

Evaluation of potato cultivars and breeding selections to identify resistance to early blight - Hancock,

A trial was established 24 Apr at the Hancock Agricultural Research Station, in central WI, to evaluate foliar reaction of 84 potato cultivars and breeding selections to early and late blight. Small whole tubers or hand-cut seedpieces (approximately 2 oz) were mechanically planted in a randomized complete block design with three replications. There were five plants per replicate of each test line. Four Dark Red Norland plants (highly susceptible to both early and late blight) were planted to separate pairs of test lines within a row (the red potatoes also help separate test lines at harvest). Rows with test lines were alternated with rows of Russet Burbank (also susceptible to both early and late blight) to help minimize interplot interference. Spacing was 12 in. within the row and 36 in. between rows. The soil type was Plainfield loamy sand, pH 5.7. Fertilizer applied was: 0-0-60, 250 lb/A, broadcast 3 Apr; 5-10-30, 550 lb/A, banded in the row at planting; and sidedress applications on 8 May (21-0-0, 350 lb/A), 29 May (46-0-0, 225 lb/A) and 30 May (Cal-Sul, 550 lb/A). Insects were controlled with Admire 2F incorporated in the fertilizer at planting (16 fl oz/500 lb) and foliar application of Spintor 2SC (6.0 fl oz/A) 18 Jun and 7 Aug, and Agrimek 0.15EC (12.0 fl oz/A) 28 Jun. Lorox DF (1.0 lb/A) 7 May, Matrix (1 oz/A) + NIS (2 pt/A) 9 Jun and Poast (1.5 pt/A) + Crop Oil Concentrate (1.25 pt/A) 6 Jul were applied for weed control. No fungicides were applied to the plots, and plots were not inoculated but relied on natural dispersal of inoculum for disease establishment. Only early blight caused by *Alternaria solani* was observed in the trial. Varieties were included in the trial for late blight evaluation also, but no late blight (caused by *Phytophthora infestans*) was observed in Wisconsin during the 2007 growing season. Disease severity was rated on each plant weekly (20 Jun – 31 Aug) using the Horsfall-Barratt rating scale. Vines were killed with applications of Reglone (1.0 pt/A) + NIS (1.0 pt/A) 31 Aug and 5 Sep. Tubers were mechanically harvested on 19 Sep and were manually separated into undersize (<1.9 in. diam), US#1 size (>1.9 in.), and culls (misshapen or with green or decayed areas). Rainfall recorded during the growing season (in.) was: 24-30 Apr (1.7); May (3.0); Jun (1.1); Jul (2.5); Aug (7.9); 1-16 Sep (1.0). An additional 20.5 in. of water was applied as overhead sprinkler irrigation in 39 applications (21 May – 10 Sep).

Early blight was the primary foliar disease affecting the health of potato foliage during the 2007 growing season. Environmental conditions favored the early development and rapid increase in severity of early blight, especially from mid-July to vinekill. The first symptoms of early blight were noted on 20 Jun, two weeks earlier than 2006. Disease progressed rapidly in these unsprayed plots, especially on the most susceptible entries such as Dark Red Norland and by 23 Jul, disease severity for this cultivar was > 80%. Disease severity continued to increase and the majority of the foliage of the most susceptible entries was dead prior to the application of vine desiccant. Six out of 84 entries exhibited less than 10% disease severity on 30 Jul, and 15 entries exhibited less than 25% disease severity on this date. Comparing relative area under the disease progress curve (RAUDPC), 67 of the lines tested had RAUDPC values significantly lower than Dark Red Norland and 42 lines had RAUDPC values significantly lower than Russet Burbank. Nine entries had a RAUDPC of 0.250 or lower, a level typically observed when a susceptible cultivar such as Russet Burbank is treated weekly with fungicide sprays. The cultivar Defender which has displayed useful levels of resistance to early blight in past field trials was among the more susceptible entries in this trial. Generally high yields reflected ideal growing conditions for most of the season. Total yields of eight entries exceeded 600 cwt/A and total yields of 13 entries exceeded 500 cwt/A. Four very late maturing entries (431-26, 436-10, 431-6, 424-2) exhibited very low disease severity throughout the season, but produced no tubers larger than 1.9 in. diameter. Several entries represent significant gains in high levels of disease resistance combined with high yields of quality tubers.

Table 1. Foliar disease severity for potato cultivars and breeding selections.

