

Rejuvenate Can Reduce Stem and Tuber Number Does this Translate into a More Valuable Crop

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Justification: Growers are using Rejuvenate even though no solid third-party research has been conducted to confirm that it works.

Purpose: When applied on potato seed prior to planting at the recommended label rate of 0.16 oz/ton of seed, Rejuvenate is supposed to reduce stem and tuber number and increase average tuber weight. This study was conducted to evaluate Rejuvenate's effect on several varieties of commercially purchased seed.

Background: In 2013, Russet Burbank and Umatilla Russet seed was treated with Rejuvenate at three rates: 0-, 0.16- and 0.32-oz/ton of seed. In 2014 the experiment was repeated with the same three rates but another rate (0.24-oz/ton of seed) and Clearwater Russet were added to the trial. Emergence, stem and tuber number per plant, yield, tuber quality, and gross return were assessed. The trial was grown at the WSU Othello Research Farm under typical R. Burbank cultural management and harvested approximately 150 days after planting. Rejuvenate is a common compound 1-Naphthaleneacetic Acid, Potassium Salt (1-NAA acid) found on the shelves of most research laboratories.

Results: The commercially bought seed lots from all varieties both years produced less than 3 stems when left untreated (Table 1). In 2014, growers would have lost money if using Rejuvenate on Clearwater Russet at the labeled rate of 0.16 oz/ton of seed. On Russet Burbank and Umatilla Russet, there were no significant differences in gross return between the treated and untreated plants. When 2013 and 2014 data were combined, there were no significant differences between the treated and untreated gross returns (Table 1). Numerically, the labeled rate treatment produced a higher gross for Umatilla Russet than the untreated treatment, but there was high variation among the plots (data not shown) which threw some doubt into whether or not Rejuvenate worked on these varieties. On occasion, Rejuvenate reduced stem and tuber number, but these trends were not consistent each year or for each variety (Table 1).

Recommendations:

If the growers typically get physiologically young seed with less than 3 stems on average, Rejuvenate may be a waste of money. Several issues: 1) how does the grower know when he has old or young seed? 2) Research is needed on using Rejuvenate on older seed.

Rick Knowles conducted research in the past using the active ingredient of Rejuvenate, 1-NAA acid, several years ago. He indicated that older (5.4 stems/plant) seed did see a higher reduction in stem and tuber number than younger seed (2.9 stems/plant) and that 1-NAA acid had positive effects on the yield and tuber size from the older seed. He also indicated that higher rates of NAA reduced emergence rate. Based on his conclusions, it appears that growers with older seed may benefit from the use of Rejuvenate, however, the rates he used may not have matched the labeled rate and he only tested one variety. This issue still lies – how can growers find out if their seed is physiologically old, before they plant. Winter grow-out of seed on bench tops in dark rooms (room temperature) may provide an indication of stem number prior to planting, but this is not proven. These procedures and use of Rejuvenate warrant more investigation, until then, growers might experiment on half of a pivot, or conduct strip trials with several rows of treated versus untreated.

Table 1. Results from Rejuvenate x Variety trials for 2014 and 2013-14 combined in a two year summary. Although different rates are shown, the labeled rate is 0.16 oz/ton of seed.

2014 WSU Rejuvenate Trial													
Variety	Rejuvenate Rate oz	Gross ^A \$/A	Total Yield CWT/A	Market Yield CWT/A	US 1s > 4 oz %	US 2s > 4 oz %	Culls & < 4 oz %	US 1 & 2s > 6 oz %	SG	Average			
										Tuber			Stem
										Weight oz	No. Per Plant	No. Per Stem	No. Per Plant
Clearwater F	0.00	3600 a	545	535	80 ab	1 b	19 ab	61 ab	1.082	7.1 ab	6.6 a	3.3	2.02 a
	0.16	2730 b	458	448	77 b	2 ab	22 a	53 b	1.086	6.5 b	6.2 a	3.1	2.04 a
	0.24	2805 b	470	464	75 b	3 a	22 a	55 b	1.080	6.7 b	6.3 a	3.2	1.97 ab
	0.32	3100 ab	444	433	86 a	1 b	13 b	69 a	1.080	8.0 a	4.9 b	3.2	1.53 b
	<i>pValue*</i>	0.0677	ns	ns	0.0185	0.0837	0.0663	0.0446	ns	0.0584	0.0307	ns	0.1038
R. Burbank	0.00	4400	655	640	78	5	17	76	1.094	7.2	7.9	3.4	2.31
	0.16	4020	628	613	77	4	19	70	1.084	7.0	7.8	3.4	2.31
	0.24	4495	695	675	79	3	18	72	1.085	7.1	8.5	3.7	2.31
	0.32	4280	660	649	78	2	20	74	1.084	7.0	8.2	3.5	2.38
	<i>pValue*</i>	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Umatilla R.	0.00	3105	567	550	69	0 c	31	52	1.094	5.7	8.8	3.9	2.29
	0.16	2960	568	540	66	3 a	31	53	1.090	5.7	8.6	4.0	2.16
	0.24	2580	525	508	67	1 bc	31	41	1.090	5.3	8.6	3.7	2.35
	0.32	2840	541	526	72	2 b	26	51	1.093	5.8	8.2	3.9	2.10
	<i>pValue*</i>	ns	ns	ns	ns	0.0068	ns	ns	ns	ns	ns	ns	ns

^AProcessing economic values - adjusted for Rejuvenate expense, \$40/acre expense subtracted for each treatment except the non-treat
Stem & bud end seed pieces were separated by block/rep to increase statistical power by reducing variability within each block
*ns = values are not significantly different at the 5% or 10% level via Fisher's LSD Test.

2013-14 WSU Rejuvenate Trial (data averaged across both years)													
Variety	Rejuvenate Rate oz	Gross ^A \$/A	Total Yield CWT/A	Market Yield CWT/A	US 1s > 4 oz %	US 2s > 4 oz %	Culls & < 4 oz %	US 1 & 2s > 6 oz %	SG	Average			
										Tuber			Stem
										Weight oz	No. Per Plant	No. Per Stem	No. Per Plant
R. Burbank	0.00	3900	629	621	75	4	21	60	1.086	7.2	7.6	2.9	2.66
	0.16	3980	661	648	75	4	21	59	1.080	7.4	7.8	3.0	2.60
	0.32	3845	637	628	75	3	22	59	1.082	7.2	7.8	3.0	2.65
	<i>pValue*</i>	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Umatilla R.	0.00	4080	700	685	73	1	26	51	1.093	6.6	9.2 a	3.5	2.64 a
	0.16	4205	700	676	73	3	24	54	1.088	7.0	8.8 ab	3.8	2.35 ab
	0.32	3980	668	647	77	2	21	55	1.094	7.4	8.0 b	3.8	2.13 b
	<i>pValue*</i>	ns	ns	ns	ns	ns	ns	ns	ns	ns	0.0402	ns	0.0736

^AProcessing economic values - adjusted for Rejuvenate expense, \$40/acre expense subtracted for each treatment except the non-treat
Stem & bud end seed pieces were separated by block/rep to increase statistical power by reducing variability within each block
*ns = values are not significantly different at the 5% or 10% level via Fisher's LSD Test.