

Evaluation of lettuce germplasm for resistance to *Impatiens necrotic spot virus*

Euphytica

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Online Resource 1. Summary statistics of disease severity and incidence							
Experiment	No. of Entry	Rating Week	Median	Mean	SD	Min	Max
Disease severity							
June 2021	94	6	0	0.1	0.2	0	0.9
		7	0	0.2	0.3	0	1.4
		8	0.4	0.5	0.5	0	2.2
		9	0.9	0.9	0.7	0	3.4
		10	1.5	1.6	1.0	0	4.4
August 2021	170	6	0	0.2	0.4	0	3
		7	0.2	0.4	0.6	0	3.8
		8	0.5	0.7	0.8	0	4.7
		9	1.2	1.4	1.1	0	4.7
		10	2.2	2.2	1.4	0	5
June 2022	110	6	0	0.1	0.2	0	1.8
		7	0.2	0.4	0.6	0	3.4
		8	1.3	1.4	1.1	0	4.8
		9	3	2.7	1.4	0	5
		10	4.3	3.8	1.3	0	5
August 2022	110	6	0	0.1	0.3	0	2.6
		7	0.4	0.7	0.8	0	3.7
		8	1.5	1.7	1.3	0	5
		9	2.5	2.5	1.5	0	5
		10	3.2	3.0	1.5	0	5
Disease incidence							
June 2021	94	6	0	1.7	4.5	0	30
		7	0	4.7	8.6	0	50
		8	0	8.1	11.7	0	90
		9	10	19.2	20.5	0	100
		10	40	40.9	29.2	0	100
August 2021	170	6	0	3.0	6.9	0	60
		7	0	8.0	12.5	0	80
		8	10	17.4	21.9	0	100

June 2022	110	9	30	35.0	31.6	0	100
		10	60	55.0	33.7	0	100
		6	0	2.3	5.5	0	40
		7	10	13.2	18.3	0	100
		8	33.3	39.3	33.4	0	100
August 2022	110	9	80	67.8	33.8	0	100
		10	100	83.4	27.3	0	100
		6	0	3.8	8.8	0	80
		7	10	20.8	24.1	0	100
		8	40	44.5	31.6	0	100
		9	60	56.3	32.6	0	100
		10	70	65.6	31.3	0	100

No. of Entry = Number of cultivars tested in the experiment; SD = Standard deviation; Min = minimum; Max = Maximum

Online Resource 2. Spearman rank correlation between disease severity and incidence at different week of data collection under different environment

Environment	Week 6	Week 7	Week 8	Week 9	Week 10	AUDPS
June 2021	0.89***	0.80***	0.76***	0.89***	0.94***	0.96***
August 2021	0.74***	0.86***	0.90***	0.96***	0.96***	0.97***
June 2022	0.88***	0.94***	0.97***	0.92***	0.84***	0.98***
August 2022	0.86***	0.96***	0.97***	0.98***	0.97***	0.99***

***indicates that Spearman correlation coefficient significant at p -value <0.0001

Online Resource 3. Summary statistics of INSV disease severity and incidence of different horticultural types of lettuce at 10-week post planting in different environment