Cultivar or Line	Source ²	Ma- tur- ity ³	Foliar Disease Severity - Early Blight (%) ¹											Relative AUDPC ⁴
			20 Jun	2 Jul	9 Jul	16 Jul	23 Jul	30 Jul	6 Aug	13 Aug	20 Aug	27 Aug	31 Aug	
424-2	ID	VL	---	---	---	1.0	2.5	3.1	5.6	5.9	9.7	7.8	6.9	0.035
431-26	ID	VL	---	---	---	0.0	0.0	3.4	2.6	3.7	4.4	2.7	3.6	0.017
431-6	ID	VL	---	---	---	0.0	2.2	2.8	4.7	4.1	7.7	4.8	5.0	0.026
436-10	ID	VL	0.3	2.3	3.3	4.7	4.5	5.6	10.0	12.5	14.4	15.0	15.6	0.073
A00412-3LB	ID	ML	1.4	1.4	2.8	5.8	10.6	44.4	67.5	62.1	68.8	67.5	69.4	0.328
A00466-1LBC	ID	ML	0.8	1.9	4.4	5.3	21.9	63.3	71.3	75.9	79.7	55.3	62.6	0.376
A01263-6LB	ID	M	1.4	1.2	4.1	6.7	37.3	88.1	88.9	97.0	97.6	98.0	98.2	0.513
A01394-65LB	ID	L	1.1	2.3	3.1	4.2	7.2	37.9	72.3	84.5	89.4	84.4	89.9	0.384
A01458-4LB	ID	ML	0.3	2.0	2.7	4.0	4.4	17.2	38.2	51.9	65.1	74.0	80.3	0.260
A01602-5LB	ID	ML	0.2	1.9	2.1	3.3	6.6	15.0	48.3	62.9	70.0	67.5	73.8	0.277
A96814-65LB	ID	L	1.9	2.3	5.1	10.6	21.7	43.5	68.2	70.6	72.2	74.7	78.3	0.367
A97066-42LB	ID	ML	1.1	2.0	2.3	4.1	7.2	14.4	24.4	57.1	74.4	76.6	79.7	0.263
AC96052-1RU	CSU		1.1	2.0	4.7	6.2	15.3	41.3	52.6	56.8	56.0	65.2	65.1	0.298
AOTX95265-3Ru	TAMU	ML	0.6	2.3	6.4	12.2	63.1	82.5	93.8	94.8	96.4	98.3	97.8	0.543
AOTX95265-4Ru	TAMU	ML	1.4	2.3	4.8	17.2	67.7	90.8	97.1	96.6	98.0	98.3	98.9	0.566
AOTX95295-3Ru	TAMU	EM	0.9	2.3	17.8	39.6	91.6	98.0	99.4	99.4	99.4	99.2	99.4	0.637
AOTX98137-1Ru	TAMU	E	0.8	2.3	5.8	44.4	84.7	97.3	98.4	98.8	98.8	99.2	99.5	0.621
ATTX95490-2W	TAMU	L	0.6	2.3	7.7	10.9	29.4	72.5	76.9	67.5	70.2	72.5	70.0	0.404
ATTX961014-1R/Y	TAMU	L	0.3	2.3	29.2	63.8	92.8	98.6	99.5	99.7	99.7	99.7	99.7	0.674
ATTX98453-6R	TAMU	EM	0.4	1.4	4.1	5.7	28.8	91.2	99.3	99.0	99.5	99.5	99.5	0.522
ATTX98500-2P/Y	TAMU	L	0.3	1.6	2.5	3.5	4.4	7.2	31.2	48.3	60.4	64.6	65.8	0.223
ATTX98500-3P/Y	TAMU	L	0.8	1.4	2.5	3.5	6.8	27.8	79.0	83.6	86.7	88.3	93.0	0.378
ATX91137-1Ru	TAMU	ML	0.2	1.7	3.7	10.3	53.2	84.4	92.0	94.1	97.3	96.7	97.8	0.527
ATX97232-1Ru	TAMU	L	1.2	2.2	4.5	12.2	60.8	70.0	75.0	72.3	78.9	65.3	76.2	0.438
BTX1749-1W/Y	TAMU	M	0.2	2.1	15.0	49.6	93.9	98.3	98.8	98.9	99.2	99.5	99.8	0.645
CO95051-7W	CSU		1.2	2.0	3.9	4.7	13.7	62.9	73.8	74.0	82.8	85.5	88.4	0.401
CO95086-8RU	CSU		0.9	2.3	5.9	22.5	65.0	75.0	82.7	82.5	90.5	86.7	92.8	0.508
CO95172-3RU	CSU		0.5	1.6	4.8	4.8	12.2	50.4	62.1	48.3	50.8	47.9	57.3	0.282
CO96141-4W	CSU		0.8	1.9	5.8	15.0	58.8	76.8	89.1	89.4	90.0	91.6	95.3	0.512
COTX00104-7R	TAMU	M	0.7	2.3	9.8	6.8	47.1	72.7	81.9	85.5	81.1	84.4	90.3	0.467
COTX94218-1R	TAMU	L	1.6	2.0	3.0	6.2	17.6	68.1	86.6	93.1	95.3	98.4	99.5	0.466
Defender	ID	L	0.0	2.3	27.2	41.0	57.1	86.2	95.0	94.9	96.1	98.1	98.0	0.589
Dk Red Norland	Com	E	1.3	2.0	7.6	36.5	81.9	94.7	96.3	97.1	96.5	99.2	99.0	0.603
FL 1867	F-L		0.0	2.3	3.1	6.4	52.1	89.5	97.9	98.0	98.8	98.8	98.8	0.539
FL 1879	F-L		0.5	2.0	3.7	8.0	10.0	60.4	78.1	85.0	79.4	92.0	93.8	0.415
FL line 1	F-L		0.0	1.3	3.1	7.5	48.3	82.0	93.4	88.4	82.6	91.7	92.0	0.492
FL line 2	F-L		1.6	2.2	2.8	5.5	10.0	43.7	71.3	78.8	89.4	82.0	85.2	0.383
FL line 3	F-L		0.7	1.7	3.0	5.6	27.0	74.8	84.1	85.5	90.4	95.2	94.0	0.462
FL line 4	F-L		0.0	1.3	2.7	4.1	13.4	44.7	63.3	64.6	47.4	65.0	54.6	0.300
FL line 5	F-L		0.3	2.0	3.7	7.0	29.4	68.3	55.4	59.8	60.9	74.1	68.3	0.355
FL line 6	F-L		0.8	2.1	2.8	7.3	9.4	53.4	75.6	82.8	85.2	87.1	93.5	0.404
FL line 7	F-L		0.0	2.0	2.3	3.4	5.1	12.2	43.7	65.6	77.0	81.3	89.7	0.293
FL line 8	F-L		0.0	1.0	2.2	3.4	5.7	17.7	58.4	71.9	69.4	76.7	78.8	0.304
MSH228-6	MSU	L	1.1	2.3	6.9	5.9	7.8	14.4	10.6	55.8	47.5	66.0	83.1	0.222
MSJ036-A	MSU	L	1.4	1.9	3.7	3.9	4.5	40.1	66.3	79.1	91.9	89.8	91.1	0.379
MSJ126-9Y	MSU	M	1.1	2.1	8.5	6.7	43.4	71.5	95.0	96.5	98.5	99.6	99.8	0.516
MSJ461-1	MSU	L	0.9	1.4	3.0	5.5	7.2	47.5	78.1	80.0	86.3	88.7	84.7	0.393
MSK061-4	MSU	L	0.9	2.3	4.7	10.3	47.5	61.9	56.7	65.1	71.6	76.6	85.3	0.395
MSK409-1	MSU	L	0.9	2.2	7.2	8.5	40.0	75.6	84.7	84.8	82.2	88.4	88.1	0.468
MSM171-A	MSU	EM	1.1	1.6	4.5	7.1	44.4	78.6	86.3	84.4	82.7	89.8	89.5	0.474

