



RUTGERS

New Jersey Agricultural
Experiment Station

Screening Bell Peppers for Resistance to Bacterial Leaf Spot (*Xanthomonas spp.*)

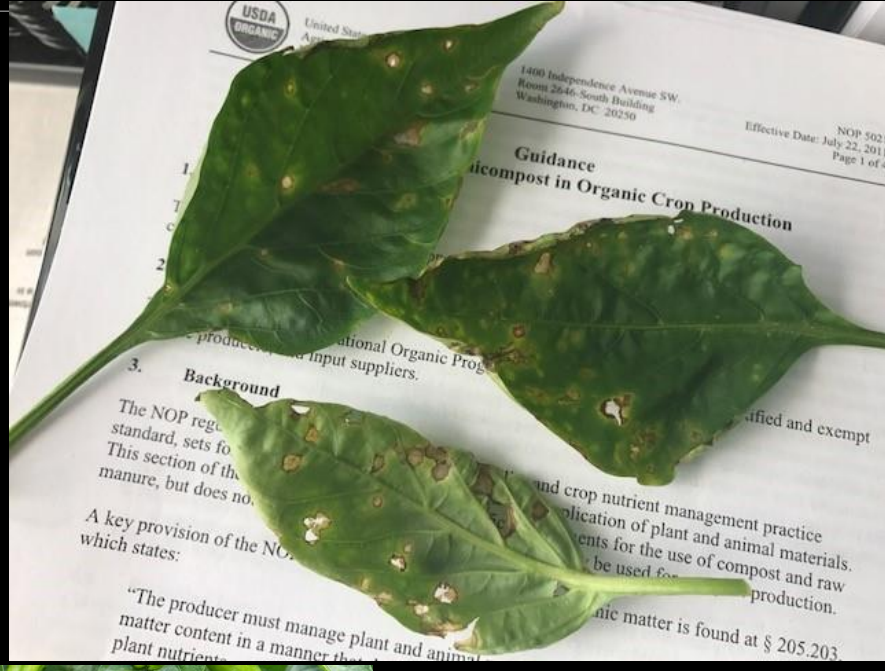
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Bacterial leaf spot in New Jersey

- Very common in pepper and tomato plantings throughout New Jersey especially in the South.
- Same bacterium...
- Overwinters in infected debris in soil
- Once established in field/farm its a yearly problem...
- Long crop rotations are needed, but most NJ vegetable farmers are land locked.







Surveying for BLS races in New Jersey

- Up until recently (as little as 12 years ago), only BLS races 1, 2 & 3 were detected in southern New Jersey...
- Therefore commonly grown bell pepper cultivars were effective at limiting the spread and losses to BLS.
- More importantly, over the years fewer and fewer transplants were brought up from the South which has helped limit BLS.
- In 2004, BLS was detected in some cultivars with resistance to races 1,2, & 3...
- This was the first sign that new BLS races may have been introduced in our region...

- Based on a differential study and what was happening in grower fields we suspected that in 2005/2006 Races 4 and 5 were beginning to appear...
- Thus cultivars with only Race 1-3 were not going to provide sufficient resistance...
- In 2012, symptoms of BLS in cultivars with resistance to Races 1 – 5 started to express symptoms...
- In a differential study in 2013, only one line (9235) with resistance to Races 1 to 10 did not show any BLS symptoms...
- Other lines without resistance to Race 6/10 developed symptoms...

- So we know that by 2014 we had at least Races 1,2,3,4,5 and 6...
- Since Phytophthora-resistant lines are so widely grown in New Jersey, and some cultivars like Paladin have no resistance, and others such as Aristotle (1-3), 1819 (1-5, 7 and 9), and Intruder (1-3) the threat of BLS remains high...
- Seed companies over the last three years have started to release cultivars with resistance to races 1-10

Seed Company	Cultivar
Sakata	Samurai Ninja
Clifton	Green Flash Galleon Mariner
Harris Moran	Skyhawk Raven Tracer Prowler
Seminis	Playmaker Green machine Autry