Horticultural Type	Environment [†]	N	Disease Severity (10 Week)					Disease Incidence (10 Week)				
			Median	Mean	SEM	Min	Max	Median	Mean	SEM	Min	Max
Butterhead	21-Jun	9	1.6	1.7	0.3	0.2	2.9	40.0	50.0	11.4	0	100
Crisphead		42	1.5	1.4	0.1	0.0	3.3	40.0	40.2	4.7	0	100
Head		3	0.3	0.9	0.7	0.0	2.3	0.0	33.3	33.3	0	100
Leaf		87	1.4	1.4	0.1	0.0	3.9	30.0	34.1	3.0	0	100
Romaine		69	2.0	1.9	0.1	0.0	4.4	50.0	50.3	3.3	0	100
Segregating		3	0.5	0.9	0.6	0.1	2.0	0.0	26.7	26.7	0	80
Butterhead	21-Aug	9	1.0	1.8	0.5	0.3	4.5	20.0	37.6	12.1	0	100
Crisphead		42	2.1	2.1	0.2	0.0	3.9	60.0	57.6	4.1	0	100
Head		3	0.1	0.4	0.3	0.0	1.0	0.0	0.0	0.0	0	0
Leaf		87	2.3	2.1	0.2	0.0	4.8	50.0	51.4	4.0	0	100
Romaine		68	3.4	3.1	0.1	0.0	4.7	90.0	78.7	3.2	0	100
Segregating		3	1.5	1.5	0.3	1.0	2.1	40.0	46.7	6.7	40	60
Butterhead	22-Jun	9	2.3	2.7	0.4	1.0	4.7	50.0	60.0	8.5	30	100
Crisphead		42	4.3	4.2	0.1	2.7	5.0	100.0	94.5	1.4	67	100
Head		3	1.3	1.4	0.1	1.3	1.6	40.0	30.0	10.0	10	40
Leaf		85	4.0	3.3	0.2	0.0	5.0	90.0	73.2	3.8	0	100
Romaine		68	4.5	4.3	0.1	0.7	5.0	100.0	93.4	2.4	20	100
Segregating		3	3.6	3.5	0.4	2.8	4.0	80.0	80.0	5.8	70	90
Butterhead	22-Aug	9	1.0	1.3	0.4	0.2	4.3	20.0	28.9	9.9	0	90
Crisphead		63	2.3	2.3	0.1	0.1	4.6	60.0	53.7	3.1	0	100
Head		3	0.5	0.4	0.2	0.0	0.7	20.0	13.3	6.7	0	20
Leaf		132	2.1	2.2	0.1	0.0	5.0	50.0	49.2	3.0	0	100
Romaine		118	4.7	4.2	0.1	0.3	5.0	100.0	90.2	1.8	10	100
Segregating		3	1.8	1.8	0.1	1.7	1.9	40.0	46.7	6.7	40	60

SEM, Standard error of mean; Min, Minimum; and Max, Maximum.

[†]Environment; 21-Jun = June 2021, 21-Aug = August 2021, 22-Jun = June 2022, and 22-Aug = August 2022.

Online Resource 4. Summary statistics of INSV disease severity and incidence of lettuce having different leaf color at 10-week post planting in different environment

Horticultural Type	Environment [†]	N	Disease Severity (10 Week)					Disease Incidence (10 Week)				
			Median	Mean	SEM	Min	Max	Median	Mean	SEM	Min	Max
Green	21-Jun	162	1.7	1.7	0.1	0.0	4.4	40.0	46.2	2.3	0	100
Green and purple		3	0.5	0.7	0.5	0.0	1.6	10.0	20.0	15.3	0	50
Green and red		12	0.7	1.2	0.4	0.0	3.4	25.0	36.7	10.0	0	90
Red		36	1.0	0.9	0.1	0.0	2.9	15.0	21.7	4.0	0	80
Green	21-Aug	162	2.9	2.8	0.1	0.0	4.8	79.0	69.6	2.3	0	100
Green and purple		3	0.0	0.4	0.4	0.0	1.1	0.0	3.3	3.3	0	10
Green and red		11	1.7	1.9	0.5	0.0	4.5	50.0	47.3	9.6	0	100
Red		36	0.6	1.1	0.2	0.0	4.7	10.0	25.3	5.0	0	100
Green	22-Jun	161	4.4	4.1	0.1	1.0	5.0	100.0	90.7	1.5	10	100
Green and purple		3	1.7	1.8	0.1	1.7	2.1	70.0	73.3	3.3	70	80
Green and red		12	4.5	3.6	0.5	0.7	4.9	100.0	79.2	9.8	20	100
Red		34	2.1	2.2	0.3	0.0	4.9	45.0	48.3	6.8	0	100
Green	22-Aug	230	3.9	3.4	0.1	0.0	5.0	90.0	73.2	2.0	0	100
Green and purple		3	0.9	1.0	0.5	0.2	2.0	20.0	23.3	8.8	10	40
Green and red		24	3.7	3.2	0.2	0.9	5.0	80.0	73.3	4.5	30	100
Red		71	1.2	1.4	0.1	0.0	4.7	30.0	32.1	3.3	0	100

SEM, Standard error of mean; Min, Minimum; and Max, Maximum.

[†]Environment; 21-Jun = June 2021, 21-Aug = August 2021, 22-Jun = June 2022, and 22-Aug = August 2022.

Online Resource 5. Means of thrips feeding scores, and number of mature and immature thrips on different lettuce cultivars evaluated under choice and no-choice tests in greenhouse conditions.