Cultivar or Line	Source ²	Ma- tur- ity ³	Foliar Disease Severity - Early Blight (%) ¹										Relative AUDPC ⁴	
			20 Jun	2 Jul	9 Jul	16 Jul	23 Jul	30 Jul	6 Aug	13 Aug	20 Aug	27 Aug		31 Aug
MSN105-1	MSU	EM	1.6	2.3	5.5	18.7	57.8	79.5	80.5	79.9	83.9	88.0	91.7	0.492
MWTX2609-2Ru	TAMU	L	1.2	2.0	5.3	23.6	63.4	85.5	92.0	89.8	94.6	96.4	97.3	0.546
MWTX2609-4Ru	TAMU	L	0.0	2.0	6.9	8.1	23.7	54.2	63.8	65.0	71.3	76.9	81.9	0.369
NDA5507-3Y	ID	EM	0.2	2.3	4.8	9.1	19.0	51.9	71.5	73.0	86.0	82.7	87.7	0.397
NDTX4271-5R	TAMU	EM	1.2	2.2	5.9	30.8	75.6	89.4	91.9	79.9	86.7	86.1	84.2	0.541
NDTX4756-1R/Y	TAMU	E	1.6	2.2	8.7	8.0	56.7	92.0	94.5	95.1	94.8	96.6	96.6	0.542
NDTX4784-7R	TAMU	M	0.9	2.1	6.4	39.4	81.6	96.6	97.7	96.9	97.9	97.8	98.2	0.608
NDTX4847-7R	TAMU	EM	1.4	2.6	4.6	34.2	67.6	95.7	98.8	99.5	99.5	99.6	99.5	0.594
NY140	CU	L	0.8	2.2	3.3	4.2	7.5	31.5	62.1	63.3	72.5	71.3	87.5	0.320
PA04LB1-1	ID	ML	0.3	1.5	2.2	4.1	6.5	31.2	71.6	87.8	97.0	99.6	100.0	0.398
PA04LNC18-1	ID	L	0.2	2.1	2.7	4.1	5.3	10.3	40.6	56.4	58.8	65.8	74.9	0.247
Purine	Com		0.0	2.1	3.9	4.2	6.9	13.1	44.6	57.5	62.1	71.3	70.0	0.264
Rio Rojo														
NDTX4304-1R	TAMU	EM	0.2	1.8	5.5	12.9	57.5	96.3	99.0	97.7	98.8	98.5	98.8	0.560
Russet Burbank	Com	L	0.6	2.0	4.4	7.8	37.7	67.9	85.6	91.9	94.1	97.0	97.7	0.483
TX1475-3W	TAMU	ML	1.3	2.3	5.9	14.7	59.7	84.8	87.1	78.0	84.3	87.1	92.0	0.499
TX1674-1W/Y	TAMU	L	1.1	1.4	4.4	8.4	15.7	58.0	55.6	72.9	80.3	85.9	86.6	0.380
TXA549-1Ru	TAMU	L	0.4	2.3	3.6	4.4	18.0	69.5	78.9	80.9	79.6	84.8	90.1	0.418
UNTX383-3WR/Y	TAMU	M	0.0	2.0	3.5	4.9	20.8	79.9	97.1	96.7	98.2	99.2	99.2	0.496
VC1009-1W/Y	CSU		1.3	1.6	8.0	4.7	7.5	19.5	58.3	65.4	66.7	68.1	63.3	0.297
W2253-5rus	UW		1.7	2.3	5.1	6.1	21.6	52.3	70.8	84.8	91.7	95.0	97.0	0.427
W2564-2	UW		1.2	2.0	2.7	3.3	4.2	8.4	34.0	57.1	59.6	64.2	66.3	0.236
W2609-1R	UW		0.2	2.3	4.7	14.8	80.7	97.4	99.0	98.8	98.8	99.0	100.0	0.587
W3160-5rusLB	UW		0.9	2.2	4.4	3.9	6.6	47.9	71.3	76.9	77.5	76.9	83.4	0.366
W3382-1R	UW		0.5	2.3	4.4	11.9	43.5	89.1	95.8	97.2	96.7	96.4	96.6	0.530
W3743-5rus	UW		0.2	2.0	3.3	7.2	11.9	29.6	42.7	43.5	38.1	43.3	56.8	0.223
W3852-4Y	UW		0.4	2.3	3.0	5.3	10.6	39.8	60.8	67.2	58.2	54.2	72.5	0.303
W3952-3rus	UW		1.9	2.2	4.5	8.1	16.2	62.5	85.6	85.0	88.9	90.3	89.7	0.440
W4016-4	UW		0.8	2.2	5.3	5.3	7.5	29.8	16.2	28.3	27.5	52.1	59.6	0.177
W4697-2 Rus	UW		0.2	2.3	5.9	11.8	14.6	48.4	71.7	67.5	83.3	88.4	88.5	0.390
W5716-1rus	UW		0.3	2.3	3.6	7.2	8.4	43.8	72.8	79.4	89.8	87.0	89.8	0.391
W6153-6Yrus	UW		0.5	2.3	5.3	21.9	78.8	96.7	98.4	98.9	98.9	98.7	98.7	0.591
W6234-4 Rus	UW		0.3	2.2	4.1	10.0	52.1	67.1	92.3	94.2	94.2	95.2	97.0	0.505
W6270-1R	UW		0.5	2.2	4.5	7.8	41.0	82.8	87.2	88.9	93.9	95.0	95.8	0.497
W7070-2 Rus	UW		0.6	1.9	3.9	12.0	59.0	68.8	80.6	81.9	84.1	83.8	88.4	0.471
$P > F^6$			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
LSD			1.2	0.8	6.9	14.1	21.3	18.7	16.1	16.0	15.4	15.6	15.4	0.068

