summer monsoonal storms may have played a big role in this herbicide injury observed on peppers.

Recommendations: To avoid such scenarios in the future, be mindful of late summer monsoonal storms that coincide with fall pepper planting and herbicide applications that could increase herbicide drift incidence in California's southern Desert Valleys. Nutsedge can be best controlled in early application just at tuber germination and later when the crop is established to tolerate herbicide injury. However, the critical early control is difficult without injury while delaying it to allow the crop to establish also lets the nutsedge to grow and becomes harder to control even with high herbicide rates. This is especially advantageous to nutsedge in warmer areas as in the desert. Refer to UC IPM Pest Management Guidelines for recommended herbicides and how best to apply them in peppers in California.

For more information, contact UCCE Vegetable Crops Advisor Philip Waisen at pwaisen@ucanr.edu or +1-760-905-5204.

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Iris Yellow Spot Virus (IYSV) Detected in Imperial Valley Onion Fields

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Iris Yellow Spot Virus (IYSV) was a significant problem in bulb and seed onion fields in the Imperial Valley between approximately 2003 and 2012. Since then, growers and PCAs have reported limited occurrences, although symptoms can easily be misidentified as spray injury or other foliar diseases. In April 2026, symptoms of IYSV were recently observed and confirmed in onion fields in the Imperial Valley, with reports indicating increased incidence and severity this season.

What is Iris Yellow Spot Virus?

Iris Yellow Spot Virus is a member of the Tospovirus genus. This virus is a significant threat to bulb onion production by substantially reducing yield. IYSV is mainly transmitted by onion thrips (*Thrips tabaci*) and cannot be spread through seed or mechanical means.

Current management of IYSV relies on effective management of the thrips vector combined with cultural practices.

Symptoms and Identification

Look for the following symptoms in your onion fields:

- Yellow to straw-colored lesions on leaves and scapes
- Dry, elongated lesions or flecks that resemble severe thrips feeding injury
- Diamond-shaped lesions (more common on scapes than leaves)
- Concentric rings of alternating green and yellow/tan colors
- Necrotic areas on leaves that reduce photosynthetic capacity and can be colonized by secondary pathogens like *Stemphylium vesicarium*, complicating diagnosis.
- Highest disease incidence typically occurs near field edges.
- Lodging (plant toppling) on seed stalks during seed set
- Reduced bulb size in severe infections

Figure 1. Yellow to straw-colored lesions on onion leaves. Credit: UC IPM.

Figure 2. Diamond-shaped lesions on an onion leaf caused by Iris Yellow Spot Virus. Credit: Utah State University Extension.

Disease Cycle and Transmission

- IYSV overwinters in volunteer onions and infected host plants
- Onion thrips (*Thrips tabaci*) acquire the virus as nymphs and transmit it as adults
- Tobacco thrips (*Frankliniella fusca*) can also transmit the virus
- Virus spreads from infected plants to healthy plants during thrips feeding
- Alternative hosts include various weeds and ornamental plants
- NOT seed-transmitted – transplants can carry both virus and thrips

Management Options

Cultural Control

1. Remove and destroy infected plants and onion cull piles immediately
2. Eliminate volunteer onions and wild *Allium* species in and around fields
3. Control weeds in field margins and within production areas
4. Maintain good fertility and adequate soil moisture to reduce plant stress
5. Avoid excessive nitrogen fertilization – attracts onion thrips
6. Plant as densely and uniformly as possible
7. Use overhead irrigation, when possible, to suppress thrips populations
8. Separate seed and bulb production fields
9. Maintain crop-free periods between onion plantings

Thrips Management

CRITICAL: Disease severity is directly related to the presence and density of virus-carrying onion thrips. Controlling onion thrips will reduce disease incidence and spread within fields.

Variety Selection

- No onion varieties are completely resistant to thrips or IYSV

Contact Information

For suspected IYSV symptoms or questions about management:

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Deficit Irrigation in Alfalfa Reduces Crop Water Use by 40 to 50 Percent During Summer

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Introduction

Alfalfa is a highly productive and resilient crop in California's Imperial Valley, well suited to the region's climate and growing conditions. High summer temperatures and strong evaporative demand result in substantial water use during the peak growing season. As water management continues to be an important part of farming in the region, growers are increasingly adopting strategies that improve efficiency while maintaining or improving crop performance.

One such approach is the Deficit Irrigation Program (DIP), implemented by the Imperial Irrigation District (IID). This program encourages growers to temporarily suspend irrigation during the peak summer period. Alfalfa's deep root system and perennial growth habit allow it to tolerate this short-term water stress, making deficit irrigation a practical and widely adopted strategy in the region.

