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Effects of spring burning of bermudagrass on bermudagrass mite damage and seed yield

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Introduction. Over the past couple of years, pest control advisors (PCAs) and growers have increasingly observed symptoms of Bermudagrass mite damage in Bermudagrass fields across the Imperial Valley. A previous article reviewed the biology, damage, and management options of this pest (Babu and Rethwisch 2025). As a continuation, this article presents the results of a recent trial conducted in a grower's bermudagrass seed production field located in the Imperial Valley that evaluates the effect of spring burning as a Bermudagrass mite management option. Before we discuss this study, let's briefly review this pest and its damage symptoms.

Pest description and damage. The Bermudagrass mite, also known as the couch grass mite, *Eriophyes cynodoniensis* (Sayed), is a microscopic arachnid pest that specializes in Bermudagrass. Adult mites are white to cream-colored worm-like pests with two pairs of forward-facing legs (Fig. 1A). The lifecycle consists of eggs, a short larval stage, two nymphal stages, namely protonymph and deutonymph, and adults. From egg to adult, this pest can complete its life cycle within 5-10 days in summer (80-110°F). In the Imperial Valley, mites appear to be active year-round.

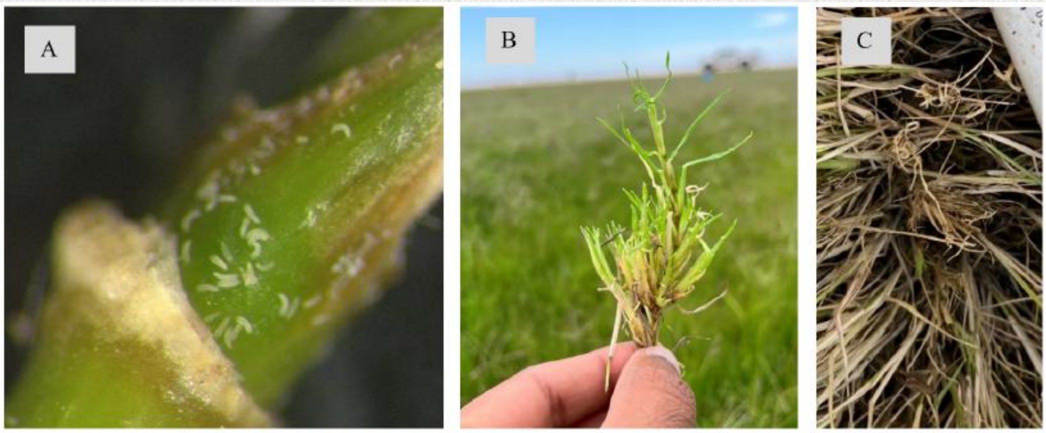

Figure 1. A) Bermudagrass mites on a bermudagrass stem beneath a removed leaf sheath. B) The bermudagrass mites cause damage symptoms known as witches' broom, and C) Dead shoots with witches' broom symptoms.

Bermudagrass mites feed from the plant stems around nodes and are protected under the leaf sheath. Both nymphs and adults extract plant juice using piercing and sucking mouthparts. During feeding, they inject salivary secretions containing chemicals into plant cells, triggering physiological responses that lead to reduced shoot growth, highly shortened internodes, and multiple side shoots arising from the main shoot. Damaged shoots appear as a tuft or rosette commonly referred to as witches' broom (Fig. 1B). Shoots with witches' brooms gradually die off (Fig. 1C).

Study backgrounds. In recent years, Imperial County Bermudagrass growers have reported increased damage from the bermudagrass mite in their fields. Although this pest has been present in the Imperial Valley since 1960, there are no well-defined IPM guidelines for managing this pest in hay and seed production fields. Additionally, most recent studies in the United States have focused on its management in residential turf lawns and golf courses. For chemical management, some older chemistries known to be effective against this pest are no longer labeled (Reinert 1982), and efficacy information against the bermudagrass mite of currently labeled pesticide products in Bermudagrass hay and seed crops is unclear. In this situation, the growers and PCAs were wondering whether agricultural burning affects the Bermudagrass mite population growth and plant damage. While agricultural burning is highly regulated in Imperial County, growers sometimes conduct controlled burning of Bermudagrass fields in early spring before the spring green-up. Because the effect of spring burning on Bermudagrass mite damage and crop yield is not well established, a field trial was conducted to explore the effect of spring burning of Bermudagrass fields as a management option for this pest in seed production fields.

Materials and methods. In January 2025, UCCE Entomology team visited a grower's field that exhibited severe bermudagrass mite damage symptoms in the 2024 season. The sample collected from this field on 22 Jan 2025 suggested high Bermudagrass mite activity in the field, and the grower decided to conduct a spring burning. The grower conducted a controlled burn in late January, and we revisited the field on 6 February 2025 and observed several large patches of unburned area alongside the burned area (Fig. 2A). Eight unburned areas were selected and paired with a nearby burned area, each marked with a flag (Fig. 2B). From each plot, four random one-square-foot areas were inspected for bermudagrass mite damage on 17 April, 20 May, and 24 June. The number of shoots showing damage symptoms was counted and recorded. Because unburned plots had stubble from the previous season with dried-up witches' broom symptoms, only fresh damage with green shoots was counted from the burned and unburned plots to ensure that the damage was incurred during the current season after the burning event. Additionally, on each observation date, aboveground biomass was harvested from a random 1-square-foot area within each plot, placed in a Ziploc bag, and transported to the laboratory in a cooler. From these samples, the dry weight of the grass was measured, and the number of total shoots (bermudagrass mite-damaged + undamaged shoots), undamaged shoots, and shoots with seed heads was counted and recorded. All seedheads present in the 24 June sample (collected 3 days before the grower harvested this field) were separated, threshed to collect the seeds. The seed samples were then screened through multiple sieves to separate the seeds from the stubble. The semi-purified seeds were then placed in the Oregon Seed blower (Hoffman Manufacturing Inc., Corvallis, OR), and the blower was operated for 5 minutes to remove chaff and nonviable seeds. The weight of purified unhulled seeds was measured. Data were analyzed using the GraphPad Prism Wilcoxon two-tailed matched-pairs signed rank test at α =0.05.

Figure 2. A) Unburned area along with burned area after a spring burning event in a dormant Bermudagrass field. Photo taken on 6 Feb 2025. B) Paired burned and unburned areas marked with flags for this study. Red arrows point to the flags. Photo taken on 1 April 2025.

Results.

Bermudagrass mite-damaged shoots: The results indicated that spring burning significantly reduced the bermudagrass mite damage symptoms in burned plots compared to unburned areas when plots were maintained for seed crop (Fig. 3A-C). Following the burning, in the subsequent observation months, on average, the burned plots had 93-94% fewer damaged shoots than the unburned areas. Since the damage led to severe stunting, the damaged shoot was quickly outcompeted by the normally growing shoots. By the June observation, most of the damaged shoots had dried up, as reflected in the low number of damaged shoots in the results (Fig. 3C), as we counted only fresh damage with green shoots to ensure that the damage occurred during the current season.

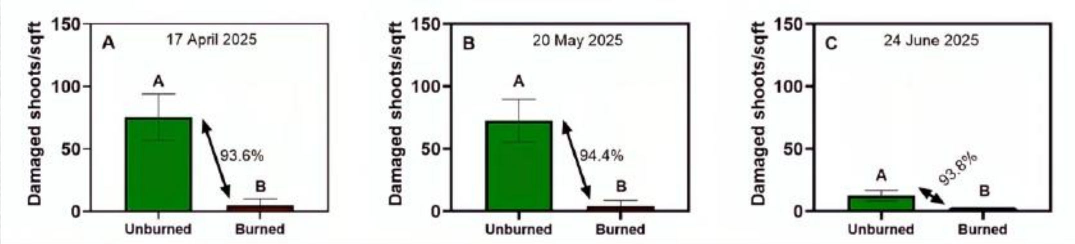

Figure 3. Average number of green shoots with Bermudagrass mite damage symptoms per square foot in spring burned and unburned plots. Damage shoot counts from A) April, B) May, and C) June 2025.