1 Severity rated on a Horsfall-Barratt scale of 0 (no infection) to 11 (all foliage and stems dead). Ratings were converted to percentages.

2 Sources of material used in this trial

Com	Commercial grower
CSU	Colorado State University - David Holm
CU	Cornell University - Walter DeJong
F-L	Frito-Lay, Bob Moerkerke
ID	USDA/ARS Aberdeen, ID - Rich Novy
MSU	Michigan State University - David Douches
TAMU	Texas A & M University - Creighton Miller
UW	UW Potato Breeding Program - Jiwan Palta, Bryan Bowan and Felix Navarro

3 Maturity group: E = Early; EM = Early-Medium; L = Late; L-VL = Late to Very Late; M = Medium; ML = Medium to Late; NK = Not known; VL = Very Late

4 Relative area under the disease progress curve. Data for each date were plotted on a graph and the area under the line was calculated for each treatment providing a measure of the relative severity of disease throughout the season. A disease rating of 100% for the entire season would produce a value of 1.0. All relative AUDPC values are expressed as a proportion of this value. Either decreased disease severity or later disease development contribute to lower relative areas under the disease progress curve.

5 These lines were exceedingly slow to emerge. There were no plants emerged until after first 3 weeks of rating. The foliage on these plants was thus less mature throughout the season that most of the other lines tested. Since early blight is more severe on older foliage, these lines may not be as resistant as they appear.

6 Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05).

Table 2. Yield for potato cultivars and breeding selections.

