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AgroLiquid Nutrition In Sugarbeet Production

Good sugarbeet production is not only raw tons/acre.

It’s mainly pounds of sugar per acre

Growers are generally paid on the pounds of sucrose (sugar) extracted from their crop. Everything else is by-product.

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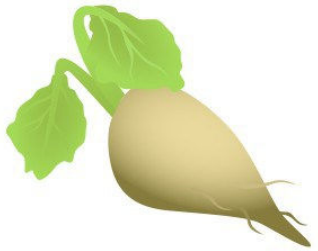
High sugarbeet root yields are important, but sugar yield is not tightly correlated to root yield. In other words, a higher sugar content but less root yield can result in more tons of sugar per acre. Nitrogen management is the most important factor in producing sugar. Nitrogen will increase both beet tonnage and sugar yield, but only to a point. Too much nitrogen will increase tonnage and reduce extractable sugar.

Here is a chart from NDSU that illustrates this effect:

Nitrogen Rate (lb/A)	Sugar Content (%)	Recoverable Sucrose (lb/A)
100	14.4	6040
150	13.2	5600
200	13.1	5440
300	12.6	5110



N-Suite

AgroLiquid's nitrogen products are an excellent fit for sugar beets. They allow for higher recoverable sugar and quality payments.

High NRG-N

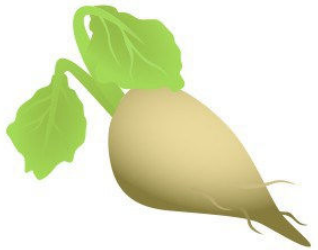
In multiple locations High NRG-N has been the top performer, generally out-sugar-yielding straight 28 or 32% UAN solution at only a 60-80% comparable rate of N.

eNhance

Reduced rates of 28 or 32% UAN solutions with eNhance added to them have performed nearly as well as High NRG-N.

NResponse™

Foliar N often results in a higher sugar yield in sugarbeets. NResponse is a great rescue N product, as a fungicide carrier, and for giving the sugarbeets that boost of N later in the season for more sugar.



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High NRG-N

- Performance equivalency of 4-5 lbs N/gal.
- Release rate varies depending on conditions but figure at least 60 days, up to 90 days.
- Apply it early either pre-plant incorporated, or pre-emergence (works great with herbicides), or at planting (away from the seed).
- Application methods with the planter can include a portion of the N needs in a 2X2 band or surface banded behind the press wheels (0X2). Use caution with the surface banding.
- High NRG-N has been a consistent performer is sugarbeets when applied early in the growing season. For growers who split-apply N, use High NRG for 50% of the total N and use UAN + eNhance for the later application.

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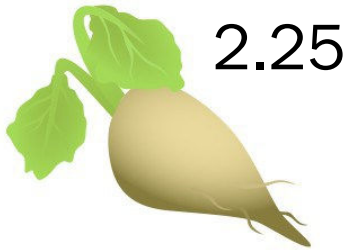
eNhance

- Designed to “enhance” the performance of UAN solutions which it does very reliably. N application rate with UAN can be reduced by 10 to 20% by adding eNhance to the solution.
- It is an excellent source of sulfur, providing the equivalent of 12 pounds S per gallon.
- Add it to your UAN solutions no matter when you apply your N: Pre-plant; pre-emergence; in a band with the planter, or side-dressed.
- eNhance can also be used as a foliar N and S source at 2 quarts/acre, but its best value is added to UAN. Rates are 2.0 gal/ton of 28%, or 2.25 gal/ton of 32%.



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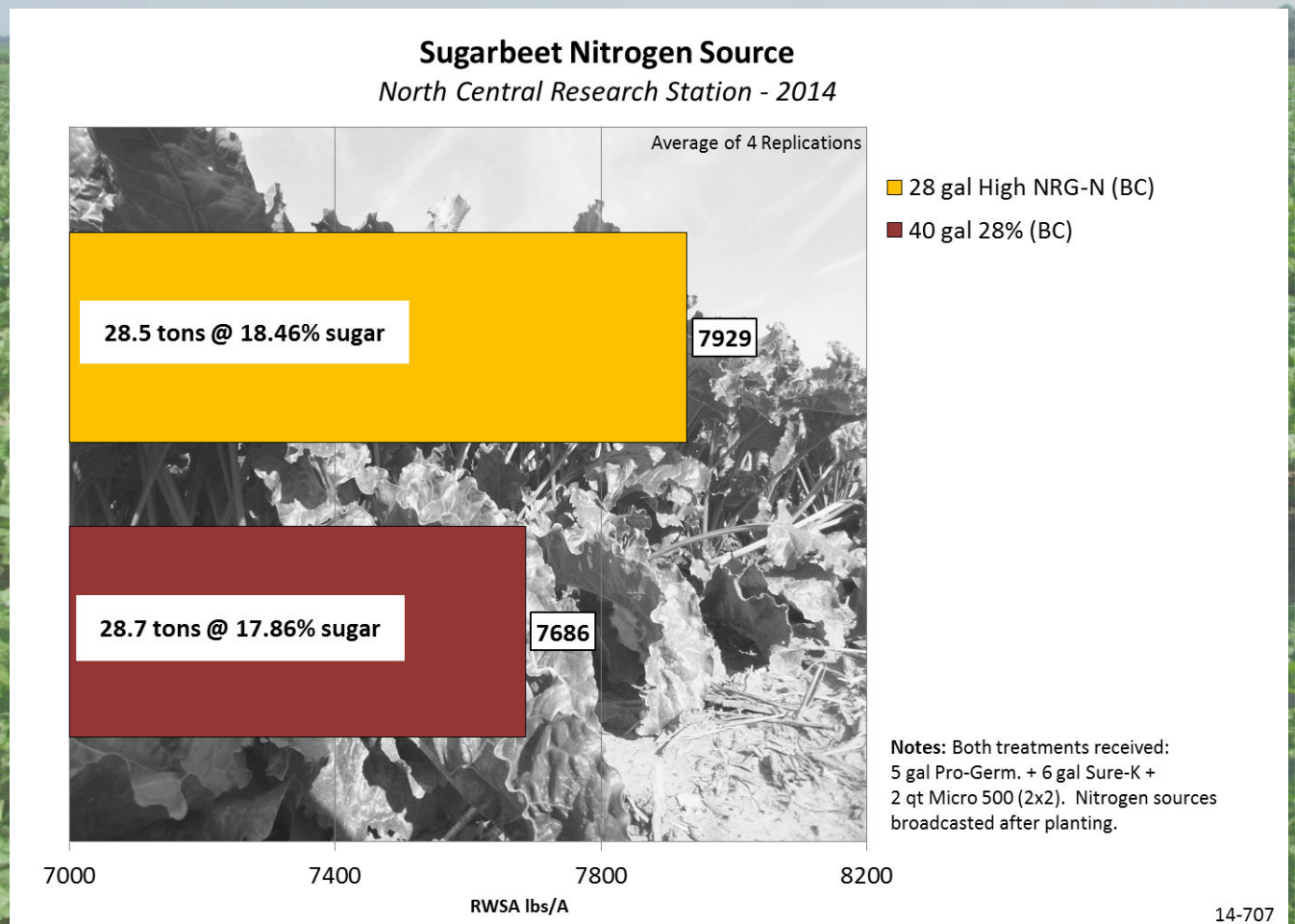
NResponse™