Undamaged/healthy shoots: Despite a significant reduction of Bermudagrass mite damage symptoms in burned plots, no significant statistical differences were observed in the number of undamaged/healthy shoots per square foot area between the burned and unburned plots during the April and May observations (Figs. 4A & B). However, by the June observation, conducted a couple of days before the grower harvested the fields for seed, the number of undamaged shoots was significantly higher in the unburned plots compared to the burned plots.

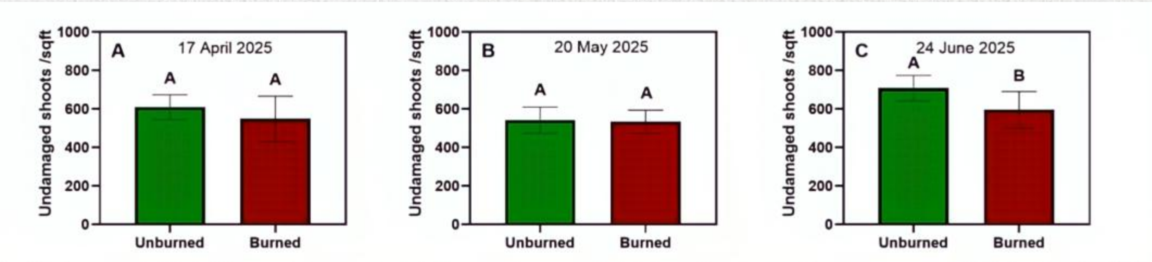

Figure 4. Average number of undamaged/healthy shoots per square foot in spring burned and unburned plots. Undamaged shoot counts from A) April, B) May, and C) June 2025.

Bermudagrass seedhead count: Seedhead development was significantly delayed in the spring-burned plots compared with the unburned plots as indicated by a significantly lower number of shoots with seed head in burned plots during April observation (Fig. 5A). This delay in reproductive development was visually recognizable in the field (see Fig. 2B). However, by mid-May, there were no significant differences in the mean number of seedheads between burned and unburned plots (Fig. 5B), but as the field neared harvest, the unburned plots again had significantly more number seedheads per sqft than the burned plots (Fig. 5C).

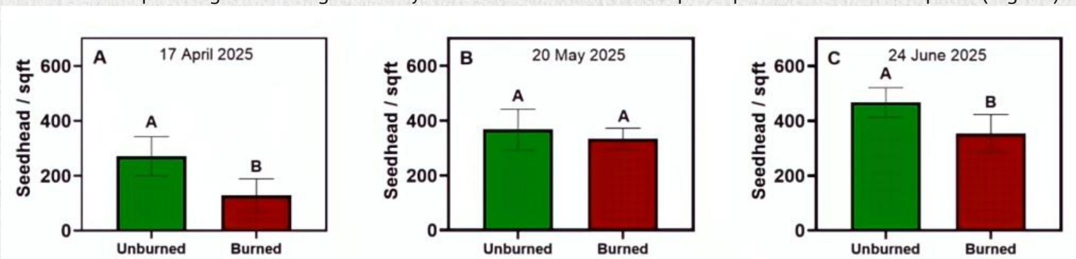

Figure 5. Effect of spring burning on seedhead count. Shoot with seedhead from A) April, B) May, and C) June 2025.

Bermudagrass dry weight: No significant statistical differences were observed in grass dry weight between the burned and unburned plots during the May observation (Figs. 6B). However, by the June observation (Figs. 6C), the grass dry weight was significantly higher in the burned plots compared to the unburned plots. Thus, by the time of seed harvest, the burned plot had accumulated significantly more aboveground biomass than the unburned plots.

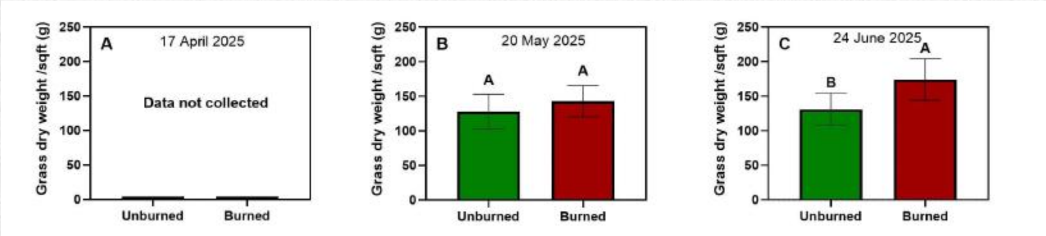

Figure 6. Effect of spring burning on the grass dry weight A) April, (data was not collected) B) May, and C) June 2025.

Bermudagrass seed yield: When comparing cleaned, unhulled seed yield between burned and unburned plots, no significant difference in mean yield was observed between burned and treatments (Fig. 7).

Discussion

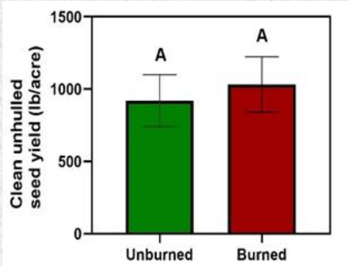

Figure 7. Effect of spring burning on the Bermudagrass seed yield.

The study examines the effect of spring burning on bermudagrass mite damage and grass seed yield in a commercial bermudagrass field maintained for seed production that experiences relatively high mite pressure. In this field, active mite populations were detected at relatively high population levels in samples collected in late January. However, early symptoms of Bermudagrass mite damage began to appear on the plots only around late February to early March. By mid-April, the damage symptoms were highly visible, and we therefore began collecting mite-damage observations for this study. Thus, if you are a grower or PCA concerned about Bermudagrass mite damage in your field, collecting plant samples in early spring, ideally in mid-January, is recommended for detecting adult mite activity. At that time, in some fields most plants may be dormant; however, due to relatively mild winter temperatures in the Imperial Valley, the field will have some green shoots that you can target for sample collection. This will help identify adult mite activity levels early in the spring, even before the spring greenup, thereby providing growers time to respond before mite feeding causes widespread damage.

The results suggest that spring burning significantly reduces Bermudagrass damage in burned plots compared with unburned plots. Thus, spring burning can be used as an effective tool to reduce the witches' broom symptoms in seed production fields by up to 94% when pest pressure is high. However, in this study, the steep reduction in bermudagrass mite damage symptoms observed in spring-burned plots did not translate into increased seed yield. To understand the reason for this result, we need to examine several factors, including the nature of pest damage, crop characteristics, the influence of spring burning on plant growth and development, and how these factors interact to affect seed yield.

Let's begin by examining the influence of spring burning on plant growth. It appeared that the burned plots lagged behind the unburned plots in plant development after the spring green up (Fig. 2B). Specifically, in burned plots, seedhead development was significantly lagged behind the unburned plots in April, and this delay ultimately led to a significantly lower number of seed heads in the burned plots compared with the unburned plots. However, when we examined plant growth in terms of vegetative mass accumulation, burned plots generally accumulated more mass/vegetative growth when measured around the seed harvest. Overall, spring burning led to delayed but uniform and vigorous vegetative growth in the burned plots and significantly reduced mite damage, but delayed seed head development, along with lower seed head density per sqft, compared with unburned plots, prevents translating these positive effects of burning into increased seed yield.