Cultivar or Line	Yield ¹					
	Total lb/hill	cwt/A		%		
		Total	US#1 size	US#1 size	Undersize	Culls
424-2	0.0	1.2	0.0	0.0	100.0	0.0
431-26	0.0	3.4	0.0	0.0	100.0	0.0
431-6	0.0	0.0	0.0	0.0	0.0	0.0
436-10	0.2	32.9	0.0	0.0	100.0	0.0
A00412-3LB	3.4	492.7	422.0	85.7	8.4	5.9
A00466-1LBC	3.2	462.7	369.8	79.7	8.2	12.2
A01263-6LB	1.3	183.4	122.0	67.0	30.7	2.3
A01394-65LB	2.4	342.7	265.2	77.7	17.4	5.0
A01458-4LB	2.7	386.7	206.9	57.1	36.1	6.8
A01602-5LB	2.9	424.0	267.2	62.4	15.4	22.2
A96814-65LB	2.3	339.3	278.3	79.0	19.4	1.6
A97066-42LB	3.5	506.3	374.6	73.9	7.3	18.7
AC96052-1RU	2.7	389.1	334.9	86.1	11.7	2.1
AOTX95265-3Ru	2.4	353.3	271.0	77.5	15.9	6.6
AOTX95265-4Ru	2.8	399.8	342.7	85.5	7.6	6.9
AOTX95295-3Ru	2.2	324.3	230.4	71.0	29.0	0.0
AOTX98137-1Ru	1.9	275.9	183.0	65.3	34.7	0.0
ATTX95490-2W	5.4	784.1	494.6	63.6	7.6	28.8
ATTX961014-1R/Y	2.1	303.0	248.8	81.2	17.9	0.9
ATTX98453-6R	1.4	209.3	181.5	87.7	11.7	0.6
ATTX98500-2P/Y	4.7	685.3	548.9	79.5	5.3	15.2
ATTX98500-3P/Y	2.2	322.7	227.5	65.7	20.1	14.2
ATX91137-1Ru	2.5	364.2	283.6	77.6	8.9	13.5
ATX97232-1Ru	3.2	468.5	385.3	82.3	15.2	2.5
BTX1749-1W/Y	1.5	215.9	168.4	78.6	18.8	2.6
CO95051-7W	2.6	382.4	330.1	86.3	10.1	3.5
CO95086-8RU	2.9	425.9	361.1	84.9	14.3	0.9
CO95172-3RU	3.3	472.4	372.7	79.1	14.3	6.6
CO96141-4W	3.3	475.3	425.9	89.5	4.6	5.9
COTX00104-7R	3.5	507.0	408.7	79.8	7.0	13.2
COTX94218-1R	2.0	295.2	227.5	76.8	20.4	2.8
Defender	1.2	179.3	98.3	55.4	39.9	4.7
Dk Red Norland	3.0	435.1	292.1	68.1	13.7	18.2
FL 1867	1.5	214.4	157.8	72.9	22.5	4.5
FL 1879	2.1	311.7	289.4	92.6	1.2	6.2
FL line 1	1.0	152.0	131.6	58.1	38.3	3.6
FL line 2	2.2	317.5	297.2	93.5	6.5	0.0
FL line 3	2.0	296.5	266.9	89.6	8.9	1.5
FL line 4	2.5	365.9	305.2	82.9	2.5	14.6
FL line 5	1.6	227.5	133.6	58.8	36.4	4.8
FL line 6	2.7	390.3	327.7	83.5	9.2	7.3
FL line 7	1.5	218.1	156.7	69.7	25.4	4.9
FL line 8	1.9	279.3	260.9	93.5	1.6	4.9
MSH228-6	3.6	523.7	457.9	87.8	5.0	7.2
MSJ036-A	3.9	570.2	505.3	88.1	9.5	2.4
MSJ126-9Y	1.4	203.8	160.4	69.8	28.5	1.7
MSJ461-1	3.2	460.8	403.7	87.4	9.5	3.1
MSK061-4	3.2	465.6	323.3	70.0	14.5	15.4
MSK409-1	2.2	324.5	222.4	68.8	17.8	13.4
MSM171-A	3.2	458.8	378.5	82.7	7.4	9.9
MSN105-1	3.1	445.3	318.5	70.9	25.4	3.7
MWTX2609-2Ru	2.2	325.5	214.4	64.2	33.1	2.7
MWTX2609-4Ru	4.6	663.1	479.2	72.1	10.5	17.4
NDA5507-3Y	3.1	448.6	357.8	79.8	11.7	8.5
NDTX4271-5R	4.0	577.9	434.6	75.8	12.6	11.6
NDTX4756-1R/Y	1.7	239.6	118.1	49.2	48.3	2.5
NDTX4784-7R	2.2	325.5	243.2	72.7	16.0	11.3

Cultivar or Line	Yield ¹					
	Total lb/hill	cwt/A		%		
		Total	US#1 size	US#1 size	Undersize	Culls
NDTX4847-7R	1.6	230.4	197.8	86.8	13.2	0.0
NY140	6.0	864.4	828.6	95.9	2.2	1.9
PA04LB1-1	3.3	485.0	400.5	82.3	5.8	11.8
PA04LNC18-1	3.4	486.7	381.6	78.1	10.9	11.0
Purine	3.0	442.7	240.4	54.9	8.9	36.2
Rio Rojo NDTX4304-1R	3.3	485.2	416.2	85.7	9.5	4.8
Russet Burbank	3.0	439.5	280.7	61.3	23.0	15.8
TX1475-3W	3.0	438.0	380.2	86.7	5.6	7.8
TX1674-1W/Y	1.1	155.4	71.4	45.4	46.0	8.6
TXA549-1Ru	3.4	491.0	379.7	78.3	9.4	12.3
UNTX383-3WR/Y	1.3	191.2	148.4	71.6	21.9	6.5
VC1009-1W/Y	5.0	724.1	566.3	77.7	11.8	10.6
W2253-5rus	2.3	339.8	274.9	80.4	7.2	12.5
W2564-2	4.2	604.0	570.2	94.3	3.2	2.5
W2609-1R	2.0	291.1	221.7	75.0	22.9	2.1
W3160-5rusLB	2.1	307.8	164.6	52.8	38.7	8.6
W3382-1R	2.8	401.7	266.2	66.7	26.7	6.6
W3743-5rus	4.4	637.9	514.0	80.5	11.9	7.6
W3852-4Y	3.1	454.0	406.6	89.5	5.1	5.4
W3952-3rus	2.9	425.0	268.1	63.4	30.8	5.7
W4016-4	4.3	617.6	399.8	63.2	12.4	24.4
W4697-2 Rus	3.2	460.2	371.3	82.5	11.7	5.7
W5716-1rus	3.3	478.2	289.4	61.5	15.1	23.4
W6153-6Yrus	2.0	294.3	179.1	61.2	38.1	0.7
W6234-4 Rus	3.0	435.6	358.2	82.0	15.9	2.1
W6270-1R	3.3	472.4	392.0	82.5	16.6	0.9
W7070-2 Rus	3.2	461.7	384.3	83.2	13.2	3.6
<i>P</i> > <i>F</i> ²	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
LSD	0.8	122.8	119.3	19.6	16.8	10.5

