

Evaluation of potato cultivars and breeding selections for reaction to common scab – Endeavor, 2007.

A trial was established at a commercial muck farm near Endeavor, WI on 9 May to evaluate potato cultivars and breeding selections for resistance to common scab. An area in a field where the grower had encountered problems with common scab in the past was chosen for the trial. Tubers were cut by hand into approximately 2 oz seedpieces and were allowed to heal before being mechanically planted. A randomized complete block design with four replications was used and each plot consisted of two 10-ft-long rows with 3 ft spacing between rows, and 12 in. between seedpieces within the row. The soil type was Houghton muck and the field was maintained during the growing season according to standard grower practices. Tubers were harvested on 13 Sep and taken to the Hancock Agricultural Research Station where they were graded on 20 Sep into US#1, undersize, and cull categories. After undersize tubers were graded out and tubers were washed, but before cull potatoes were removed, 40 tubers from each treatment plot were chosen arbitrarily and assessed for scab severity (area covered by lesions and lesion type). Lesion type was rated on a 5-point scale with: 0 = no lesions; 1 = superficial, < 0.4 in. diam; 2 = superficial, > 0.4 in.; 3 = raised, < 0.4 in.; 4 = raised, > 0.4 in.; 5 = pitted scab. Cull potatoes included misshapen, green, and rotten potatoes along with tubers exhibiting pitted scab. Plots were not irrigated.

Environmental conditions during the 2007 growing season were ideal for the development of common scab, leading to significant differences between entries in most categories. The lesion area index ranged from 6.5 (ATX98500-2P/Y) to 43.4 (NDTX4271-3R). The lesion type index ranged from 11.4 (ATX98500-2P/Y) to 70.4 (COTX94218-1R). The percentage of tubers without symptoms of common scab ranged from 0% (COTX94218-1R) to 68.9% (ATX98500-2P/Y). Yields were variable, but ranged from 105.6 cwt/A (COTX94218-1R) to 514.2 cwt/A (Rio Rojo). This field site provided a severe test for screening breeding lines and cultivars for field susceptibility to common scab.

Table 1. Emergence, yield and evaluation of scab symptoms on potato cultivars and breeding lines.