Moreover, understanding the type of damage caused by the mite helps interpret the results. Bermudagrass mite feeding causes damage when they feed around the auxiliary nodes, which develop into sideshoots. In the seed production fields in the Imperial Valley, after the winter dormancy, most of the sideshoots grow between February and March. During this period, plants rapidly produce numerous side shoots (>500 shoots/sq ft). This creates intense competition among the shoots for resources, including nutrients and sunlight. Damaged shoots with stunted growth and markedly shortened internodes are quickly outcompeted and outgrown by normally growing shoots. This limits the sunlight reaching the damaged shoots, and they subsequently turn yellow to brown and dry up (Fig. 8). This overall limit the competitive potential of the damaged shoots, thereby limiting their negative effect on seed yield within a season (= thus limited short-term effect).

Figure 8. Bermudagrass damaged shoots are outcompeted by normally growing shoots.

However, continuous bermudagrass mite damage over multiple seasons may weaken the plants, thus leading to overall decline of plant health and competitive ability of the affected plants. This can lead to a delay in breaking dormancy in the spring, slowing the greening up process in the spring and can lead to an overall reduction in the number of healthy shoots/ sqft area. While these effects are reported in turf grass systems maintained with long replanting cycles, the long-term impact of bermudagrass damage in the commercial hay or seed production fields with relatively shorter 5-7 year replanting cycle is not well studied. Thus, future research should focus on the long-term impact of spring burning on Bermudagrass mite damage and grass hay and seed yield.

In summary, in this study where we measured the short-term impact of spring burning, spring burning significantly reduced bermudagrass mite damage symptoms in the seed production field, but the resulting reduction in damage did not translate into a seed yield advantage.

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Acknowledgement

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Alfalfa's regional value in the low desert: Field data document unmatched nitrogen removal with minimal inputs

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1. Introduction

Agricultural sustainability in California's low-desert region depends on efficient use of water and fertilizers to maintain productivity, support water conservation, and protect regional water quality. Because most desert cropping systems rely on irrigation, fertilizer use and water management are closely connected. Nitrogen that is not removed through harvest may partially contribute to the nitrogen supply of subsequent crops, or it may move beyond the root zone or into drainage systems depending on soil conditions, irrigation practices, and crop sequence. Understanding how much nitrogen is removed through harvested products at the cropping-system level is therefore an important component of evaluating long-term nitrogen balance in desert agriculture.

Alfalfa is a long-established crop in low-desert farming systems and is widely recognized for its high productivity and multiple harvests each year. As a legume, alfalfa is typically managed with little or no nitrogen fertilizer, relying primarily on biological nitrogen fixation by symbiotic soil microorganisms to meet its nitrogen demand. At the same time, substantial quantities of nitrogen are exported from the field through harvested biomass. While these characteristics are well known, nitrogen removal has rarely been quantified and compared across major desert cropping systems using a consistent, field-based approach.

This article presents field-measured nitrogen removal crop coefficients for alfalfa, bermudagrass, kleingrass, broccoli, and romaine lettuce grown under low-desert conditions. The coefficients quantify nitrogen removed in harvested biomass and provide a practical framework for comparing nitrogen removal across perennial forage and annual vegetable systems. The objective of this article is to use field-measured nitrogen removal crop coefficients to evaluate alfalfa's contribution to agricultural sustainability and environmental compatibility within low-desert cropping systems, with a focus on its role in nitrogen removal through harvested biomass. Field measurements indicate that, on average, alfalfa removes approximately 3.3 lb of nitrogen per 100 lb of harvested product, representing a substantially greater nitrogen removal potential per unit yield than the other crops evaluated in this study.

2. Field Data Source

Extensive field sampling, processing, and laboratory analysis were conducted on alfalfa, bermudagrass, kleingrass, broccoli, and romaine lettuce across commercial production systems in California's low-desert region. Field data were collected from 56 individual commercial fields in the Imperial and Coachella Valleys during the 2025 growing season. The selected fields represent typical grower-managed conditions in the region, including standard irrigation practices, fertilization programs, and harvest operations.

For perennial forage crops (alfalfa, bermudagrass, and kleingrass), plant samples were collected from six to seven harvests over the course of the year, reflecting normal commercial cutting schedules. For annual vegetable crops (broccoli and romaine lettuce), samples were collected at the time of commercial harvest. Within each field, samples were taken from five representative locations following standard harvest practices. These subsamples were combined to form a composite sample representative of each field and harvest event.

Collected plant material consisted of harvested plant parts removed from the field as marketable or usable products. Samples were oven-dried at 60 °C to a constant weight to determine dry matter content. Initial fresh weights and final dry weights were recorded, allowing nitrogen concentration to be expressed on a fresh-weight basis where appropriate. Dried samples were ground using a Wiley mill to pass through a 1 mm screen, thoroughly mixed, and subsampled. Total nitrogen concentration of harvested biomass was determined through laboratory analysis.

3. Nitrogen Removal Crop Coefficients Across Major Low-Desert Crops

Nitrogen removal crop coefficients were developed using field-measured harvested yield and laboratory-determined nitrogen concentration of harvested plant material. The coefficient represents the amount of nitrogen removed per unit of harvested yield and provides a consistent, harvest-based metric for comparing nitrogen removal potential across crops with different growth habits, harvest practices, and production cycles. Table 1 presents the mean and observed range of nitrogen removal crop coefficients for the five crops evaluated, along with associated plant characteristics used in coefficient development, including tissue nitrogen concentration and percent solids. Clear and consistent numerical differences among crops are evident.

Table 1. Mean and range of nitrogen removal crop coefficients for major low-desert crops, along with associated plant characteristics used in coefficient development, including percent solids and tissue nitrogen concentration.

Commodity	# Fields sampled	mean N-Coeff.	min N-Coeff.	max N-Coeff.	mean % solids	min % solids	max % solids	mean %N	min %N	max %N
Alfalfa hay	12	0.033293	0.01780	0.04520	-	-	-	3.33	1.78	4.52
Bermudagrass hay	8	0.018361	0.01220	0.0240	-	-	-	1.84	1.22	2.40
Broccoli	9	0.005405	0.003749	0.007342	10.15	8.96	11.42	5.31	3.72	6.73
Kleingrass hay	8	0.022197	0.01120	0.03360	-	-	-	2.22	1.12	3.36
Romaine lettuce	19	0.001851	0.001062	0.002774	5.54	3.32	8.48	3.42	2.16	4.02

Alfalfa exhibited the highest nitrogen removal crop coefficient among the crops evaluated, with a mean value of 0.0333 and an observed range from 0.0178 to 0.0452 across commercial fields. This indicates that, on average, alfalfa removes approximately 3.3 lb of nitrogen per 100 lb of harvested product, representing a substantially greater nitrogen removal potential per unit yield than the other crops included in this analysis.

Perennial forage grasses showed intermediate nitrogen removal crop coefficients. Kleingrass had a mean coefficient of 0.0222, with values ranging from 0.0112 to 0.0336, while bermudagrass had a lower mean coefficient of 0.0184, with a range of 0.0122 to 0.0240. These values indicate that, per unit of harvested yield, both forage grasses remove less nitrogen than alfalfa, reflecting lower nitrogen content in the harvested material.

Annual vegetable crops exhibited substantially lower nitrogen removal crop coefficients. Broccoli had a mean coefficient of 0.0054, with values ranging from 0.0037 to 0.0073, while romaine lettuce had the lowest mean coefficient at 0.0019, with a range of 0.0011 to 0.0028. Although broccoli tissue nitrogen concentration was relatively high, the nitrogen removal crop coefficient remains low because only a small portion of total plant biomass is removed at harvest. In the case of romaine lettuce, low percent solids further limit nitrogen removal per unit of harvested fresh weight.

Overall, nitrogen removal crop coefficients differed by more than an order of magnitude across the crops evaluated. These numerical differences highlight the importance of using a harvest-based coefficient when comparing nitrogen removal among cropping systems and provide a quantitative basis for understanding why alfalfa exhibits substantially greater nitrogen removal per unit of harvested yield than other major low-desert crops.

