

# **Colorado Potato Cultivar Management**

## **Research Data Summary 2014**



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## TABLE OF CONTENTS

### Page

<b>MISSION STATEMENT</b> .....	3
<b>INTRODUCTION</b> .....	3
<b>MATERIALS AND METHODS</b> .....	3-5
<b>RESULTS (Data Tables):</b>	
<b><i>Fortress Russet (AC99375-1RU)</i></b>	
Response of Fortress Russet (AC99375-1RU) to nitrogen application rate .....	6
Response of Fortress Russet (AC99375-1RU) to nitrogen application timing .....	7
Response of Fortress Russet (AC99375-1RU) to in row seed spacing .....	8
<b><i>Mercury Russet</i></b>	
Response of Mercury Russet (CO99100-1RU) to nitrogen application timing .....	9
Response of Mercury Russet (CO99100-1RU) to deficit irrigation .....	10
<b><i>Crestone Russet</i></b>	
Response of Crestone Russet (CO99053-3RU) to nitrogen application timing .....	11
<b><i>Rio Grande Russet</i></b>	
Response of Rio Grande Russet to deficit irrigation .....	12
<b><i>Russet Norkotah (sel. 8)</i></b>	
Performance of Russet Norkotah (sel. 8) grown under different management practices .....	13
<b><i>CO05175-1RU</i></b>	
Performance of CO05175-1RU grown under different management practices .....	14
<b><i>CO05068-1RU</i></b>	
Performance of CO05068-1RU grown under different management practices .....	15
<b><i>CO05110-6RU</i></b>	
Performance of CO05110-6RU grown under different management practices .....	16
<b><i>AC05039-2RU</i></b>	
Performance of AC05039-2RU grown under different management practices .....	17
<b><i>CO05189-2RU</i></b>	
Performance of CO05189-2RU grown under different management practices .....	18

<b>CO06057-3RU</b>	
Performance of CO06057-3RU grown under different management practices .....	19
<b>AC05153-1W</b>	
Performance of AC05153-1W grown under different management practices .....	20
<b>Yukon Gold</b>	
Performance of Yukon Gold grown under different management practices .....	21
<b>CO05037-3W/Y</b>	
Performance of CO05037-3W/Y grown under different management practices .....	22
<b>CO05035-1PW/Y</b>	
Performance of CO05035-1PW/Y grown under different management practices .....	23
<b>AC05175-3P/Y</b>	
Performance of AC05175-3P/Y grown under different management practices .....	24
<b>CO05028-4P/PY</b>	
Performance of CO05028-4P/PY grown under different management practices .....	25
<b>AC03534-2R/Y</b>	
Performance of AC03534-2R/Y grown under different management practices .....	26
<b>CO05037-2R/Y</b>	
Performance of CO05037-2R/Y grown under different management practices .....	27
<b>Purple Majesty</b>	
Performance of Purple Majesty grown under different management practices .....	28
<b>CO05079-4P/PW</b>	
Performance of CO05079-4P/PW grown under different management practices .....	29
<b>TC05276-7P/PW</b>	
Performance of TC05276-7P/PW grown under different management practices .....	30
<b>CO05028-11P/RWP</b>	
Performance of CO05028-11P/RWP grown under different management practices .....	31
<b>Sangre</b>	
Performance of Sangre grown under different management practices .....	32
<b>CO05228-4R</b>	
Performance of CO05228-4R grown under different management practices .....	33

## MISSION STATEMENT

The mission of the Colorado Potato Field Management and Physiology Program is to develop cultural management guidelines for the successful, sustainable and economic production of newly released and existing potato cultivars, as well as advanced potato selections that have the potential of being released, through field and laboratory research.

## INTRODUCTION

Each potato cultivar has its own unique set of cultural management requirements for maximizing tuber yield of premium size and quality. Therefore, cultural management practices that maximize tuber production and quality of each potato cultivar must be developed. The best guidelines for nutrient management, irrigation management, plant population management, vine kill management, and other cultural management practices are obtained from field experiments conducted in replicated trials. New cultivars are much more successful when release is accompanied by cultivar specific management guidelines. Information reported in this book reveals management practices that are agronomically sound, economically advantageous, and environmentally responsible, while optimizing potato tuber yield and quality. When management guidelines are tailored for individual cultivars it leads to the successful, sustainable, and economic production of the cultivar, which results in the optimization of its genetic potential, while minimizing economic inputs and environmental degradation.

In 2014, potato cultivars were evaluated under Colorado production conditions for their response to nitrogen fertilizer application management, potassium fertilizer application management, plant population (in-row seed piece spacing) management and deficit irrigation management. The performance of several advanced potato selections under different grower management conditions are also reported.

