Datasheet

Product Overview

- **Product Name:** EF Polymer
- **Description:** EF is an eco-friendly, biodegradable polymer designed to improve water retention in soils, reduce irrigation needs, and enhance crop productivity. Tailored for sustainable agriculture, it is especially effective for tomatoes and other field crops.
- **Applications:** Ideal for both direct-seeded and transplanted tomatoes, as well as other vegetables and row crops. Suitable for water-scarce regions or areas with erratic rainfall.

Key Benefits

- Enhances soil water retention, reducing irrigation needs by up to 40%.
- Improves nutrient availability and minimizes leaching losses.
- Encourages healthy root development and boosts crop yields.
- Fully biodegradable and safe for the environment.

Technical Specifications

- **Composition:** Plant-based, organic, non-toxic polymer blend.
- **Appearance:** Fine powder or granules.
- **Water Absorption Capacity:** Absorbs up to 50x its weight in water.
- **pH Range:** Neutral (4.0 - 9.0).
- **Biodegradability:** 100% within one year under typical field conditions.

EF Polymer – Germination Zone Moisture Management in Romaine Lettuce

Location: Yuma, Arizona, USA
Season: Winter 2026
Crop: Romaine Lettuce

1. Study Overview

Background

Romaine lettuce production in major U.S. growing regions (Yuma, AZ; Salinas, CA; Oxnard, CA) is increasingly constrained by limited water availability and regulatory pressure on water use. Efficient irrigation strategies during crop establishment are critical, particularly for direct-seeded systems where germination success depends on maintaining adequate moisture in the seed zone.

Traditional sprinkler irrigation practices in Yuma often involve extended run times (≈8 hours/day) during germination to prevent seed-zone desiccation. However, under winter conditions, prolonged irrigation may suppress soil warming and negatively affect germination dynamics.

EF Polymer is a biodegradable soil amendment designed to enhance moisture retention in the seed zone and potentially support crop establishment under reduced irrigation regimes.

Objectives

1. Evaluate whether irrigation duration during germination can be reduced without compromising lettuce establishment.
2. Assess whether EF Polymer supports germination, stand development, and early growth under reduced irrigation.
3. Determine the interaction between irrigation strategy and polymer application on stand uniformity and early plant development.

2. Trial Overview

- **Trial ID:** 1504-01
- **Location:** Yuma, Arizona
- **Planting Date:** January 15, 2026
- **First Irrigation (Wet Date):** January 19, 2026
- **Final Assessment:** March 25, 2026 (8–10 leaf stage)
- **Design:** Split-plot design with 8 replications

Key Agronomic Context

- Germination success depends on maintaining moisture in the top 0.25–0.5 inch of soil
- Over-irrigation during winter may suppress soil temperature and delay development
- Stand uniformity is a critical determinant of harvest efficiency and revenue

3. Experimental Design and Treatments

Design

- Split-plot design
- Replications: 8
- Factors:
    - **Irrigation Duration (Factor A):**
        - 4 hr/day (−50%)
        - 6 hr/day (−25%)
        - 8 hr/day (standard)
    - **Polymer (Factor B):**

- EF Polymer
- No Polymer

Treatment Structure

Treatment	Irrigation	Polymer	Description
T1	4 hr	Yes	Reduced irrigation + polymer
T2	4 hr	No	Reduced irrigation control
T3	8 hr	Yes	Standard irrigation + polymer
T4	8 hr	No	Standard control
T5	6 hr	Yes	Moderate reduction + polymer
T6	6 hr	No	Moderate reduction control

Polymer Application

- Applied as a **narrow band over seed lines**
- Incorporated **~¼ inch into the seed zone** during planting

4. Data Collection

- Emergence scoring (0–3 scale) across multiple dates
- Stand count at full emergence
- Seed-line soil temperature (°F)
- Measurements taken across germination window
- Plant size:
  - Leaf length (cm)
  - Leaf width (cm)
  - Total size (L + W)
- **Coefficient of variation (CV%)** for plant size (uniformity metric)