4. Estimated Field-Scale Nitrogen Removal Based on Example Yields

Nitrogen removal crop coefficients provide a normalized measure of nitrogen removed per unit of harvested yield. To translate these coefficients into field-scale nitrogen removal, total nitrogen removal per acre was estimated by multiplying the mean nitrogen removal crop coefficient for each crop by an example harvested yield.

For illustrative purposes, example harvested yields of 16,000 lb ac^{-1} for alfalfa, 12,000 lb ac^{-1} for kleingrass, 14,000 lb ac^{-1} for bermudagrass, 16,000 lb ac^{-1} for broccoli, and 33,000 lb ac^{-1} for romaine lettuce were considered. These yields are not intended to represent regional averages, but fall within the range observed in some local fields and are used here to demonstrate how nitrogen removal scales with yield using the coefficients presented in Table 1.

Applying these example yields results in clear numerical differences in estimated nitrogen removal among crops (Figure 1). Using the mean nitrogen removal crop coefficients, alfalfa removes approximately 530 lb N ac^{-1} through harvested biomass. Under the same approach, kleingrass removes approximately 266 lb N ac^{-1} and bermudagrass removes approximately 258 lb N ac^{-1}, reflecting their intermediate nitrogen removal crop coefficients combined with moderate harvested yields.

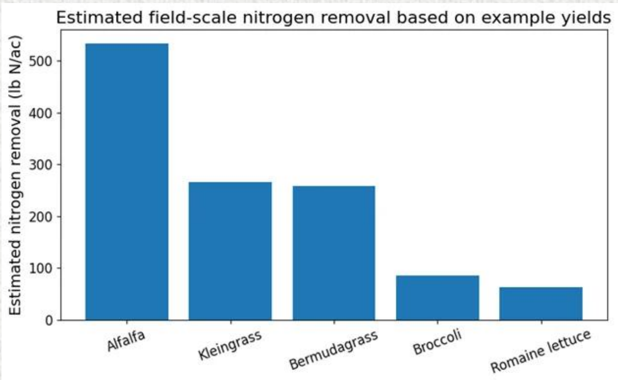

Figure 1. Estimated nitrogen removal per acre for major low-desert crops calculated using mean nitrogen removal crop coefficients (Table 1) and example harvested yields. Example yields are used for illustrative purposes only and do not represent regional average production.

Annual vegetable crops remove substantially smaller amounts of nitrogen at the field scale. Based on the example yields and mean coefficients, broccoli removes approximately 86 lb N ac^{-1}, while romaine lettuce removes approximately 63 lb N ac^{-1}. Although broccoli has relatively high tissue nitrogen concentration, harvested nitrogen removal remains limited because only a portion of total plant biomass is removed at harvest. For romaine lettuce, low percent solids further constrain nitrogen removal per unit of harvested fresh weight.

Across the crops evaluated, estimated harvested nitrogen removal spans nearly an order of magnitude, from approximately 60 lb N ac^{-1} for romaine lettuce to more than 500 lb N ac^{-1} for alfalfa under the example yield assumptions. These numerical differences illustrate how nitrogen removal crop coefficients and harvested yield together determine total nitrogen removal at the field scale.

5. Implications for Low-Desert Cropping Systems

The results presented in this study highlight important differences in how cropping systems influence nitrogen dynamics in low-desert agriculture. Nitrogen removal through harvest depends on crop type, harvested biomass, harvest frequency, and the proportion of total plant material that is removed from the field. As a result, nitrogen removal should be interpreted at the cropping-system level rather than inferred solely from tissue nitrogen concentration or fertilizer application rates.

Perennial forage systems remove nitrogen repeatedly through multiple harvests over the year, while annual vegetable crops export nitrogen over a shorter production window and often remove only a fraction of total plant biomass. For romaine lettuce, outer leaves and nonmarketable tissue typically remain in the field, while for broccoli only the harvested head is removed, leaving most plant material behind. Nitrogen contained in this unharvested biomass may partially contribute to soil nitrogen pools available for subsequent crops or may be subject to loss depending on residue management, irrigation practices, and environmental conditions. This distinction highlights the complexity of nitrogen management in irrigated desert systems and reinforces the need for site-specific interpretation.

Within this broader context, alfalfa functions as a sustained nitrogen-removal system. Because it is typically managed with minimal nitrogen fertilizer inputs and removes large quantities of nitrogen through harvested biomass, alfalfa exports nitrogen from the field rather than allowing it to accumulate in the soil profile. This characteristic contributes to improved nitrogen balance at both the field and regional scales.

Conclusion

Field-measured nitrogen removal crop coefficients from commercial low-desert cropping systems reveal clear and consistent differences in harvested nitrogen removal among major crops. When evaluated using a common, harvest-based framework, alfalfa removes substantially more nitrogen through harvested biomass than bermudagrass, kleingrass, broccoli, or romaine lettuce. This outcome reflects alfalfa's highest nitrogen removal crop coefficient among the crops evaluated, indicating greater nitrogen removal per unit of harvested yield. At the field scale, total nitrogen removal is governed by the interaction between this coefficient and realized yield, whereas other crops remove less nitrogen because of lower nitrogen removal crop coefficients, lower harvested yields, or because only a fraction of total plant biomass is removed during harvest.

Taken together, these findings indicate that alfalfa provides documented environmental value within low-desert cropping systems. While alfalfa is typically managed with minimal nitrogen fertilizer inputs, it contributes to improved regional nitrogen balance under irrigated conditions through consistent export of nitrogen in harvested biomass. Although the quantitative values presented here are derived from low-desert field data, this nitrogen function is intrinsic to alfalfa grown under irrigated conditions and is therefore relevant to broader evaluations of irrigated cropping systems. Quantifying this function using field-measured crop coefficients provides a clear, data-driven basis for recognizing alfalfa as a valuable regional cropping system whose environmental performance warrants consideration in regional evaluations of cropping systems, sustainability planning, and irrigated agricultural performance. In regional assessments of irrigated agriculture, alfalfa's contribution to regional nitrogen balance represents a measurable, system-level environmental contribution that should be considered alongside other performance metrics.

Continuing Research

This work is part of an ongoing, CDFA-FREP–funded research program examining nitrogen removal across a wide range of low-desert cropping systems. While this article focuses on five crops, the broader study includes nearly 20 commodities, with additional results to be communicated as they become available.

New World screwworm threat

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What is the New World Screwworm

Figure 1. New World screwworm. Source – USDA-APHIS

The New World screwworm (*Cochliomyia hominivorax*) is a flesh-eating fly larva (maggot) that infests open wounds in warm-blooded animals, feeding on live tissue and enlarging the wound. If left untreated, infestations (myiasis) can be fatal to animals. Adult screwworm flies are about the size of a common housefly or slightly larger (Fig. 1). They have orange eyes, a metallic blue or green body, and three dark stripes along their upper back. The fly that produces these maggots was eradicated from the United States in the 1960s through the successful release of sterile male flies. Female flies only mate once in their lifetime, so a mating with a sterile male will result in no offspring. The eradication campaign was able to eliminate the fly not only from the United States, but also from Central America through the isthmus of Panama. A United States Department of Agriculture facility in Panama, called COPEG (Panama-United States Commission for the Eradication and Prevention of Screwworm) produces and releases approximately 100 million sterilized screwworm flies every week (Fig. 2). For the last 60 years, this process has kept the pest largely contained in the South American continent. Flies or infested animals are occasionally found north of the eradication barrier at the southern end of Panama, but these incursions are usually quickly eradicated through targeted release of sterile male flies. There was a brief re-introduction in the Florida Keys in 2016, and while the infestation was eliminated within a few months, it led to the killing or euthanasia of 14% of the population of endangered Florida Key deer underlining the devastation that this pest is capable of triggering. The eradication of New World screwworm from the United States has been an exceptionally successful federal program resulting in an estimated $2.8 billion in annual economic benefits to the USA.

While the effect of screwworm on wildlife is not well studied, the navel cord of newborn animals is a common site for screwworm maggot infestation with mortality of deer fawns reported to be high in areas where screwworm are present.