A key question is how much water is saved under real field conditions. Reducing irrigation does not always lead to the same reduction in crop water use, since some water can be stored in the soil or move below the root zone depending on soil type and properties. To better understand water savings, it is important to evaluate how much water the crop actually uses, represented by evapotranspiration (ET). In this article, water savings are reported as reductions in crop water use (ET), not simply reductions in irrigation applied.

Recent advances in satellite-based tools, such as OpenET, make it possible to estimate crop water use at the field-scale. These tools provide a practical way to evaluate irrigation practices across large agricultural areas under real farming conditions. This article summarizes results from a two-year field study in the Imperial Valley comparing alfalfa fields under deficit and full irrigation regimes, with the goal of quantifying water savings under the DIP. Additional technical details and full analysis from this study are presented in a recent peer-reviewed publication in Agricultural Water Management (Montazar et al., 2026), which interested readers are encouraged to consult for further information.

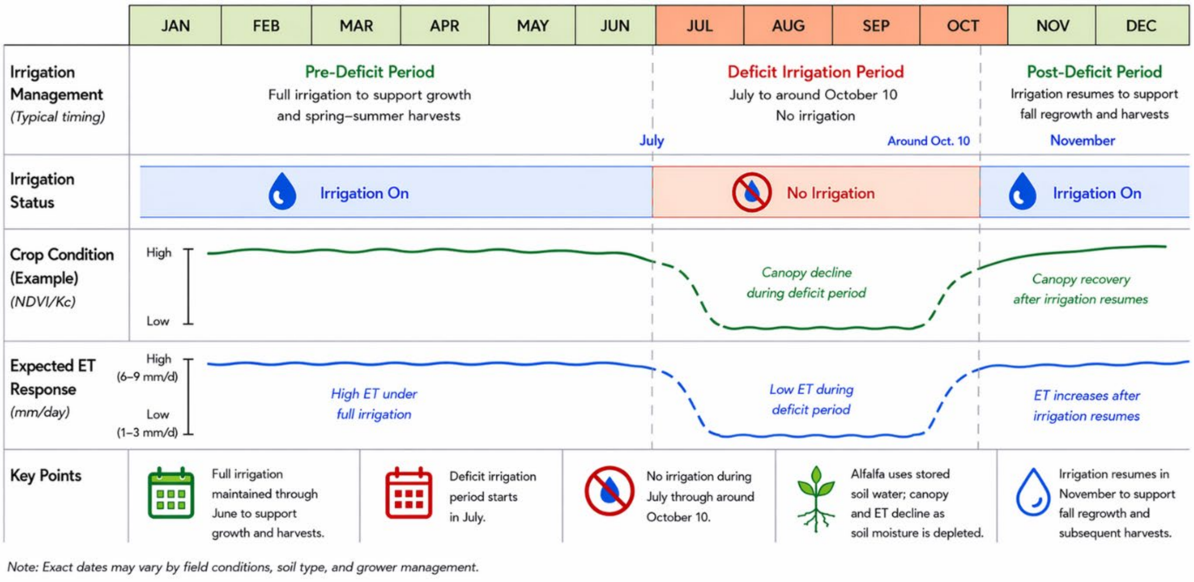
Study Overview: Field Evaluation Within the DIP Framework

This study evaluated how deficit irrigation affects crop water use under real farming conditions in the Imperial Valley. The work was conducted within the framework of the IID Deficit Irrigation Program (Fig. 1), which encourages growers to temporarily stop irrigating alfalfa during the peak summer period.

Field data were collected during the 2024 and 2025 growing seasons from 20 commercial alfalfa fields across the Imperial Valley. These fields were managed by cooperating growers using standard practices, including typical harvest cycles and surface irrigation. Fields were grouped based on irrigation management:

- **Deficit irrigated (DI) fields (n = 10):** Irrigation was suspended for approximately 70 to 78 days during mid to late summer. Although growers under the DIP are expected to stop irrigation for about 60 days, the actual irrigation free period was often longer because irrigation typically did not resume until after reseeding and other field operations were completed. Timing and duration were confirmed using grower records.

- **Fully irrigated (FI) fields (n = 10):** Irrigation was applied throughout the growing season and served as a reference for comparison.



Full irrigation maintained through June to support growth and harvests.

Deficit irrigation period starts in July.

No irrigation during July through around October 10.

Alfalfa uses stored soil water; canopy and ET decline as soil moisture is depleted.

Irrigation resumes in November to support fall regrowth and subsequent harvests.

