

Improving Potato Uniformity with Plant Growth Regulators

NDSU EXTENSION



Andy Robinson, North Dakota State University / University of Minnesota
 Mitchell Bauske, former post-doctoral scientist North Dakota State University
 Email: Andrew.P.Robinson@ndsu.edu, website: z.umn.edu/spud, @spudology



Introduction

Background: The application of plant growth regulators (PGRs), most commonly gibberellic acid (GA) has been commonly used to improve emergence and influence stem and tuber number. The challenge has been the treatment of GA has been frustrating because of various measurements and application styles for this very potent product. In this experiment we established a standard seed treatment with known rate applied in combinations of gibberellic acid, cytokinin (CK), indole-3-butyric acid (IBA) and naphthaleneacetic acid (NAA) to 10 potato cultivars in field studies performed in North Dakota. In some varieties, emergence, stem number and plant height were increased, while others did not respond to treatments. Additionally, some varieties experienced tuber elongation and a shift in the tuber profile, but rarely yield was increased. PGRs manipulate stem and tuber number and this can be used to improve tuber size profile for the desired use. PGR sensitivity it tied to variety and seed age.

Purpose of the Project: Define a standard seed treatment method for PGRs to manipulate stem and tuber number to improve tuber size profile and identify which varieties responded favorably to the rates used.

What Was Done

Experimental Procedures:

- Location: Oakes and Inkster, ND
- Varieties:
 - Late Field generation: Bannock Russet, Dakota Russet, Ivory Crisp, Atlantic, Sangre and Dark Red Norland;
 - Minitubers: ND8068-Russ, ND6002-1, ND7799c-1 and Russet Burbank
- Planting: 19 May 2017 at Oakes and 23 May 2017 at Inkster, ND
- Plots: 1 row (36 inches) × 25 ft long, replicated 4 times
- Treatments

	Product	Active ingredient	Rate	Timing
1	Non-treated	-	-	-
2	Stimulate	CK	0.16 oz/ton seed	Seed treat
		GA	0.09 oz/ton seed	
		IAA	0.09 oz/ton seed	
3	ProGibb + Rejuvenate	GA	0.05 oz/ton seed	Seed treat
		NAA	0.15 oz/ton seed	
4	ProGibb + Rejuvenate	GA	0.05 oz/ton seed	Seed treat
		NAA	0.15 oz/ton seed	
		Stimulate	CK	
	GA	0.03 oz/a		
	IAA	0.03 oz/a		
	Stimulate	CK	0.05 oz/a	10-14 Days after dime-size
GA		0.03 oz/a		
IAA		0.03 oz/a		

Measurements:

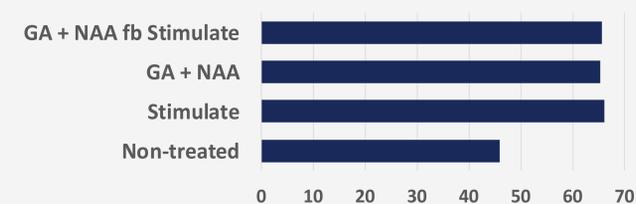
- Stand, stem and plant height counts at 3 and 5 weeks after planting.
- Harvest: 11-13 Sep in Oakes and 12-13 Oct in Inkster
- Tuber number, length:width and graded yield

What Was Found

Emergence

- Sangre and Bannock Russet emergence was increased by 11 to 25% at 3 weeks after planting with PGR treatments, but less response was found in other varieties.

Sangre stand (%) 3 weeks after planting



Stem Number

- Stem number was significantly increased with PGR treatments in Sangre, Dakota Russet, Atlantic and Ivory Crisp seed tubers.

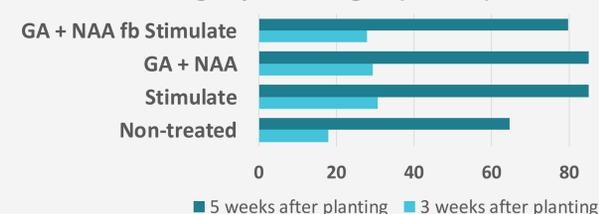
Sangre stem number/acre



Plant Height

- Plant height in Sangre was greater than the non-treated at 3 and 5 weeks after treatments, other varieties did not have a significant response.

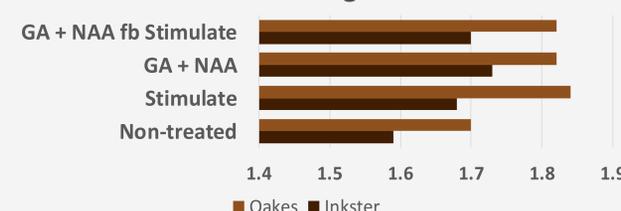
Sangre plant height (inches)



Tuber Elongation

- All of the PGR treatments increased the length:width ratio Dakota Russet, but was inconsistent for other varieties.

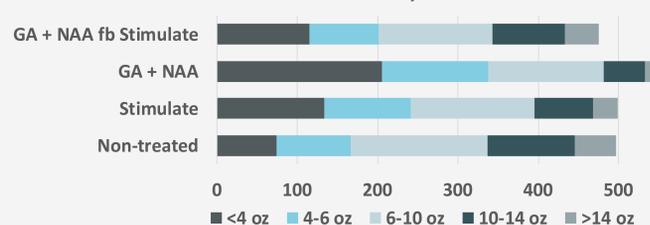
Dakota Russet length:width ratio



Yield

- Total yield was not changed in most cases, but size profile was altered in Sangre, Dakota Russet and Atlantic. Other varieties did not show as much a change in size profile.

Yield (cwt/a) of Sangre as affected by PGR treatments at Oakes, ND 2017



Yield (cwt/a) of Dakota Russet as affected by PGR treatments at Oakes, ND 2017



Take Home Messages

- Using PGRs as liquid seed treatment establishes a standard usage rate.
- PGRs manipulate stem and tuber number and this can be used to improve tuber size profile for the desired use.
- PGR sensitivity is tied to variety and seed age.

