

FERTILIZING POTATO VARIETIES FOR VARIOUS HARVEST DATES

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A few years ago the Columbia Basin was considered a one-variety area, and most of the crop was sold on the fresh market. Today there are two major varieties and at least two distinctly different markets. The fresh market, demands an attractive potato with a great deal of eye appeal and freedom from blemishes. The processing market demands high yields, high specific gravity, a minimum of paring waste and, in the case of french fries and chips, good frying qualities. The harvest season for both markets extends from early July through early November. Many factors enter into a fertilizer program when the harvest season extends for so many days, but for now, consider variety, harvest date and the market for which the crop is grown.

Little information is available concerning the response of different varieties to various fertilizer treatments for different harvest dates. In 1968, three separate but adjacent variety trials were conducted near Othello. Five varieties (Russet Burbank, Kennebec, White Rose, Norgold Russet and 48-1) and four fertilizer rates were used in each experiment.

The first experiment was planted April 4 and harvested August 6. The four fertilizer treatments were 50, 100, 150 and 200 pounds of N, P_2O_5 and K_2O per acre derived from a 16-16-16 fertilizer. The second experiment was planted April 5 and harvested September 6. The four fertilizer treatments were 75, 150, 225 and 300 pounds of N, P_2O_5 and K_2O per acre derived from a 16-16-16 fertilizer. The third experiment was planted on April 8 and harvested October 9. The four fertilizer treatments were 100, 200, 300 and 400 pounds of N, P_2O_5 and K_2O , also derived from a 16-16-16 fertilizer. All fertilizers were banded through the planter at planting time. The plants were spaced 9.3 inches apart in the row, with 32 inches between the rows.

The fertilizer treatments used were based on the results of previous experiments with the Russet Burbank variety. Most of my discussion centers around the effect of fertilizer rates and dates of harvest on yield, number one grade potatoes and specific gravity. Only the Russet Burbank variety will be discussed in detail. Other factors and other varieties will be mentioned. The data are summarized in tables.

RUSSET BURBANK

When the Russet Burbank was harvested August 6, the maximum yield

was 438 cwt per acre. It was obtained with 150 pounds of N, P_2O_5 and K_2O per acre. This was the optimum rate for both fresh market and processing purposes. There were no statistically significant differences in grade or specific gravity between the 50 and 150 pound nutrient rates. In fact, the decrease in specific gravity between the 50 and 150 pound nutrient rates was only .003. There was a statistically significant increase in the percentage of number one potatoes and a significant decrease in specific gravity between the 50 and 200 pound rates.

When harvest was delayed until September 6, the maximum yield of 520 cwt per acre was obtained with 225 pounds of N, P_2O_5 and K_2O per acre. There was a significant increase in the percentage of number one potatoes between the 75 and the 300 pound nutrient rates. However, there were no statistically significant differences between any of the other rates. Specific gravity was unaffected by fertilizer rates.

When harvest was delayed until October 9, the maximum yield of 577 cwt per acre was obtained with 300 pounds of N, P_2O_5 and K_2O per acre. When 400 pounds of N, P_2O_5 and K_2O were used, a significant decrease in the percentage of number one potatoes occurred. The difference in specific gravity between the 100 and 400 pound nutrient rates is on the borderline of being statistically significant.

NORGOLD RUSSET

Generally speaking, the Norgold Russet reached its top yield with the highest rate of fertilizer at each harvest date. In no instance was the increase in yield from the third to the fourth rate of fertilizer statistically significant. The yield figures for the October harvest are disappointing in that they were not much higher than those for the September 6 harvest. This apparent failure of the Norgold Russet to respond to a long growing season would indicate that some factor was limiting the growth of this variety during the month of September. The grade out of Norgold Russet was quite good and the response to fertilizer was almost identical to the Russet Burbank. Specific gravity values of the Norgold Russets were significantly lower than those for the Russet Burbank and generally lower than those for White Rose or Kennebec.

WHITE ROSE

The White Rose variety out-yielded all other varieties in this experiment. The percentage of number one potatoes at the August 6 harvest was significantly higher than those for the Russet Burbank. When harvested either on September 6 or October 9, the only significant differences in grade between the White Rose and the Russet Burbank occurred at lowest fertilizer rates at each harvest date. The specific gravity for the White Rose variety was similar to Kennebec and generally lower than Russet Burbank.

KENNEBEC

The top yield for the Kennebec variety occurred at the highest rate of fertilizer used at all three harvest dates. However, in no case was the increase in yield between the third and fourth rate of fertilizer of sufficient size to be statistically significant.

48-1

In this experiment a near perfect stand was obtained with all varieties except 48-1. The poor stand obtained with 48-1 probably accounts for the relatively low yields of this selection. Some indication of its yielding ability may be obtained by looking at Table 16, which is a summary of data obtained from variety trials in previous years.

VARIETY X FERTILIZER INTERACTIONS

The response of all the varieties in the experiments to time of harvest and amount of fertilizer used was similar on the August 6 and September 6 harvest dates. The variety x fertilizer interaction for total yield, per cent number one grade tubers, specific gravity, chip color and blackspot were all statistically non-significant. Some differences, however, are worthy of note. For example, within a harvest date, some varieties required more fertilizer than others to produce maximum yields.

The variety x fertilizer interaction on the third harvest date was non-significant for total yield, per cent number one grade tubers and specific gravity. This was also true for the first and second harvests.

The variety x fertilizer interaction for chip color and blackspot were highly significant for the October 9 harvest. Although these interactions were statistically significant, the total effect of fertilizers on blackspot and chip color in this experiment were so small that the differences have no economic importance.