Note: Exact dates may vary by field conditions, soil type, and grower management.

Figure 1. Deficit irrigation timing in alfalfa fields.

To evaluate water use, the study combined satellite-based estimates of crop water use (OpenET) with field-based measurements from an eddy covariance tower and soil moisture monitoring to track crop water use and soil water depletion (Fig. 2).

Figure 2. Eddy covariance tower and soil moisture monitoring installed in a representative alfalfa field in the Imperial Valley, used to measure crop water use and soil water conditions in the field.

Crop Water Use Response to Deficit Irrigation

Crop water use showed a clear and immediate response to deficit irrigation (Fig. 3). Under full irrigation, daily crop water use followed a typical seasonal pattern, increasing from about 1 to 3 mm per day in winter to peak values of approximately 7 to 9 mm per day during late spring and early summer. In contrast, the deficit irrigated field showed a sharp decline in water use following irrigation cutoff in mid-summer. Daily ET decreased from about 6 to 8 mm per day before cutoff to approximately 1 to 3 mm per day during the deficit irrigation period and remained low at these levels throughout the summer.

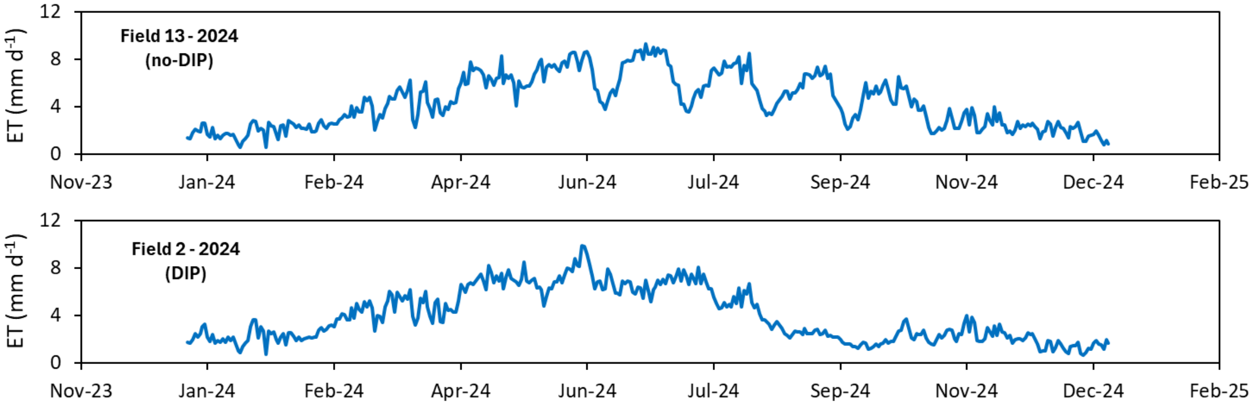


Figure 3. Daily crop water use for a representative fully irrigated and deficit irrigated alfalfa fields. Water use declines rapidly after irrigation is suspended and remains low throughout the deficit period.

Crop water use or ET drops quickly after irrigation is stopped and remains low throughout the summer, indicating that water availability, not weather, becomes the primary factor controlling water use.

Alfalfa Canopy Response to Deficit Irrigation

Crop response to deficit irrigation was also evident in canopy conditions (Fig. 4). Under full irrigation, canopy greenness, quantified by the Normalized Difference Vegetation Index (NDVI), remained consistently high (approximately 0.7 to 0.9), with only brief declines after harvest followed by rapid recovery. In contrast, the deficit irrigated field exhibited a sustained reduction in canopy greenness after irrigation cutoff, with NDVI (0 to 1 scale) declining from about 0.7 to 0.8 before cutoff to approximately 0.3 to 0.4 during the deficit period.

Canopy greenness remained low throughout the summer and recovered only after irrigation resumed. This pattern confirms that reduced water availability leads to lower crop growth activity and reduced water use.

