

Colorado Potato Cultivar Management

Research Data Summary 2012



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MISSION STATEMENT

The mission of the Colorado Potato Cultivar Management and Physiology Program is to develop cultural management guidelines for the successful 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 grade tubers. Therefore, cultural management practices that maximize tuber production and quality of each potato cultivar must be developed.

The best guidelines for fertility practices, irrigation management, plant population management, vine kill management, and other 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 2012, potato cultivars were evaluated under Colorado production conditions for their response to nitrogen fertilizer application management, potassium fertilizer application management, soil amendments, and preceding green manure and/or cover crops.

Table 1. Effect of nitrogen application rate on tuber yield and tuber size distribution of Russet Norkotah (sel.8), 2012.

Nitrogen Rate (lbN/ac)	Total	Yield (cwt/ac)								
		< 4oz	> 4oz	4 – 16oz	4 – 10oz	10 – 16oz	> 16oz			
0N(38) ¹	384	40	344(90) ²	277(72)	325	232(60)	93	112	258	19
60N(98)	336	53	283(84)	231(69)	246	161(48)	85	122	194	37
120N(158)	387	73	314(81)	258(67)	262	167(43)	95	147	206	52
180N(218)	395	43	352(89)	302(77)	295	194(49)	101	158	245	57
240N(278)	406	58	348(86)	294(72)	311	186(46)	125	162	257	37

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

² Figures in brackets and beside yield data indicate % of total

Table 2. Effect of nitrogen application rate on tuber quality of Russet Norkotah (sel. 8), 2012

Nitrogen Rate (lbN/ac)	% Growth Cracks	% Knobs	% Misshapes	% External ² Defects		% Hollow Heart	% Brown Center	% Internal ³ Defects	Specific Gravity
				% External ² Defects	% Internal ³ Defects				
0N(38) ¹	0	0	1.7	1.7	0	0	0	0	1.087
60N(98)	0	1.9	2.0	3.9	1.3	0	0	1.3	1.080
120N(158)	0	4.8	1.9	6.7	0	0	0	0	1.077
180N(218)	0	3.6	1.9	5.5	0	0	0	0	1.076
240N(278)	0	0	1.7	1.7	2.3	0	0	2.3	1.075

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

² Includes growth cracks, knobs and misshapes.

³ Includes hollow heart and brown center.

Table 3. Effect of nitrogen application rate on tuber yield and tuber size distribution of CO99100-1RU, 2012.

Nitrogen Rate (lbN/ac)	Total	Yield (cwt/ac)								
		< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
0N(38) ¹	329	88	241(73) ²	142(43)	236	209(64)	27	32	137	5
60N(98)	374	102	272(73)	180(48)	272	207(55)	65	65	180	0
120N(158)	382	113	269(70)	191(50)	269	222(58)	47	47	191	0
180N(218)	360	71	289(80)	186(52)	262	209(58)	53	80	159	27
240N(278)	320	118	202(63)	137(43)	202	159(50)	43	43	137	0

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

² Figures in brackets and beside yield data indicate % of total

Table 4. Effect of nitrogen application rate on tuber quality of CO99100-1RU, 2012.

Nitrogen Rate (lbN/ac)	% Growth Cracks	% Knobs	% Misshapes	% External ² Defects	% Hollow Heart	% Brown Center	% Internal ³ Defects	Specific Gravity
60N(98)	4.7	0	0.7	5.4	0	0	0	1.093
120N(158)	8.2	0	0	8.2	0	0	0	1.090
180N(218)	4.1	0	0.3	4.4	0	0	0	1.085
240N(278)	9.2	0	0.5	9.7	0	0	0	1.083

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

² Includes growth cracks, knobs and misshapes.

³ Includes hollow heart and brown center.

Table 5. Effect of nitrogen application rate on tuber yield and tuber size distribution of Canela Russet, 2012.