## MATERIALS AND METHODS

### *Nitrogen Management Study*

The field study was laid out as randomized complete block design. Treatments included nitrogen application rates at 60, 120, 180 and 240 lb. N/ac. A control treatment was included where no nitrogen fertilizer was applied. Each treatment was replicated four times.

Soil samples were taken from each experimental site in the spring of 2014. The soil samples were analyzed for residual soil nitrate nitrogen together with other soil nutrients. Water samples were taken from the irrigation well and analyzed for nitrate nitrogen concentration. The residual soil and irrigation water nitrate nitrogen concentration added up to 30lb N/ac. Knowledge of the residual soil and irrigation water nitrate nitrogen content is important to help estimate how much nitrogen fertilizer will be needed to apply to the potato crop for optimum

tuber yield and quality. Residual soil N + irrigation water N + applied N fertilizer = available nitrogen (N) for the plant.

Sixty lb. N/ac was applied pre-plant to all plots except the control treatment. The remaining required N for each treatment was applied in-season in split applications. Urea ammonium nitrate (32-0-0) was used as source of N fertilizer application. In-season N application began after tuber formation. In-season N fertilizer applications were done by applying 5-10 lb. N/acre at every application time until all the required N rate for a particular treatment was met.

Potato seed piece were cut and suberized for 7 days before planting. Fortress Russet was planted on May 15 2014, and harvested on September 24 2014. Vines were killed on September 11, 2014.

### *Nitrogen Application Timing Studies*

Potato cultivars used in this field study were Fortress Russet (AC99375-1RU), Mercury Russet (CO99100-1RU) and Crestone Russet (CO99053-3RU). The experimental design was randomized complete block with four treatments and four replications. The treatments included 1. Applying all the required N at planting (All) 2. Applying 66% of the required N at planting and the rest applied during the potato growing season 3. Applying 50% of the required N at planting and the remainder applied during the growing season, and 4. Applying 33% of the required N at planting and the rest applied during the potato growing season. The total amount of N applied for each treatment was 140 lb. N/acre.

In-season N fertilizer applications were done by applying 5-10 lb. N/acre at every application time until all the required N for each treatment was met.

Potato seed pieces were machine planted 12 inches within rows on May 22, 2014. The vines of Crestone Russet and Fortress Russet were killed by mechanical flailing on September 11, 2014. No vine kill was needed for Mercury Russet since it senesced naturally. Mercury Russet was harvested on September 24, and Crestone Russet and Fortress Russet were harvested on September 25, 2014.

### *Plant Population Management (In-Row Seed Spacing) Study*

Fortress Russet (AC99375-1RU) was used as the cultivar for the in-row seed spacing study. The study was laid out in the field as randomized complete block design. In-row seed spacing treatments included planting seed at 10, 12, 14, and 16 inches spacing. Each treatment was replicated four times. Each plot consisted of three rows spaced 34 inches apart. All potato seed were planted by hand. Seed was cut and suberized for seven days before planting on May 12, 2014. Vines were killed by mechanical flailing on September 11, 2014, and potatoes were harvested on September 25, 2014.

### *Reduced Irrigation Water Use in Potato Production*

The study was laid out as a factorial arrangement of treatments in a randomized complete block design. Treatments included three deficit irrigation scenarios, (1) application of irrigation water to provide 100% ET replacement for the crop growing season. (2) Providing 100% ET replacement until mid tuber bulking and then applying 90% ET replacement for the rest of the

growing season. (3) Providing 100% ET replacement until mid tuber bulking and then applying 80% ET replacement for the rest of the growing season.

Mercury Russet, an early maturity cultivar and Rio Grande Russet, a medium maturity cultivar, were evaluated under the three irrigation scenarios. Each treatment was replicated four times. Each plot consisted of four rows spaced 34 inches apart. Potato seed pieces were machine planted 12 inches within rows on May 23, 2014. Vines of Rio Grande Russet were killed by mechanical flailing on September 24, 2014.

No vine kill was needed for Mercury Russet. Vines senesced naturally. The deficit irrigation study was harvested on October 1, 2014.

Table 1. Effect of nitrogen application rate on yield and tuber size distribution of Fortress Russet (AC99375-1RU), 2014

Nitrogen rate (lb N/ac)	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/ac)					
					4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
0N(61) <sup>1</sup>	426	107	319(75) <sup>2</sup>	184(43)	313	265(62)	48	54	178	6
60N(90)	427	120	307(72)	163(38)	304	278(65)	26	29	160	3
120N(150)	421	85	336(80)	236(56)	320	260(62)	60	76	220	16
180N(210)	441	100	341(77)	205(47)	332	282(64)	50	59	196	9
240N(270)	426	105	321(75)	219(51)	318	254(60)	64	67	216	3

<sup>1</sup> Figures in brackets and beside N rate treatments indicate total available N (applied + soil + irrigation water N).

<sup>2</sup> Figures in brackets and beside yield data indicate % of total.