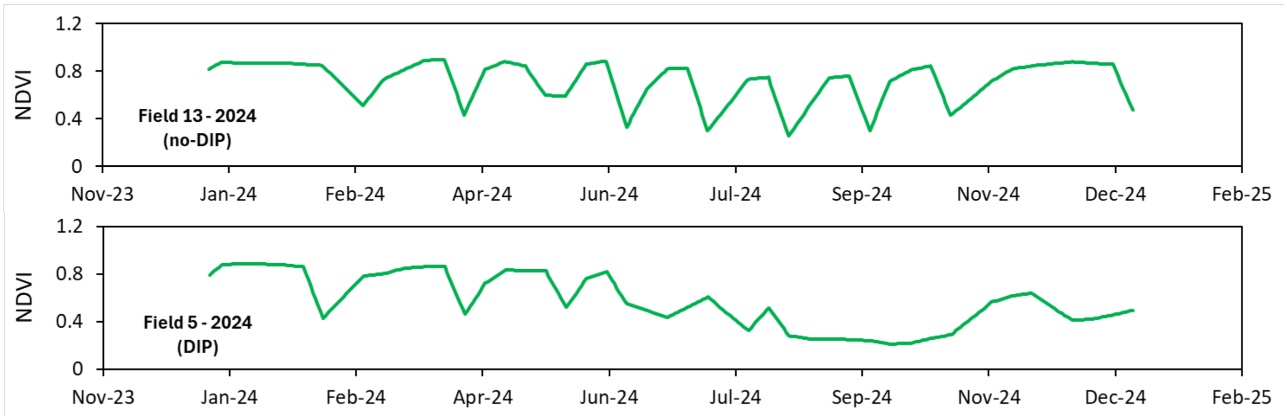


Figure 4. Canopy greenness (NDVI) for a representative fully irrigated and deficit irrigated alfalfa fields. The decline in NDVI during the deficit period reflects reduced crop activity under limited water availability.

Magnitude of Water Savings

Field-scale analysis showed clear and consistent reductions in crop water use under deficit irrigation (Fig. 5). During the deficit period, cumulative ET in deficit irrigated fields ranged from approximately 180 to 230 mm, while fully irrigated fields ranged from about 300 to 460 mm.

In 2024, deficit irrigated fields used about 208 mm compared to 364 mm under full irrigation, resulting in water savings of approximately 156 mm, or about 43 percent. In 2025, deficit irrigated fields used about 202 mm compared to 404 mm, resulting in savings of approximately 202 mm, or about 50 percent.

There was a clear separation between deficit irrigated and fully irrigated fields, with no overlap in cumulative water use, indicating a strong and consistent response across all fields. At the seasonal scale, total water use was approximately 15 percent lower under deficit irrigation, indicating that reductions during the summer period were not fully offset later in the season.

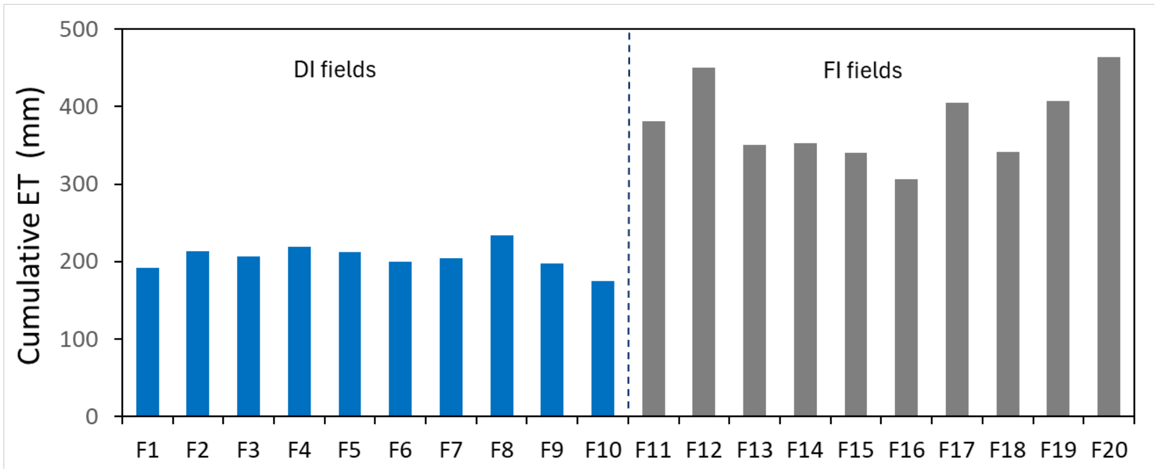


Figure 5. Cumulative crop water use during the deficit period for alfalfa fields in the Imperial Valley. Fields F1 to F10 represent deficit-irrigated (DI) fields and F11 to F20 represent fully irrigated (FI) fields. Water use in deficit-irrigated fields was consistently lower than in fully irrigated fields.

Implications for Growers and Water Managers

These results show that deficit irrigation can provide substantial and consistent reductions in water use under real farming conditions. By stopping irrigation during the peak summer period, growers can significantly reduce crop water use during the time of highest demand.
The results highlight the importance of timing. Water savings are achieved not only by applying less water, but by avoiding irrigation during periods when crop water use is highest. This allows total seasonal water application to better match the crop's actual water use.