Nitrogen Rate (lbn/ac)	Yield (cwt/ac)									
	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	6 – 16oz	> 16oz		
0N(51) ¹	350	67	283(81) ²	186(53)	273	226(65)	47	57	176	10
60N(111)	369	57	312(85)	220(60)	303	232(63)	71	80	211	9
120N(171)	362	63	299(83)	215(59)	264	207(57)	57	92	179	35
180N(231)	405	37	368(91)	289(71)	346	221(55)	125	147	267	22
240N(291)	412	43	369(90)	304(74)	336	234(57)	102	135	271	33

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

² Figures in brackets and beside yield data indicate % of total

Table 6. Effect of nitrogen application rate on tuber quality of Canela Russet, 2012

Nitrogen Rate (lbn/ac)	% Growth Cracks	% Knobs	% Misshapes	% External ² Defects	% Hollow Heart	% Brown Center	% Internal ³ Defects	Specific Gravity
60N(111)	0	0	0	0	0	0	0	1.101
120N(171)	0	0	0	0	0	0	0	1.096
180N(231)	0.7	0	1.1	1.8	0	0	0	1.091
240N(291)	0	0	0	0	0	0	0	1.092

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

² Includes growth cracks, knobs and misshapes.

³ Includes hollow heart and brown center.

Table 7. Effect of nitrogen application rate on tuber yield and tuber size distribution of Masquerade (AC99329-7PW/Y), 2012.

Nitrogen Rate (lbn/ac)	Yield (cwt/ac)									
	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	6 – 16oz	> 16oz		
0N(51) ¹	407	176	231(57) ²	98(24)	231	217(53)	14	14	98	0
60N(111)	417	148	269(65)	125(30)	259	234(56)	25	35	115	10
120N(171)	455	115	340(75)	214(47)	336	303(67)	33	37	210	4
180N(231)	454	131	323(71)	211(47)	311	271(60)	40	52	199	12
240N(291)	495	118	377(76)	258(52)	369	284(57)	85	93	250	8

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

² Figures in brackets and beside yield data indicate % of total

Table 8. Effect of nitrogen application rate on tuber quality of Masquerade (AC99329-7PW/Y), 2012.

Nitrogen Rate (lbn/ac)	% Growth Cracks	% Knobs	% Misshapes	% External ¹ Defects	% Hollow Heart	% Brown Center	% Internal ² Defects	Specific Gravity
60N(111)	0	0	0	0	0	0	0	1.093
120N(171)	0	0	0.4	0.4	0	0	0	1.089
180N(231)	0.4	0	0	0.4	0	0	0	1.086
240N(291)	0.1	0	0.4	0.5	0	0	0	1.086

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

² Includes growth cracks, knobs and misshapes.

³ Includes hollow heart and brown center.

Table 9: Effect of preceding cover crop on potato yield and tuber size distribution of Rio Grande Russet, 2012

Cover Crops	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/ac)					
					4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
Barley	471	74	397(84) ¹	267(57)	393	325(69)	68	72	263	4
Sudan Grass (2)	443	67	376(85)	276(62)	358	263(59)	95	113	258	18
Wet Fallow	424	77	347(82)	227(54)	331	270(64)	61	77	211	16
Canola	359	101	258(72)	135(38)	258	228(64)	30	30	135	0
Sudan Grass(5)	404	61	343(85)	264(65)	330	234(58)	96	109	251	13
Camellina	396	57	339(86)	224(57)	330	278(70)	52	61	215	9
Canola + Compost	411	99	312(76)	191(47)	304	247(60)	57	65	183	8
Canola + Manure	338	88	250(74)	141(42)	250	218(65)	32	32	141	0
Mustard	412	94	318(77)	211(51)	305	251(61)	54	67	198	13
Cocktail	387	61	326(84)	245(63)	301	236(61)	65	90	220	25
Sudan Grass Mixture	384	61	323(84)	261(68)	280	231(60)	49	92	218	43

¹ Figures in brackets indicate % of total

Table 10: Effect of preceding cover crop on tuber quality of Rio Grande Russet, 2012

Cover Crops	% Growth Cracks	% Knobs	% Misshapes	% External ¹ Defects	% Hollow Heart	% Brown Center	% Internal ² Defects	Specific Gravity
Barley	1.2	0	0.8	2.0	0	0	0	1.088
Sudan Grass (2)	0.9	0	0.6	1.5	1.0	0	1.0	1.088
Wet Fallow	1.2	0	1.9	3.1	0	0	0	1.084
Canola	0.7	0.2	0.3	1.2	0	0	0	1.085
Sudan Grass(5)	4.9	0.7	0.6	6.2	1.1	0	1.1	1.089
Camellina	2.2	0	1.0	3.2	0	0	0	1.086
Canola + Compost	4.0	0	1.9	5.9	0	0	0	1.085
Canola + Manure	1.0	0	1.5	2.5	0	0	0	1.083
Mustard	1.7	0	1.3	3.0	0	0	0	1.087
Cocktail	3.0	0	1.2	4.2	0	0	0	1.090
Sudan Grass Mixture	1.8	0	1.8	3.6	4.5	0	4.5	1.089

¹ Includes growth cracks, knobs and misshapes.