1. Yield from 5 ft of row, converted to cwt/A. Yield was graded by hand by passing tubers over a 1 7/8-in. grading chain to separate undersize (<1 7/8 in. diam), from those that were ≥1 7/8 in. These larger tubers were classed as US#1 size or culls (if rotted, green or severely misshapen).
2. Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05). NS = not significant at *P* = 0.05

Table 3. Data ranked according to disease and yield measurements. (Footnotes are at end of Table 3C)

A. Sorted by Early Blight AUDPC (increasing)

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²		Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size			Total	US#1 size
431-26	0.017	3.4	0.0	NY140	0.320	864.4	828.6
431-6	0.026	0.0	0.0	A00412-3LB	0.328	492.7	422.0
424-2	0.035	1.2	0.0	FL line 5	0.355	227.5	133.6
436-10	0.073	32.9	0.0	W3160-5rusLB	0.366	307.8	164.6
W4016-4	0.177	617.6	399.8	A96814-65LB	0.367	339.3	278.3
MSH228-6	0.222	523.7	457.9	MWTX2609-4Ru	0.369	663.1	479.2
W3743-5rus	0.223	637.9	514.0	A00466-1LBC	0.376	462.7	369.8
ATTX98500-2P/Y	0.223	685.3	548.9	ATTX98500-3P/Y	0.378	322.7	227.5
W2564-2	0.236	604.0	570.2	MSJ036-A	0.379	570.2	505.3
PA04LNC18-1	0.247	486.7	381.6	TX1674-1W/Y	0.380	155.4	71.4
A01458-4LB	0.260	386.7	206.9	FL line 2	0.383	317.5	297.2
A97066-42LB	0.263	506.3	374.6	A01394-65LB	0.384	342.7	265.2
Purine	0.264	442.7	240.4	W4697-2 Rus	0.390	460.2	371.3
A01602-5LB	0.277	424.0	267.2	W5716-1rus	0.391	478.2	289.4
CO95172-3RU	0.282	472.4	372.7	MSJ461-1	0.393	460.8	403.7
FL line 7	0.293	218.1	156.7	MSK061-4	0.395	465.6	323.3
VC1009-1W/Y	0.297	724.1	566.3	NDA5507-3Y	0.397	448.6	357.8
AC96052-1RU	0.298	389.1	334.9	PA04LB1-1	0.398	485.0	400.5
FL line 4	0.300	365.9	305.2	CO95051-7W	0.401	382.4	330.1
W3852-4Y	0.303	454.0	406.6	ATTX95490-2W	0.404	784.1	494.6
FL line 8	0.304	279.3	260.9	FL line 6	0.404	390.3	327.7

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size
FL 1879	0.415	311.7	289.4
TXA549-1Ru	0.418	491.0	379.7
W2253-5rus	0.427	339.8	274.9
ATX97232-1Ru	0.438	468.5	385.3
W3952-3rus	0.440	425.0	268.1
FL line 3	0.462	296.5	266.9
COTX94218-1R	0.466	295.2	227.5
COTX00104-7R	0.467	507.0	408.7
MSK409-1	0.468	324.5	222.4
W7070-2 Rus	0.471	461.7	384.3
MSM171-A	0.474	458.8	378.5
Russet Burbank	0.483	439.5	280.7
MSN105-1	0.492	445.3	318.5
FL line 1	0.492	152.0	131.6
UNTX383-3WR/Y	0.496	191.2	148.4
W6270-1R	0.497	472.4	392.0
TX1475-3W	0.499	438.0	380.2
W6234-4 Rus	0.505	435.6	358.2
CO95086-8RU	0.508	425.9	361.1
CO96141-4W	0.512	475.3	425.9
A01263-6LB	0.513	183.4	122.0
MSJ126-9Y	0.516	203.8	160.4
ATTX98453-6R	0.522	209.3	181.5

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size
ATX91137-1Ru	0.527	364.2	283.6
W3382-1R	0.530	401.7	266.2
FL 1867	0.539	214.4	157.8
NDTX4271-5R	0.541	577.9	434.6
NDTX4756-1R/Y	0.542	239.6	118.1
AOTX95265-3Ru	0.543	353.3	271.0
MWTX2609-2Ru	0.546	325.5	214.4
Rio Rojo NDTX4304-1R	0.560	485.2	416.2
AOTX95265-4Ru	0.566	399.8	342.7
W2609-1R	0.587	291.1	221.7
Defender	0.589	179.3	98.3
W6153-6Yrus	0.591	294.3	179.1
NDTX4847-7R	0.594	230.4	197.8
Dk Red Norland	0.603	435.1	292.1
NDTX4784-7R	0.608	325.5	243.2
AOTX98137-1Ru	0.621	275.9	183.0
AOTX95295-3Ru	0.637	324.3	230.4
BTX1749-1W/Y	0.645	215.9	168.4
ATTX961014-1R/Y	0.674	303.0	248.8
P>F ³	< 0.01	< 0.01	< 0.01
LSD	0.068	122.8	119.3