For growers, this means that well-timed irrigation cutoffs can improve overall water use efficiency. For water managers and irrigation districts, the results demonstrate that deficit irrigation programs can deliver measurable and consistent water savings across different alfalfa fields.

Satellite-based tools such as OpenET provide a practical way to monitor crop water use and support water accounting and program verification at the field-scale. This article focuses on quantifying water savings under deficit irrigation. Ongoing work is evaluating additional factors, including impacts on yield and forage quality, salt accumulation, soil profile recharge, and stand persistence, which will be reported in future publications.

Conclusions

- Deficit irrigation resulted in clear and consistent reductions in crop water use across all evaluated fields in the Imperial Valley. Water use declined rapidly following irrigation cutoff and remained low throughout the summer period.
- During the deficit period, crop water use was reduced by approximately 40 to 50 percent compared to fully irrigated conditions. At the seasonal scale, total water use was about 15 percent lower.
- These results provide field-based evidence that deficit irrigation can effectively reduce consumptive water use in alfalfa under real farming conditions in the Imperial Valley.

For More Information

A detailed analysis of this study is available in the following peer-reviewed publication: Montazar, A., Shields, J. W., Daccache, A., Gebremichael, M., and Putnam, D. H. (2026). Field-scale evaluation of OpenET for quantifying consumptive water savings under deficit irrigation in alfalfa. Agricultural Water Management, 328, 10337. https://doi.org/10.1016/j.agwat.2026.110337

Evaluation of Bromoxynil Herbicide for Late Season Weed Suppression and Onion Crop Safety

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Background

Onions are inherently poor competitor crops and remain vulnerable to weed pressure throughout their growing cycle. Onion's shallow root systems and narrow upright leaves allow successive flushes of weeds. Because of poor canopy development of onions, reduced light interception, and poor competition for nutrients, they are ultimately outcompeted by weeds, resulting in low bulb yield and poor quality. Therefore, weed management becomes challenging through late-season onion production. Effective late-season control is further complicated by the limited number of registered herbicides for onions, the difficulty of mechanical weeding in dense plantings without crop damage, and the high cost of hand weeding. Because season-long weed competition can cause severe yield losses maintaining weed control through the later onion growth stages is essential for onion crop performance and minimizing weed interference with crop harvest. This trial is designed to assess the efficacy of *Bromoxynil* herbicides for controlling dominant late-season weed species in low-desert onion production systems, assess its safety to onions, and the potential phytotoxicity associated with late-season herbicide applications under commercial field conditions. While *Bromoxynil* as a preemergent herbicide is labelled for onion seedlings at the 2-5 leaf stage, we tested it at a later growth stage (7-8 leaf stage) to assess potential effects when applied at later crop growth stages. Furthermore, while a double rate of standard (2x) is not currently recommended, we also wanted to test efficacy for a late season weed control and potential crop safety at higher than standard rates.

Materials and Methods

A field trial was conducted on the onion plots established at the Desert Research and Extension Center, Holtville, CA. Plots were directly planted with the variety 'Red Creole' on 29 October 2025 at a planting density of around 200,000 seeds/acre. Irrigation for crop stand establishment and plot maintenance was carried out using overhead sprinklers. An individual plot consisted of three rows of 40-inch centers, each 20 ft in length, with one planted row bordered by an unplanted row on both sides. Each planted row consisted of four rows of seed lines spaced 3.5 inches apart. Plots were managed in accordance with local growing practices. Treatments were applied only to the planted row in each plot. Buctril / Bromoxynil (post-emergence) was applied using a CO_2 backpack sprayer at 40 psi and 30 GPA. Bromoxynil is a 3,5-dibromo-4-hydroxybenzonitrile and belongs to the chemical family of Benzonitriles and WSA Resistance Group 6. At the time of herbicide application, onions were at the 7–8 leaf stages or early bulbing. The experiment plots were laid out in completely randomized block design (CRBD) with four replications for each of the three treatments: (1) untreated control, (2) *Bromoxynil* applied at the recommended labeled rate (at ~0.125 lb ai/ac (≈70 g ai/ha), and (3) *Bromoxynil* applied at a double (2×) rate (0.250 lb ai/ac).

All herbicide spray treatments included an adjuvant. Treatments were applied on 15 January 2026. Onion plants were at the 7–8 leaf stage, and 79 days since planting at the time of herbicide application. Most plots had 100% ground cover with common lambsquarters (*Chenopodium* sp.) with these weeds at about 10% flowering stage (Figure 1). *Bromoxynil w*orks best on lambsquarters until they are 4–6 inches but can still be effective on larger weeds. Lambsquarters become very difficult to control late in the season, especially once plants exceed 4 inches. In the meantime, onions are also extremely sensitive to many broadleaf herbicides, so options for effective late growing season or mature lambsquarters stage weed control are very limited.

