POTATO (*Solanum tuberosum*)
Common Scab; *Streptomyces scabies*

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Evaluation of potato cultivars and breeding selections for resistance to common scab – Antigo, 2007.

A trial consisting of 31 potato cultivars and breeding selections was established 8 May at the Langlade County Research Area, Antigo, WI to evaluate reaction of these entries to common scab. The trial was located in a field with a history of common scab. Tubers were cut by hand into approximately 2 oz seedpieces, allowed to heal 24 hr, and then were mechanically planted. The trial was a randomized complete block design. Twenty-one of the entries were replicated four times and an additional eight USDA lines were each placed in one replicate plot only. Each plot consisted of two 10-ft-long rows with spacing 3 ft between rows and 12 in. within the row. Fertilizer applications consisted of 20,000 gal liquid manure/water, applied to the field to promote the potential for development of common scab symptoms, and 9-12-19, 550 lb/A, plus Calcium Sulfate 190 lb/A in the row at planting. Insects were controlled with Platinum applied with the starter fertilizer at 6.7 oz/A. Matrix 1.5 oz/A was applied on 28 Jun for weed control. A standard foliar fungicide program was used for early blight control: Bravo Zn, 2.125 pt/A (15 Jul, 30 Jul, 14 Aug, 27 Aug); Quadris 6 fl oz/A + Bravo Zn 1.5 pt/A (23 Jul, 21 Aug); Endura 3.5 oz + Quadris 6 fl oz (7 Aug). Vines were killed with an application of Reglone, 1.5 pt/A, + surfactant, 1.0 pt/A, 24 Aug. Plots were mechanically harvested and graded 11 Sep. Total yield from each plot was graded 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 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. Rainfall (in.) measured during the growing season was May (2.3); Jun (3.4); Jul (5.3); Aug (2.3) and 1-11 Sep (0.2). An additional 2.2 in. of water was applied as irrigation in two applications (27 Jun and 13 Jul).

Low rainfall led to dry soil conditions during much of the growing season. Low soil moisture, especially during tuberization, favors the development of common scab symptoms. While differences in the lesion area index and the lesion type index were not significant at the 5% level, values differed over a broad range. The lesion area index ranged from 1.7 (NDTX4756-1R/Y) to 14.1 (Russet Burbank). The lesion type index ranged from 1.9 (NDTX4756-1R/Y) to 34.0 (Russet Burbank). The percentage of tubers without symptoms of common scab ranged from 59.4% (Snowden) to 91.6% (NDTX4756-1R/Y). Seven entries exhibited greater than 80% of the harvested tubers free of common scab symptoms. Yields were low, a reflection of dry soil conditions for much of the growing season.

