



# Physiological and Agronomic Evaluations of MN13142 Russet

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## Introduction

A new dual purpose clone with long dormancy and other desirable traits has been developed. The clone MN13142 (Fig 1) has semi-erect vine growth with mid-season maturity. Tubers are very uniform, long and attractive appearance with a heavy russet skin type. The heavy russet skin makes it suitable for mechanical harvesting with a low incidence of internal bruising. Previous results have shown this variety to store longer without sprouting and weight loss compared to conventional potato varieties grown in Minnesota. We have explored carbon and nitrogen (N) metabolic pathways using proteomic analysis, to elucidate N uptake and utilization use efficiency. Physiological, biochemical and agronomic evaluation of MN13142 clone is underway. MN13142 has been tested for its agronomic performance and yield potential, in small commercial plots at MN, ND, OR, WI and NM.



Fig. 1. Potato tubers cv. MN13142.

### Key Desirable Traits

- Unusually long dormancy, longer than Russet Burbank (RB). MN13142 can be stored at 50F without CIPC for more than 9 months.
- Shows a lack of apical dominance.
- Good plant stand with an average of 3-5 stems per seed piece.
- Uniform tuber shape and size. Not many small b size tubers (<4 oz) or extra-large jumbos (>10 oz) recorded in 2018 harvest. Around 5% of tubers were > 10 oz compared to 20% in RB.
- Specific gravity of MN13142 is comparable to or higher than RB.
- Low reducing sugars and chip color (2 or less) after 5 months storage at 48°F storage.

## Materials & Methods

Field experiments (2018 and 2019): Sand Plain Research Farm in

Becker, Minnesota.

Soil: Hubbard loamy sand soil (Sandy, mixed, frigid Entic Hapludolls): 82% sand, 10% silt, and 8% clay.

MN13142 clone was also tested in commercial field plots at Pettibone, ND, Perham, MN, Hermiston, OR, WI, NM for agronomic performance and yield attributes.

Table 1. Description of treatments

Nitrogen rate (kg ha <sup>-1</sup> )	planting		Emergence/hillin g		post-hilling	
	N rate	N source	N rate	N source	N rate*	N source
135 kg ha <sup>-1</sup>	45	DAP	90	ESN	-	-
270 Kg ha <sup>-1</sup>	45	DAP	180	ESN	45	UAN
405 kg ha <sup>-1</sup>	45	DAP	270	ESN	90	UAN

\* UAN was split into 4 equal applications.

N rates corresponded to 50, 100, and 150% of recommended rate.

- N sources
- DAP: diammonium phosphate (18-46-0)
  - ESN: Environmentally Smart N (44-0-0)
  - UAN: urea ammonium nitrate (28-0-0)

Potato cultivars

- Clearwater
- MN13142
- Russet Burbank
- Umatilla

Table 2. Soil chemical characteristics before planting.

	pH	OM	P	K	Ca	Mg	SO <sub>4</sub> <sup>2-</sup> -S
		%	mg kg <sup>-1</sup>				
2018	6.0	2.0	20.5	98.5	959	155	7.0
2019	7.2	1.2	35.7	87.0	761	176	5.5