- NResponse is a wonderful foliar N source. In sugarbeets applied mid to late season at 1 or 2 gal it has the potential to increase sugar content.
- It blends very well with most fungicides, and NResponse in the tank-mix with each fungicide application is an excellent practice. Carefully follow fungicide and other adjuvant labels.
- In AgroLiquid's research, sugarbeets respond strongly to foliar applications.
- An example program is 2-3 quarts FertiRain + 2 quarts NResponse + 1 pint each Mn and B as a foliar blend with each fungicide application (not to exceed 3 applications). When adding fungicides to foliar mixes consult pesticide labels to avoid phototoxicities.

Nitrogen For Sugarbeets

Get the sugar advantage with AgroLiquid nutrition!



Using High NRG-N from *Agro-Culture Liquid Fertilizers* will enable a lower use rate yet higher % sugar.

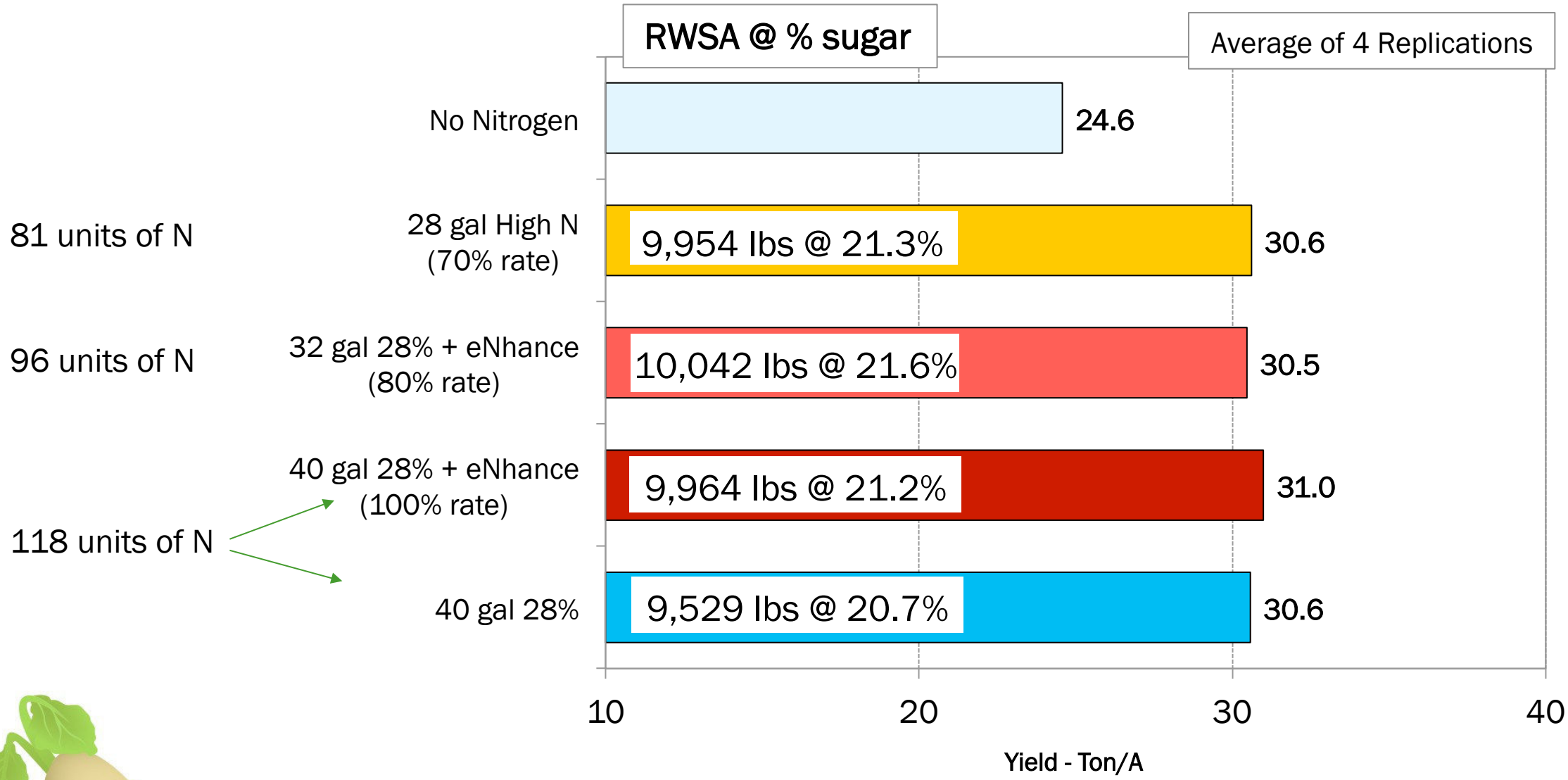
High NRG-N is a unique nitrogen source that feeds Nitrogen soon after application and into the growing season. With sulfur built into the formulation, the result is higher nutrient efficiency, excellent tonnage and high sugar yields.

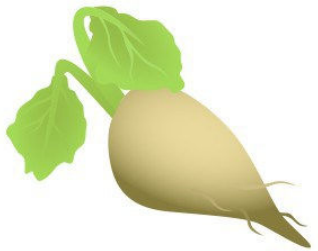
Target N Rate: 120 lbs/A. But 30% lower application volume with **High NRG-N** and much higher sugar produced. Quality that pays!

TMD516130

Broadcast Nitrogen Comparisons on Sugarbeets

North Central Research Station - 2013





- All treatments received: 2 gal Pro-Germ. + 10 gal Sure-K + 1 qt Micro 500 + 1 qt Mn (2x2)
- N fertilizers surface applied after planting.