B. Sorted by total yield (decreasing)

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size
NY140	0.320	864.4	828.6
ATTX95490-2W	0.404	784.1	494.6
VC1009-1W/Y	0.297	724.1	566.3
ATTX98500-2P/Y	0.223	685.3	548.9
MWTX2609-4Ru	0.369	663.1	479.2
W3743-5rus	0.223	637.9	514.0
W4016-4	0.177	617.6	399.8
W2564-2	0.236	604.0	570.2
NDTX4271-5R	0.541	577.9	434.6
MSJ036-A	0.379	570.2	505.3
MSH228-6	0.222	523.7	457.9
COTX00104-7R	0.467	507.0	408.7
A97066-42LB	0.263	506.3	374.6
A00412-3LB	0.328	492.7	422.0
TXA549-1Ru	0.418	491.0	379.7
PA04LNC18-1	0.247	486.7	381.6
Rio Rojo NDTX4304-1R	0.560	485.2	416.2
PA04LB1-1	0.398	485.0	400.5
W5716-1rus	0.391	478.2	289.4
CO96141-4W	0.512	475.3	425.9
CO95172-3RU	0.282	472.4	372.7
W6270-1R	0.497	472.4	392.0
ATX97232-1Ru	0.438	468.5	385.3
MSK061-4	0.395	465.6	323.3
A00466-1LBC	0.376	462.7	369.8
W7070-2 Rus	0.471	461.7	384.3
MSJ461-1	0.393	460.8	403.7
W4697-2 Rus	0.390	460.2	371.3
MSM171-A	0.474	458.8	378.5
W3852-4Y	0.303	454.0	406.6
NDA5507-3Y	0.397	448.6	357.8
MSN105-1	0.492	445.3	318.5
Purine	0.264	442.7	240.4
Russet Burbank	0.483	439.5	280.7
TX1475-3W	0.499	438.0	380.2
W6234-4 Rus	0.505	435.6	358.2
Dk Red Norland	0.603	435.1	292.1

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size
CO95086-8RU	0.508	425.9	361.1
W3952-3rus	0.440	425.0	268.1
A01602-5LB	0.277	424.0	267.2
W3382-1R	0.530	401.7	266.2
AOTX95265-4Ru	0.566	399.8	342.7
FL line 6	0.404	390.3	327.7
AC96052-1RU	0.298	389.1	334.9
A01458-4LB	0.260	386.7	206.9
CO95051-7W	0.401	382.4	330.1
FL line 4	0.300	365.9	305.2
ATX91137-1Ru	0.527	364.2	283.6
AOTX95265-3Ru	0.543	353.3	271.0
A01394-65LB	0.384	342.7	265.2
W2253-5rus	0.427	339.8	274.9
A96814-65LB	0.367	339.3	278.3
MWTX2609-2Ru	0.546	325.5	214.4
NDTX4784-7R	0.608	325.5	243.2
MSK409-1	0.468	324.5	222.4
AOTX95295-3Ru	0.637	324.3	230.4
ATTX98500-3P/Y	0.378	322.7	227.5
FL line 2	0.383	317.5	297.2
FL 1879	0.415	311.7	289.4
W3160-5rusLB	0.366	307.8	164.6
ATTX961014-1R/Y	0.674	303.0	248.8
FL line 3	0.462	296.5	266.9
COTX94218-1R	0.466	295.2	227.5
W6153-6Yrus	0.591	294.3	179.1
W2609-1R	0.587	291.1	221.7
FL line 8	0.304	279.3	260.9
AOTX98137-1Ru	0.621	275.9	183.0
NDTX4756-1R/Y	0.542	239.6	118.1
NDTX4847-7R	0.594	230.4	197.8
FL line 5	0.355	227.5	133.6
FL line 7	0.293	218.1	156.7
BTX1749-1W/Y	0.645	215.9	168.4
FL 1867	0.539	214.4	157.8
ATTX98453-6R	0.522	209.3	181.5

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size
MSJ126-9Y	0.516	203.8	160.4
UNTX383-3WR/Y	0.496	191.2	148.4
A01263-6LB	0.513	183.4	122.0
Defender	0.589	179.3	98.3
TX1674-1W/Y	0.380	155.4	71.4
FL line 1	0.492	152.0	131.6
436-10	0.073	32.9	0.0

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size
431-26	0.017	3.4	0.0
424-2	0.035	1.2	0.0
431-6	0.026	0.0	0.0
<i>P</i> > <i>F</i> ³	< 0.01	< 0.01	< 0.01
LSD	0.068	122.8	119.3

