



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 Performance in Bell Pepper Seedling Production

Location: California, USA (Fall 2025)

1. Trial Overview

Greenhouse vegetable transplant production requires frequent irrigation to maintain adequate moisture levels in propagation substrates. However, repeated irrigation cycles can lead to rapid drying of the growing media, nutrient leaching, and unstable root-zone conditions during early seedling development.

EF Polymer is a biodegradable superabsorbent polymer developed to improve water retention and nutrient buffering in soil and growing media. By absorbing water and dissolved nutrients during irrigation and gradually releasing them back into the substrate, the polymer may help stabilize moisture availability and reduce nutrient loss.

This greenhouse study was conducted with SynTech Research in California to evaluate EF Polymer's performance in a bell pepper transplant system. The study focused primarily on substrate water retention and nutrient dynamics, rather than maximizing final plant yield.

Objectives

The trial aimed to evaluate:

- The ability of EF Polymer to increase water retention in greenhouse substrates
- Whether EF Polymer buffers nutrients in the substrate
- How different polymer dosage rates influence moisture and nutrient dynamics
- Early growth responses of pepper seedlings grown in polymer-amended substrate

Experimental Design and Treatments

- **Design:** Randomized Complete Block Design (RCBD)
- **Replications:** Multiple inserts per treatment
- **Growing medium:** Commercial greenhouse potting substrate
- **Irrigation method:** Sub-irrigation

The polymer was incorporated into the potting mix prior to filling transplant inserts to ensure uniform distribution throughout the root-zone media.

Treatment Summary

Treatment	EF Polymer Rate % (w/w)
T01	0% (Control)
T02	1% EF Polymer
T03	3% EF Polymer
T04	5% EF Polymer

Polymer Application and Greenhouse Operations

The substrate was prepared by mixing EF Polymer into the potting media at the designated treatment rates before filling transplant inserts.

After planting:

1. Inserts were irrigated using a sub-irrigation system.
2. Water was allowed to fully infiltrate the substrate.
3. Inserts were allowed to drain prior to measurement.

Water retention was evaluated by monitoring substrate moisture dynamics following irrigation events.

Data Collection

Substrate Water Retention

Water retention was evaluated by monitoring changes in substrate weight following irrigation events.

Measurements included:

- Residual substrate weight after irrigation
- Rate of substrate dry-down over time
- Moisture differences between polymer-treated and untreated inserts

Higher residual weights indicate greater water retention within the substrate.

Substrate Nutrient Dynamics

Substrate samples were destructively collected to evaluate nutrient retention.

The following parameters were measured:

- Available phosphorus (P)
- Exchangeable potassium (K)
- Electrical conductivity (EC)
- pH

The reported nutrient values represent nutrients remaining in the substrate, not nutrients absorbed by plants which allowed us to evaluate whether EF Polymer could buffer nutrients and reduce rapid nutrient loss from the growing media.

KEY RESULT 1

EF Polymer Significantly Increased Water Retention

What we observed:

- Polymer-treated substrates retained **significantly higher water content** than control
- Increasing polymer rate resulted in:
 - Higher residual weight
 - Slower dry-down rates
- Clear visual swelling of substrate observed after irrigation