Cultural Practices

- Peppers were transplanted in double rows 18 inches between plants on beds 5 ft center to center covered with black plastic and one drip tape between the rows.
- Plots were 15 ft long with 4 replications RCBD
- Plants were set by hand on June 16.
- All cultural practices were carried out by the grower
- Plots were rated weekly for the presence of BLS
- Plots were harvested 5 times starting 54 days after transplanting from August 9 to September 29
- Fruit was graded based on weight – Extra Large (>0.50 lbs.); Large (0.33-0.49 lbs.); Medium (0.25-0.32 lbs.); Commercial (misshapen, but over 0.25 lbs.) and Culls



Cultivar	1	2	3	4	5	6	7	8	9	10
9325	X	X	X	X	X	X	X	X	X	X
Prowler	X	X	X	X	X	X	X	X	X	X
Paladin										
Turnpike	X	X	X	X	X		X	X	X	
Raven	X	X	X	X	X	X	X	X	X	X
Tracer	X	X	X	X	X	X	X	X	X	X
CLX-1108	X	X	X	X	X	X	X	X	X	X
Revolution	X	X	X		X					

Date	Rep	Entries							
8/11/2017	IV	4	3	5	2	1	7	6	8
	III	7	2	8	4	6	3	5	1
	II	4	1	6	7	8	2	5	3
	I	3	8	4	7	2	6	1	5

Date	Rep	Entries							
8/18/2017	IV	4	3	5	2	1	7	6	8
	III	7	2	8	4	6	3	5	1
	II	4	1	6	7	8	2	5	3
	I	3	8	4	7	2	6	1	5

Date	Rep	Entries							
8/25/2017	IV	4	3	5	2	1	7	6	8
	III	7	2	8	4	6	3	5	1
	II	4	1	6	7	8	2	5	3
	I	3	8	4	7	2	6	1	5

No.	Entry	No.	Entry
1	9325	5	Raven
2	Prowler	6	Tracer
3	Paladin	7	CLX-1108
4	Turnpike	8	Revolution

Marketable Yield (28 lb. boxes) per Acre and Percent Marketable – 2017 - Vineland, NJ

Variety/Lines	X large	Large	Medium	% marketable	Total Marketable
Turnpike	997 a	556 cd	82 bc	98.6 a	1635 a
Prowler	615 c	761 ab	113 b	94.9 c	1488 ab
CLX-1108	637 bc	678 abc	119 ab	97.5 ab	1434 abc
Paladin	430 d	821 a	170 a	97.7 ab	1422 a-d
Revolution	804 b	490 d	47 c	96.5 bc	1341 bcd
Raven	610 cd	582 cd	94 bc	96.9 abc	1285 bcd
Tracer	562 cd	531 cd	81 bc	98.4 ab	1174 cd
9325	504 cd	603 bcd	57 c	98.3 ab	1163 d
LSD	183.6	160.6	52.9	2.0	265.9

Percent Boxes Per Acre by Harvest Date – 2017 - Vineland, NJ

Variety/Line	Harvest 1	Harvest 2	Early Harvest	Late Harvest
Turnpike	18.4	47.0	65.4	36.7
Prowler	16.8	48.2	65.0	35.0
CLX-1108	11.5	51.8	63.3	36.7
Paladin	24.3	41.2	65.5	34.5
Revolution	25.2	49.6	74.8	25.2
Raven	16.2	57.2	73.4	26.6
Tracer	14.4	53.9	68.3	31.7
9325	17.5	51.2	68.7	31.3

Entry	Fruit Color	Recess Shoulder	Fruit Smooth	Fruit Gloss	Uniform	L/W	Wall thickness mm	Lobe Number
9325	9	8	9	8	8	0.92	6.06	3.8
Prowler	6	7	9	7	7	1.05	7.02	3.8
Paladin	7	8	9	7	8	1.06	6.15	3.9
Turnpike	7	7	8	7	6	1.03	6.22	4.0
Raven	8	9	8	6	8	0.89	6.46	3.6
Tracer	8	9	9	6	6	0.79	6.40	3.8
CLX-1108	6	9	8	6	8	0.85	6.37	3.9
Revolution	7	7	7	6	7	0.95	6.03	3.7