13-503

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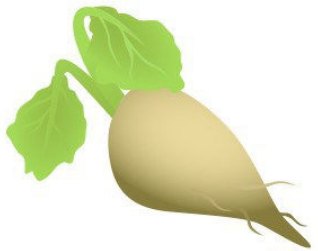
3 Year Averages of 3 Sources of Nitrogen

	40 gal/A 28% UAN			32 gal/A 28% + eNhance			28 gal/A High NRG-N		
Year	Tons	RWSA lbs	% Sucrose	Tons	RWSA lbs	% Sucrose	Tons	RWSA lbs	% Sucrose
2013	30.6	9,529	20.7	30.5	10,042	21.5	30.6	9,954	21.3
2014	28.7	7,686	17.8	---	---	---	28.5	7,929	18.5
2015	37.3	11,387	20	37.5	11,578	20.1	35.9	10,682	19.6



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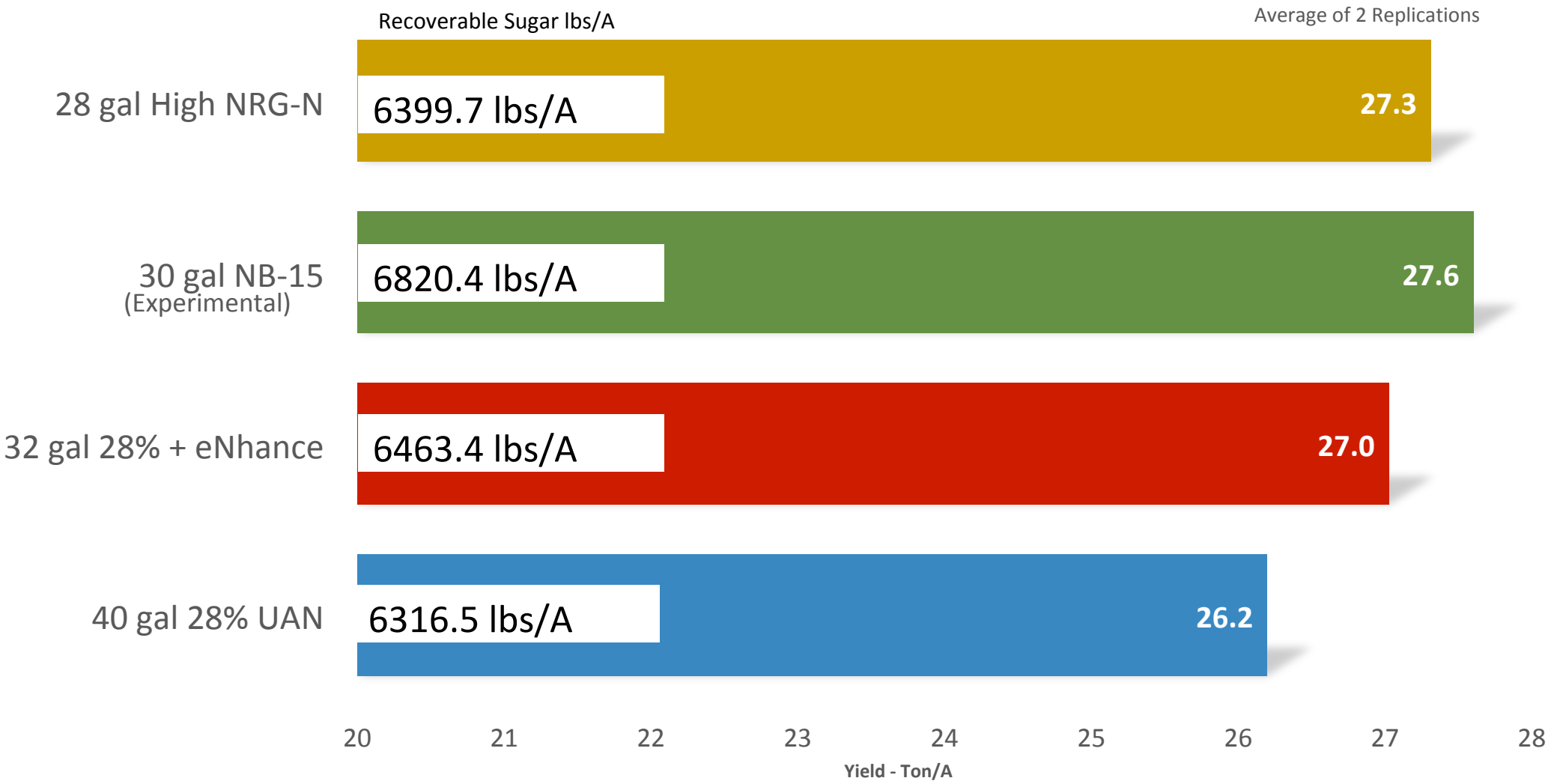
Nitrogen Source Comparison on Sugarbeets

North Central Research Station - 2016



All treatments included: 5 gal/A Pro-Germ. + 9 gal/A Sure-K + 2 qt/A Micro 500 (2x2)

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Sugarbeets are highly responsive to banded placement of phosphorus. AgroLiquid's research has demonstrated the root and sugar yield benefit from placing Pro-Germinator near the seed in a 2x2 band at planting. Sugarbeets are highly sensitive to fertilizer salts and caution should be used when placing close to the seed.

Pro-Germinator®

Pro-Germinator 9-24-3

Guaranteed Analysis

Total Nitrogen(N)	9.00%
1.00% Nitrate Nitrogen	
7.00% Ammoniacal Nitrogen	
1.00% Urea Nitrogen	
Available Phosphate(P_2O_5)	24.00%
Soluble Potash(K_2O)	3.00%
Iron(Fe)	0.10%
0.10% Water Soluble Iron (Fe)	

Derived from: Ammonium Nitrate, Ammonium Sulfate, Urea, Superphosphoric Acid, Potassium Polyphosphate, Ferrous Sulfate

F001459

Technical Data

Net Content: Bulk as Invoiced

Weight Per Gallon lbs/gal @68° F	11.21
Specific Gravity	1.342
pH at 68° F	6.0-6.4
Freezing Point	10° F

For proper agronomic application rates suitable for your geographical area or the maximum allowable non-nutrient application rate per acre, consult a trained soil specialist at AgroLiquid or call or write to AgroLiquid with the address provided.

NOTE: Information regarding the contents and levels of metals in this product is available on the internet at http://www.aapfco.org/metals.htm

Guaranteed by: AgroLiquid
Division of COG Marketers, Ltd.
3055 W M-21
St. Johns, MI 48879
agroliquid.com

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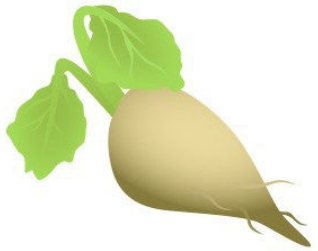
Pro-Germinator®

- *Performance* equivalency of 10-13 lbs P_2O_5/gal.
- Superior for sugarbeets due to its effectiveness in phosphorus efficiency and slow release.
- It's at its best soil applied rather than foliar because of its long soil release rate. Rates are from 3 to 6 gpa depending on soil test levels.
- Excellent performance in sugarbeets compared to 10-34-0, in most trials it results in more root and sugar yield compared to 10-34-0.
- Very clean product, does not have the impurities normally found in 10-34-0, greatly reducing orifice plugging.