## Results

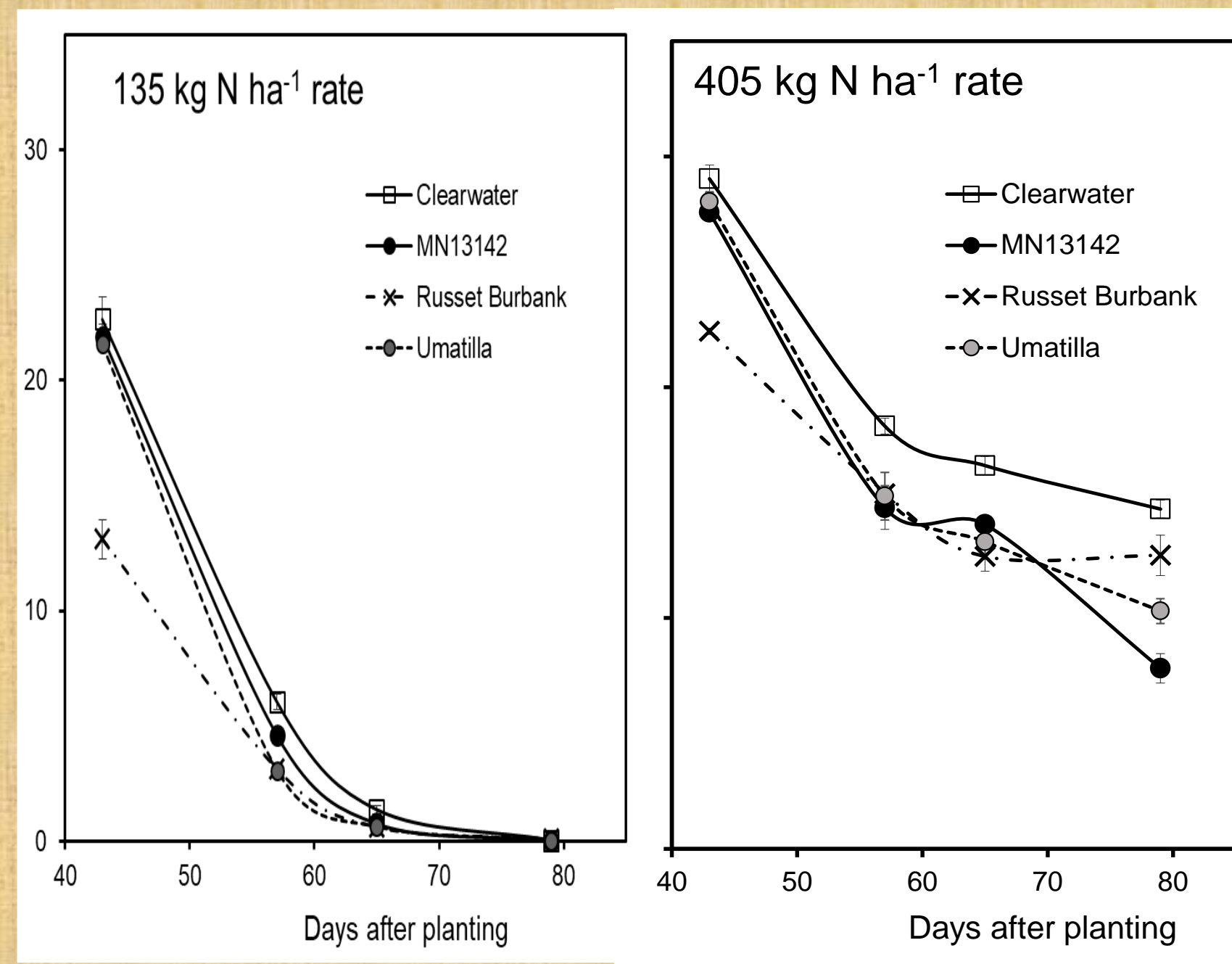


Figure 2: Petiole nitrate in cultivars supplied with 135 and 405 kg N ha<sup>-1</sup> at four growth stages