² Includes hollow heart and brown center.

Table 11: Effect of source and rate of potassium fertilizer application on tuber yield and tuber size distribution of Rio Grande Russet, 2012.

Treatment	Total	<4oz	>4oz	>6oz	Yield (cwt/ac)					
					4 – 16oz	4 – 10oz	10 – 16oz	>10oz	6 – 16oz	>16oz
Control	442	112	330(75)	232(53)	322	234(53)	88	96	224	8
SOP 40	438	105	333(76)	250(57)	329	258(59)	71	75	246	4
SOP 80	468	104	364(78)	244(52)	351	262(56)	89	102	231	13
SOP 120	486	79	407(84)	299(62)	394	301(62)	93	106	286	13
MOP-S40	476	138	338(71)	213(45)	325	269(57)	56	69	200	13
MOP-S80	412	92	320(78)	219(53)	309	226(55)	83	94	208	11
MOP-S120	468	116	352(75)	245(52)	334	276(59)	58	76	227	18
MOP+S40	440	117	323(73)	235(53)	319	238(54)	81	85	231	4
MOP+S80	428	106	322(75)	236(55)	294	216(51)	78	106	208	28
MOP+S120	459	113	346(75)	210(46)	338	295(64)	43	51	202	8

¹ Figures in brackets indicate % of total

Table 12. Effect of source of potassium fertilizer averaged over application rate on tuber yield and tuber size distribution of Rio Grande Russet potato, 2012

Treatment	Total	<4oz	>4oz	>6oz	Yield (cwt/ac)					
					4 – 16oz	4 – 10oz	10 – 16oz	>10oz	6 – 16oz	>16oz
Control	442	112	330(75) ¹	232(53)	322	234(53)	88	96	224	8
SOP	464	96	368(79)	264(57)	358	274(59)	84	94	254	10
MOP	448	114	334(75)	227(51)	320	253(57)	67	81	213	14

¹ Figures in brackets indicate % of total

Table 13. Effect of potassium sulfate, muriate of potash mixed with sulfur fertilizer, and muriate of potash without sulfur fertilizer on tuber yield and tuber size distribution of Rio Grande Russet potato, 2012.

Treatment	Total	<4oz	>4oz	>6oz	Yield (cwt/ac)					
					4 – 16oz	4 – 10oz	10 – 16oz	>10oz	6 – 16oz	>16oz
Control ¹	442	112	330(75) ²	232(53)	322	234(53)	88	96	224	8
SOP	464	96	368(79)	264(57)	358	274(59)	84	94	254	10
MOP-S	452	115	337(75)	226(50)	323	257(57)	66	80	212	14
MOP+S	442	112	330(75)	227(51)	317	250(57)	67	80	214	13

¹MOP-S = Muriate of Potash with no Sulfur fertilizer added.

MOP+S = Muriate of Potash with Sulfur fertilizer added.

² Figures in brackets indicate % of total

Table 14. Effect of source and rate of potassium fertilizer application on tuber quality of Rio Grande Russet, 2012.

Treatment	% Growth Cracks	% Knobs	% Misshapes	% External ¹ Defects	% Hollow Heart	% Brown Center	% Internal ² Defects	Specific Gravity
SOP 40	1.0	0	0.6	1.6	0	0	0	1.089
SOP 80	1.3	0.2	1.2	2.7	0	0	0	1.089
SOP 120	4.3	0	0	4.3	0	0	0	1.090
MOP-S40	2.2	0	1.4	3.6	0	0	0	1.090
MOP-S80	3.6	0	0.5	4.1	0	0	0	1.088
MOP-S120	2.2	0	2.9	5.1	0	0	0	1.089
MOP+S40	7.0	0	1.3	8.3	0	0	0	1.094
MOP+S80	2.4	0.5	0	2.9	0	0	0	1.089
MOP+S120	2.3	0	1.2	3.5	0	0	0	1.090

¹ Includes growth cracks, knobs and misshapes.

² Includes hollow heart and brown center.