Bromoxynil is absorbed by foliage and moves very little within the plant. Its Mode of Action is through inhibition of photosynthesis and ATP formation by blocking electron transport. Phytotoxic symptoms (which are basically due to foliar contact) are blistering (mottling) or necrotic spots within 24 hours and extensive destruction of leaf tissue later (4-7 days); chlorosis around the necrotic areas of leaves, and susceptible seedlings become extremely brittle and eventually disintegrate (Figure 1).

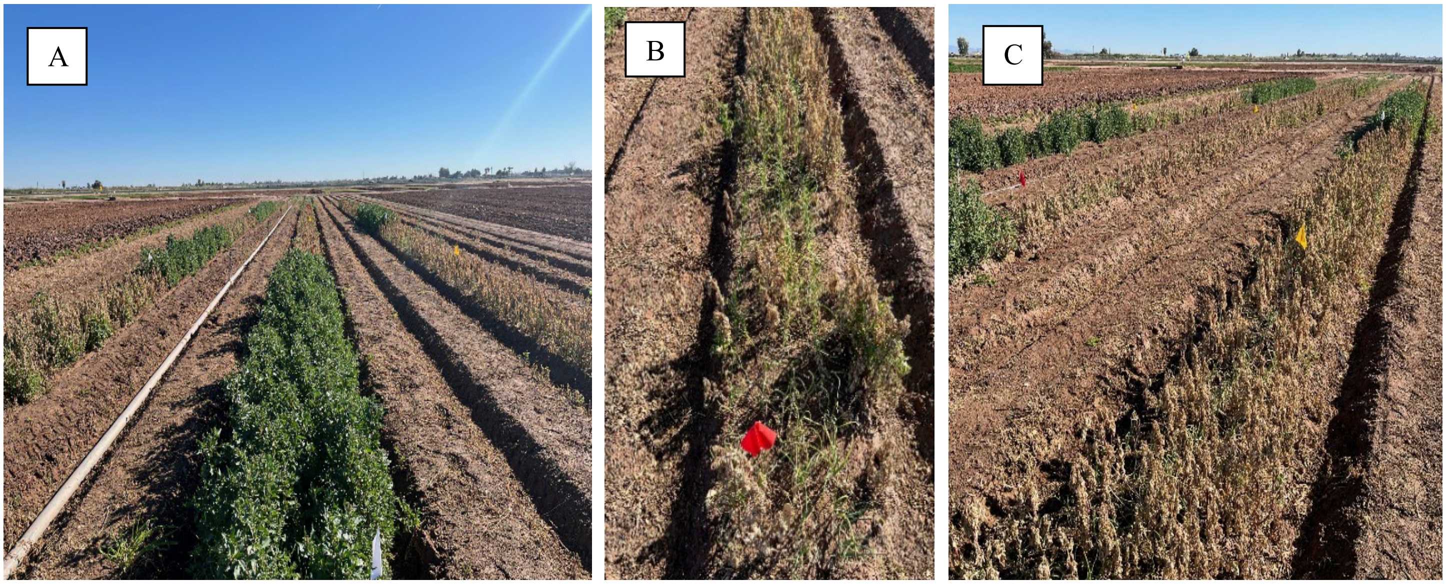

Figure 1: Research plots photographed on 27 Jan 2026, 12 days after the treatment application, A (Untreated control plots marked with white flags showing high weed pressure), B & C Onion phytotoxicity damage and weed mortality under 1x rate herbicide-treated plots marked by yellow flags and 2x rate herbicide-treated plots marked by red flags.

Weed Suppression (Weed Counts)

Chenopodium were the only major weed species (100%) in the plots. All counts or ratings are made on a 20 ft long bed. Application of herbicide produced a clear rate-dependent reduction in weed density ($p < 0.001$). In the control treatment, no dead *Chenopodium* plants were recorded at any observation dates (Table 1), confirming uniform, untreated weed pressure. At 1× rate, surviving weed counts were reduced relative to the untreated plots, indicating moderate suppression. However, surviving weeds persisted at levels suggesting incomplete control at the standard rate. At this rate, dead-weed counts ranged from 7.5–11 plants per plot (7 DAT), 9.5–15.5 (14 DAT), indicating continued but moderate activity, and 6–12 (21 DAT), suggesting plateaued efficacy. Overall: The 1× rate provided moderate suppression, with consistent but incomplete weed mortality (Table 1).