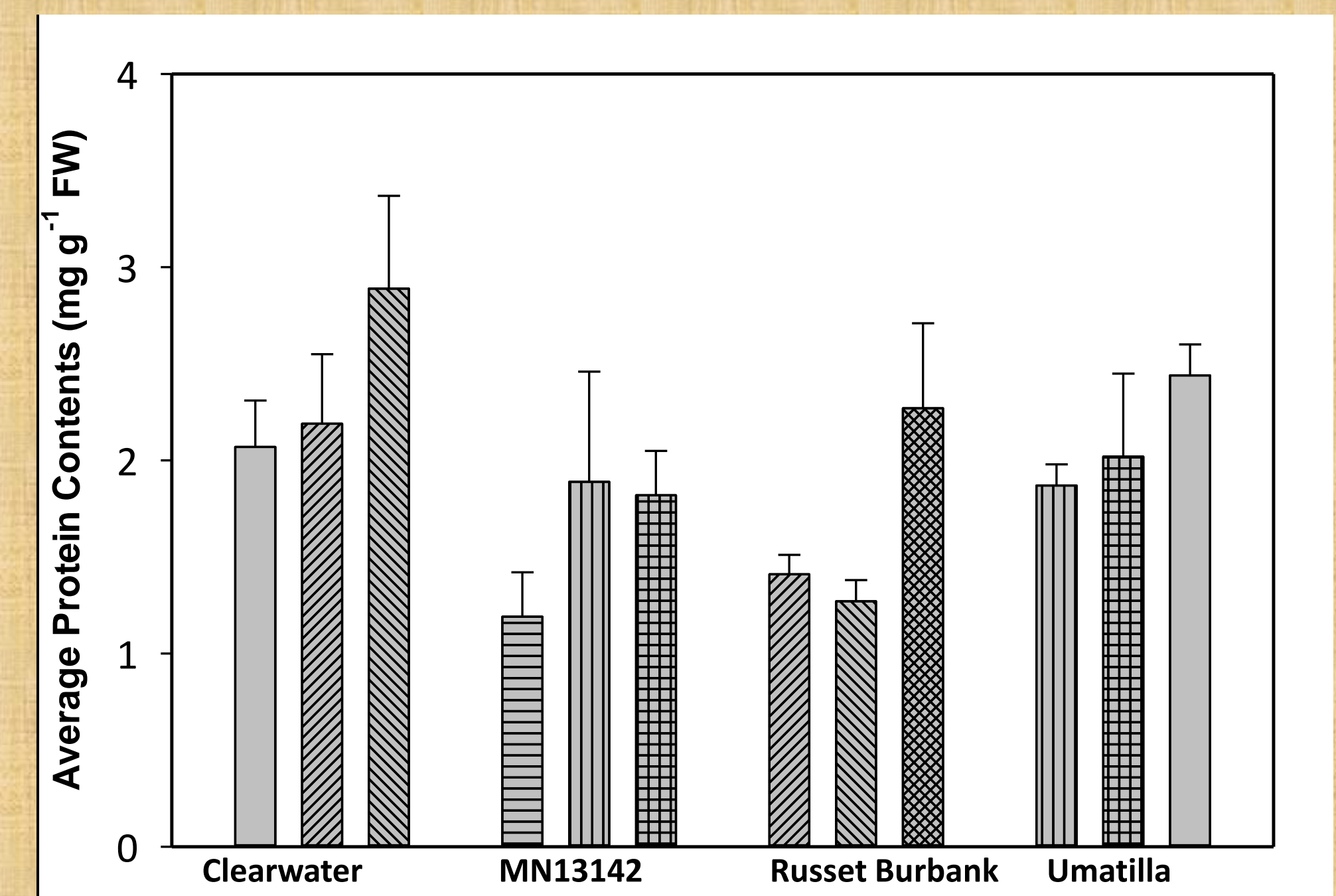


Figure 4: Effect of N fertilizer rate on protein accumulation in tubers.