Table 15. Effect of source of potassium averaged over application rate on tuber quality of Rio Grande Russet, 2012

Treatment	% Growth Cracks	% Knobs	% Misshapes	% External ¹ Defects	% Hollow Heart	% Brown Center	% Internal ² Defects	Specific Gravity
Control ¹	6.4	0.3	1.2	7.9	0	0	0	1.090
SOP	2.2	0.1	0.6	2.9	0	0	0	1.089
MOP	3.3	0.1	1.2	4.6	0	0	0	1.090

¹ Includes growth cracks, knobs and misshapes.

² Includes hollow heart and brown center.

Table 16. Effect of potassium sulfate, muriate of potash mixed with sulfur fertilizer, and muriate of potash without sulfur fertilizer on tuber quality of Rio Grande Russet potato, 2012.

Treatment	% Growth Cracks	% Knobs	% Misshapes	% External ² Defects	% Hollow Heart	% Brown Center	% Internal ³ Defects	Specific Gravity
Control ¹	6.4	0.3	1.2	7.9	0	0	0	1.090
SOP	2.2	0.1	0.6	2.9	0	0	0	1.089
MOP-S	2.7	0	1.6	4.3	0	0	0	1.089
MOP+S	3.9	0.2	0.8	4.9	0	0	0	1.091

¹MOP-S = Muriate of Potash with no Sulfur fertilizer added.

MOP+S = Muriate of Potash with Sulfur fertilizer added.

² Includes growth cracks, knobs and misshapes.

³ Includes hollow heart and brown center.

Table 17: Effect of Foliar blend and fungicide application rate on tuber yield and tuber size distribution of Rio Grande Russet, 2012

Treatment	Total	< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	>10oz	6 – 16oz	>16oz
					Yield (cwt/ac)					
Control ¹	457	91	366(80) ²	270(59)	346	230(50)	116	136	250	20
T1	502	118	384(77)	235(47)	384	304(61)	80	80	235	0
T2	492	128	364(74)	234(48)	360	310(63)	50	54	230	4

¹T1 = Reduced fungicide application plus foliar blend.

T2 = Full Rate of fungicide application plus foliar blend.

² Figures in brackets indicate % of total

Table 18: Effect of Foliar blend and fungicide application rate on tuber quality of Rio Grande Russet, 2012

Treatment	% Growth Cracks	% Knobs	% Misshapes	% External ² Defects	% Hollow Heart	% Brown Center	% Internal ³ Defects	Specific Gravity
Control	2.7	0	4.7	7.4	0.8	0	0.8	1.084
T1	3.2	0	2.5	5.7	0.8	0	0.8	1.087
T2	2.2	0	1.4	3.6	0	0	0	1.088

¹T1 = Reduced fungicide application plus foliar blend.

T2 = Full Rate of fungicide application plus foliar blend.

² Includes growth cracks, knobs and misshapes.

³ Includes hollow heart and brown center.

Table 19: Effect of additional late nitrogen application on tuber yield and tuber size distribution of Rio Grande Russet, 2012.

Nitrogen Rate (lbn/ac)	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/ac)					
					4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
Control	499	144	355(71) ¹	205(41)	334	278(56)	56	77	184	21
20lb Inorganic	535	151	384(72)	224(42)	380	320(60)	60	64	220	4
40lb Inorganic	531	137	394(74)	230(43)	394	341(64)	53	53	230	0
20lb Organic	505	149	356(71)	230(46)	350	305(60)	45	51	224	6
40lb Organic	489	158	331(68)	201(41)	327	279(57)	48	52	197	4

¹ Figures in brackets indicate % of total

Table 20: Effect of additional late nitrogen application on tuber quality of Rio Grande Russet, 2012.

Nitrogen Rate (lbn/ac)	% Growth Cracks	% Knobs	% Misshapes	% External ¹ Defects	% Hollow Heart	% Brown Center	% Internal ² Defects	Specific Gravity
20lb Inorganic	4.2	0	2.0	6.2	0.9	0	0.9	1.091
40lb Inorganic	4.5	0	0.5	5.0	0	0	0	1.088
20lb Organic	2.3	0	2.2	4.5	0	0	0	1.090
40lb Organic	1.4	0	1.0	2.4	0	0	0	1.088

¹ Includes growth cracks, knobs and misshapes.

² Includes hollow heart and brown center.

Table 21: Effect of additional late nitrogen application on yield and tuber size distribution of Canela Russet, 2012.