What has changed?

Figure 2. COPEG facility Panama. Image source - https://entomologytoday.org/copeg

Unfortunately, starting in 2023 the screwworm fly escaped the Panama quarantine zone penetrating northward into Central America and subsequently reaching southern Mexico (states of Oaxaca and Veracruz) by November of 2024. Flies usually disperse only a few kilometers to find a host but may travel 10-25 km or even further in some conditions, including by human transport of infested animals. In response to the threat posed by accidental import of animals infested with screwworm, U.S. Secretary of Agriculture, Brooke L. Rollins, suspended imports of cattle and other live animals from Mexico. In addition, a fruit fly production facility in Mexico will be refurbished to produce additional sterile New World screwworm flies and a bill has been introduced in Congress to build a new sterile fly facility replacing the original screwworm production facility in Texas that was instrumental in the early US screwworm eradication program during the 1960s; however, if approved, the new facility may not be operational for several years. The National Cattlemen's Beef Association (NCBA) is strongly in favor of such a facility and is working to secure additional funding to combat the pest.

What to look for

We do not yet have reports of the reintroduction of screwworm into the United States, but it is extremely important to report any suspicious cases immediately. All warm-blooded animals, including humans, are susceptible, but cattle are a common target. Larvae are often deposited in the navel of newborn calves, wounds from dehorning, any other open sores, or body openings (mouth, nose, anus, vulva). Affected animals may separate from the herd, appear very irritated and display head shaking. Maggots may be seen in the wounds. Please alert your veterinarian and/or the California Department of Food and Agriculture if you suspect a case of screwworm infestation. The sooner it can be detected, the sooner it can be eradicated. A spread through the United States livestock herds would be tremendously costly and cause a lot of animal suffering.

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Update on USDA Efforts to Fight New World Screwworm
NCBA Pushes for Domestic Sterile Fly Facility
USDA APHIS New World Screwworm
New World Screwworm – Historical Economic Impact
New World Screwworm Outbreak in Central America and Mexico

Evaluation of broccoli cultivars for production in Imperial County, CA.

Written By: Jairo Diaz[1] and Gilberto Magallon[2],
[1]Director, [2]Superintendent, Desert Research and Extension Center

Backgrounds. The University of California Desert Research and Extension Center (UC DREC) evaluated broccoli (*Brassica oleracea* var. *italica*) cultivars to assess their performance in the low desert region of California.

Material and Methods. There were 26 broccoli cultivars tested for suitability in desert conditions in the 2024-2025 trial. Field studies were performed at the UC DREC located in Holtville, CA. The trial evaluated all broccoli cultivars in twin rows on 101.6-cm beds by 3.0-m-long plots (Figure 1). Four replicates of each cultivar were grown. The top 30-cm soil has a loam textural classification, a pH of 7.9, a cation exchange capacity of 20.0 meq 100 g^{-1} and soil electrical conductivity of 2.5 dS m^{-1} (Table 1). Broccoli cultivars were direct seeded on September 25, 2024. Trial followed similar cultural practices (irrigation, fertilization, weed and pest control) adopted by commercial growers in the region. Pre-plant fertilization included 560 kg ha^{-1} of 11-52-00 (NPK) and 168 kg ha^{-1} of urea. In addition, 224 kg ha^{-1} of urea were applied on November 7, 2024. Sprinkler irrigation was used for germination and establishment. Furrow irrigation was performed after crop establishment. Weed control was maintained by hand weeding during the growing season. Pest management practices included the application of Admire Pro (0.73 L ha^{-1}) on September 25th, 2024 and Prefar 4-E (14 L ha^{-1}) on September 27th, 2024.

Figure 1. Figure 1. Field trial view.

Six broccoli heads were harvested per cultivar per replicate (four replicates). Each head of broccoli was weighed and head diameter was recorded. The experimental design of this trial was a randomized complete block design with four replications. Statistical analysis was conducted using the Statistical Analysis Software, SAS.

Table 1. Soil fertility characterization (0-30 cm) of testing plots at DREC before planting.[1]

pH	NO_3-N (ppm)	PO_4-P (ppm)	K (ppm)	CEC (meq g^{-1})	ECE (dS m^{-1})	Ca (ppm)	Mg (ppm)	Na (ppm)	ESP
7.9	67.6	18.3	260	20.0	2.5	4,256	630	272	3.2

[1]NO_3-N = nitrate nitrogen, PO_4-P = orthophosphate phosphorus (Olsen method), K= potassium, CEC = cation exchange capacity, Ca = calcium, Mg = magnesium, Na = sodium, ESP = exchangeable sodium percentage.

Results and Discussion

Harvest began on December 30th, 2024 and concluded on January 21, 2025. Each cultivar was evaluated and selected for harvest based upon adequately sized heads (Figure 2). Average head weight ranged from 286 to 630g (Table 2 and Figure 3). BC1764, C701, and C902 had the greatest average head weights; however, they were not significantly different from the top fourteen cultivars. Mean head diameters ranged from 105 to 145mm (Table 3 and Figure 4), with cultivar BC1764 exhibiting the largest head diameter.

Acknowledgments

Thanks to UC DREC staff for supporting field operations and data collection for this project. Dr. Roberto Soto, Universidad Autónoma de Baja California, performed statistical analysis in SAS. Funds were provided by Known-You Seed America Corporation through research agreement No. Y24-7313.