Cultivar or breeding line (source ¹)	Lesion area index ²	Lesion type index ³	% of tubers with no scab symptoms	Yield				Size grades of US#1 potatoes - %									
				Total cwt/A	US#1		Culls		< 4 oz	4-6 oz	6-10 oz	10-13 oz	6-13 oz	13-16 oz	>16 oz		
					cwt/A	%	cwt/A	%								cwt/A	%
Red Norland WI1 (com)	23.5	54.5	8.1	336.9	204.7	59.5	21.1	6.6	111.1	33.8	24.2	20.7	42.8	6.0	48.8	3.8	2.4
Dk Red Norland WI2 (com)	19.5	53.9	10.0	360.1	237.9	64.8	18.5	5.3	103.6	29.9	25.7	25.7	33.5	10.5	44.0	2.5	2.2
Red Norland – MN (com)	29.3	55.6	5.1	326.0	244.1	74.0	8.3	4.0	73.5	22.0	12.2	19.6	33.3	10.0	43.4	15.7	9.1
Mazama (com)	28.9	59.3	4.2	170.1	104.5	63.4	24.7	18.0	40.8	18.6	53.9	31.8	12.2	2.1	14.3	0.0	0.0
Modoc (com)	21.0	55.4	9.4	410.4	269.7	64.0	22.5	5.8	118.2	30.3	24.0	18.9	37.3	7.0	44.3	4.0	8.8
Rio Colorado (com)	19.6	53.8	8.8	295.1	213.1	72.3	30.7	11.0	51.4	16.7	40.8	28.8	29.4	0.9	30.3	0.0	0.0
Villetta Rose (com)	25.1	62.4	1.9	286.6	223.4	77.8	41.7	14.5	21.4	7.8	62.1	28.4	9.4	0.0	9.4	0.0	0.0
NDTX4271-3R (TAMU)	43.4	57.7	1.5	234.5	145.9	63.0	33.9	17.3	54.6	19.7	51.7	31.0	12.3	0.8	13.1	0.0	4.2
ATX961014-1R/Y (TAMU)	32.0	48.5	5.0	261.7	204.7	71.2	21.2	15.8	35.8	13.0	28.1	31.0	35.0	5.2	40.2	0.8	0.0
ATX98500-2P/Y (TAMU)	6.5	11.4	68.9	249.2	199.3	81.5	37.9	14.7	12.0	3.7	41.7	25.4	29.7	3.2	32.9	0.0	0.0
COTX94218-1R (TAMU)	32.9	70.4	0.0	105.6	65.3	48.2	10.9	12.7	29.4	39.1	31.1	14.6	19.8	4.2	24.0	5.3	0.0
NDTX4271-5R (TAMU)	18.2	43.9	18.9	356.1	231.2	67.0	29.8	7.7	95.1	25.3	28.8	20.8	37.5	8.1	45.5	2.5	2.4
NDTX4847-7R (TAMU)	26.2	54.0	5.7	141.0	78.2	52.7	7.4	6.8	55.4	40.5	34.5	21.7	32.2	11.6	43.8	0.0	0.0
NDTX4756-1R/Y (TAMU)	14.3	37.6	35.5	124.3	67.7	53.2	21.6	18.0	35.0	28.7	50.0	30.3	19.7	0.0	19.7	0.0	0.0
ATTX98453-6R (TAMU)	24.0	57.6	5.8	178.8	96.0	47.6	29.6	14.1	53.2	38.4	33.9	26.5	33.8	0.0	33.8	0.0	5.8
Rio Rojo (NDTX4304-1R) (TAMU)	22.8	63.9	1.3	514.2	298.7	59.5	15.8	2.9	199.7	37.6	18.8	18.3	38.3	10.7	49.1	10.2	3.6
Durango Red (CSU)	25.4	59.9	6.0	300.7	167.7	53.5	52.3	21.1	80.8	25.4	51.5	26.8	18.8	1.1	19.9	0.0	1.8
W2609-1R (WI)	32.8	64.2	2.5	271.5	188.6	68.8	20.9	8.2	62.1	23.0	35.7	28.4	33.8	2.2	35.9	0.0	0.0
W3957-6R (WI)	26.6	63.4	5.0	351.9	206.7	57.7	39.7	11.4	105.5	30.9	45.7	32.8	20.6	0.8	21.5	0.0	0.0
W3882-1R (WI)	21.1	48.4	19.2	218.2	127.1	52.7	29.4	12.8	61.7	34.5	33.9	39.7	19.6	0.0	19.6	6.7	0.0
Romance (com)	24.5	54.1	9.4	268.8	193.1	67.5	43.2	20.5	32.5	12.1	64.9	26.6	8.5	0.0	8.5	0.0	0.0
W6270-112 (WI)	26.4	55.4	5.0	367.7	284.8	77.9	34.3	9.4	48.6	12.8	42.0	28.7	20.8	5.6	26.4	2.9	0.0
Mountain Rose (com)	19.0	48.6	12.4	327.4	198.4	63.0	27.8	8.5	101.3	28.5	30.9	29.7	34.7	4.7	39.4	0.0	0.0
Superior (com)	20.3	31.5	12.7	238.9	121.6	42.9	14.2	8.3	103.1	48.8	29.9	28.8	27.1	4.3	31.4	3.0	6.9
$P > F^5$	<0.01	<0.01	<0.01	<0.01	0.02	0.02	<0.01	0.01	<0.01	<0.01	<0.01	0.17	<0.01	0.05	<0.01	0.02	0.51
LSD	8.5	12.9	12.4	181.9	137.8	20.8	20.3	10.5	64.3	18.0	20.8	NS	17.7	8.4	19.5	7.9	NS

1. Sources of material used in this trial: Com = Commercial grower; CSU = David Holm, Colorado State University; TAMU = Creighton Miller, Texas A & M University; WI = UW-Madison, Dept. of Horticulture Potato Breeding Program.
2. Lesion area index. Lesions were rated on a 5-point scale with: 0 = no lesions; 1 = 1-10% of the surface area of the tuber affected; 2 = 10-25% affected; 3 = 25-50% affected; 4 = 50-75% affected; 5 = > 75% affected. The lesion area index = the sum for all classes of [(the number of tubers in that class x the class number) x 100]/(5 x total number of tubers rated). The maximum value for this index (if all tubers were rated 5) is 100.
3. Lesion type index. Lesions were rated on a 5-point scale as described in the text. The type lesion index = the sum for all classes of [(the number of tubers in that class x the class number) x 100]/(5 x the total number of tubers rated). The maximum value for this index (if all tubers were rated 5) is 100.
4. Undersize indicates potatoes < 1 7/8 in. diam.
5. Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05).