Table 2. Effect of nitrogen application rate on tuber quality of Fortress Russet (AC99375-1RU), 2014

Nitrogen rate (lb N/ac)	% Growth Cracks	% Knobs	% misshapes	External <sup>2</sup> Defects	% Hollow Heart	% Brown Center	% Internal <sup>3</sup> Defects	Specific Gravity
60N(90)	0.5	0	0	0.5	0	0	0	1.113
120N(150)	0.6	0	0.3	0.9	1.1	0	1.1	1.107
180N(210)	0	0	0.4	0.4	0	0	0	1.104
240N(270)	0	0	0.5	0.5	0	0	0	1.098

<sup>1</sup> Figures in brackets indicate total available N (applied + soil + irrigation water N).

<sup>2</sup> Includes growth cracks, knobs and misshapes.

<sup>3</sup> Includes hollow heart and brown center.

Table 3. Effect of nitrogen application timing on yield and tuber size distribution of Fortress Russet (AC99375-1RU), 2014

Pre - Plant N Rate (lb N/ac)	Total	< 4oz	> 4oz	> 6oz	4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz	Yield (cwt/ac)			
											ALL <sup>1</sup>	66%	50%	33%
	466	128	338(73) <sup>2</sup>	204(44)	334	305(66)	29	33	200	4				
	453	142	311(69)	152(34)	311	287(63)	24	24	152	0				
	458	129	329(72)	177(39)	329	297(65)	32	32	177	0				
	491	133	358(73)	190(39)	355	324(66)	31	34	187	3				

<sup>1</sup> Indicates % of required N rate applied pre - plant.

<sup>2</sup> Figures in brackets indicate % of total yield.

Note: Total fertilizer N applied for each treatment was 140lb N/Ac.

Table 4. Effect of nitrogen application timing on tuber quality of Fortress Russet (AC99375-1RU), 2014

Pre - Plant N Rate (lb N/ac)	% Growth Cracks	% Knobs	% misshapes	External <sup>2</sup> Defects	% Hollow Heart	% Brown Center	% Internal <sup>3</sup> Defects	Specific Gravity
	0	0	0	0	0.7	0	0.7	1.096
	0.3	0	0	0.3	0	0	0	1.105
	0	0	0	0	0	0	0	1.107
	0	0	0	0	0	0	0	1.104

<sup>1</sup> Indicates % of required N rate applied pre - plant.

<sup>2</sup> Includes growth cracks, knobs and misshapes.

<sup>3</sup> Includes hollow heart and brown center.

Note: Total fertilizer N applied for each treatment was 140lb N/Ac.



Table 5. Effect of in row seed spacing on yield and tuber size distribution of Fortress Russet (AC99375-IRU), 2014

Seed spacing (Inches)	Total	Yield (cwt/ac)								
		< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
10	442	100	342(77) <sup>1</sup>	207(47)	342	291(66)	51	51	207	0
12	426	114	312(73)	191(45)	309	272(64)	37	40	188	3
14	452	98	354(78)	202(45)	346	319(71)	27	35	194	8
16	445	94	351(79)	202(45)	351	314(71)	37	37	202	0

<sup>1</sup> Figures in brackets indicate % of total yield.

Table 6. Effect of in row seed spacing on tuber quality of Fortress Russet (AC99375-IRU), 2014

Seed spacing (inches)	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Brown Center	% Internal <sup>2</sup> Defects	Specific Gravity
12	0	0	0	0	1.1	0	1.1	1.111
14	0	0	0.3	0.3	0.9	0	0.9	1.109
16	0	0	0.9	0.9	0.4	0	0.4	1.107

<sup>1</sup> Includes growth cracks, knobs and misshapes.

<sup>2</sup> Includes hollow heart and brown center.

Table 7. Effect of nitrogen application timing on yield and tuber size distribution of Mercury Russet (CO99100-1RU), 2014

Pre - Plant N Rate (lb N/ac)	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/ac)					
					4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz
ALL <sup>1</sup>	329	92	237(72) <sup>2</sup>	138(42)	237	219(67)	18	18	138	0
66%	347	99	248(72)	147(42)	248	230(66)	18	18	147	0
50%	358	117	241(67)	122(34)	241	221(62)	20	20	122	0
33%	348	106	242(70)	123(35)	242	217(62)	25	25	123	0

<sup>1</sup> Indicates % of required N rate applied pre - plant.

<sup>2</sup> Figures in brackets indicate % of total yield.

Note: Total fertilizer N applied for each treatment was 140lb N/Ac.