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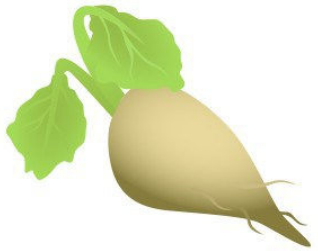
Phosphorus Management: *Why it's Important*

- Phosphorus is a critical plant nutrient, but difficult to manage.
- Only a small amount is in the soil solution at any one time.
- Subject to removal from the soil solution by fixation (tie-up) and leaching.
- Off-site movement can lead to environmental problems.



The Phosphorus Cycle

Phosphate Inputs

Fertilizers

- P Minerals (apatite)
- P on clay surfaces (as oxides/adsorption)

Biomass Phosphate

Soluble Phosphate

Fixed Phosphate

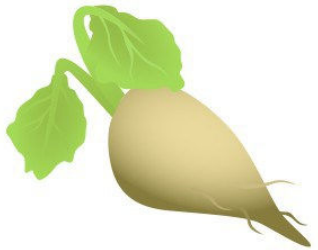
Soil Organic Phosphate

Leaching

(From K. Corbin, U of VT)

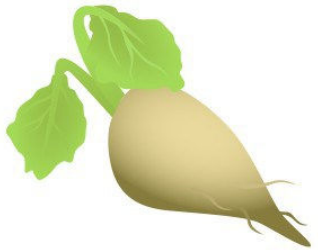
Improving Phosphorus Efficiency (usability)

Use extended-release, low-leaching phosphorus products to help reduce the losses from tie-up or leaching of phosphorus in the environment.



ProGerminator®

- 30% Orthophosphate; 70% Polyphosphate
  - Ortho designed to be quickly available
  - Poly is encapsulated in a flavonol polymer preventing fixation with soil cations
- Balanced with multi-form N, tech-grade K, and micronutrients for optimal performance
- Applications include: At planting, Broadcast, In-Season, Strip-Till
  - Compatible with other AgroLiquid products
- 10 – 13 lb P_2O_5/gal equivalency



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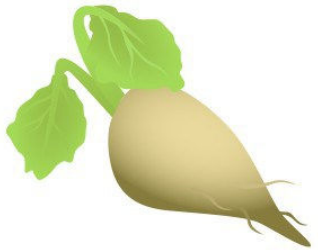
ProGerminator®

- Safer Seed Placement than other Phosphate Sources
- Lower use rate volumes means less storage and trips to the field
- No other Phosphate Product is more researched



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What Happens to Phosphate

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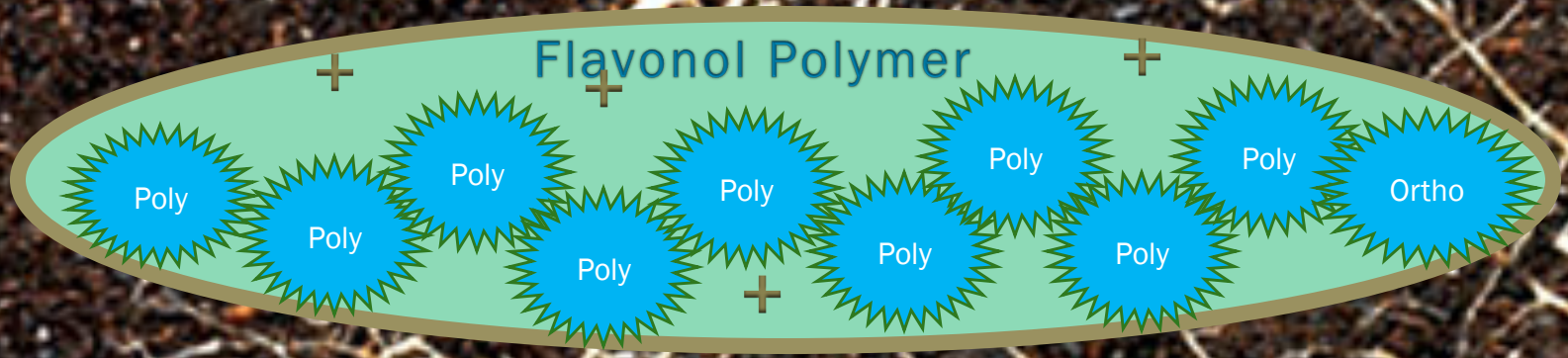
Pro-Germinator®



Ortho

Ca+

Mg+

Al+

Fe+

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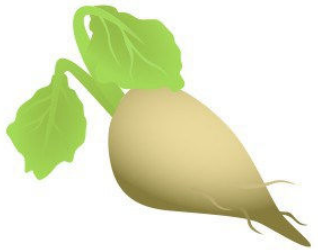
Sure-K®

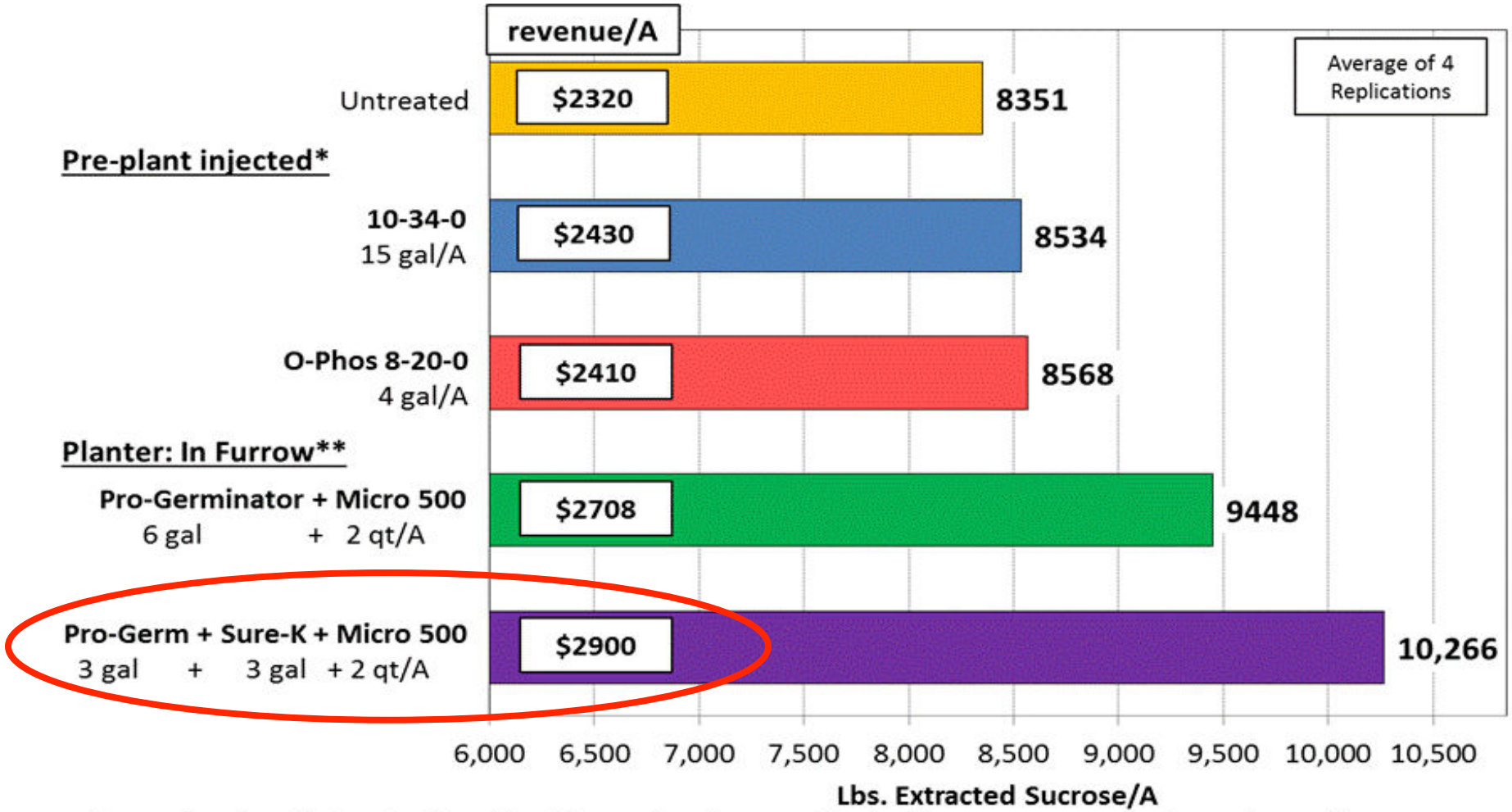
- Tremendously effective as a foliar K.
- It has been shown to increase the sugar content of several crops.
- In both our research and that of others, a combination of Pro-Germinator + Sure K + Micro 500 significantly improves sugar yield versus other treatments.
- Sure K is extremely safe for sugarbeets, commonly applied at 3 to 4 gpa (gal/ acre) with Pro-Germinator.
- Works great as a foliar tank mix partner with or without fungicides. Include it at 1-2 gpa blended with FertiRain, NResponse, and micronutrients. Follow all fungicide label directions.