Cultivar	Type	Leaf color	Feeding Score [†]		Number of Thrips	
			Choice test	No-choice test	Choice test (mature)	Choice test (immature)
Rubens Red	Romaine	Red	2.0 (0.3)	1.3 (0.3)	6.3 (1.1)	60.1 (13.2)
Cavalry	Leaf	Red	1.0 (0.3)	2.0 (0.0)	4.4 (0.8)	26.7 (6.6)
Eruption	Leaf	Red	1.4 (0.2)	2.3 (0.9)	3.3 (0.9)	44.3 (12.1)
Red Hot	Leaf	Red	1.8 (0.4)	2.7 (0.7)	7.9 (1.7)	67.1 (16.0)
Flashy Trout Back	Leaf	Green with red patches	1.4 (0.2)	1.0 (0.0)	9.8 (2.5)	43.8 (7.7)
BL288	Segregating	Green	1.4 (0.4)	2.0 (0.6)	6.0 (1.3)	33.6 (10.1)
BL280	Segregating	Green	1.5 (0.5)	2.7 (0.9)	5.0 (1.8)	21.3 (6.2)
Beacon	Crisphead	Green	3.0 (0.4)	3.5 (0.5)	13.3 (2.2)	103.7 (21.7)
Salinas	Crisphead	Green	1.2 (0.2)	2.3 (0.3)	8.1 (1.3)	61.1 (25.7)
Pacific	Crisphead	Green	3.2 (0.7)	2.3 (0.9)	10.0 (1.5)	87.3 (13.7)
Conquistador	Romaine	Green	2.6 (0.7)	1.7 (0.3)	8.4 (2.3)	91.4 (23.2)
Defender	Romaine	Green	2.0 (0.3)	1.7 (0.3)	8.1 (1.9)	62.4 (18.2)
Paris White	Romaine	Green	2.2 (0.4)	2.3 (0.3)	10.0 (1.5)	78.1 (18.3)

Mean indicates the arithmetic mean value calculated across all experiments.

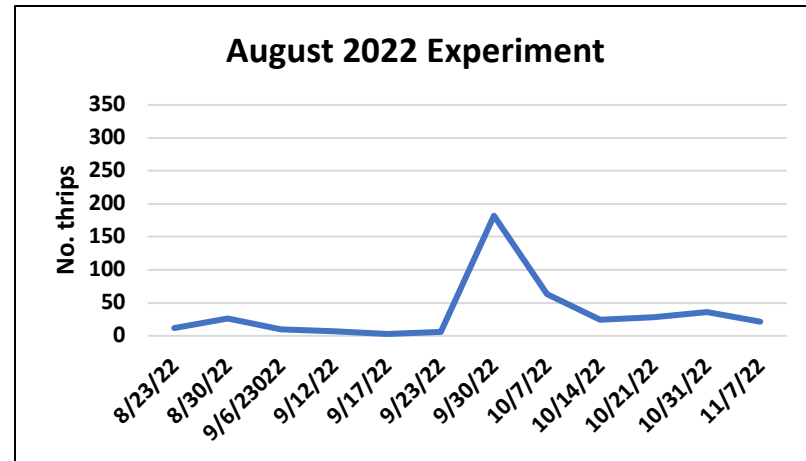
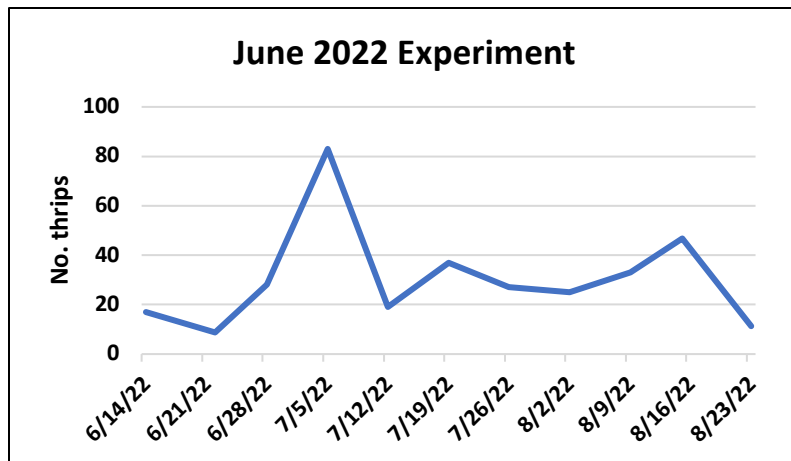
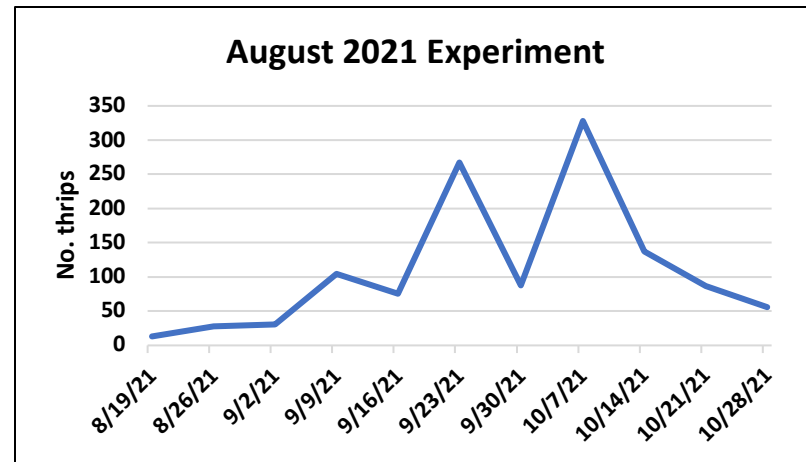
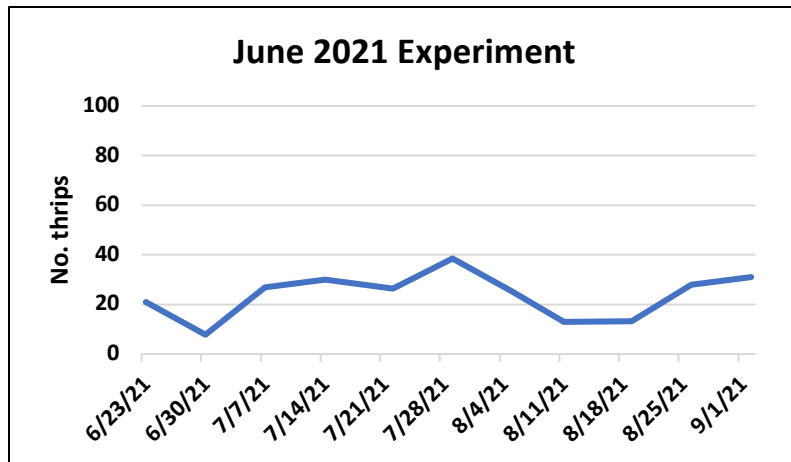
Value in parentheses represents standard error of mean.