Table 8. Effect of nitrogen application timing on tuber quality of Mercury Russet (CO99100-1RU), 2014

Pre - Plant N Rate (lb N/ac)	% Growth Cracks	% Knobs	% misshapes	External <sup>2</sup> Defects	% Hollow Heart	% Brown Center	% Internal Defects	Specific Gravity
66%	3.9	0	0.3	4.2	0	0	0	1.087
50%	6.7	0	0	6.7	0	0	0	1.085
33%	7.8	0	0	7.8	0	0	0	1.089

<sup>1</sup> Indicates % of required N rate applied pre - plant.

<sup>2</sup> Includes growth cracks, knobs and misshapes.

<sup>3</sup> Includes hollow heart and brown center.

Note: Total fertilizer N applied for each treatment was 140lb N/Ac.

Table 9. Effect of deficit irrigation on yield and tuber size distribution of Mercury Russet (CO99100-1RU), 2014

Irrigation % of ET	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/ac)					
					4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
80	293	147	146(50) <sup>1</sup>	50(17)	146	146(50)	0	0	50	0
90	327	135	192(59)	93(28)	192	177(54)	15	15	93	0
100	322	148	174(54)	63(20)	174	166(52)	8	8	63	0

<sup>1</sup> Figures in brackets indicate % of total yield.

Table 10. Effect of deficit irrigation on tuber quality of Mercury Russet (CO99100-1RU), 2014

Irrigation % of ET	% Growth Cracks	% Knobs	% misshapes	External <sup>1</sup> Defects	% Hollow Heart	% Brown Center	% Internal <sup>2</sup> Defects	Specific Gravity
90	10.7	0	0	10.7	0	0	0	1.079
100	11.1	0	0.4	11.5	0	0	0	1.078

<sup>1</sup> Includes growth cracks, knobs and misshapes.

<sup>2</sup> Includes hollow heart and brown center.

Table 11. Effect of nitrogen application timing on yield and tuber size distribution of Crestone Russet (CO99053-3RU), 2014

Pre -- Plant N Rate (lb N/ac)	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/ac)					
					4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz
ALL <sup>1</sup>	472	103	369(78) <sup>2</sup>	270(57)	363	294(62)	69	76	264	6
66%	462	83	379(82)	297(64)	358	277(60)	81	102	276	21
50%	489	80	409(84)	301(62)	369	277(57)	92	132	261	40
33%	438	117	321(73)	200(46)	318	270(62)	48	51	197	3

<sup>1</sup> Indicates % of required N rate applied pre -- plant.

<sup>2</sup> Figures in brackets indicate % of total yield.

Note: Total fertilizer N applied for each treatment was 140lb N/Ac.

Table 12. Effect of nitrogen application timing on tuber quality of Crestone Russet (CO99053-3RU), 2014

Pre -- Plant N Rate (lb N/ac)	% Growth Cracks	% Knobs	% misshapes	External <sup>2</sup> Defects	% Hollow Heart	% Brown Center	% Internal <sup>3</sup> Defects	Specific Gravity
66%	1.3	0	0	1.3	1.0	0	1.0	1.095
50%	1.3	0	0.7	2.0	0.6	0	0.6	1.096
33%	1.1	0	0	1.1	0	0	0	1.094

<sup>1</sup> Indicates % of required N rate applied pre -- plant.

<sup>2</sup> Includes growth cracks, knobs and misshapes.

<sup>3</sup> Includes hollow heart and brown center.

Note: Total fertilizer N applied for each treatment was 140lb N/Ac.

Table 13. Effect of deficit irrigation on yield and tuber size distribution of Rio Grande Russet, 2014

Irrigation % of ET	Total	Yield (cwt/ac)								
		< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
80	447	138	309(69) <sup>1</sup>	193(43)	292	249(56)	43	60	175	17
90	468	120	348(74)	225(48)	334	274(59)	60	74	211	14
100	510	124	386(76)	268(53)	372	303(59)	69	83	254	14

<sup>1</sup> Figures in brackets indicate % of total yield.

Table 14. Effect of deficit irrigation on tuber quality of Rio Grande Russet, 2014

Irrigation % of ET	% Growth Cracks	% Knobs	% misshapes	External <sup>1</sup> Defects	% Hollow Heart	% Brown Center	% Internal <sup>2</sup> Defects	Specific Gravity
90	1.5	0	0	1.5	0	0	0	1.096
100	2.9	0	0.4	3.3	0	0	0	1.096

<sup>1</sup> Includes growth cracks, knobs and misshapes.

<sup>2</sup> Includes hollow heart and brown center.

Table 15. Yield and tuber size distribution of Russet Norkotah (sel.8) grown under different management practices, 2014.