Table 1. Mean dead weed counts on a 20 ft long sampling row across treatments and assessment days.

Treatment (TRT) × days after treatment (DAT)	Mean count of dead weeds	Tukey Group
2× 7 DAT	13.75	A
2× 14 DAT	12.00	A
1× 14 DAT	12.50	A
1× 21 DAT	8.13	A
1× 7 DAT	8.75	A
2× 21 DAT	8.50	A
Control (all DAT)	0.00	B

Treatment (TRT; $p < 0.001$), days after treatment (DAT; $p = 0.0085$), and their interaction (TRT × DAT; $p = 0.0150$).

At 2× rate: Weed counts declined substantially compared to both the control and the 1× rate. The higher rate provided stronger early-season suppression and maintained lower weed densities throughout the evaluation period. Overall, weed suppression improved consistently with increasing herbicide rate. At the double rate (2× Rate), there was a higher early kill of 8.5–17 (7 DAT), exceeding the 1× rate, remained elevated at 9.5–13.5 (14 DAT), maintaining stronger suppression, and weed counts still narrowed with counts of 8–9.5 (21 DAT), but still comparable to the standard, 1× rate. Overall, the 2× rate produced stronger and more rapid *Chenopodium* mortality, especially early (Table 1).

Dead-Weed Rating (% cover)

Visual ratings of dead or desiccated weeds followed the same rate-response, relative to the control. The dead weed rating among treatment levels (rates) and sampling dates were not significantly different from each other (Table 2). However, the 1× rate caused partial necrosis and weed kill, while the 2× rate resulted in a higher proportion of fully necrotic weeds, with more wilting and desiccation, although weeds were still alive. Dead-weed (with chlorosis or desiccation symptoms) were markedly higher at the 2× rate, indicating enhanced efficacy. The 2× rate consistently delivered stronger and more terminal injury to target weeds, although weeds were not fully dead to be counted as dead.

Table 2. Mean rating of dead *Chenopodium* (0-100%).

Treatment (TRT) × days after treatment (DAT)	Mean dead (% rating)	Tukey Group
2× 21 DAT	49.6	A
2× 14 DAT	48.6	A
2× 7 DAT	47.8	A
1× 21 DAT	48.6	A
1× 41 DAT	48.1	A
1× 7 DAT	46.5	A
Control (all DAT)	0.0	B

Chenopodium % rating treatment (TRT; $p < 0.0001$), days after treatment (DAT; $p = 0.144$), and their interaction (TRT × DAT; $p = 0.2674$).

Ratings were remarkably consistent across treatments ($p < 0.001$), but not DAT ($p = 0.144$) but with clear rate separation. The control treatment always had 0% weed dead, while dead weeds clustered around 45–49%, regardless of DAT. The 2× Rate consistently killed 47–50% of weed population, slightly higher than the 1× rate, but not statistically significant. The dead-weeds counts aligns with the visual rating of dead weeds (% cover)

Effects on Onion Death / Crop Injury

Table 3. Mean injured onion ratings (0-100%).

Treatment (TRT) × days after treatment (DAT)	Mean injury (%)	Tukey Group
2× 7 DAT	50.1	A
2× 14 DAT	45.0	A
1× 7 DAT	23.1	B
1× 14 DAT	6.3	C
2× 21 DAT	3.0	C
1× 21 DAT	2.9	C
Control (all DAT)	0.0	D

Treatment (TRT; $p < 0.001$), days after treatment (DAT; $p = 0.0027$), and their interaction (TRT × DAT; $p = 0.0157$).

Under Control treatment, onions were intact, and 0% seedling death due to herbicide phytotoxicity was observed across all dates. The responses on the onion showed expected sensitivity to increasing herbicide load. At 1× rate: Crop injury was minimal to low. Occasional necrosis or slight growth reduction was observed, but onion mortality remained low and within acceptable tolerance for field use. At 1× rate, there was 7.5–50% onion injury (7 DAT), although injury was highly variable within replications. Onion injury sharply dropped to 5–10% (14 DAT), suggesting recovery. There was further recovery with very low injury of 1.5–5% at 21 DAT. Overall, the 1× rate caused transient early injury, but onions largely recovered by 14–21 DAT. At 2× rate, crop injury increased noticeably. Symptoms included greater chlorosis, slowed growth, and in some cases stand loss. Onion mortality was higher than at the 1× rate, reflecting the crop's limited tolerance to elevated doses of bromoxynil. While the 2× rate improved weed control, it also increased the risk of onion injury and may exceed the crop's safe threshold depending on environmental conditions and growth stage. At the 2× rate onion injury ranged from 30–95.5%, (7 DAT), with one of the replications showing extreme mortality. Onion injury levels dropped to 25–80% (14 DAT), indicating sustained stress. Onion injury levels sharply dropped to 1.5–5% (21 DAT), similar to the 1× rate. Overall, the 2× rate caused severe early phytotoxicity to onions, including near-complete stand loss in one replication, but surviving plants showed substantial recovery by 21 DAT.

