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BACKGROUND

Production acres of dehydrator onions in the low desert of California are increasing. It is also a crop for which biostimulant experimentation data is extremely limited, with just a few field trials conducted almost 20 years ago.



Many additional biostimulant products have since become commercially available, with no known replicated trials completed on low desert dehydrator onions for these newer products. These experiments were conducted to document dehydrator onion yield responses to various biostimulants.

METHODS

In the past three years 5 replicated field experiments, utilizing large and/or small plots, were conducted and harvested to evaluate and compare various commercially available biostimulant products for their ability to increase dehydrator onion yields under California low desert production conditions.

For some experiment product rates and/or application timing relative to onion development were also included.

These trials were grouped into two main areas based on initial application:

- 1). At planting/early emergence (*late fall*)
- 2). Foliar (*when multiple leaves present*)

Additional information

Category	2018-2019	2019-2020	2020-2021
Replications:	4	4	6

Soil type: Fine sandy loam Silty clay loam Silty clay

Variety: Olam 41 Olam 41 Sensient

Plot sizes: 100 x 1,200 ft 25' x 4 beds 25' x 4 beds

GERMINATION/EARLY EMERGENCE TRIALS

In 2019 the first treatment was applied post planting but prior to germination water being applied via sprinkler irrigation. In the 2020-2021 experiment this early application was delayed until seedlings were able to rowed (Fig. 2).

Treatments at this stage of development were:

A). 1 qt./acre of Guarantee Complex (*Ocean Organics*)

B). 2 qts/acre Liquid Seaweed Concentrate (*Acadian Seaplants LLC*)

C). 7 oz./acre Penegetic K (*Penegetic Solutions*).



Fig. 2. Onions had emerged and were able to be rowed at application on December 24, 2020.

Foliar applications of the products were also made at 3rd and/or 5th leaf, with Penegetic P being applied at 3.5 oz./acre at 3rd leaf.

Yields were affected by rate of Guarantee Complex in 2020, as well as timing, as higher rates at 3rd leaf decreased yields, while applications at 5th leaf increased yields (Fig. 3). An additive effect of Liquid Seaweed Concentrate was noted both years, while a consistent numeric increase in yields was noted for the Penegetic treatment regimen (Figs. 3, 4).

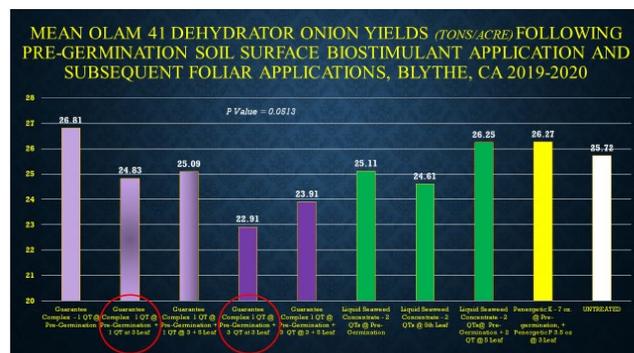


Fig. 3. Yields of dehydrator onions, July 2020.

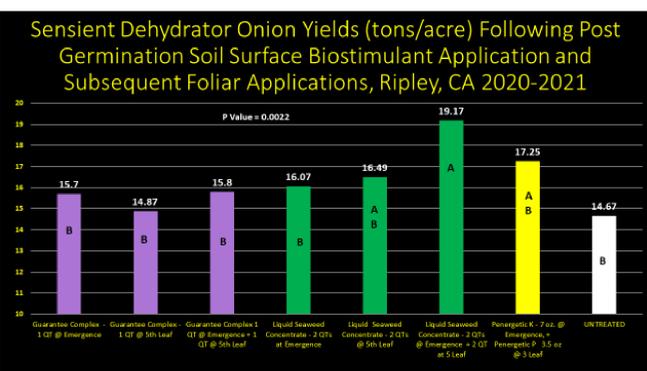


Fig. 4. Yields of dehydrator onions, July 2021

FOLIAR TREATMENT TRIALS

Large plot trials in 2019 evaluated 3 treatments of CytoPower (MilAgro Inc.) applied at 3rd, 5th and 7th green leaf stages of development. Data from commercially harvested plots noted a significant yield increase for the 1.1 lb./acre rate (Fig. 5).