[†]Feeding score are based on the total number of feeding scars counted on the leaf disc (2.54 cm diameter) sampled from three leaves using a scale of 0 - 5 (0 = no scars, 1 = 1 to 5 scars, 2 = 6 to 10 scars, 3 = 11 to 15 scars, 4 = 15 to 20 scars, 5 > 20 scars).

Online Resource 6. Climate data of test site during experiment period (2021 and 2022)^z

Year	Month	Ave Air Temp (F)	Max Temp (F)	Min Temp (F)	Wind Speed (mph)	Precipitation (in)
2021	Jan	51.6	64.9	42.1	6.5	3.43
	Feb	51.9	65.1	42.1	6.2	0.46
	Mar	52.8	65.4	43	7.4	1.11
	Apr	55.8	68.5	47.9	8.4	0.11
	May	57.7	69.2	50.1	9.3	0.04
	Jun	61.3	72.8	53.5	9.1	0
	Jul	60.7	71.3	55	8.7	0.01
	Aug	62.6	73.6	56.8	7.9	0.04
	Sep	63.9	79.1	56.3	7.3	0.01
	Oct	66.3	91.9	54.3	7.6	1.26
	Nov	61.1	78.6	50.9	6.4	0.53
	Dec	49.3	58.5	42	7	4.56
2022	Jan	50.9	65.6	41.3	6.3	0.05
	Feb	52	69.7	39.3	6.9	0.09
	Mar	53.4	67.6	43.3	7.7	0.62
	Apr	54.8	68.7	44.5	8.5	0.65
	May	56.8	70.2	47.3	10	0.01
	Jun	61.6	74.6	51.4	9.6	0.02
	Jul	60.8	71.8	54.5	9.2	0.01
	Aug	62.6	74.9	55.7	8.4	0.03
	Sep	65.2	79.9	55.9	8.1	0.08
	Oct	57.7	71.6	49	6.7	0.02
	Nov	50.4	65.3	40.4	6.2	1.53
	Dec	49.4	59.4	42.3	6.5	5.98

^z Climate data were retrieved from the California Irrigation Management Information System (CIMIS) for station #214 Salinas South II



Online Resource 7. Line chart showing the number of thrips captured on yellow sticky cards at different dates during the period of each field experiment