



Downy Mildew Resistant Basil Variety Trial: Preliminary Results, August 2018

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INTRODUCTION

Sweet or Italian basil (*Ocimum basilicum*) is a high-value herb (Year 2012= \$6.8 million, NASS) that is grown year-round in Hawaii, prized for its aromatic leaves in cooking or freshly eaten. However, production can be greatly diminished by infections of basil downy mildew (*Peronospora belbahrii*), one of the most economically damaging diseases of basil (Uyeda et al. 2012). Basil downy mildew (BDM) infections produce yellow, damaged, and unmarketable leaves, and it can quickly take over entire fields during high humidity and rainy, cooler weather. Other areas in the US have lost entire crops to BDM (CTAHR 2011), and Hawaii farms have seen decreased harvest periods from nine to about three months during severe outbreaks.



Current practices to manage BDM include rotational sprays of approved pesticides, adjusting field spacing, field sanitation, and planting resistant varieties.

However, approved pesticides can be limited in number or lose effectiveness if overused, and field spacing and sanitation can be difficult when trying to maximize yield and productivity. As such, this field trial took the varietal approach and evaluated the resistance levels of six commercial basil varieties with reported BDM resistance.

VARIETIES EVALUATED

Name	Traits	Reported Resistances	Supplier
Genovese	Field production		High Mowing Seeds
Eleonora	Field production	Downy mildew (medium)	Johnny's Seeds
Everleaf *	Compact; Potted production	Downy mildew (medium), Fusarium wilt (medium)	Johnny's Seeds
Devotion*	Field or potted	Downy mildew (high)	VDF Specialty Seeds
Obsession*	Field or potted	Downy mildew (high), Fusarium wilt (high)	VDF Specialty Seeds
Thunderstruck*	Ruffled leaf; Field production	Downy mildew (high)	VDF Specialty Seeds

*New varieties released 2018



METHODS

Field Design (Poamoho Research Station, Oahu)

Row #1	#2	#3	#4
Devotion	Everleaf	Obsession	Everleaf
Genovese	Thunderstruck	Devotion	Eleonora
Obsession	Eleonora	Everleaf	Genovese
Thunderstruck	Obsession	Genovese	Thunderstruck
Eleonora	Devotion	Thunderstruck	Obsession
Everleaf	Genovese	Eleonora	Devotion



Planting, Harvesting

- 4 double-row plots per variety (3ft apart, 5ft between centers)
- 10 plants per row (1.5ft apart, 20 per plot)
- 2ft between plots inline
- **Seeded:** May 18
Transplanted to field: June 20
Pruned: August 3
Disease Assessment: August 28

Field Management

- Soil pH= 6.6
- Fertilized monthly with 5 lbs of triple 19
- Applied
 - Admire Pro (drenched 10.5oz/acre) to control aphids, leafminers, and other pests
 - Neemix 4.5 (drench: 9 oz/1000 sq.ft.) to control nematodes

Data Collection:

Disease severity was assessed on August 28, approximately 2 months after transplanting. Disease severity was determined by comparing the number of infected and uninfected plants, with the disease severity score scale consisting of those in the following table:

Additionally, at time of pruning, amount of flowering, which is a negative characteristic for basil production, was assessed using a similar scale, with 0=no flowering, and 4=very high flowering.

Scores were analyzed using ANOVA with a Tukey comparison.

Disease Severity Scale	
Value	% of Plants Infected
0	None
1	1-25
2	26-50
3	51-75
4	75-100