Figure 2. Broccoli pictures at harvest

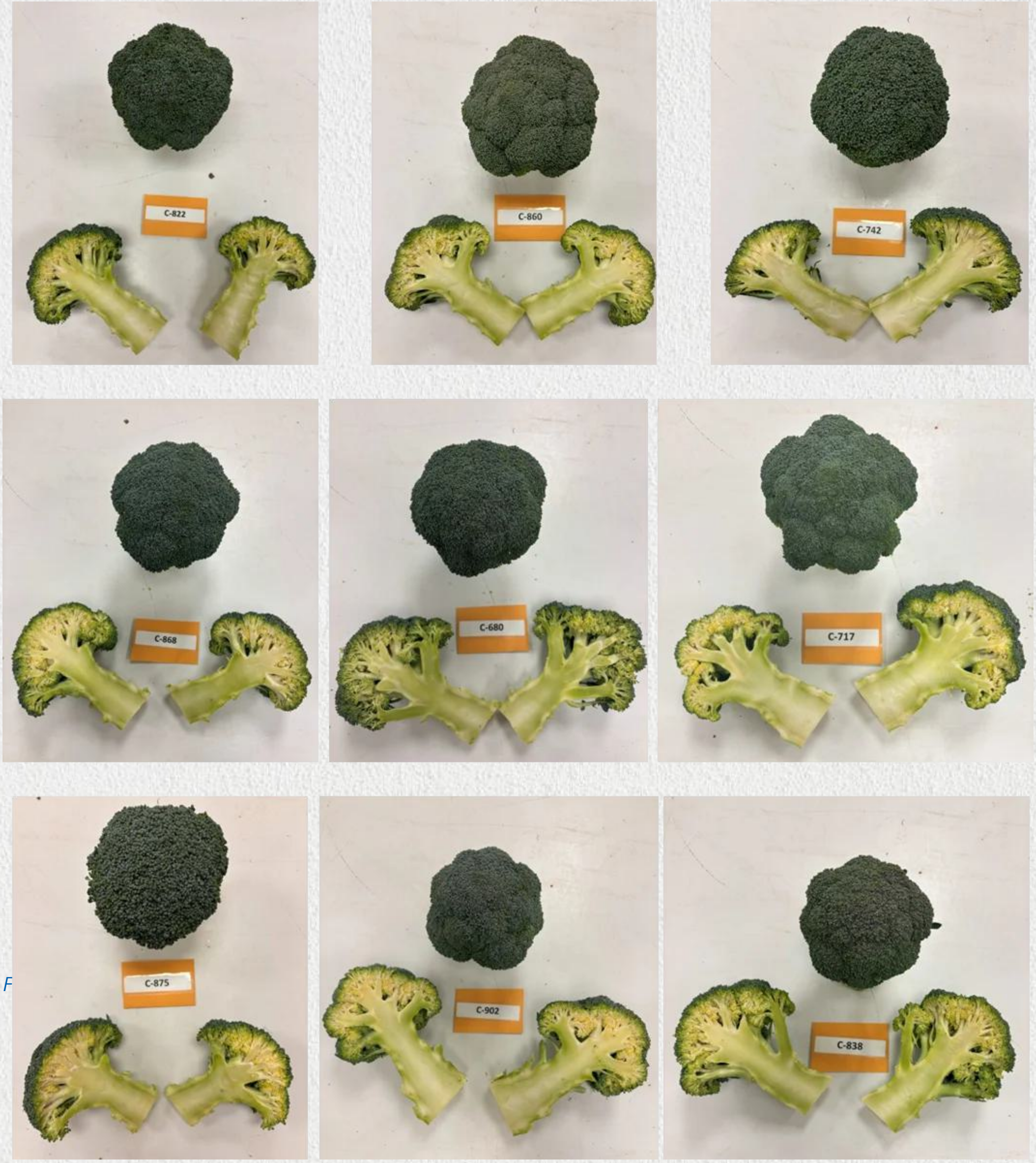

Figure 2. Broccoli pictures at harvest

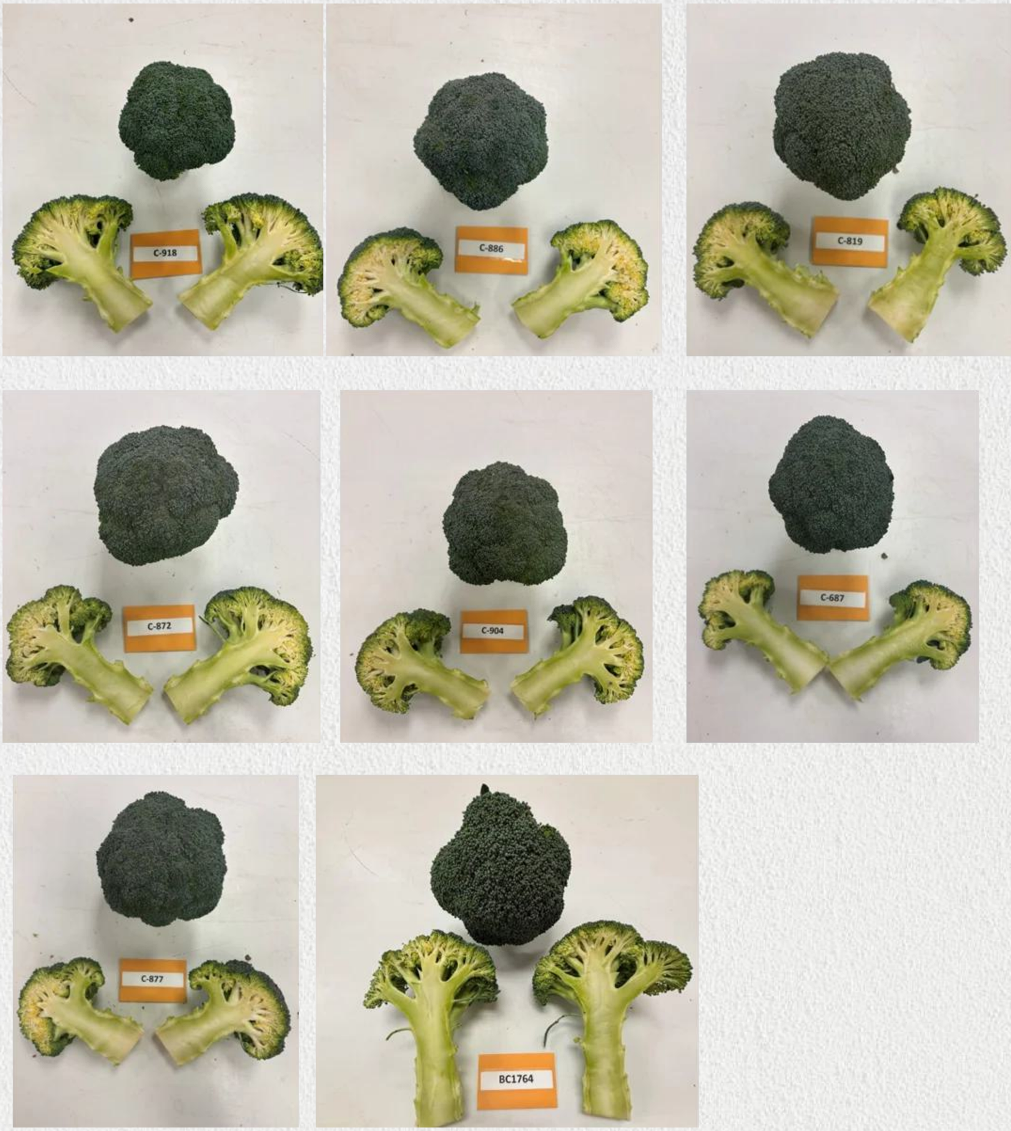

Figure 2. Broccoli pictures at harvest

Table 2. Average head weight.

Cultivar	Average Weight (g)
BC1764	510a
C701	508a
C902	505a
C822	485ba
C700	472ba
C826	461bdac
C740	436ebdac
C904	429ebdac
C817	428ebdac
Emeral Crown	426ebdac
C877	424ebdac
C872	421ebdac
C918	408ebdac
C886	405ebdac
C558	397ebdc
C716	394ebdc
C717	386ebdc
C860	381ebdc
C680	374edc
C875	374edc
C866	370edc
C819	369edc
C687	357ed
C838	356ed
C868	349e
C742	342e

Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to the Duncan's multiple range test.

Table 3. Average head diameter

Cultivar	Average Diameter (mm)
BC1764	141a
C826	128b
C701	126cb
C918	124cbd
Emeral Crown	123cebd
C902	121fcebd
C740	120fcebdg
C866	118fcedg
C822	118fcedg
C700	118fcedg
C680	117fcedg
C877	117fcedg
C716	117fcedg
C875	116fedg
C717	116fedg
C872	115fedg
C860	114feg
C817	114feg
C904	113fg
C742	113fg
C886	113fg
C558	112fg
C838	112fg
C868	112fg
C687	112fg
C819	111g

Means in a column followed by the same letter are not significantly different at $P \leq 0.05$ according to the Duncan's multiple range test.

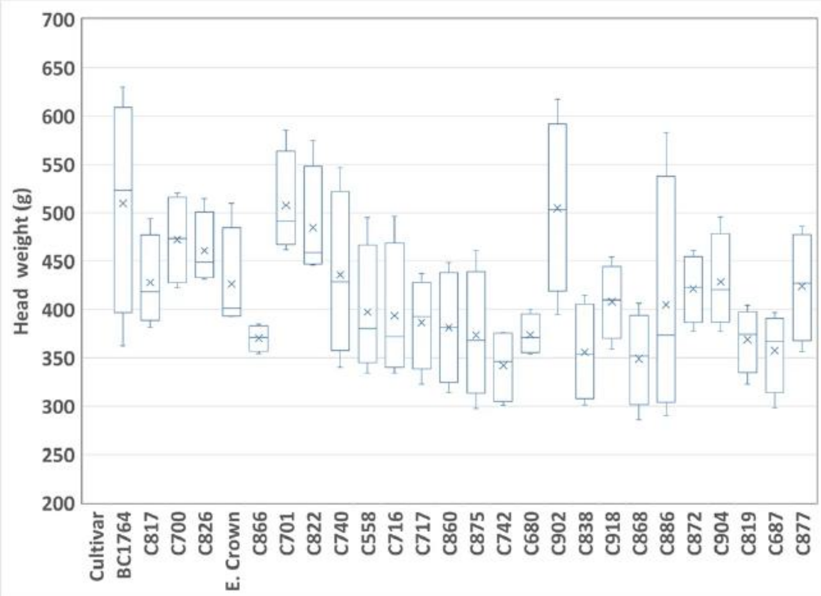

Figure 3. Box-and-whisker plot showing the distribution of average head weight per cultivar. The line within the box indicates the median of the distribution. 50% of the data is present within the ends of the box, which represents the 25th percentile (first quartile) and 75th percentile (third quartile). The whiskers indicate the variability outside the first and third quartiles.