Here is an example of the value of AgroLiquid applied in-furrow on sugarbeets: Not Recommeded

Fertilizer Effects on Extracted Sugar and Revenue Per Acre in Sugarbeets

Spreckels Sugar Company. Brawley, CA - 2014



*- pre-plant band injected off to side of furrow location, combined with water to a total volume of 20 gal/A.

**- fertilizer combined with 6.5 gal/A of water.

All plots received a layby application of 38 gal/A of 32% UAN (133 lb-N/A).

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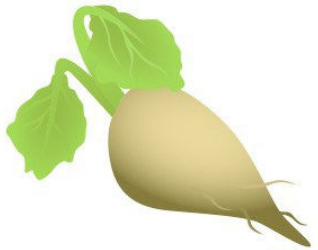
Manganese Micro 500™ Boron

- Sugarbeets are highly responsive to Mn and B.
- Soils in the Red River valley of MN and ND, and MI - the three states where much of the U.S. sugarbeet production is, are deficient in Mn and B.
- Micro 500 is a blend of 5 essential micronutrients and should be included at 1 to 2 quarts with Pro-Germinator and Sure K. An example program is 3 or 4 gal Pro-Germinator + 3 or 4 gal Sure K + 2 qts Micro 500.
- MicroLink Mn and B should be included in foliar blends at 1 pint/acre up to 3 applications/season.



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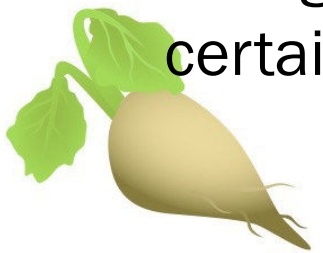
FERTIRAIN

- Very effective foliar product in sugarbeets.
- Increases sugar yields in sugarbeets.
- Very effective as a tank mix partner with fungicides.
- Excellent tank-mixed with Sure K, NResponse, and micronutrients.
- Apply at 2 -3 quarts with each fungicide application (not to exceed 3 applications
- Nitrogen containing products may cause leaf tissue injury when mixed with certain fungicides or adjuvants, follow all labels.



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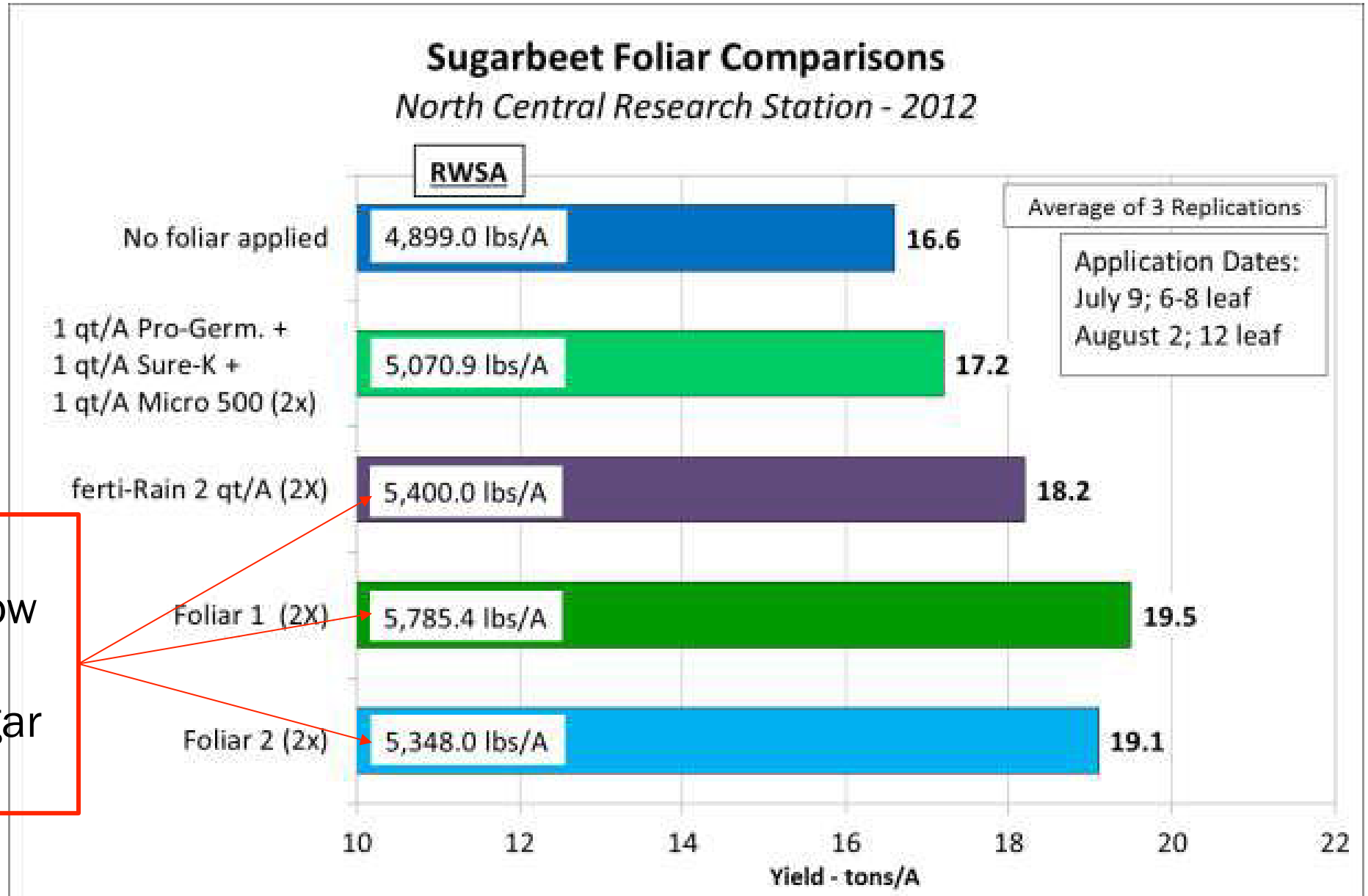
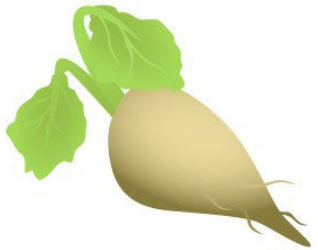
Test was on replanted sugarbeets