Nitrogen Rate (lbN/ac)	Total	Yield (cwt/ac)								
		< 4oz	> 4oz	> 6oz	4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
Control	381	70	311(82) ¹	219(58)	293	231(61)	62	80	201	18
20lb Inorganic	372	85	287(77)	199(54)	272	234(63)	38	53	184	15
40lb Inorganic	366	80	286(78)	204(56)	281	230(63)	51	56	199	5
20lb Organic	364	48	316(87)	232(64)	299	227(62)	72	89	215	17
40lb Organic	387	56	331(86)	230(59)	313	224(58)	89	107	212	18

¹ Figures in brackets indicate % of total

Table 22: Effect of additional late nitrogen application on tuber quality of Canela Russet, 2012.

Nitrogen Rate (lbN/ac)	% Growth Cracks	% Knobs	% Misshapes	% External ¹ Defects	% Hollow Heart	% Brown Center	% Internal ² Defects	Specific Gravity
20lb Inorganic	0	0	0.5	0.5	0	0	0	1.098
40lb Inorganic	1.0	0.3	0.3	1.6	0	0	0	1.097
20lb Organic	0.9	0	0	0.9	0	0	0	1.097
40lb Organic	0	0	0	0	0	0	0	1.096

¹ Includes growth cracks, knobs and misshapes.

² Includes hollow heart and brown center.

Table 23: Effect of additional late nitrogen application on yield and tuber size distribution of Premier Russet, 2012.

Nitrogen Rate (lbn/ac)	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/ac)					
					4 - 16oz	4 - 10oz	10 - 16oz	> 10oz	6 - 16oz	> 16oz
Control	442	135	307(70) ¹	189(43)	307	267(60)	40	40	189	0
20lb Inorganic	465	103	362(78)	232(50)	362	325(70)	37	37	232	0
40lb Inorganic	449	96	353(79)	248(55)	350	284(63)	66	69	245	3
20lb Organic	468	88	380(81)	267(57)	380	327(70)	53	53	267	0
40lb Organic	472	106	366(78)	242(51)	362	272(58)	90	94	238	4

¹ Figures in brackets indicate % of total

Table 24: Effect of additional late nitrogen application on tuber quality of Premier Russet, 2012.

Nitrogen Rate (lbn/ac)	% Growth Cracks	% Knobs	% Misshapes	% External ¹ Defects	% Hollow Heart	% Brown Center	% Internal ² Defects	Specific Gravity
20lb Inorganic	3.1	0	1.5	4.6	3.1	0	3.1	1.107
40lb Inorganic	9.3	0	1.4	10.7	6.4	0	6.4	1.099
20lb Organic	4.5	0.2	0.6	5.3	3.3	0	3.3	1.101
40lb Organic	3.7	0	0	3.7	3.8	0	3.8	1.100

¹ Includes growth cracks, knobs and misshapes.

² Includes hollow heart and brown center.

Table 25: Effect of additional late nitrogen application on yield and tuber size distribution of Centennial Russet, 2012.

Nitrogen Rate (lbn/ac)	Total	< 4oz	> 4oz	> 6oz	Yield (cwt/ac)					
					4 – 16oz	4 – 10oz	10 – 16oz	> 10oz	6 – 16oz	> 16oz
Control	359	143	216(60) ¹	107(30)	210	183(51)	27	33	101	6
20lb Inorganic	360	157	203(56)	89(25)	203	189(53)	14	14	89	0
40lb Inorganic	414	184	230(56)	90(22)	230	210(51)	20	20	90	0
20lb Organic	396	164	232(59)	106(27)	232	206(52)	26	26	106	0
40lb Organic	373	151	222(60)	87(23)	222	213(57)	9	9	87	0

¹ Figures in brackets indicate % of total

Table 26: Effect of additional late nitrogen application on tuber quality of Centennial Russet, 2012.

Nitrogen Rate (lbn/ac)	% Growth Cracks	% Knobs	% Misshapes	% External ¹ Defects	% Hollow Heart	% Brown Center	% Internal ² Defects	Specific Gravity
20lb Inorganic	0	0	0	0	0	0	0	1.086
40lb Inorganic	0	0	0	0	0	0	0	1.082
20lb Organic	0	0	0	0	0	0	0	1.084
40lb Organic	0	0	0	0	0	0	0	1.084

¹ Includes growth cracks, knobs and misshapes.

² Includes hollow heart and brown center.

A . . . A

B . . . B

C . . . C