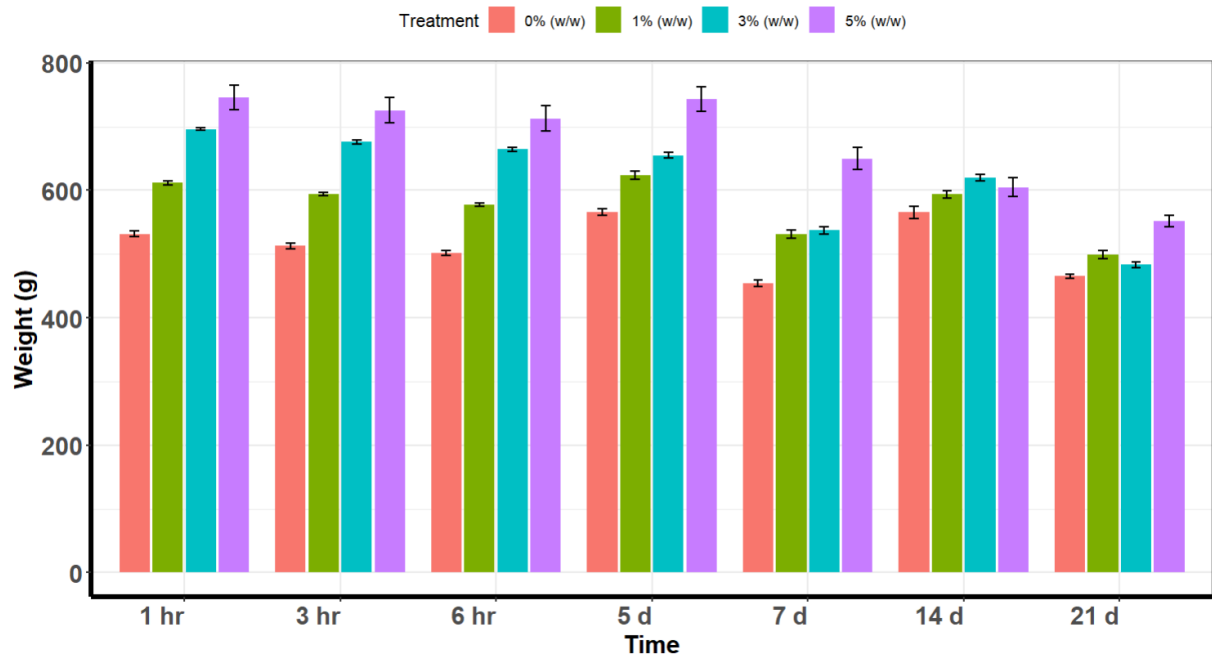


Figure 1: *Residual substrate weight over time across treatments*



Figure 2: *Visual comparison of treated vs untreated substrate 8 hours after irrigation*

KEY RESULT 2

EF Polymer Acts as a Nutrient Buffer

Key observations:

Nitrogen (N)

- Lower measured N in polymer treatments
- Indicates **temporary retention within polymer matrix**

Phosphorus (P)

- Lower at Day 7, but similar by Day 14–21
- Suggests **delayed release back into substrate**

Potassium (K)

- Increased with polymer rate

- Indicates **absorption and gradual release**

EC

- No major disruption across treatments
- Slight EC increase at higher rates later in the cycle