Conclusion:

The herbicide (Bromoxynil, post-emergence) showed a strong weed suppression, but the experimental 2× rate poses a substantial risk to onion survival, making it unsuitable for commercial use under conditions like this trial. The 2× rate consistently kills more *Chenopodium*, especially at 7 DAT (mean 13.75 vs. 8.75). By 21 DAT, both rates converge, but 2× remains slightly higher. Visual Ratings: Both rates produce moderate injury (≈47–50%). The 2× rate is slightly higher, matching the dead-plant counts. Onion Safety: 1× rate: Early injury is variable but declines rapidly; onions recover well. 2× rate: Causes major early loss, including extreme mortality in one rep; recovery occurs only after 21 DAT.

Bromoxynil herbicide shows a clear rate-response: Better weed suppression is achieved at 2×, but was unacceptable onion injury, especially at 7–14 DAT. Application of this herbicide produced a clear rate-dependent response in *Chenopodium* control and onion tolerance. No mortality or injury occurred in the untreated control. At the 1× rate, dead-weed counts averaged 8.8, 12.5, and 8.1 plants per plot at 7, 14, and 21 DAT, respectively, indicating moderate suppression with peak activity at 14 DAT. The 2× rate increased early mortality, with 13.8 dead plants at 7 DAT, and maintained slightly higher kill through 21 DAT. Visual percent-dead ratings were consistently higher at the 2× rate (overall mean 48.7%) than at the 1× rate (47.8%). Onion injury showed the strongest rate response: the 1× rate caused variable, but early mortality (mean 23.1% at 7 DAT), but declined to ≤6% by 14–21 DAT. In contrast, the 2× rate caused severe early stand loss (mean 50.1% at 7 DAT, with one replicate reaching 95.5%) and remained high at 14 DAT (mean 45%). By 21 DAT, onions at both rates showed similar low injury (≈3%). Overall, Bromoxynil improved *Chenopodium* suppression at the 2× rate but caused unacceptable onion injury, whereas the 1× rate provided moderate weed control with recoverable onion crop injury.

Note: Growers must be cautious when applying to onions, especially at high doses, although late-season application of Bromoxynil could effectively control late-season *Chenopodium* weeds. For any questions on the findings, contact Oli Bachie (obachie@ucanr.edu).

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Imperial Valley CIMIS Report and UC Water Management Resources

Ali Montazar
Irrigation and Water Management Advisor, UCCE Imperial, Riverside, and San Diego Counties

The reference evapotranspiration (ET_o) is derived from a well-watered grass field and may be obtained from the nearest CIMIS (California Irrigation Management Information System) station. CIMIS is a program unit in the Water Use and Efficiency Branch, California Department of Water Resources that manages a network of over 145 automated weather stations in California. The network was designed to assist irrigators in managing their water resources more efficiently. CIMIS ET data are a good guideline for planning irrigations as bottom line, while crop ET may be estimated by multiplying ET_o by a crop coefficient (K_c) which is specific for each crop.

There are three CIMIS stations in Imperial County include Calipatria (CIMIS #41), Seeley (CIMIS #68), and Meloland (CIMIS #87). Data from the CIMIS network are available at: http://www.cimis.water.ca.gov/. Estimates of the average daily ET_o for the period of May 1st to July 31th for the Imperial Valley stations are presented in Table 1. These values were calculated using the long-term data of each station.

Table 1. Estimates of average daily potential evapotranspiration (ET_o) in inch per day

Station	May		June		July	
	1-15	16-31	1-15	16-30	1-15	16-31
Calipatria	0.27	0.29	0.31	0.32	0.32	0.31
El Centro (Seeley)	0.29	0.31	0.34	0.36	0.33	0.31
Holtville (Meloland)	0.29	0.31	0.33	0.34	0.32	0.31

For more information about ET and crop coefficients, feel free to contact the UC Imperial County Cooperative Extension office (442-265-7700). You can also find the latest research-based advice and California water & drought management information/resources through link below: http://ciwr.ucanr.edu/.