C. Sorted by yield US#1 size tubers (decreasing)

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size
NY140	0.320	864.4	828.6
W2564-2	0.236	604.0	570.2
VC1009-1W/Y	0.297	724.1	566.3
ATTX98500-2P/Y	0.223	685.3	548.9
W3743-5rus	0.223	637.9	514.0
MSJ036-A	0.379	570.2	505.3
ATTX95490-2W	0.404	784.1	494.6
MWTX2609-4Ru	0.369	663.1	479.2
MSH228-6	0.222	523.7	457.9
NDTX4271-5R	0.541	577.9	434.6
CO96141-4W	0.512	475.3	425.9
A00412-3LB	0.328	492.7	422.0
Rio Rojo NDTX4304-1R	0.560	485.2	416.2
COTX00104-7R	0.467	507.0	408.7
W3852-4Y	0.303	454.0	406.6
MSJ461-1	0.393	460.8	403.7
PA04LB1-1	0.398	485.0	400.5
W4016-4	0.177	617.6	399.8
W6270-1R	0.497	472.4	392.0
ATX97232-1Ru	0.438	468.5	385.3
W7070-2 Rus	0.471	461.7	384.3
PA04LNC18-1	0.247	486.7	381.6
TX1475-3W	0.499	438.0	380.2
TXA549-1Ru	0.418	491.0	379.7
MSM171-A	0.474	458.8	378.5
A97066-42LB	0.263	506.3	374.6
CO95172-3RU	0.282	472.4	372.7
W4697-2 Rus	0.390	460.2	371.3
A00466-1LBC	0.376	462.7	369.8
CO95086-8RU	0.508	425.9	361.1
W6234-4 Rus	0.505	435.6	358.2
NDA5507-3Y	0.397	448.6	357.8
AOTX95265-4Ru	0.566	399.8	342.7
AC96052-1RU	0.298	389.1	334.9
CO95051-7W	0.401	382.4	330.1
FL line 6	0.404	390.3	327.7
MSK061-4	0.395	465.6	323.3
MSN105-1	0.492	445.3	318.5
FL line 4	0.300	365.9	305.2
FL line 2	0.383	317.5	297.2
Dk Red Norland	0.603	435.1	292.1
W5716-1rus	0.391	478.2	289.4
FL 1879	0.415	311.7	289.4
ATX91137-1Ru	0.527	364.2	283.6

Cultivar or breeding selection	Relative AUDPC ¹	Yield cwt/A ²	
		Total	US#1 size
Russet Burbank	0.483	439.5	280.7
A96814-65LB	0.367	339.3	278.3
W2253-5rus	0.427	339.8	274.9
AOTX95265-3Ru	0.543	353.3	271.0
W3952-3rus	0.440	425.0	268.1
A01602-5LB	0.277	424.0	267.2
FL line 3	0.462	296.5	266.9
W3382-1R	0.530	401.7	266.2
A01394-65LB	0.384	342.7	265.2
FL line 8	0.304	279.3	260.9
ATTX961014-1R/Y	0.674	303.0	248.8
NDTX4784-7R	0.608	325.5	243.2
Purine	0.264	442.7	240.4
AOTX95295-3Ru	0.637	324.3	230.4
ATTX98500-3P/Y	0.378	322.7	227.5
COTX94218-1R	0.466	295.2	227.5
MSK409-1	0.468	324.5	222.4
W2609-1R	0.587	291.1	221.7
MWTX2609-2Ru	0.546	325.5	214.4
A01458-4LB	0.260	386.7	206.9
NDTX4847-7R	0.594	230.4	197.8
AOTX98137-1Ru	0.621	275.9	183.0
ATTX98453-6R	0.522	209.3	181.5
W6153-6Yrus	0.591	294.3	179.1
BTX1749-1W/Y	0.645	215.9	168.4
W3160-5rusLB	0.366	307.8	164.6
MSJ126-9Y	0.516	203.8	160.4
FL 1867	0.539	214.4	157.8
FL line 7	0.293	218.1	156.7
UNTX383-3WR/Y	0.496	191.2	148.4
FL line 5	0.355	227.5	133.6
FL line 1	0.492	152.0	131.6
A01263-6LB	0.513	183.4	122.0
NDTX4756-1R/Y	0.542	239.6	118.1
Defender	0.589	179.3	98.3
TX1674-1W/Y	0.380	155.4	71.4
431-26	0.017	3.4	0.0
431-6	0.026	0.0	0.0
424-2	0.035	1.2	0.0
436-10	0.073	32.9	0.0
<i>P</i> > <i>F</i> ³	< 0.01	< 0.01	< 0.01
LSD	0.068	122.8	119.3

1. Relative area under the disease progress curve. Data for each date were plotted on a graph and the area under the line was calculated for each treatment providing a measure of the relative severity of disease throughout the season. A disease rating of 100% for the entire season would produce a value of 1.0. All relative AUDPC values are expressed as a proportion of this value. Either decreased disease severity or later disease development contribute to lower relative areas under the disease progress curve.
2. Yield from 5 ft of row, converted to cwt/A. Yield was graded by hand by passing tubers over a 1 7/8-in. grading chain to separate undersize (<1 7/8 in. diam), from those that were ≥1 7/8 in. These larger tubers were classed as US#1 size or culls (if rotted, green or severely misshapen).
3. Analysis of variance was performed on data, and Fisher's protected least significant difference (LSD) was calculated (alpha=0.05)