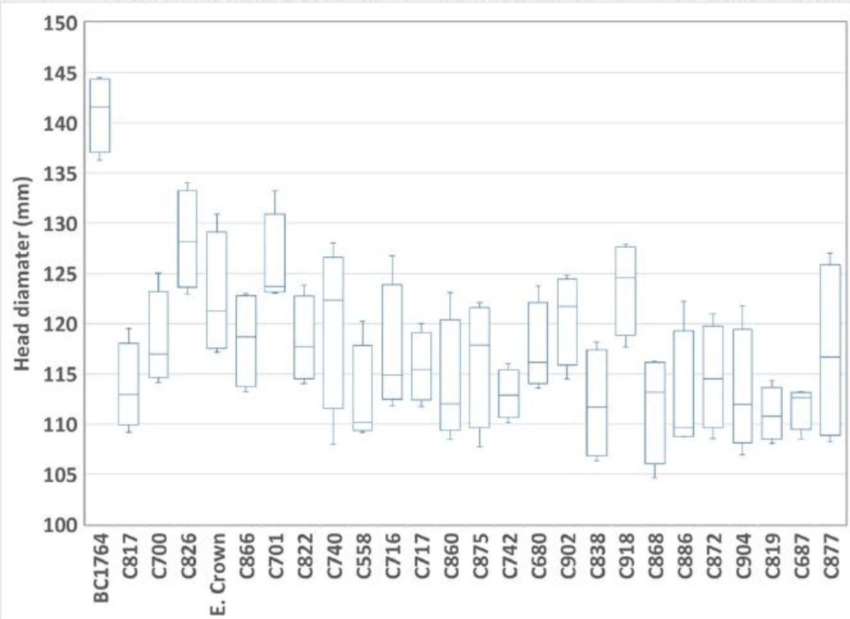

Figure 4. Box-and-whisker plot shows the distribution of average head diameter per cultivar. The line within the box indicates the median of the distribution. 50% of the data is present within the ends of the box, which represents the 25th percentile (first quartile) and 75th percentile (third quartile). The whiskers indicate the variability outside the first and third quartiles.

Updates on downy mildew resistance in lettuce

Written By: **Ana M. Pastrana**
Plant Pathology Advisor, UCCE Imperial, Riverside, and San Diego Counties

The International Bremia Evaluation Board – United States (IBEB-US) has updated its guidelines for reporting lettuce resistance to downy mildew (*Bremia lactucae*). Starting now, resistance claims for U.S. lettuce varieties will focus only on races **Bl: 7–10US. Earlier races (Bl: 1–6US) are no longer found in U.S. fields, so claims for these are no longer relevant.**

Lettuce varieties with Bl: 7–10US resistance offer protection against the most common downy mildew races, but **resistance is not a guarantee**. Rare or new races may still cause disease, and plants may show some symptoms under heavy disease pressure.

Growers are encouraged to combine resistant varieties with good cultural practices, including **reducing leaf wetness. Applying fungicides,** especially to young plants, adds extra protection to resistant lettuce and helps reduce the risk of new Bremia races developing.

If you have fields showing symptoms of lettuce downy mildew now or in the coming weeks, I am **collecting samples to characterize new races** in collaboration with IBEB-US. Please contact me if you would like me to visit your fields to take samples: ampastranaleon@ucanr.edu / 442-238-3950.

Read the full announcement here: SeedQuest News

Area-wide monitoring of key insect pests across the Imperial Valley: January 2025 updates

Written By: **Arun Babu**
Entomology Advisor, UCCE Imperial County

This article is intended to provide growers, PCAs, and other stakeholders with information on the adult pest activity of whiteflies, aphid complex, western flower thrips, and flea beetles across the Imperial Valley. The data were collected using a yellow sticky trap network maintained by the UCCE Entomology program. The yellow sticky traps set up in each site consist of a 6 × 12 in (15.2 × 30.5 cm) sticky trap (Olson Products, Medina, OH), shaped into a cylinder, attached to a wooden stake using a binder clip, and positioned about 60 cm above the ground (Fig. 1A and 1B). The traps are distributed throughout the Imperial Valley in major agricultural areas (Fig. 1C). Insects that are attracted to the yellow colors get trapped on the sticky surfaces when they land on the surface during their flight. The traps are replaced weekly. The type and abundance of trapped insect pests are examined in the laboratory using a stereo microscope.

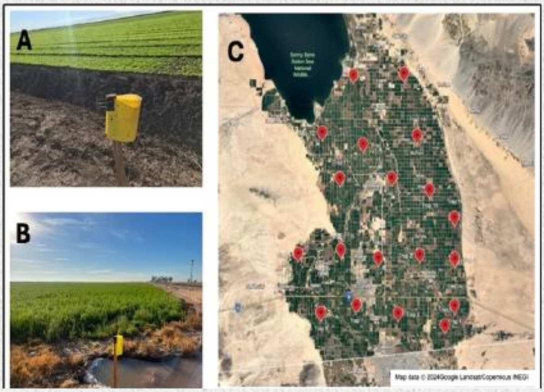

Figure 1 A &B. Yellow sticky traps in various fields, and C) Trap locations across the Imperial Valley

Insect count data from the sticky traps could help forecast the adult insect activity of targeted pests around crop fields. However, since several biological (crop type, crop age, presence of weed hosts, etc.), physical factors (temperature, wind, precipitation, etc.), and farm operations (insecticide sprays, dust from the land preparation, crop harvest, etc.) can influence insect populations development in the field and trap capture efficiency, the insect numbers in sticky traps do not always strongly correlate to the actual infestation levels in the grower's fields. Despite this, the insect pest counts from the sticky traps are a valuable indicator of adult insects' prevalence across a landscape. Collecting data on trapped insects across multiple years may help establish a baseline of pest activity and potential crop infestations throughout the season. Such historical pest data can then be compared with current pest activity in the traps to identify population trends. The sticky traps can also be screened to detect invasive insect pests, such as Asian citrus psyllids, spotted lanternflies, and Mexican fruit flies.

Insect count updates until 20 January 2025

The insect counts from the monitoring trap network are presented below (Figures 2, 3, 4, and 5). Each dot in each of the graphs represents the average insect count from 19 traps placed across the Imperial Valley for that sampling week, with the value expressed as the number of insects per trap per day.

Whiteflies: The whitefly counts (Fig. 2) in the traps consisted mainly of sweetpotato whitefly (*Bemisia tabaci* MEAM1), but also a small fraction (< 5%) of bandedwinged whiteflies, Trialeurodes abutilonia, and other minor whitefly species. Their population peaked in August-September. Since then, with the onset of lower temperatures, adult counts have declined, and currently, the trap counts indicate very low adult activity across the Imperial Valley.

Aphids. The trap-count data for aphids (Fig. 3) do not focus on any single species and represent the aphid complex in the Valley. Currently, we are observing low alate (winged) aphid counts in the traps, lower than the seasonal average. That being said, the latest trap count data indicate that the winged aphid population is trending upward, and several PCAs indicate that they are starting to see the population building up in their crops.

