Utilization of Plant Growth Regulators for Suppression of Sugarbeet Root Yield

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Through the Years…

ACSC, MDFC & SMBSC Average TPA by Year

Tons per Harvested Acre

12 14 16 18 20 22 24 26 28 30 32

Method Behind the Madness…

• Trying to stunt/shut off the beet crop is a hard concept for a researcher/grower/agriculturist because we spend all summer doing just the opposite

• The idea is that something could be applied in a foliar fashion that would halt root growth without being detrimental to the quality of the crop

• Could potentially be applied over areas of commercial fields to avoid a Corral, At-Risk Acres, Set-Aside Acres, etc.
A plant growth regulator (PGR) is an organic compound, either natural or synthetic, that modifies or controls one or more specific physiological processes within a plant.

Multiple PGRs have been tested on sugarbeets, but always have been applied & evaluated for specific crop enhancements:

- Emergence rate
- Drought stress
- Frost tolerance
- Storage enhancements

PGRs have never been reported as being utilized to ‘halt’ the crop:

- Starting from square one
Selecting the Products...

- Ethephon is the most widely utilized plant growth hormone in the world
  - It is used extensively in cotton, wheat, coffee and rice.
  - When taken up by a plant, it is metabolized into ethylene, which is one of the main signal regulators of plant growth

- Atrimmec (dikegulac-sodium) works systemically to interrupt several pathways of hormone production that regulate plant growth
  - Reduces and/or breaks apical dominance and promotes lateral branching in its target crop
Materials & Methods

• Three-year study: 2016-2018

• Split-plot design with six replications
  • Whole Plots: Low / High rates of PGRs
    • Ethephon = 0.6 & 6 fl oz/A
    • Atrimmec = 2.5 & 25 fl oz/A
  • Sub-Plots: Variety
    • 4 different varieties were evaluated over the course of the study
      • ACH 352 / ACH 830
      • Hilleshög 4062 / 4302

• Applications took place ~30-days before main-harvest
  • Ag Staff yield estimates established
  • Pre-Harvest underway
Atrimmec Low – ACH 830

Atrimmec Low – HIL 4302
2016-2018 – Percent Sugar

Sugar Content, %

Check | Ethephon - Low | Ethephon - High | Atrimmec - Low | Atrimmec - High

LSD_{0.10} = 2016: 0.59 / 2017: 1.0 / 2018: 0.87
2016-2018 – Tons per Acre

LSD_{(0.10)} = NS
2016-2018 – Recoverable Sugar per Acre

LSD(0.10) = 2016: 853 / 2017: 919 / 2018: 960
Putting It All Together…

• Data was variable in 2016 & 2018 – more consistent in 2017
• Atrimmec resulted in less sugarbeet injury than Ethephon
• Higher rates of PGRs can result in significant sugarbeet injury
• PGRs may be ‘variety specific’
• We did manage to lower TPA, but this minor reduction appeared to have significant negative impacts to sugarbeet quality
• The concept of what we are trying to accomplish is solid - If at first you do not succeed, you continue to explore other PGRs in 2019 and beyond…stay tuned!!!