CONCLUSION

A good, sound fertilizer program for the Russet Burbank should work fairly well with any of the varieties studied in this experiment. Small adjustments may be made. In making fertilizer adjustments for different varieties, it should be remembered that the Russet Burbank has been studied extensively in the Columbia Basin while data for the other varieties is limited. Failure to properly evaluate such variables as soil fertility, cropping history, length of growing season and number of plants per acre are all more important than the variety grown.

Table 1. Total yield in cwt/acre of potatoes harvested on August 6, 1968.

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1*
50	50	50	320	358	371	318	282
100	100	100	381	456	491	366	351
150	150	150	438	451	489	395	393
200	200	200	430	491	547	428	400

*stand problem

Table 2 Yield of number one potatoes harvested on August 6, 1968.

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
50	50	50	191	302	285	263	217
100	100	100	231	399	396	308	304
150	150	150	283	381	383	335	339
200	200	200	290	416	411	374	362

Table 3. Specific Gravity of potatoes harvested on August 6, 1968.
(higher specific gravity, better processing quality)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
50	50	50	1.091	1.088	1.087	1.083	1.089
100	100	100	1.089	1.085	1.086	1.084	1.085
150	150	150	1.088	1.082	1.079	1.080	1.080
200	200	200	1.085	1.082	1.077	1.075	1.079

Table 4. Blackspot of potatoes harvested August 6, 1968.
(higher numbers, less blackspot - over 80, no blackspot)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
50	50	50	75	78	82	75	80
100	100	100	78	79	82	76	80
150	150	150	80	78	81	73	80
200	200	200	79	77	81	74	79

Table 5. Chip Color of potatoes harvested August 6, 1968.
(higher numbers, better color - over 25 O. K.)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
50	50	50	34	35	30	18	31
100	100	100	36	30	28	22	29
150	150	150	39	26	23	20	25
200	200	200	35	28	27	22	32

Table 6. Total yield in cwt/acre of potatoes harvested on September 6, 1968

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
75	75	75	353	442	459	351	334
150	150	150	451	521	584	398	410
225	225	225	520	584	637	436	473
300	300	300	518	629	643	487	427

* stand problem

Table 7. Yield of number one potatoes harvested on September 6, 1968.

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
75	75	75	218	387	335	287	267
150	150	150	324	453	447	338	361
225	225	225	350	504	467	367	393
300	300	300	387	499	456	418	327

Table 8. Specific Gravity of potatoes harvested on September 6, 1968.
(higher specific gravity, better processing quality)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
75	75	75	1.086	1.085	1.087	1.081	1.085
150	150	150	1.085	1.084	1.083	1.076	1.082
225	225	225	1.084	1.082	1.079	1.076	1.080
300	300	300	1.084	1.079	1.077	1.076	1.080

Table 9. Blackspot of potatoes harvested September 6, 1968.
(higher numbers, less blackspot - over 80, no blackspot)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
75	75	75	74	79	85	78	80
150	150	150	74	83	84	79	80
225	225	225	74	80	84	75	78
300	300	300	74	80	82	77	72

Table 10. Chip Color of potatoes harvested September 6, 1968.
(higher numbers, better color - over 25 O.K.)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
75	75	75	28	34	24	21	25
150	150	150	28	32	25	24	28
225	225	225	31	27	27	26	31
300	300	300	34	34	27	23	25

Table 11 Total yield in cwt/acre of potatoes harvested on October 9, 1968.

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1*
100	100	100	447	494	559	395	448
200	200	200	526	581	688	432	465
300	300	300	577	615	710	443	510
400	400	400	539	670	696	464	531

*stand problem

Table 12. Yield of number one potatoes harvested on October 9, 1968.

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
100	100	100	278	418	416	307	347
200	200	200	353	456	513	353	367
300	300	300	393	447	461	364	381
400	400	400	310	416	407	310	350

Table 13. Specific Gravity of potatoes harvested on October 9, 1968.
(higher specific gravity, better processing quality)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
100	100	100	1.089	1.087	1.087	1.083	1.085
200	200	200	1.088	1.082	1.081	1.077	1.082
300	300	300	1.085	1.080	1.079	1.075	1.078
400	400	400	1.083	1.078	1.077	1.074	1.074

Table 14. Blackspot of potatoes harvested October 9, 1968.
(higher numbers, less blackspot - over 80, no blackspot)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
100	100	100	63	69	82	69	76
200	200	200	68	72	81	73	67
300	300	300	66	73	75	66	67
400	400	400	65	72	78	69	65

Table 15. Chip Color of potatoes harvested October 9, 1968.
(higher number, better color - over 25 O. K.)

Pounds Per Acre of			Varieties				
N	P ₂ O ₅	K ₂ O	R. Burbank	Kennebec	W. Rose	Norgold R.	48-1
100	100	100	27	26	26	19	24
200	200	200	25	28	23	21	26
300	300	300	28	32	22	16	20
400	400	400	28	29	22	23	22

Table 16. Total yield in cwt/A of five potato varieties in four years.

<u>Year</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>		
Number of Growing Days	176	141	98	169	97	153
Pounds of N, P ₂ O ₅ and K ₂ O per acre	350	300	150	320	160	340
<u>Variety</u>						
Russet Burbank	718	698	341	567	140	542
Norgold Russet	614	621	412	---	189	406
Kennebec	866	819	399	543	209	635
White Rose	---	752	331	633	---	532
48-1	747	770	501	570	269	---