Here is an example of how foliar feeding increases sugar yield.

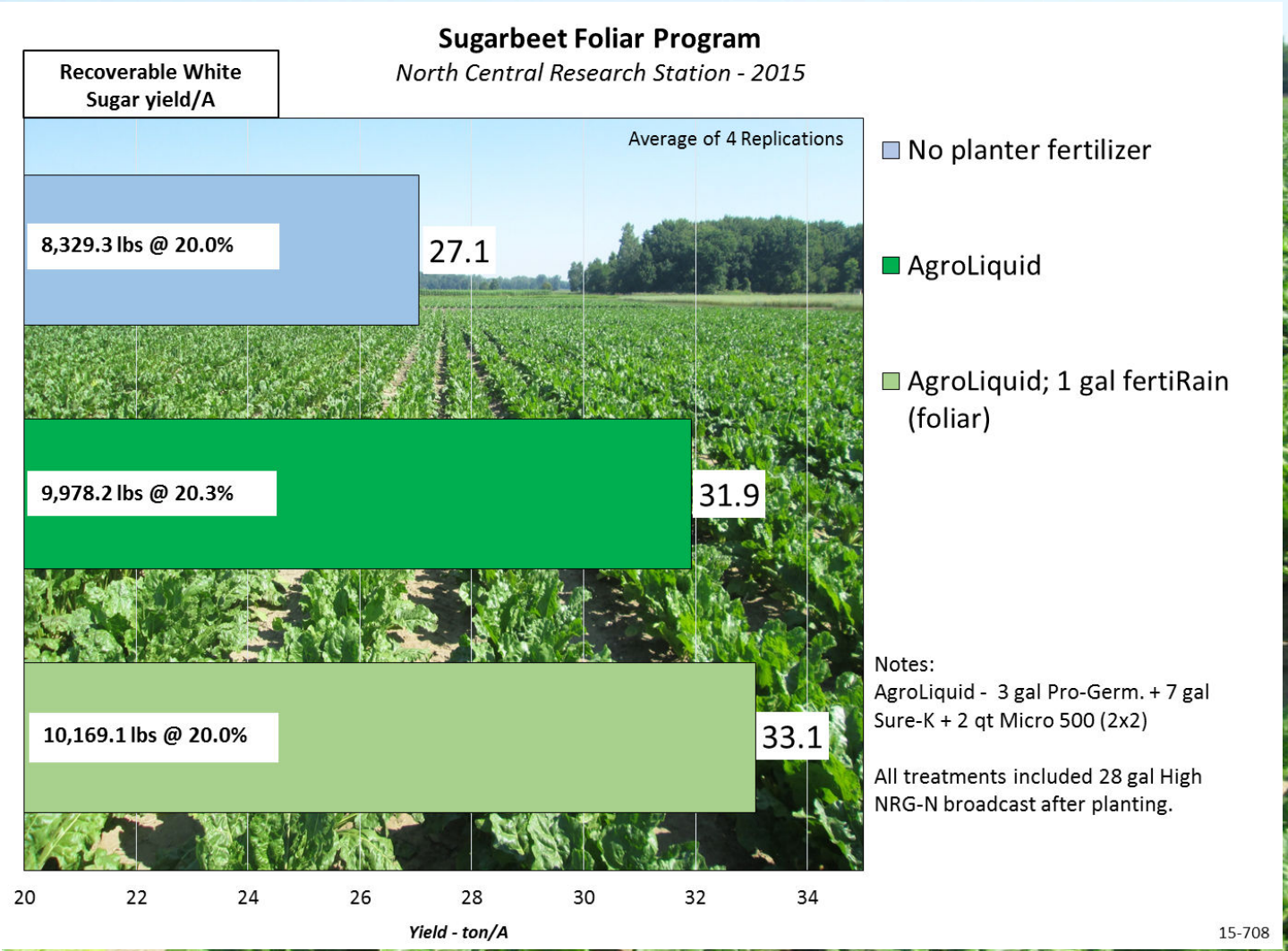


Foliar 1: 26 oz/A Pro-Germ. + 51 oz/A Sure-K + 38 oz/A NResponse + 6 oz/A Micro 500 + 3 oz/A B + 4 oz/A Mn (1st app. 1/2 rate, 2nd app. 1.5 rate)
Foliar 2: 48 oz/A eNhance + 25.6 oz/A Micro 500 + 16oz/A B + 16 oz/A Fe + 22.4 oz/A Mn
- All treatments received: 4 gal/A Pro-Germ. + 6 gal/A Sure-K + 1 qt/A Micro 500 + 1 qt/A Mn (2x2); 20 gal/A High NRG-N

