Final Report

Integrative approach using fungicide and variety combination to manage downy mildew disease in Lettuce: year 2

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Introduction

The Arizona Iceberg Lettuce Research Council conducted a survey of Arizona iceberg lettuce producers to identify research priorities. Among different areas of research, Disease Control and Management received the largest number of high priority votes, with downy mildew being one of the major problem.

Every year in Yuma valley, the growers suffer economic loss in lettuce by downy mildew. Sometimes, the farmers lose up to 100% of their crop. The symptoms observed are green to yellow angular spots on the upper surface of the leaves and fluffy growth on the lower side (See Picture). Symptoms usually start

from older leaves. As disease progresses the lesion turn brown and dry up and in some occasions the disease can become systemic causing dark discoloration of vascular tissue.

The pathogen *Bremia lactucae* thrives in damp, cool condition, with moisture present on leaves. Spores are short-lived but dispersed efficiently by wind during moist period. Cultivated lettuce is the main host of the pathogen but it has also been reported to infect artichoke, cornflower and strawflower.

One of the main reason that hinders the disease management is the complexity of the pathogen. *Bremia lactucae* consists of multiple races (pathotypes), and new races continue to occur as pathogen evolves. The pathogen is one of the fastest evolving plant pathogen. And each pathotypes have developed insensitivity to fungicides to different extent.

One of the best practice is to grow resistant cultivar, but there are limitations. As the pathogen is highly variable and dynamic, resistant cultivars are not a permanent solution as the pathogen overcomes the resistance by evolving into virulent strains and isolates.

Preventative and curative application of fungicides are effective to some extent and rotation of fungicide is very important to not develop resistance against fungicide. The efficacy trial was conducted on 4 different varieties of lettuce and different fungicide treatments were screened for efficacy.

Materials and Methods

2021-2022 Downy Mildew of Lettuce Fungicide Trial

Bindu Poudel-Ward, Martin Porchas Sr., Jason Furr, and Neeraja Singh
Yuma Agricultural Center, University of Arizona, Yuma, AZ

This study was conducted at the Yuma Valley Agricultural Center. The soil was a silty clay loam (7-56-37 sand-silt-clay, pH 7.2, O.M. 0.7%). Lettuce was seeded, then sprinkler-irrigated to germinate seed on Nov 2, 2021 on double rows 12 in. apart on beds with 42 in. between bed centers. All other water was supplied by furrow irrigation or rainfall. Treatments were replicated five times in a randomized complete block design. Each replicate plot consisted of 25 ft of bed, which contained two 25 ft rows of lettuce. Plants were thinned Jan 6, 202**2** at the 3-4 leaf stage to a 12-inch spacing. Treatment beds were separated by single nontreated beds. Treatments were applied with a tractor-mounted boom sprayer that delivered 50 gal/acre at 100 psi to flat-fan nozzles spaced 12 in apart.

Month	Max	Min	Avg	Rain
November	84	53	67	0.00
December	71	44	57	0.27
January	72	42	57	1.31
February	75	43	59	0.02
March	81	48	65	0.00

Downy mildew (caused by *Bremia lactucae*) rating was done on 3 different commercial lettuce varieties Magosa, Bobcat and 180. Disease was first seen on 1-9-22. Foliar applications were made on January 13th, January 24th, and February 1st 2022. Disease rating was done on February 21st 2022. Disease severity was determined by

rating 10 plants within each of the five replicate plots per treatment using the following rating system: 0 = no downy mildew present; 0.5 = one to a few very small downy mildew colonies on bottom leaves; 1 = downy mildew present on bottom leaves of plant; 2 = downy mildew present on bottom leaves and lower wrapper leaves; 3 = downy mildew present on bottom leaves and all wrapper leaves; 4 = downy mildew present on bottom leaves, wrapper leaves, and cap leaf; 5 = downy mildew present on entire plant.

Education and Outreach:

Field day was conducted on March 3, 2022 and was open to the community. Over 100 people attended the field day representing farming community, chemical industry, PCAs etc. The project received overwhelmingly positive feedback.


EzyFast
Yuma Plant Pathology

The field day was also covered by news outlets and published in KYMA (https://kyma.com/news/home-grown/2022/03/08/home-grown-field-trials-give-farmers-disease-resistance-data/) and Farmpress (https://www.farmprogress.com/crop-disease/arizona-extension-continues-downy-mildew-studies).

Future projects:

The plant pathology program is interested in making this fungicide trial and field day an annual program for years to come.

Results and conclusion

The data in the table illustrate the degree of disease control obtained by application of the various treatments in this trial. Variety 180 did not show any downy mildew disease symptoms. Most of the treatments exhibited activity against the disease to some extent on variety Magosa and Bobcat. The most effective fungicides, that held the percentage of leaves that were infected to 20% or less, included Zampro, Revus, Cevya, and Timorex ACT/Ranman for the variety Magosa and Zampro, Cevya and Timorex ACT/Ranman for the variety Bobcat. Phytotoxicity symptoms were not noted for any treatments in this trial.