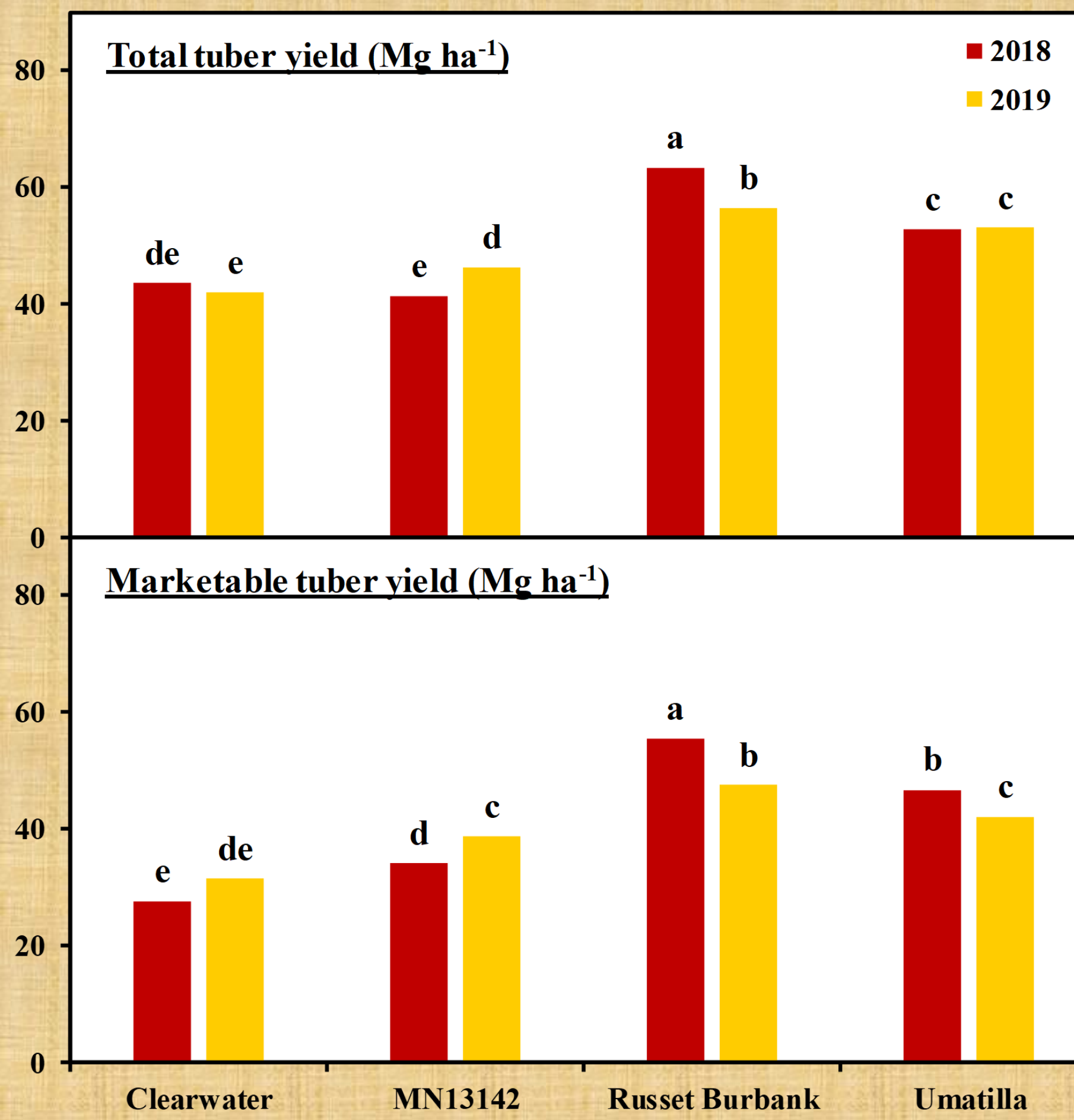


Figure 3: Total and marketable tuber yield in four cultivars grown at Becker, MN.

The average total yield of MN13142 from other commercial field trials in year 2019 ranged from 415 (MN) to 618 cwt ha<sup>-1</sup> (OR)