Field number	Total									
	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz	
	Yield (cwt/at)									
1	496	45	451	387	426	270	156	180	362	25
2	627	46	581	513	476	314	162	267	408	105
3	325	191	134	44	134	128	6	6	44	0
4	433	179	254	103	254	254	0	0	103	0
5	277	122	155	60	155	138	17	17	60	0
Mean	432	117	315	221	289	221	68	94	195	26

Table 16. Tuber quality of Russet Norkotah (sel.8) grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup>		% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
				Defects	Defects			
1	0	0	0	0	0	0	0	1.068
2	0	1	0.6	1.6	0	0	0	1.072
3	0	0	0	0	0	0	0	1.071
4	0	0	0	0	0	0	0	1.072
5	0	0	2.2	2.2	0	0	0	1.071
Mean	0	0.2	0.6	0.8	0	0	0	1.071

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 17. Yield and tuber size distribution of CO05175-1RU grown under different management practices, 2014.

Field number	Yield (cwt/at)									
	Total	< 4oz	> 40z	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
1	632	37	595	545	433	190	243	405	383	162
2	558	29	529	480	430	212	218	317	381	99
3	493	45	448	385	437	297	140	151	374	11
4	592	106	486	309	473	442	31	44	296	13
5	596	38	558	490	485	235	250	323	417	73
Mean	574	51	523	442	452	275	176	248	370	72

Table 18. Tuber quality of CO05175-1RU grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	0	1.1	5.4	6.5	0	0	1.076
2	0.7	0	0.7	1.4	0	0	1.077
3	0	0	0	0	0	0	1.087
4	0	0	0	0	0	0	1.090
5	0	0	0	0	0	0	1.086
Mean	0.1	0.2	1.2	1.6	0	0	1.083

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 19. Yield and tuber size distribution of CO05068-1RU grown under different management practices, 2014.

Field number	Total	Yield (cwt/at)								
		< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
1	613	31	582	493	515	301	214	281	426	67
2	593	44	549	437	498	323	175	226	386	51
3	481	82	399	245	399	377	22	22	245	0
4	665	103	562	391	527	448	79	114	356	35
5	537	46	491	381	470	352	118	139	360	21
Mean	578	61	517	389	482	360	122	156	355	35

Table 20. Tuber quality of CO05068-1RU grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
2	0	0	2.6	2.6	3.6	3.6	1.091
3	0	0	0	0	0	0	1.096
4	0	0	0	0	1.7	1.7	1.104
5	0	0	0	0	0	0	1.094
Mean	0	0	0.5	0.5	1.1	1.1	1.096

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center



Table 21. Yield and tuber size distribution of CO05110-6RU grown under different management practices, 2014.

Field number	Total	Yield (cwt/at)								
		< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
1	270	67	203	103	192	185	7	19	92	11
2	321	97	224	115	224	197	27	27	115	0
3	274	168	106	38	106	98	8	8	38	0
4	330	131	199	82	199	192	7	7	82	0
5	225	145	80	7	80	80	0	0	7	0
Mean	284	122	162	69	160	150	10	12	67	2

Table 22. Tuber quality of CO05110-6RU grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup>		% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
				Defects	Defects			
1	0	0	0	0	0	0	0	1.070
2	0	0	0	0	0	0	0	1.074
3	0	0	0	0	0	0	0	1.075
4	0	0	0	0	0	0	0	1.074
5	0	0	0	0	0	0	0	1.075
Mean	0	0	0	0	0	0	0	1.074

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 23. Yield and tuber size distribution of AC05039-2RU grown under different management practices, 2014.

Field number	Total								
	< 4oz	> 40z	> 6oz	4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz
Yield (cwt/at)									
1	315	44	271	214	271	209	62	214	0
2	556	65	491	370	480	348	132	359	11
3	301	131	170	72	170	163	7	72	0
4	380	122	258	116	258	237	21	116	0
5	299	58	241	109	241	233	8	109	0
Mean	370	84	286	176	284	238	46	174	2

Table 24. Tuber quality of AC05039-2RU grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	0	0	0	0	0	0	1.080
2	0	0	4.1	4.1	0	0	1.084
3	0	0	0	0	0	0	1.080
4	0	0	0	0	0	0	1.092
5	0	0	0	0	0	0	1.081
Mean	0	0	0.8	0.8	0	0	1.083

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 25. Yield and tuber size distribution of CO05189-2RU grown under different management practices, 2014.

Field number	Total						Yield (cwt/at)					
	<4oz	>40z	>6oz	4-16oz	4-10oz	10-16oz	>10oz	6-16oz	>16oz			
1	266	54	212	117	212	184	28	117	0			
2	404	140	264	122	264	236	28	122	0			
3	253	228	25	0	25	25	0	0	0			
4	375	179	196	51	196	196	0	51	0			
5	215	126	89	3	89	89	0	3	0			
Mean	303	145	157	59	157	146	11	59	0			

Table 26. Tuber quality of CO05189-2RU grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	1.2	0	4.2	5.4	0	0	1.071
2	0	0	0	0	0	0	1.076
3	0	0	0	0	0	0	1.076
4	0	0	0	0	0	0	1.079
5	0	0	0	0	0	0	1.072
Mean	0.2	0	0.8	1.1	0	0	1.075

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 27. Yield and tuber size distribution of CO06057-3RU grown under different management practices, 2014.