12-708



Proven foliar nutrition for sugarbeets



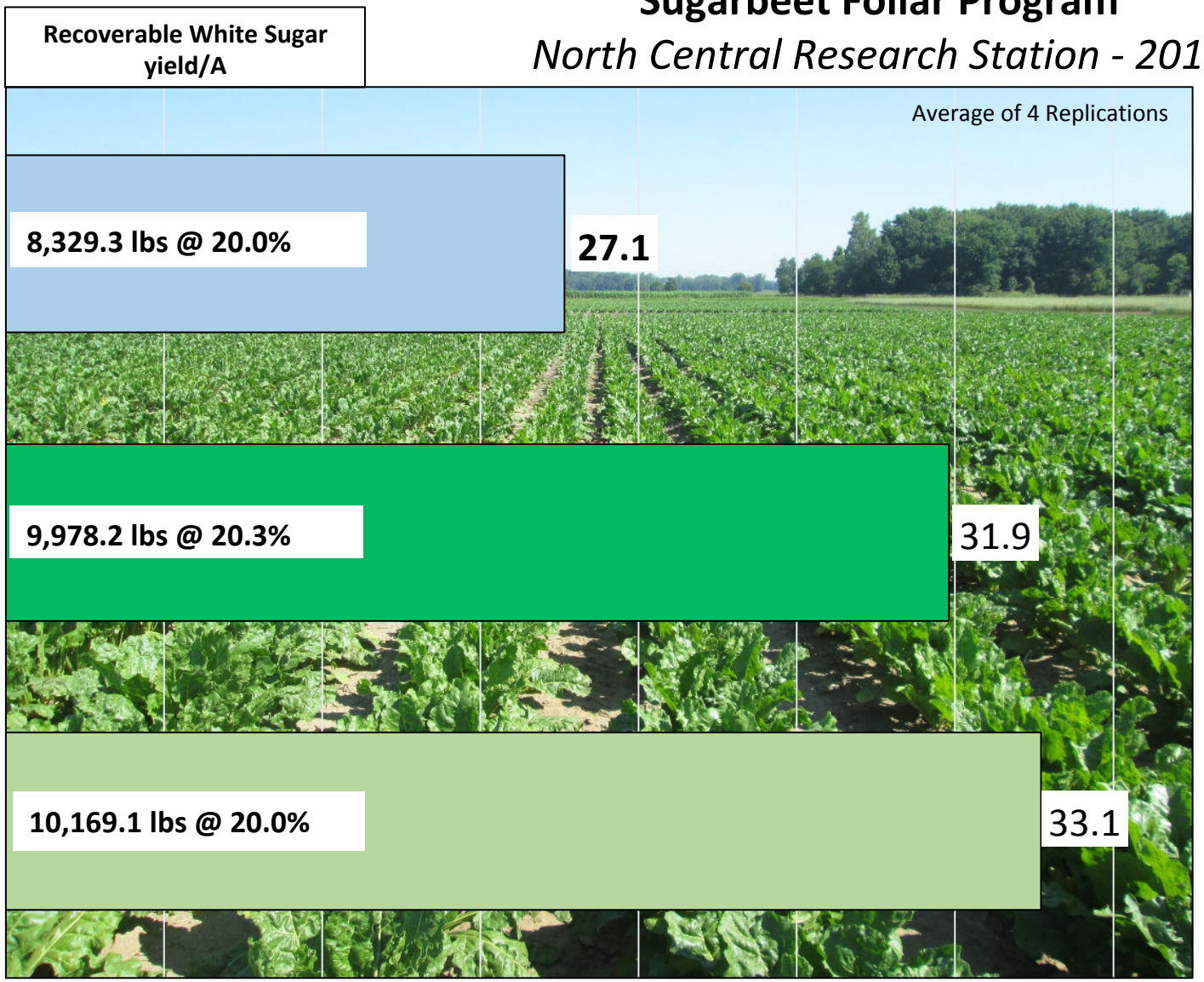
fertiRain is a great product designed for foliar application consisting of N, P and K along with essential secondary and micro-nutrients to provide effective crop nutrition.

A single foliar application of fertiRain @ 1 gpa applied to sugarbeets in the 14 leaf stage resulted in 1.2 ton yield increase.

TMD619220BPI

Sugarbeet Foliar Program

North Central Research Station - 2015



- No planter fertilizer
- AgroLiquid
- AgroLiquid; 1 gal fertiRain (foliar)

Notes:
AgroLiquid - 3 gal Pro-Germ. + 7 gal Sure-K + 2 qt Micro 500 (2x2)

All treatments included 28 gal High NRG-N broadcast after planting.

CEC: 17.2 pH: 6.7 p1: 16 ppm OM: 3%

15-708

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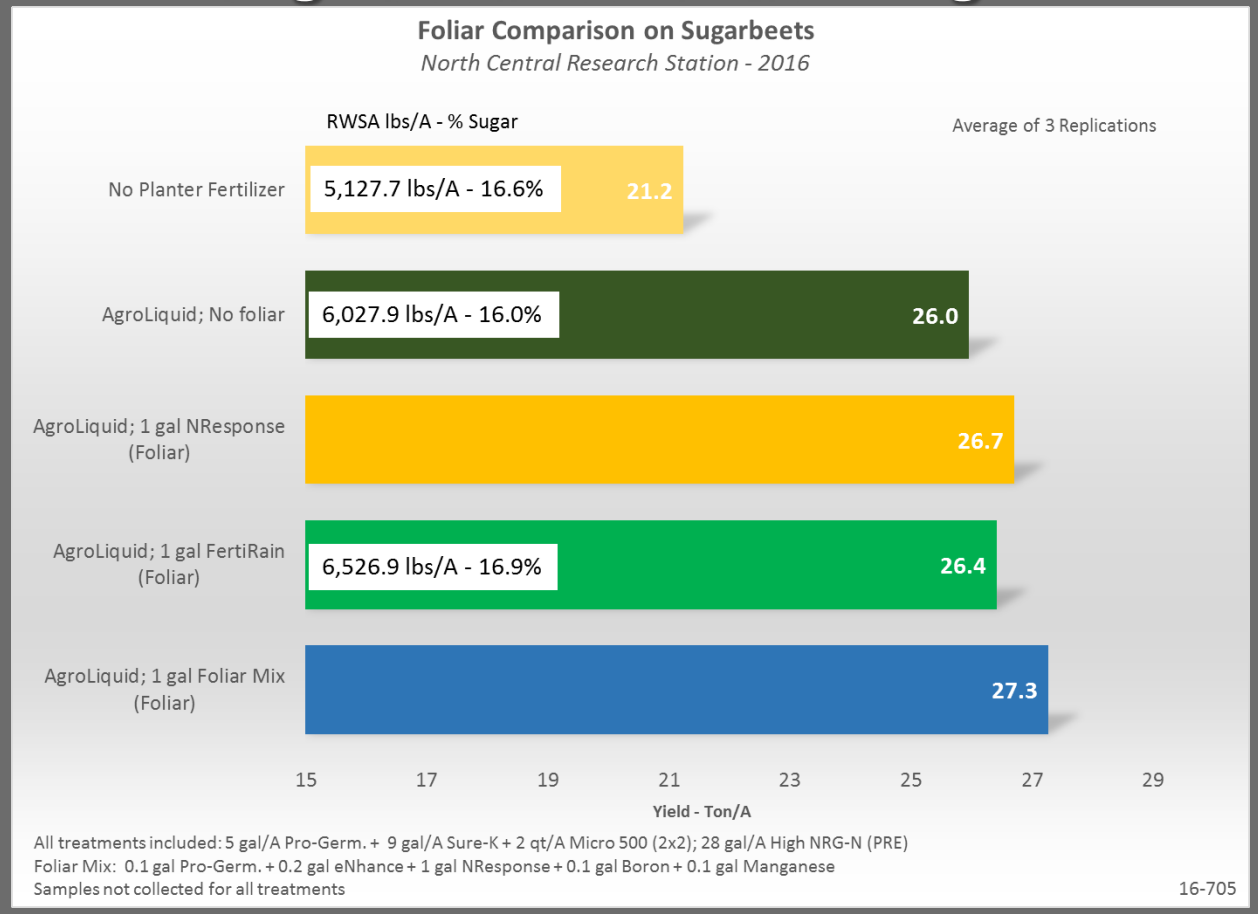
Sugarbeet Foliar Advantages