Acknowledgements

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University of Arizona- Yuma Agriculture Center
Dr. Bindu Poudel-Ward
Martin Porchas Sr.
Jason Furr
Neeraja Singh
Applied at a rate of 50 G of spray mixture per acre using tractor mounted sprayer on beds with 42 inches between bed centers.

Lettuce Downy Mildww

Treatment date: 1-13-22, 1 Disease seen: 1/9/22 Disease Scoring: 2-21-22

Variety: Magosa, Bobcat, 1 Disease incidence in plots (1-5) **Disease incidence in plots (1-5)** **Disease incidence in plots (1-5)**

Planting Date: 11-02-21 **MAGOSA** **Bobcat** **180**

Treatment **Treatment** **Treatment**

Treatment	Rate/Acre	1	2	3	4	5	Mean	1	2	3	4	5	Mean	1	2	3	4	5	Mean
UTC		2.5	2.5	2.7	2.6	2.4	2.54	2.3	2.3	2.5	2.3	2.5	2.38	0	0	0	0	0	0
Stargus +Jet-	2 qt + 64 oz/	1.1	1.3	1.3	1.2	1.4	1.26	1.7	1.4	1.5	1	1.4	1.4	0	0	0	0	0	0
Zampro	14 oz	0.8	0.8	0.7	0.6	0.6	0.7	0.9	0.8	0.6	0.7	0.6	0.72	0	0	0	0	0	0
Cevya	5 oz	1	0.8	0.5	0.6	0.5	0.68	0.7	0.9	0.7	0.5	0.7	0.7	0	0	0	0	0	0
Cevya	4 oz	0.8	0.9	0.7	0.8	0.7	0.78	0.9	1	0.9	0.6	0.7	0.82	0	0	0	0	0	0
Timorex ACT	17.8 + 2.7 oz	1.3	1.4	1.5	1.4	1.5	1.42	0.8	1.1	1	1.1	1.3	1.06	0	0	0	0	0	0
Timorex ACT	17.8 oz/2.7 o	0.6	0.7	0.6	0.8	0.7	0.68	0.6	0.5	0.5	0.8	0.7	0.62	0	0	0	0	0	0
Vacciplant	14 oz	1.9	2	2.3	2.1	1.8	2.02	1.7	2	2	2.1	2.4	2.04	0	0	0	0	0	0
Dexter Max	2.25 lb	1.8	2.3	2.5	2.5	2.4	2.3	1.6	2.2	1.9	1.9	2.4	2	0	0	0	0	0	0
Dexter Max/	2.25 lb / 14 o	2.1	2.3	2	2.6	2.5	2.3	1.8	2	1.9	2	2.2	1.98	0	0	0	0	0	0
Orondis Ultra	8 oz + 0.25 v/	0.9	1.2	1	1.4	1.3	1.16	2	2.2	1.8	1.9	1.6	1.9	0	0	0	0	0	0
Serifel	6 oz	2	1.9	2.2	2.1	2	2.04	1.6	2	2.1	2	2.4	2.02	0	0	0	0	0	0
Serande ASO	4 qt	1.6	1.9	1.8	2	2.1	1.88	1.7	2.1	1.7	2	2	1.9	0	0	0	0	0	0
Sonata	4 qt	2.1	2.3	2.2	2.3	2.1	2.2	1.7	2.2	2	2	2.5	2.08	0	0	0	0	0	0
Actigard	1 oz	0.9	1.1	1.2	1.3	1.5	1.2	1.8	1.6	1.4	1.4	1.6	1.56	0	0	0	0	0	0
Revus	8 oz	0.8	1	1	0.7	0.8	0.86	1.6	1.8	1.4	0.8	1	1.32	0	0	0	0	0	0
Torac EC + Sil	21 oz + 3 oz/	1.6	1.9	1.4	1.6	1.6	1.62	1.9	2	1.5	1.3	1.6	1.66	0	0	0	0	0	0
Stargus + Tor	2 qt + 14 oz	0.6	1.4	1.4	1.5	1.4	1.26	1.5	1.6	1.6	1.6	1.5	1.56	0	0	0	0	0	0
Ridomil Gold	4 oz + 3oz/10	0.8	1	1.2	1.5	1.2	1.14	1	1.8	1.6	1.3	1.6	1.46	0	0	0	0	0	0
																			0
LSD (Least Significant Difference, P =0.05)							**0.242**						**0.289**						

THE UNIVERSITY OF ARIZONA
Cooperative Extension
Yuma County &
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Lettuce Downy Mildew Field Day

Partially Funded by:

Arizona Iceberg Lettuce Research Council

Yuma Plant Pathology's fungicide trials

20 + treatments

March 3, 2021

9 AM to 1:00 PM

@

Yuma AG Center-Research Plot
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Follow Signs

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