Field number	Total								
	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
	Yield (cwt/at)								
1	382	130	252	154	252	222	30	154	0
2	357	142	215	84	204	196	8	73	11
3	283	167	116	35	116	108	8	35	0
4	380	284	96	20	96	96	0	20	0
5	305	207	98	32	98	98	0	32	0
Mean	341	186	155	65	153	144	9	63	2

Table 28. Tuber quality of CO06057-3RU grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup>		% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
				Defects	Defects			
1	0	0	1.6	1.6	0	0	0	1.080
2	1.2	0	0	1.2	3.2	3.2	3.2	1.090
3	0	0	0	0	0	0	0	1.085
4	0	0	0	0	0	0	0	1.092
5	0	0	0	0	0	0	0	1.084
Mean	0.2	0	0.3	0.6	0.6	0.6	0.6	1.086

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 29. Yield and tuber size distribution of AC05153-1W grown under different management practices, 2014.

Field number	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/at)					
					4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
1	340	180	160	47	160	160	0	0	47	0
2	360	165	195	87	195	188	7	7	87	0
3	260	204	56	7	56	56	0	0	7	0
4	272	200	72	3	72	72	0	0	3	0
5	343	195	148	64	148	148	0	0	64	0
Mean	315	189	126	42	126	125	1	1	42	0

Table 30. Tuber quality of AC05153-1W grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup>		% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
				Defects	Defects			
1	0	0	0	0	0	0	0	1.080
2	0	0	0	0	0	0	0	1.086
3	0	0	0	0	0	0	0	1.087
4	0	0	0	0	0	0	0	1.088
5	0	0	0	0	0	0	0	1.088
Mean	0	0	0	0	0	0	0	1.086

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 31. Yield and tuber size distribution of Yukon Gold grown under different management practices, 2014.

Field number	Yield (cwt/at)									
	Total	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
1	441	31	410	348	313	198	115	212	251	97
2	371	36	335	258	324	179	145	156	247	11
3	346	104	242	121	242	227	15	15	121	0
4	425	82	343	241	343	292	51	51	241	0
5	320	87	233	141	233	199	34	34	141	0
Mean	381	68	313	222	291	219	72	94	200	22

Table 32. Tuber quality of Yukon Gold grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup>		% Hollow Heart	% Internal <sup>2</sup>		Specific Gravity
				Defects	Defects		Defects	Defects	
1	0	0	0	0	0	0	0	0	1.069
2	0	0	0	0	0	0	0	0	1.077
3	0	0	0	0	0	0	0	0	1.078
4	0	0	1	1	1	0	0	0	1.083
5	0	0	2.2	2.2	2.2	0	0	0	1.082
Mean	0	0	0.6	0.6	0.6	0	0	0	1.078

<sup>1</sup>It includes growth cracks, knobs, and misshapes.

<sup>2</sup>It includes hollow heart and brown center

Table 33. Yield and tuber size distribution of CO05037-3W/Y grown under different management practices, 2014.

Field number	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/at)					
					4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz
1	543	341	202	68	202	202	0	0	68	0
2	447	249	198	53	198	185	13	13	53	0
3	395	338	57	11	57	57	0	0	11	0
4	491	328	163	33	163	163	0	0	33	0
5	506	340	166	46	166	166	0	0	46	0
Mean	476	319	157	42	157	155	3	3	42	0

Table 34. Tuber quality of CO05037-3W/Y grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	0	0	0	0	0	0	1.070
2	0	0	0	0	0	0	1.076
3	0	0	0	0	0	0	1.076
4	0	0	0	0	0	0	1.078
5	0	0	0	0	0	0	1.074
Mean	0	0	0	0	0	0	1.075

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 35. Yield and tuber size distribution of CO05035-1PW/Y grown under different management practices, 2014.

Field number	Total						Yield (cwt/at)					
	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz			
1	30	610	567	520	202	318	408	477	90			
2	35	538	474	469	252	217	286	405	69			
3	47	472	382	461	351	110	121	371	11			
4	46	554	457	554	415	139	139	457	0			
5	46	515	453	492	288	204	227	430	23			
Mean	41	538	467	499	302	198	236	428	39			

Table 36. Tuber quality of CO05035-1PW/Y grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	0	0	0	0	0	0	1.083
2	0	0	0	0	0	0	1.082
3	0	0	0	0	0	0	1.088
4	0	0	0	0	0	0	1.085
5	0	0	0	0	0	0	1.085
Mean	0	0	0	0	0	0	1.085

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center



Table 37. Yield and tuber size distribution of AC05175-3P/Y grown under different management practices, 2014.