- A good fertility plan is the foundation to good sugarbeet yields and helps to get the sugarbeets growing quickly.
- The addition of a foliar fertilizer can give higher tonnage and increased sugar content.
- 1 gal/A FertiRain increased sugar content by 0.9% and with the increased tonnage, recoverable sugar was nearly 500 lbs/A higher than the planter only fertilizer.
- Using NResponse or the foliar mix as described above also increased tons/A.

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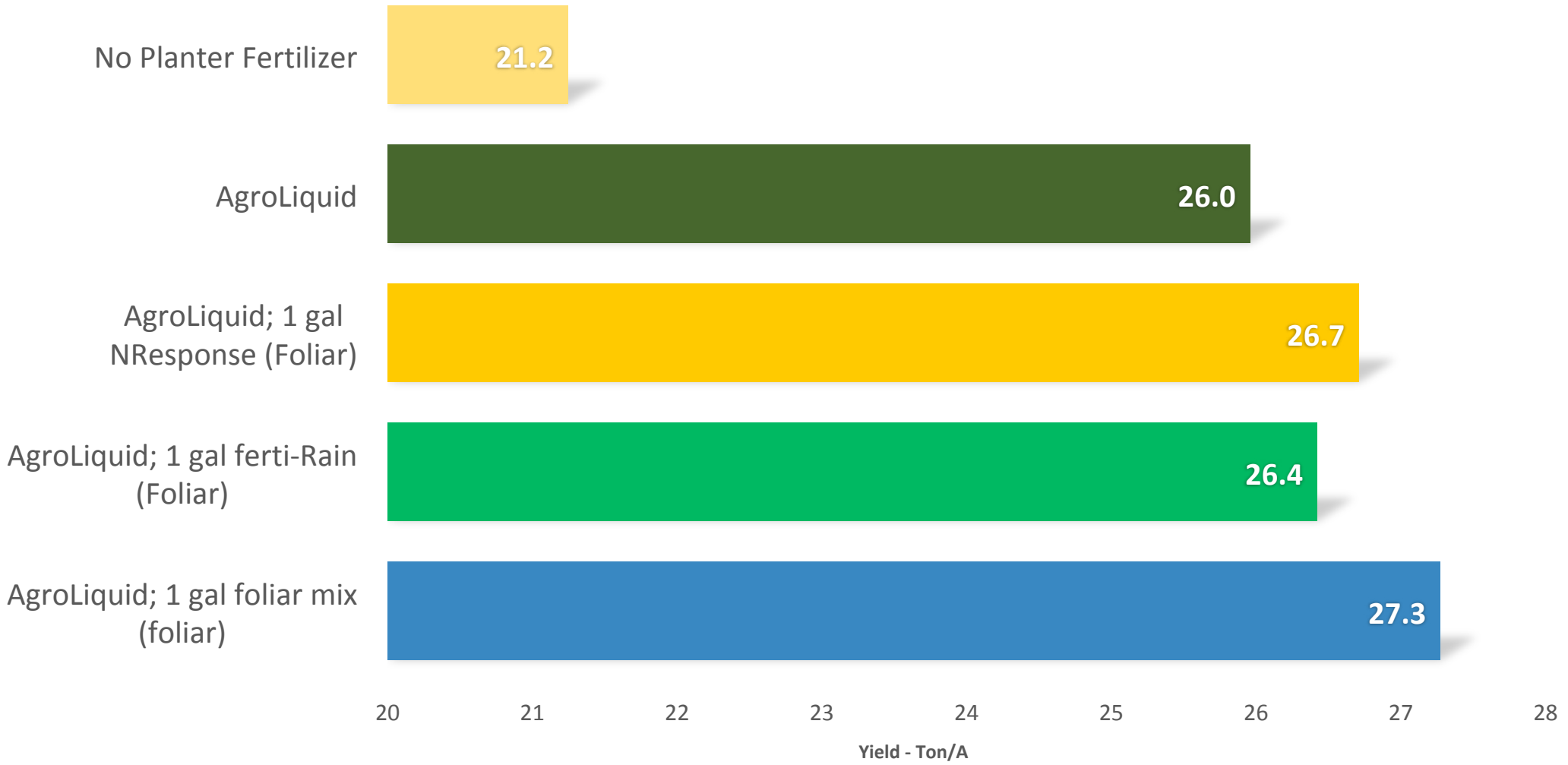
TMD715210BPI

Foliar Comparison on Sugarbeets

North Central Research Station - 2016

Average of 4 Replications



All treatments included: 5 gal Pro-Germ. + 9 gal Sure-K + 2 qt Micro 500 (2x2); 28 gal High NRG-N (PRE)

16-705

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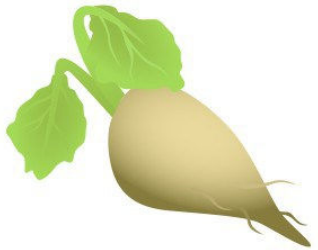
Foliar nutrition for sugarbeets

- Begins with the sprayer
- Proper nozzle - distance to the crop
- At least 40 psi
- Temperature less than 80



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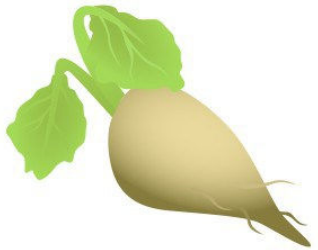
Foliar nutrition for sugarbeets

- Early morning or late evening, avoid excessive dews
- Compatible with other crop protection
- FertiRain is a safe foliar nutrition product with excellent crop uptake to get the most out of nutrients applied



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AgroLiquid Nutrition In Sugarbeet Production

For more information about sugarbeet production or AgroLiquid product usage in sugarbeets contact John Leif (john.leif@agroliquid.com) for Michigan production or Dan Peterson (dan.peterson@agroliquid.com) for MN and ND production or Tim Duckert (tim.duckert@agroliquid.com) for research information.