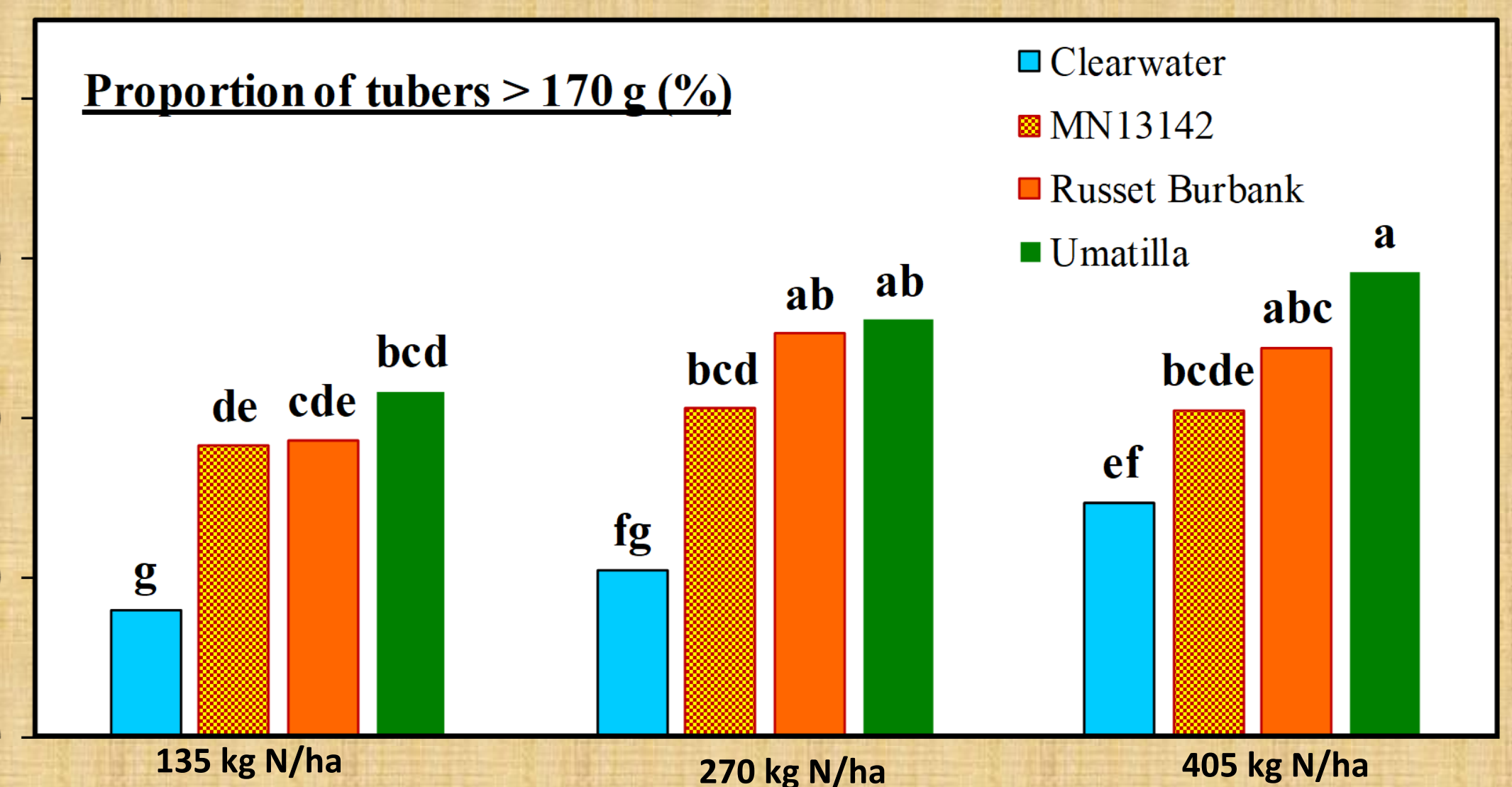


Figure 5: Effect of N fertilizer rate on marketable tubers in four cultivars grown at Becker, MN averaged over 2 years.

Table 2. Quality attributes of four cultivars grown at Becker, MN

	HH	BC	Scab	Specific Gravity	Tuber DM
Year (Y)	%				
2018	1.42	1.42	2.44	1.084	22.9
2019	0.33	0.33	6.82	1.089	22.4
Significance	ns	ns	ns	ns	ns
Cultivar (C)					
MN13142	0.50	0.50	3.62	1.087	22.9b
Russet Burbank	2.80	2.80	1.11	1.080	21.3c
Umatilla	0.22	0.22	10.7	1.090	22.7b
Clearwater	0.00	0.00	3.13	1.089	23.7a
Significance	**	**	ns	**	**

## Conclusions & Future Research

In 2019, MN13142 had greater total tuber yield than Clearwater. Russet Burbank resulted in a greater proportion of larger tubers than MN13142 at 405 kg N ha<sup>-1</sup>, but these cultivars resulted in similar tuber size-quality at the 135 and 270 kg N ha<sup>-1</sup> rates. Therefore, our findings indicate that although MN13142 did not reach the yield potential obtained with Russet Burbank and Umatilla, this new potato variety was able to achieve similar tuber size and quality relative to conventional potatoes grown in Minnesota. Future success of MN13142 will largely depend on proper seed management and development of a seed warm up protocol. Further studies are needed to determine if alternate N timing or seed spacing are needed to improve total tuber yield of MN13142 potato clone.

## Acknowledgments

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