Field number	Total									
	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz	
	Yield (cwt/at)									
1	380	90	290	208	290	250	40	40	208	0
2	588	186	402	194	402	364	38	38	194	0
3	291	265	26	2	26	26	0	0	2	0
4	347	250	97	21	97	97	0	0	21	0
5	328	251	77	12	77	77	0	0	12	0
Mean	387	208	178	87	178	163	16	16	87	0

Table 38. Tuber quality of AC05175-3P/Y grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	0	0	0	0	0	0	1.069
2	0	0	0	0	0	0	1.070
3	0	0	0	0	0	0	1.073
4	0	0	0	0	0	0	1.072
5	0	0	0	0	0	0	1.071
Mean	0	0	0	0	0	0	1.071

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 39. Yield and tuber size distribution of CO05028-4P/PY grown under different management practices, 2014.

Field number	Total						Yield (cwt/at)					
	< 4oz	> 4oz	> 6oz	4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz			
1	652	111	541	398	530	422	108	119	387	11		
2	694	117	577	440	566	493	73	84	429	11		
3	467	262	205	81	205	192	13	13	81	0		
4	530	207	323	161	323	291	32	32	161	0		
5	526	117	409	263	409	341	68	68	263	0		
Mean	574	163	411	269	407	348	59	63	264	4		

Table 40. Tuber quality of CO05028-4P/PY grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	1.6	0	0	1.6	1.6	1.6	1.080
2	0	0	0	0	0	0	1.079
3	0	0	0	0	0	0	1.079
4	0	0	0.4	0.4	0	0	1.090
5	0	0	0	0	0	0	1.081
Mean	0.3	0	0.1	0.4	0.3	0.3	1.082

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 41. Yield and tuber size distribution of AC03534-2R/Y grown under different management practices, 2014.

Field number	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/at)					
					4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz
1	449	270	179	35	179	179	0	0	35	0
2	702	159	543	310	543	504	39	39	310	0
3	497	213	284	147	284	269	15	15	147	0
4	569	254	315	174	315	315	0	0	174	0
5	535	210	325	152	325	311	14	14	152	0
Mean	550	221	329	164	329	316	14	14	164	0

Table 42. Tuber quality of AC03534-2R/Y grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	0	0	0	0	0	0	1.089
2	0	0	0	0	0	0	1.067
3	0	0	0	0	0	0	1.064
4	0	0	0	0	0	0	1.073
5	0	0	0	0	0	0	1.066
Mean	0	0	0	0	0	0	1.072

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 43. Yield and tuber size distribution of CO05037-2R/Y grown under different management practices, 2014.

Field number	Yield (cwt/at)									
	Total	< 4oz	> 4oz	> 6oz	4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz
1	531	130	401	256	401	354	47	47	256	0
2	388	255	133	16	133	133	0	0	16	0
3	357	316	41	12	41	41	0	0	12	0
4	496	346	150	23	150	150	0	0	23	0
5	411	306	105	7	105	105	0	0	7	0
Mean	437	271	166	63	166	157	9	9	63	0

Table 44. Tuber quality of CO05037-2R/Y grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	2.5	0	0	2.5	0	0	1.064
2	0	0	0	0	0	0	1.088
3	0	0	0	0	0	0	1.088
4	0	0	0	0	0	0	1.094
5	0	0	0	0	0	0	1.090
Mean	0.5	0	0	0.5	0	0	1.085

<sup>1</sup>It includes growth cracks, knobs, and misshapes,

<sup>2</sup>It includes hollow heart and brown center

Table 45. Yield and tuber size distribution of Purple Majesty grown under different management practices, 2014.

Field number	Yield (cwt/at)									
	Total	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
1	521	171	350	178	338	284	54	66	166	12
2	547	201	346	200	346	304	42	42	200	0
3	264	204	60	15	60	52	8	8	15	0
4	500	249	251	114	251	243	8	8	114	0
5	448	236	212	79	212	203	9	9	79	0
Mean	456	212	244	117	241	217	24	27	115	2

Table 46. Tuber quality of Purple Majesty grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	0	0	0	0	0	0	1.078
2	0	0	0	0	1.7	1.7	1.081
3	0	0	0	0	0	0	1.075
4	0	0	0	0	0	0	1.081
5	0	0	0	0	1.2	1.2	1.083
Mean	0	0	0	0	0.6	0.6	1.080

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 47. Yield and tuber size distribution of CO05079-4P/PW grown under different management practices, 2014.