RESULTS, DISCUSSION

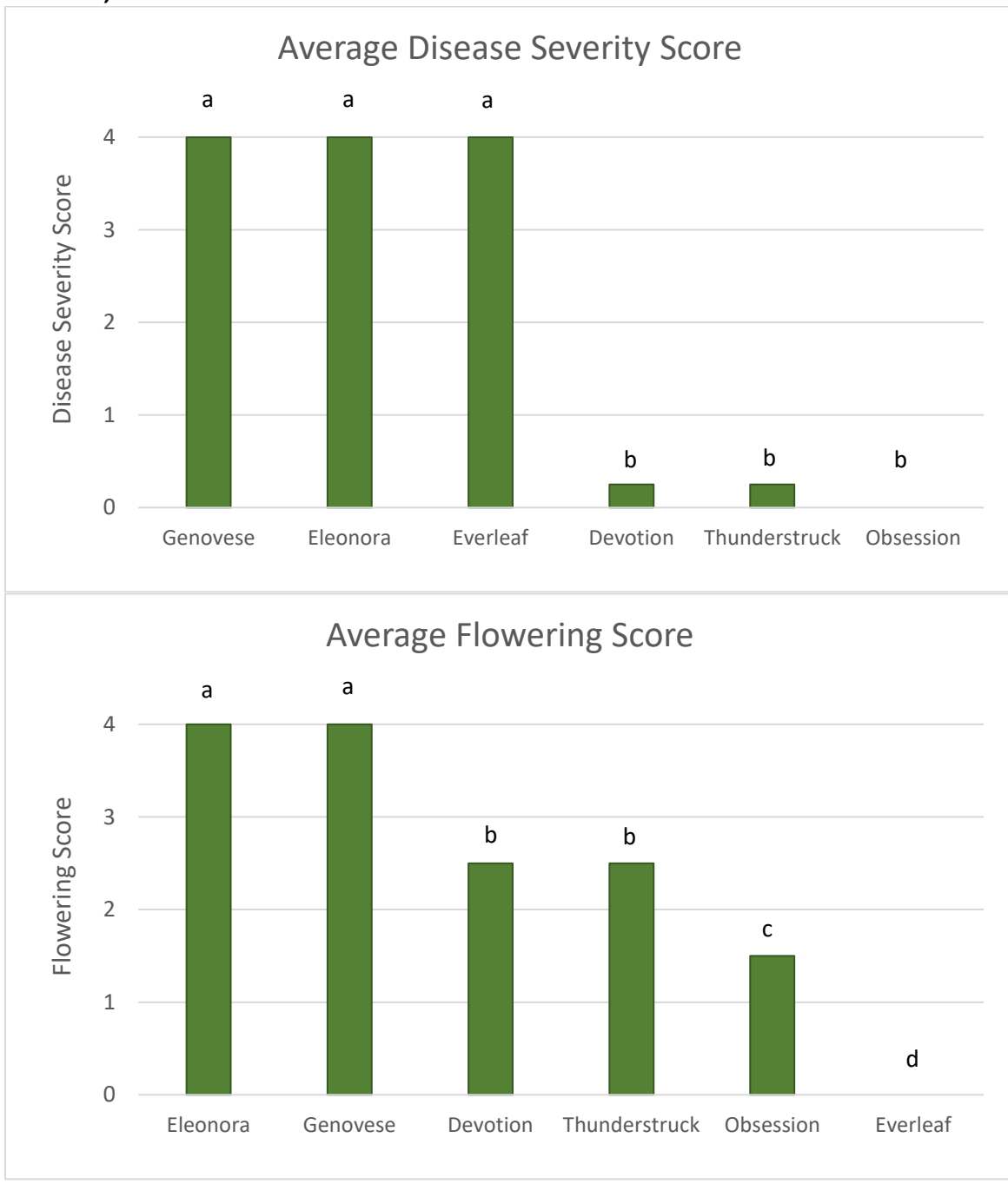


Fig. 1,2. Average disease severity and flowering levels of six downy mildew resistant basil varieties. Varieties that do not share a letter are statistically significant from each other.



Disease severity assessments from this field trial found the three VDF varieties to be highly resistant to BDM in Hawaii. Only 1 plant in all replicates for the Devotion and Thunderstruck varieties were infected, but other plants remained healthy and green. Despite their advertised resistances, Eleonora and Everleaf varieties were 100% infected by BDM, similar to the Genovese control variety.

In addition to their resistance levels, these VDF varieties also flowered nearly half the amount of the Genovese and Eleonora varieties. Everleaf was the best in terms of not flowering.



CONCLUSION

Considering resistance, flowering, and size, the new Devotion and Obsession varieties are a potential solution to BDM issues facing field basil production in Hawaii. Thunderstruck also displayed good characteristics but may need to target markets that will accept a slightly ruffled, lettuce-basil appearance. However, should farmers choose to contact VDF and grow these three promising varieties, they should know that these varieties are proprietary and cannot be used to make future seed or cuttings, which is a common propagation method of local farmers.

Despite its disease severity performance, Everleaf variety may be ideal for home or indoor potted production given its compact size and low flowering levels, making labor easier. With indoor management and frequent use at home, downy mildew may be more manageable for potted Everleaf production.

Upon completion of this trial, companies notified of additional resistant varieties scheduled for release. Further trials including these varieties will be conducted, and also evaluate variety yield, leaf size, and flavor.

REFERENCES

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Devotion



Obsession



Thunderstruck



Genovese



Eleonora



Everleaf