Fruit Color - 1=Pale Green; 9=Dark Green

Recess Shoulder – 1=Deep; 9=Slight

Fruit Smoothness – 1=Rough; 9=Smooth

Fruit Gloss – 1=Dull; 9=Shiny

Uniform – 1=Not uniform; 9=Uniform



- Nice looking fruit
- Highest yielder



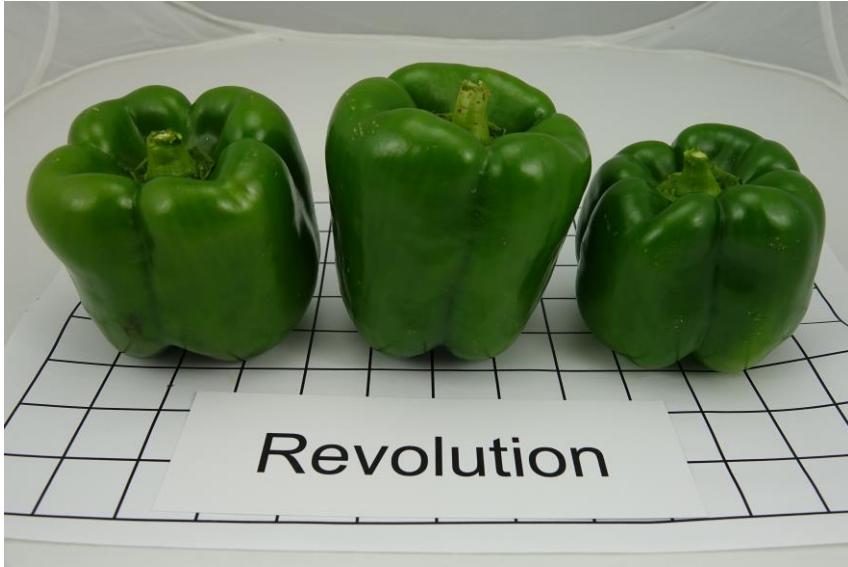
- Light color
- Recess shoulder
- Thick walled



- Medium green
- Slight recessed shoulder
- Slightly elongated



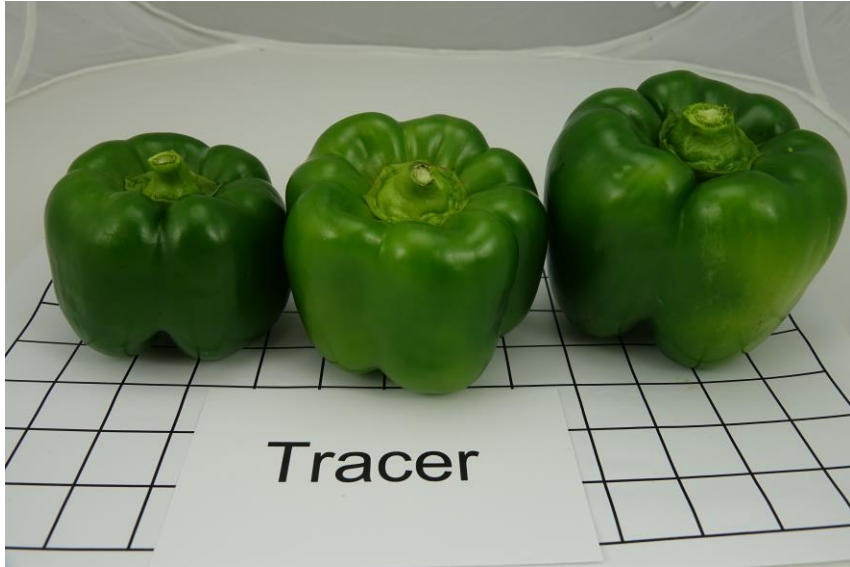
- Light color
- Slight recessed shoulder
- Deep blossom end



- Recessed shoulder
- Blocky fruit



- Dark green
- Slight recessed shoulder
- Blocky fruit



- Slight recessed shoulder
- Good color and smooth fruit
- Blocky fruit

- Most characteristics very good
- Blocky fruit
- Lowest yielder

- There are options available with resistance to bacterial leaf spot
- Yield suppression may be a concern with some resistant cultivars
- A grower can not rely on just a resistant cultivar, but must have a complete management package including clean seed; disinfected stakes; not working in the field when wet and chemical applications.
- If *Phytophthora* is a concern base the decision on a variety on whether it has resistance or tolerance to *Phytophthora*

Questions

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