

2013
—

**RESPONSE OF RED POTATO TO CROP ROTATION TYPE AND PRECEDING
COVER CROP**

**Samuel YC Essah
Colorado State University
San Luis Valley Research Center**

RESULTS

Tuber Yield and Tuber Size Distribution

In this study, a two years rotation (2-Years) of preceding Colorado Rose with rye planted in the fall just after potato harvest and sudan grass planted in the spring and ploughed under in the fall (rye/sudan grass) increased total yield and the yield of all tuber size groups significantly (Table 1). Total yield, marketable yield (> 4 oz), and premium size tuber yield (> 10 oz) were increased by 35, 40, and 54%, respectively. In addition to the 2-years rotation of ry/sudan grass-potato, the three years rotation (3-years rotation) of barley-canola-potato, barley-canola+manure-potato, and barley-mustard-potato produced high and similar yields for medium size (4-10 oz) tubers (Table 1). The yield increases were, 24, 24, 24, and 23%, for rye/sudan grass-potato, barley-canola-potato, barley-canola+manure-potato, and barley-mustard-potato, respectively. The lowest total tuber yield was obtained when Colorado Rose was preceded by barley-cover crop mixture (cocktail)-potato rotation. This 3-year rotation and preceding cover crop reduced yield by 20% (Table 1).

Tuber Diameter

Red potatoes are usually sized and sold according to tuber diameter. Tuber diameter of Colorado Rose responded to crop rotation type and preceding cover crop. Tubers in the 2-4 inches, > 2 inches > 10 oz, and > 2 inches diameter groups showed higher yields than tubers in all other treatments when Colorado Rose was preceded by the 2-years rotation of rye/sudan grass-potato (Table 2). Tubers in the > 2 inches < 10 oz diameter group were found to yield very high when Colorado Rose was preceded by rye/sudan grass, barley-canola, barley-canola+manure, and barley-mustard rotation type and cover crop (Table 2). The lowest tuber yield in the > 2 inches diameter category was observed when Colorado Rose was preceded by barley-cover crop mixture.

Tuber Quality

A 3-years rotation of barley-cover crop mixture-potato, and a 2-years rotation of barley-potato, rye/sudan grass-potato, and the control treatment produced the highest percentage of tubers with external defects (growth cracks, knobs, and misshapes) – Table 3. All other treatments produced tubers with less than 2% external defects.

The maximum percentage of hollow heart (1.4%) was observed in tubers that followed rye/sudan grass or the control treatments (Table 3).

The lowest tuber specific gravity of 1.081, 1.079, and 1.082, were observed in tubers that followed the control fallow plot, 3-years rotation of barley-canola+manure-potato, and barley-mustard-potato treatments, respectively (Table 3).

Table 1 Effect of rotation type and preceding cover crops on tuber yield and tuber size distribution of Colorado Rose, 2013.

Cover Crop	Yield (cwt/ac)									
	Total	< 4oz	> 4oz	4 - 16oz	> 6oz	6 - 16oz	4 - 10oz	10 - 16oz	> 10oz	> 16oz
Fallow Ground	424cd	78bcd	346cd	316bcd	274bcd	245b	193c	124b	153b	29cd
Barley	419cd	67d	352bc	316bcd	280bc	243b	202c	113bc	150b	37bc
Rye/Sudan Grass	573a	90ab	483a	411a	410a	339a	247a	164a	236a	72a
Barley-Canola	413cd	79bcd	334cd	314bcd	249cdef	229b	240ab	73ef	93f	20de
Barley-Sudan Grass	397d	77bcd	320d	290d	264bcde	234b	203c	87def	117def	30cd
Barley-Camelina	356e	70cd	286e	259e	220f	193c	160d	100cd	127bcd	27cd
Barley-Canola+ Compost	406d	75bcd	331cd	298cd	258cde	225b	213bc	85def	118cdef	33c
Barley-Canola+ Manure	439bc	105a	335cd	326bc	256cde	247b	240ab	86def	95ef	9e
Barley Mustard	466b	89abc	377b	330b	294b	246b	238ab	92cd	139bcd	47b
Barley-Cover Crop mixture	339e	69cd	270e	188f	230ef	149d	122e	67f	148bc	82a
Rye/Cover Crop mixture-Sudan Grass	394d	76bcd	318d	303bcd	242def	228b	193c	110bc	125bcde	14e
LSD (%)	31	20	31	30	35	30	28	23	30	12
CV (%)	5	18	6	7	9	9	10	15	15	22

Table 2. Effect of rotation type and preceding cover crops on tuber diameter of Colorado Rose, 2013.

Cover Crop	Yield (cwt/ac)				
	> 2ins. dia.	< 2ins. dia.	2 – 4ins. dia.	> 2ins < 10oz	> 2ins. > 10oz
Fallow Ground	379cd	45a	369cd	226b	153b
Barley	376cde	44a	371cd	226b	150bc
Rye/Sudan Grass	524a	48a	504a	288a	236a
Barley-Canola	371cde	42a	365cd	277a	93e
Barley-Sudan Grass	354de	43a	354d	236b	117de
Barley-Camelina	320f	39a	314e	194c	127cd
Barley-Canola+ Compost	365cde	41a	358d	248b	118de
Barley-Canola+ Manure	386c	52a	386bc	292a	95e
Barley Mustard	419b	45a	406b	280a	139bcd
Barley-Cover Crop mixture	302f	37a	281f	154d	148bc
Rye/Cover Crop mixture-Sudan Grass	349e	44	349	225	125
LSD (0.05)	29	17	28	24	26
CV (%)	5	26	5	7	13

Table 3. Effect of rotation type and preceding cover crops on tuber quality of Colorado Rose, 2013.

Cover Crop	External Defects	Hollow Heart	Specific Gravity
Fallow Ground	1.8bc	1.4a	1.081cd
Barley	2.3ab	0c	1.083abc
Rye/Sudan Grass	2.1abc	1.4a	1.083abc
Barley-Canola	0.6d	0c	1.083abc
Barley-Sudan Grass	0.7d	0c	1.085a
Barley-Camelina	0.6d	0c	1.083ab
Barley-Canola+ Compost	0.5d	0c	1.082bc
Barley-Canola+ Manure	1.2cd	0c	1.079d
Barley Mustard	0.4d	0c	1.082bc
Barley-Cover Crop mixture	3.0a	0.7b	1.083abc
Rye/Cover Crop mixture-Sudan Grass	1.3	0	1.083
LSD (0.05)	1.1	0.5	0.003
CV (%)	57	113	0.173