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

Cultivar or breeding line[1]	% of plants emerged 11 Jul	Lesion area index[2]	Lesion type index[3]	% of tubers with no scab symptoms	Yield						
					Total yield cwt/A	US#1		Undersize[4]		Culls	
						cwt/A	%	cwt/A	%	cwt/A	%
Norland (com)	96	8.3	24.6	64.4	136.3	106.7	79.7	5.3	3.8	24.3	16.5
R.Burbank (com)	96	14.1	34.0	40.6	172.1	140.7	82.6	8.9	5.2	22.5	12.3
Snowden (com)	91	9.1	24.0	59.4	167.2	133.6	79.2	8.3	5.3	25.2	15.5
A95109-1 (ID)	90	9.4	19.1	71.3	145.7	121.6	83.3	9.3	6.6	14.9	10.1
A95409-1 (ID)	96	8.6	24.9	60.8	100.0	75.0	79.3	3.6	5.1	21.4	15.6
A96510-4Y (ID)	96	3.6	5.4	81.9	249.6	210.4	83.5	6.0	3.1	33.2	13.4
AOA95154-1 (ID)	93	2.9	3.4	87.5	204.9	184.8	89.6	10.0	5.1	10.2	5.3
AOA95155-7 (ID)	99	8.6	18.0	61.9	208.9	171.9	83.2	14.7	7.9	22.3	8.9
ATX91137-1Ru (TAMU)	96	3.8	9.8	80.6	188.8	160.4	83.9	8.5	5.1	19.8	11.0
CO95051-7W (CSU)	91	3.4	8.8	82.5	157.5	134.1	86.1	10.0	6.6	13.4	7.3
CO96141-4W (CSU)	96	8.6	20.4	65.6	144.3	117.2	80.8	4.2	3.2	22.9	15.9
MSH228-6 (MSU)	96	7.5	16.2	62.6	137.0	126.5	91.4	3.6	2.7	6.9	5.8
MSJ036-A (MSU)	95	2.5	5.6	88.1	228.5	201.6	88.1	9.8	4.7	17.1	7.1
MSJ126-9Y (MSU)	95	6.5	13.3	67.5	132.3	117.2	87.8	8.9	7.0	6.2	5.2
MSJ461-1 (MSU)	94	9.4	23.7	59.8	187.7	163.2	85.2	7.8	6.0	16.7	8.8
MSK061-4 (MSU)	93	5.0	10.8	74.2	105.6	91.1	85.0	9.1	9.2	5.4	5.8
MSK409-1 (MSU)	93	4.8	10.2	75.8	96.7	78.2	80.3	9.3	9.6	9.3	10.0
MSM171-A (MSU)	95	10.8	24.4	64.0	194.9	163.5	82.1	9.4	6.1	22.0	11.7
MSN105-1 (MSU)	89	7.8	16.6	61.3	154.1	131.8	84.8	10.2	6.6	12.2	8.7
NDTX4756-1R/Y (TAMU)	90	1.7	1.9	91.6	91.8	75.0	77.8	6.0	15.4	10.9	6.9
NDTX4847-7R (TAMU)	46	7.8	22.8	61.8	42.1	31.6	69.3	1.6	7.1	8.9	23.6
Stampede Russet (TAMU)	90	3.9	7.9	81.1	124.1	99.1	80.6	8.2	6.6	16.9	12.8
VC1009-1W/Y (CSU)	95	7.6	16.4	60.6	320.9	285.0	87.8	13.1	4.4	22.9	7.8
$P > F$[5]	< 0.01	0.75	0.60	0.60	< 0.01	< 0.01	0.64	< 0.01	0.05	0.70	0.56
LSD	7.3	NS	NS	NS	84.9	78.8	NS	5.3	5.8	NS	NS
The lines below were each present in one non-replicated plot and were not included in the analysis of variance											
06-10321 (USDA-UW)	100	3.0	3.0	85.0	219.3	198.9	90.7	3.6	1.7	16.7	7.6
06-10322 (USDA-UW)	90	2.5	2.5	87.5	184.4	163.4	88.6	7.3	3.9	13.8	7.5
06-10323 (USDA-UW)	94	3.0	8.5	82.5	167.7	125.6	74.9	19.6	11.7	22.5	13.4
06-10324 (USDA-UW)	81	5.0	13.3	77.8	92.9	58.8	63.3	2.9	3.1	31.2	33.6
06-10325 (USDA-UW)	100	1.5	2.5	92.5	296.2	255.6	86.3	3.6	1.2	37.0	12.5
06-10326 (USDA-UW)	81	6.5	11.5	67.5	233.8	203.3	87.0	5.1	2.2	25.4	10.9
06-10327 (USDA-UW)	100	16.5	36.5	25.0	162.6	102.4	62.9	10.9	6.7	49.4	30.4
06-10328 (USDA-UW)	100	7.0	19.5	70.0	163.4	142.3	87.1	5.8	3.6	15.2	9.3

1. Source of tubers: com = commercial grower; CSU = David Holm - Colorado State University; MSU = David Douches, Michigan State University; TAMU= Creighton Miller, Texas A & M University; USDA-UW = Shelley Jansky, USDA, UW Horticulture.
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).