Field number	Total									
	< 4oz	> 4oz	> 6oz	4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz	
	Yield (cwt/at)									
1	444	118	326	217	326	252	74	74	217	0
2	596	248	348	168	348	324	24	24	168	0
3	391	195	196	50	196	196	0	0	50	0
4	363	269	94	4	94	94	0	0	4	0
5	387	182	205	58	205	196	9	9	58	0
Mean	436	202	234	99	234	212	21	21	99	0

Table 48. Tuber quality of CO05079-4P/PW grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup>		% Hollow Heart	% Internal <sup>2</sup>		Specific Gravity
				Defects	Defects		Defects	Defects	
1	0	0	0	0	0	0	0	0	1.086
2	0	0	0	0	0	0	0	0	1.084
3	0	0	0	0	0	0	0	0	1.086
4	0	0	0	0	0	0	0	0	1.089
5	0	0	0	0	0	0	0	0	1.087
Mean	0	0	0	0	0	0	0	0	1.086

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 49. Yield and tuber size distribution of TC05276-7P/PW grown under different management practices, 2014.

Field number	Total								
	<4oz	>40z	>6oz	4-16oz	4-10oz	10-16oz	>10oz	6-16oz	>16oz
	Yield (cwt/at)								
1	315	231	84	4	84	84	0	4	0
2	307	222	85	17	85	85	0	17	0
3	270	270	0	0	0	0	0	0	0
4	262	209	53	0	53	53	0	0	0
5	204	199	5	0	5	5	0	0	0
Mean	272	226	45	4	45	45	0	4	0

Table 50. Tuber quality of TC05276-7P/PW grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	0	0	0	0	0	0	1.079
2	0	0	0	0	0	0	1.080
3	0	0	0	0	0	0	1.078
4	0	0	0	0	0	0	1.084
5	0	0	0	0	0	0	1.081
Mean	0	0	0	0	0	0	1.080

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

Table 51. Yield and tuber size distribution of CO05028-11P/RWP grown under different management practices, 2014.

Field number	Yield (cwt/at)									
	Total	< 4oz	> 4oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz	
1	601	117	484	324	473	362	111	122	313	11
2	575	202	373	174	373	365	8	8	174	0
3	398	192	206	66	206	206	0	0	66	0
4	611	297	314	79	314	314	0	0	79	0
5	486	141	345	238	346	317	29	29	238	0
Mean	534	190	344	176	342	313	30	32	174	2

Table 52. Tuber quality of CO05028-11P/RWP grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup> Defects	% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
1	2.9	0	0	2.9	0	0	1.076
2	0	0	0	0	0	0	1.075
3	1	0	0	1	0	0	1.079
4	0	0	0	0	0	0	1.088
5	0.6	0	0	0.6	0	0	1.083
Mean	0.9	0	0	0.9	0	0	1.080

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center



Table 53. Yield and tuber size distribution of Sangre grown under different management practices, 2014.

Field number	Total						Yield (cwt/at)			
	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz		> 10oz	6 – 16oz	> 16oz
1	534	62	472	429	400	195	205	277	357	72
2	628	41	587	498	517	292	225	295	428	70
3	472	131	341	175	328	284	44	57	162	13
4	394	104	290	181	290	257	33	33	181	0
5	583	85	498	378	460	323	137	175	340	38
Mean	522	85	438	332	399	270	129	167	294	39

Table 54. Tuber quality of Sangre grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup>		% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
				Defects	Defects			
1	7	0	0	7	0	0	0	1.076
2	0.5	0	0	0.5	0	0	0	1.076
3	0	0	0	0	0	0	0	1.073
4	2.1	0	0	2.1	0	0	0	1.079
5	1.9	0	0	1.9	0	0	0	1.076
Mean	2.3	0	0	2.3	0	0	0	1.076

<sup>1</sup>It includes growth cracks, knobs, and misshapes.

<sup>2</sup>It includes hollow heart and brown center

Table 55. Yield and tuber size distribution of CO05228-4R grown under different management practices, 2014.

Field number	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/at)					
					4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz
1	346	164	182	79	182	145	37	37	79	0
2	438	259	179	48	179	179	0	0	48	0
3	344	267	77	3	77	77	0	0	3	0
4	404	319	85	33	85	78	7	7	33	0
5	386	239	147	45	147	147	0	0	45	0
Mean	384	250	134	42	134	125	9	9	42	0

Table 56. Tuber quality of CO05228-4R grown under different management practices, 2014.

Field Number	% Growth Cracks	% Knobs	% Misshapes	% External <sup>1</sup>		% Hollow Heart	% Internal <sup>2</sup> Defects	Specific Gravity
				Defects	Defects			
1	0	0	0	0	0	0	0	1.077
2	0	0	0	0	0	0	0	1.084
3	0	0	0	0	0	0	0	1.081
4	0	0	0	0	0	0	0	1.087
5	0	0	0	0	0	0	0	1.080
Mean	0	0	0	0	0	0	0	1.082

<sup>1</sup>It includes growth cracks, knobs, and misshapes

<sup>2</sup>It includes hollow heart and brown center

1  
2  
3

4  
5  
6

7  
8  
9