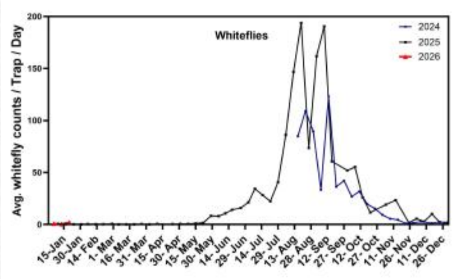

Figure 2. Whitefly counts from the traps

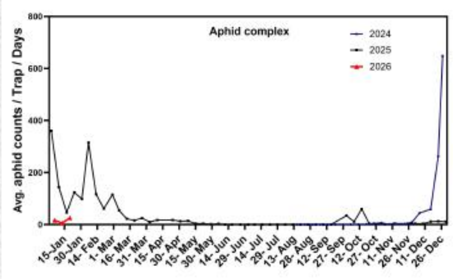

Figure 3. Aphids count from the traps

Flea beetles. The flea beetle counts on the traps (Fig. 4) comprised the pale-striped flea beetle, *Systena blanda*, the desert corn flea beetle, *Chaetocnema ectypa*, and other minor species. Currently, we are observing relatively low adult activity across the Imperial Valley, but slightly above the seasonal average for this time of the year.

Western flower thrips. Several thrip species were captured in the traps, but only western flower thrips, *Frankliniella occidentalis*, the major thrip species of concern for several crops of the Imperial Valley, were counted. Currently, we are observing relatively low adult counts in our traps, but slightly above the seasonal average for this time of the year.

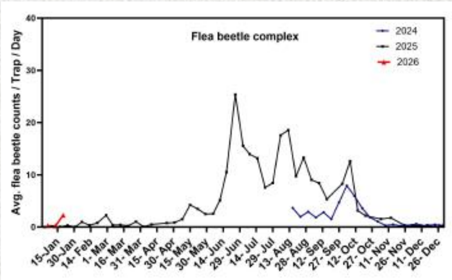

Figure 4. Flea beetle count from the traps

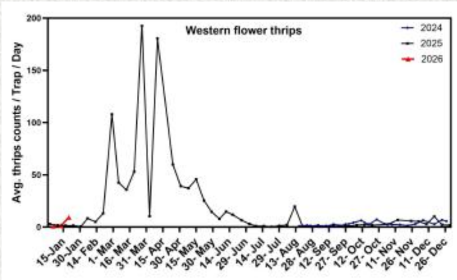

Figure 5. Western flower thrips count from the traps

Additional biweekly updates of trap capture data are available from the UCCE Imperial County Entomology webpage, which can be accessed at https://ucanr.edu/county-office/cooperative-extension-imperial-county/imperial-valley-areawide-pest-monitoring. If you are interested in additional data from this project or have questions or comments, please contact Arun Babu at (442) 265-7700 or arbabu@ucanr.edu.

Acknowledgements

Gustavo Gamboa Paredes provided technical assistance. This project is being supported by the Imperial County Agricultural Benefit Program grant (2024-2027).

Imperial Valley CIMIS Report and UC Water Management Resources

Written By: **Ali Montazar**
Irrigation and Water Management Advisor, UCCE Imperial, Riverside, and San Diego Counties

The reference evapotranspiration (ETo) 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 ETo by a crop coefficient (Kc) 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: https://cimis.water.ca.gov/ Estimates of the average daily ETo for the period of January 1st to March 31st 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 (ETo) in inches per day

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

Station	January		February		March	
	1-15	16-31	1-15	16-28	1-15	16-31
Calipatria	0.09	0.10	0.12	0.13	0.16	0.19
El Centro (Seeley)	0.10	0.11	0.13	0.15	0.19	0.22
Holtville (Meloland)	0.09	0.10	0.12	0.14	0.17	0.21

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 the link below: http://ciwr.ucanr.edu/.

CALENDAR

Stay up-to-date with seminars, webinars, trainings, events, and more!

JANUARY

CDFA FARM TO SCHOOL RESOURCE FAIR

January 31, 9:00 AM to 1:00 PM

DREC, 1004 Holton Rd., Holtville, CA 92250

FEBRUARY

HARVESTING COMMUNITY WORKSHOP

February 19, 1:30 PM

SDSU Calexico Campus, 720 Heber Ave, Calexico, CA 92231

VEGETABLE PRODUCTION AND IPM FOR CONVENTIONAL AND ORGANIC SYSTEMS WORKSHOP

February 25, 8:00 AM to 12:30 PM

AgWest Farm Credit, 485 Business Pkwy, Imperial, CA 92251

https://surveys.ucanr.edu/survey.cfm?surveynumber=47576

VEGETABLE PRODUCTION AND IPM FOR CONVENTIONAL AND ORGANIC SYSTEMS WORKSHOP

February 26, 8:00 AM to 12:30 PM

Coachella Public Library, 1500 6th St, Coachella, CA 92236

https://surveys.ucanr.edu/survey.cfm?surveynumber=47577

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2026 Vegetable Production and IPM for Conventional and Organic Systems - Imperial

February 25, 2026

AgWest Farm Credit, 485 Business Pkwy, Imperial, CA 92251

Registration link: https://surveys.ucanr.edu/survey.cfm?surveynumber=47576

8:00 a.m. – 12:00 p.m.

7:30	Registration
8:00	**Welcome & Introduction**
8:05	**Selecting organic insecticides for effective insect pest management in organic vegetable production –** *Wilfrid Calvin, Assistant Professor, Specialty Crops Entomologist, University of Arizona*
8:35	**Soilborne pathogens of lettuce and research updates on fusarium wilt** – *Alex Putman, Associate Professor of Cooperative Extension, University of California, Riverside*
9:05	**Weed management challenges and considerations in vegetable crops** – *Oleg Daugovish, Vegetable and Strawberry Crop Advisor, UCCE Ventura*
9:35	**Beyond the fix: how root cause analysis prevents repeat food safety issues and builds trust in fresh produce** – *Ahmed El-Moghazy. Assistant Professor & CE Specialist of Food Safety*

10:05 Break (5 minutes)

10:10	**Vegetable production and IPM discussion panel: industry perspectives on practical challenges and solutions**
10:40	**Whitefly management in melons: results from recent insecticide efficacy trials** - *Arun Babu, UCCE Entomology Advisor - Imperial County*
11:56	**Understanding mode of action and applications of nematicides to maximize root-knot nematode control in low desert vegetable production** – *Philip Waisen, Vegetable Crop Advisor, UCCE Riverside and Imperial*
11:12	**Significance of cover cropping for subsequent vegetable crop rotations** – *Oli Bachie, Agronomy & Weed Management Advisor, UCCE Imperial, Riverside, and San Diego.*
11:28	**Building food safety capacity in low-desert vegetable systems: UCCE research and extension updates** – *Jimmy Nguyen, Food Safety and Organic Production Advisor, UCCE Imperial and Riverside*
11:44	**Field trial lessons: best practices for water and nitrogen in drip-irrigated desert lettuce** – *Ali Montazar, Irrigation and Water Management Advisor, UCCE Imperial, Riverside, San Diego*
12:00	**Adjourn** – *Please, stay for lunch*

For additional information about the workshop, please contact Andrea Ramirez at aiestrada@ucanr.edu or call (442) 265-7700.

Pending CEU Approval: California DPR (2 hours), Arizona Department of Agriculture (2 hours), and CCA (3.5 hours).

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2026 Vegetable Production and IPM for Conventional and Organic Systems - Coachella

February 26, 2026

Coachella Public Library - 1500 6th St, Coachella, CA, 92236

Registration link: https://surveys.ucanr.edu/survey.cfm?surveynumber=47577

8:00 a.m. – 12:00 p.m.

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Pending CEU Approval: California DPR (2.0 hours), Arizona Department of Agriculture (2.0 hours), and CCA (3.5 hours).

If you require any accommodations to participate in this event, please submit your request using the contact information listed above.

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