EF Polymer **reduces rapid nutrient loss and stabilizes nutrient availability**

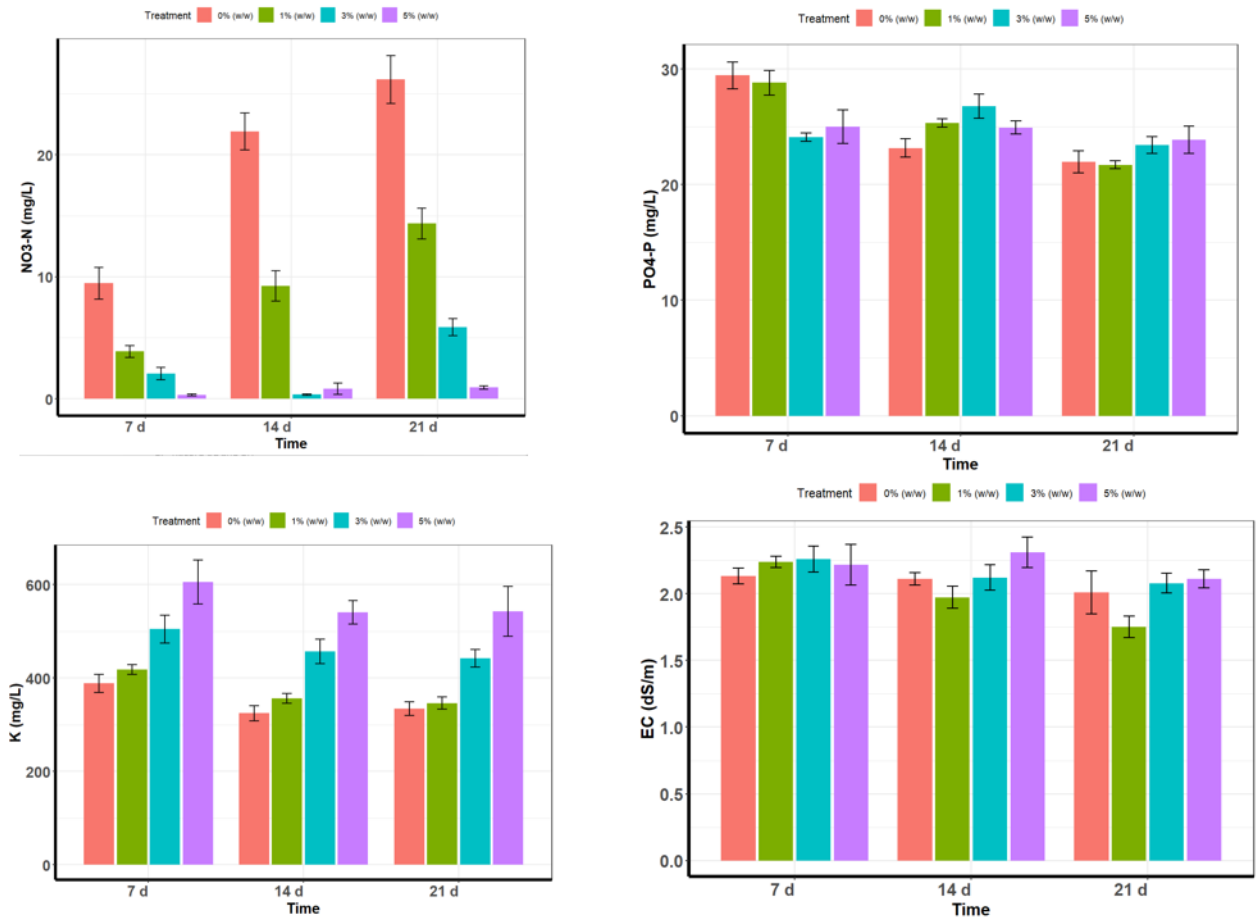


Figure 3: Nutrient retention trends (P, K, EC over time)

KEY RESULT 3

Compact, Transplant-Ready Seedlings

Observed response:

- Reduced plant height with increasing polymer rate
- Lower shoot biomass at higher rates
- Similar chlorophyll levels across treatments
- Plants were **shorter, sturdier, and more compact**

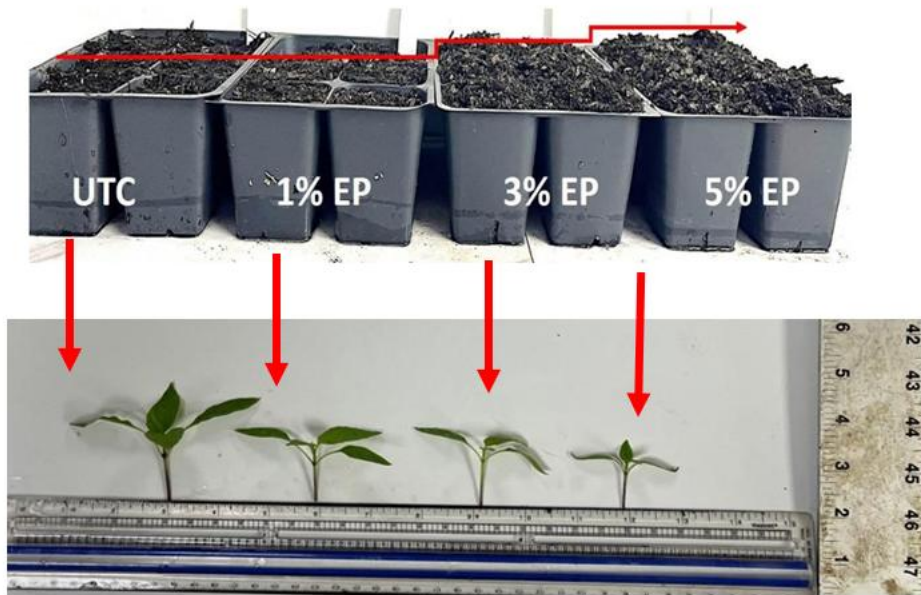


Figure 4: *Plant height and biomass across treatments*

Conclusion

The SynTech bell pepper greenhouse study demonstrated that EF Polymer significantly improved water retention and influenced nutrient dynamics in greenhouse propagation substrates.

Key conclusions include:

- EF Polymer increased substrate water retention and slowed drying rates.
- The polymer buffered nutrient dynamics, reducing rapid nutrient loss from the substrate.
- Pepper seedlings grown in polymer-amended substrates exhibited compact, structurally stable growth suitable for transplant production.

Overall, EF Polymer shows strong potential as a substrate amendment for greenhouse transplant systems, where moisture stability and nutrient buffering are critical during early crop development.

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