5. Results and Discussion

5.1 Irrigation Effects on Plant Growth
Key Findings

- Reduced irrigation (4 hr and 6 hr):
  - Produced **~19% larger plants**
  - Produced **more uniform stands**
- Standard irrigation (8 hr):
  - Produced **smallest and least uniform plants**

Despite receiving the highest total water (~5× atmospheric demand), the 8-hour irrigation treatment performed worst.
This suggests that:

- Excess irrigation during winter suppressed soil warming
- Likely created suboptimal oxygen conditions in the seed zone

5.2 Emergence Dynamics
Key Findings

- 4-hour irrigation had the fastest early emergence
- 6-hour irrigation had slower initial emergence, later convergence
- Final plant size was not different between 4 hr and 6 hr

Early emergence rate differences did not translate into differences in final plant performance, indicating that **germination speed is not the primary determinant of final stand quality**.

5.3 Stand Uniformity (Key Polymer Finding)

Key Findings

- Polymer improved uniformity under reduced irrigation:
  - 4 hr → improved uniformity
  - 6 hr → **best uniformity in trial (CV = 12.4%)**
- Polymer reduced uniformity under 8 hr irrigation

Interpretation

The polymer effect was **conditional on irrigation level**:

- Beneficial when moisture was limiting
- Detrimental when moisture was excessive

This interaction aligns with the expected behavior of a water-retention amendment.

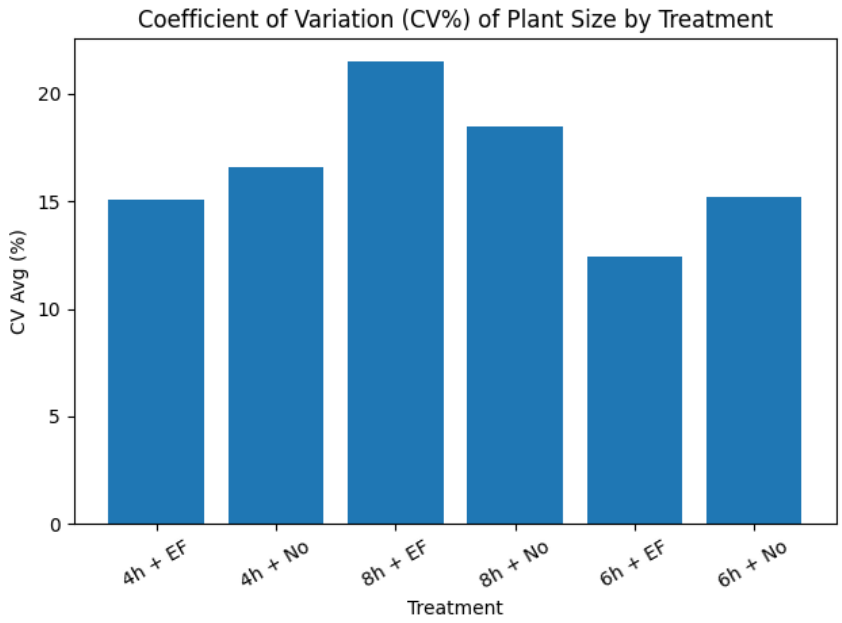

Figure 4. Coefficient of variation (CV%) of plant size by treatment.

6. Key Findings

- Reduced irrigation (4 hr and 6 hr) produced better plant growth and uniformity than standard irrigation
- Irrigation strategy is the primary driver of establishment performance
- EF Polymer:
  - Did not increase plant size
  - Showed consistent directional improvement in stand uniformity under reduced irrigation
- Best-performing treatment: **6-hour irrigation + EF Polymer**

7. Conclusion

This trial demonstrates that standard winter irrigation practices for romaine lettuce in Yuma are excessive and can negatively impact plant development. Reduced irrigation durations improved both plant size and stand uniformity while significantly reducing water use.

EF Polymer did not increase plant growth directly but showed consistent directional improvements in stand uniformity under reduced irrigation conditions. The combination of optimized irrigation management and EF Polymer presents a promising approach to improving establishment consistency and potentially increasing harvest efficiency.