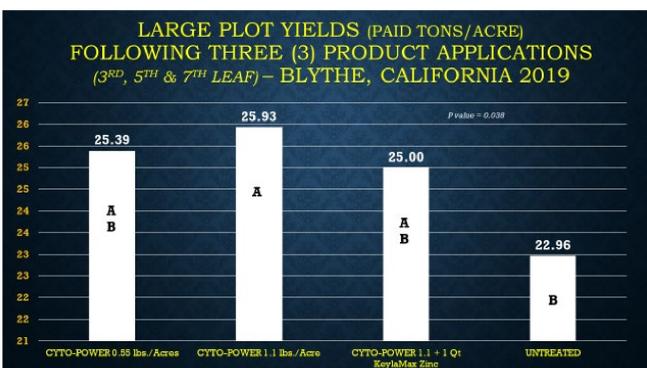


Fig. 5. 2019 Yields from three CytoPower treatments

Foliar trials in 2020 and 2021 compared multiple products, and rates. Two applications were made for most products in 2020 (3rd and 5th green leaf), and 2 and 3 applications (addition of 7th green leaf) in 2021.

Products evaluated in addition to CytoPower:

- Action 6 oz./acre (*Stoller*),
- Vitazyme 10, 13, 20, 30 oz./acre (*Vital Earth*)
- GreenSol 48 - 8 oz./acre (*FRIT Industries*)
- Advantigro 6 oz./acre (*Wilbur-Ellis*)
- RyzUp SmartGrass 0.3 oz./acre (*Valent*) 2nd leaf only
- Foliar Transit 10/8 oz. per acre @ 4th (2020)/3rd (2021) (*FBSciences*)

Several 2020 treatments resulted in 1+ tons/acre more yield than untreated onions (Fig. 5).

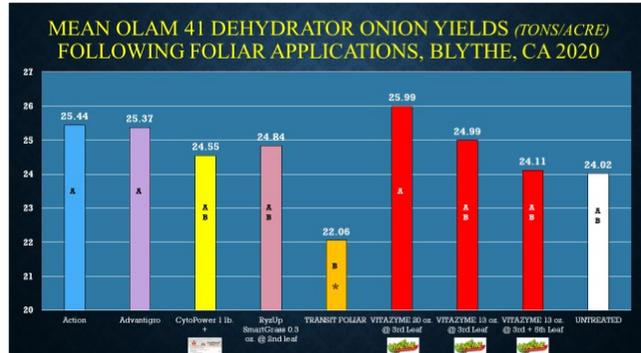


Fig. 5. Mean dehydrator onion yields following biostimulant application, 2020.

Experimentation in 2021 compared 2 vs. 3 applications of several products. Two applications for several products resulted in greater yields than three applications, while GreenSol 48 had higher yields with 3 applications (Fig. 6).

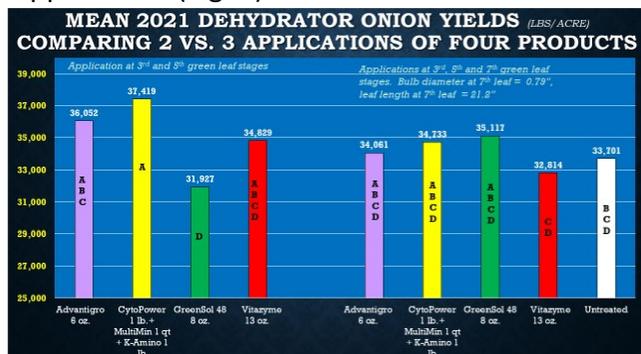


Fig. 6. Yield comparisons of various biostimulants applied at 3rd and 5th vs. 3rd, 5th and 7th leaf, 2021.

When comparing yields obtained from various foliar biostimulant products for the two years, consistent trends were noted.

Table 1. Mean dehydrator onion yields by treatment expressed as percentage of untreated onions.

Treatment	2020	2021	Average
Vitazyme 20 oz./acre @ 3 rd leaf	104.8	108.2	106.5
CytoPower 1 lb./acre @ 3 rd + 5 th leaf	107.0	102.2	104.6
Advantigro 6 oz./acre @ 3 rd + 5 th leaf	103.0	105.6	104.3
Vitazyme 13 oz. /acre @ 3 rd leaf	100.2	104.0	102.1
Vitazyme 13 oz./acre @ 3 rd leaf + 5 th leaf	99.5	100.4	99.9
RyzUp SmartGrass 0.3 oz./acre @ 2 nd leaf	91.9	103.4	97.7
Transit Foliar 10/8 oz./acre @ 4 th /3 rd leaf	93.2	91.8	92.5

- Yields responses were fairly consistent over the two years for most products.
- Yield differences exist between products
- Interactions between onion development stage and product and rate exist
- The consistency of yield results over years while involving different varieties and conditions provide high confidence for repeatable future results.