CUCUMBER, SUMMER (*Cucumis sativus*)
Downy mildew; *Pseudoperonospora cubensis*

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Management of cucumber downy mildew using cultivars and fungicide programs, Clinton, NC 2023.

The experiment was performed at the Horticultural Crops Research Station in Clinton, NC. Experimental plots were single raised beds on 5-ft centers covered with white plastic mulch; 14-ft long with 5-ft fallow borders on each end and nontreated guard rows on each side. Susceptible pickling cucumber 'Vlaspik' and two tolerant pickling cucumber cultivars, 'Citadel' and 'Chaperon', were directly seeded on 2 Aug (2-ft in-row spacing, 2 seed/hill) and thinned to one plant per hill after emergence (7 plants/plot). Regular cultural practices like irrigation and fertilization (4-0-8, N-P-K) were applied via drip tape. Three chemical program treatments and nontreated control were tested in a factorial design with each cultivar in a randomized complete block design with four repetitions. Fungicide treatments were applied using a CO_2-pressurized backpack sprayer equipped with a single-nozzle, handheld boom with a hollow cone nozzle (TXVS-26) delivering 40 gal/A at 35 psi on 30 Aug, 6, 15, 20, 27 Sep, and 4 Oct. Disease severity per plot, marketable yields, and non-marketable yields were assessed each week. Data were analyzed in the software ARM (Gylling Data Management, Brookings, SD) using analysis of variance (AOV) and Fisher's protected least significant differences (LSD) test to separate means.

Downy mildew was first detected on 30 Aug at approximately 2% disease severity in the field. Downy mildew progressed quickly so only six foliar applications were applied before disease severity reached 100%, and the trial was concluded. Disease severity in the non-treated 'Vlaspik' and 'Citadel' plots were significantly higher than the 'Chaperon' non-treated plots. Treatments 11, 8, and 7 had a significantly lower AUDPC than all the Vlaspik treatments, treatments 1-4. Marketable yields were variable across treatment, with treatment 11 producing 21.2 lb/plot and treatment 3 producing 10.3 lb/plot. Treatment 11 had a significantly higher yield than treatments 1, 2, 3, 7, and 8. No phytotoxicity was observed for any treatments in the experiment.

	Cultivar	Treatments	Application Code[z]	Disease Severity[y] (%) 20 Sep	AUDPC[x]	Marketable Yields (lb/plot)
1	Vlaspik	Nontreated	–	38.8 a[w]	1918.3 ab	12.0 cd
		Orondis Opti 2.5 pt/A	AE			
		Kocide 3000 1.25 lb/A	AE			
		Ranman 2.75 fl oz/A	BF			
		Howler Evo 1.25 lb/A	BF			
		Dyne-Amic 0.375% v/v	BF			
		Previcur Flex 1.2 pt/A	C			
		Kocide 3000 1.25 lb/A	C			
		Dyne-Amic 0.375% v/v	C			
		Zampro 14 fl oz/A	D			
		Howler Evo 1.25 lb/A	D			
2	Vlaspik	Dyne-Amic 0.375% v/v	D	36.3 ab	1993.3 a	12.4 cd
		Howler Evo 1.25 lb/A	ACE			
		Dyne-Amic 0.375% v/v	ACE			
		Kocide 3000 1.25 lb/A	BDF			
3	Vlaspik	Dyne-Amic 0.375% v/v	BDF	41.3 a	1974.3 a	10.3 d
		Orondis Opti 2.5 pt/A	AE			
		Ranman 2.75 fl oz/A	BF			
		Bravo Weather Stik 2 pt/A	BF			
		Previcur Flex 1.2 pt/A	C			
		Bravo Weather Stik 2 pt/A	C			
		Zampro 14 fl oz/A	D			
4	Vlaspik	Bravo Weather Stik 2 pt/A	D	30.0 abc	1380.0 cd	19.0 abc
5	Citadel	Nontreated	–	33.5 ab	1513.6 c	18.0 abc
		Orondis Opti 2.5 pt/A	AE			
		Kocide 3000 1.25 lb/A	AE			
		Ranman 2.75 fl oz/A	BF			
		Howler Evo 1.25 lb/A	BF			
		Dyne-Amic 0.375% v/v	BF			
		Previcur Flex 1.2 pt/A	C			
		Kocide 3000 1.25 lb/A	C			
		Dyne-Amic 0.375% v/v	C			
		Zampro 14 fl oz/A	D			
		Howler Evo 1.25 lb/A	D			
6	Citadel	Dyne-Amic 0.375% v/v	D	25.0 bcd	1533.0 bc	16.2 a-d
		Howler Evo 1.25 lb/A	ACE			
		Dyne-Amic 0.375% v/v	ACE			
		Kocide 3000 1.25 lb/A	BDF			
7	Citadel	Dyne-Amic 0.375% v/v	BDF	16.8 de	977.0 ef	11.9 cd
		Orondis Opti 2.5 pt/A	AE			
		Ranman 2.75 fl oz/A	BF			
		Bravo Weather Stik 2 pt/A	BF			
		Previcur Flex 1.2 pt/A	C			
		Bravo Weather Stik 2 pt/A	C			
		Zampro 14 fl oz/A	D			
8	Citadel	Bravo Weather Stik 2 pt/A	D	21.8 cd	943.6 ef	14.0 bcd

9	Chaperon	Nontreated		12.5 de	1054.9 def	16.9 a-d
		Orondis Opti 2.5 pt/A	AE			
		Kocide 3000 1.25 lb/A	AE			
		Ranman 2.75 fl oz/A	BF			
		Howler Evo 1.25 lb/A	BF			
		Dyne-Amic 0.375% v/v	BF			
		Previcur Flex 1.2 pt/A	C			
		Kocide 3000 1.25 lb/A	C			
		Dyne-Amic 0.375% v/v	C			
		Zampro 14 fl oz/A	D			
		Howler Evo 1.25 lb/A	D			
10	Chaperon	Dyne-Amic 0.375% v/v	D	17.2 de	1150.3 cde	18.5 abc
		Howler Evo 1.25 lb/A	ACE			
		Dyne-Amic 0.375% v/v	ACE			
		Kocide 3000 1.25 lb/A	BDF			
11	Chaperon	Dyne-Amic 0.375% v/v	BDF	9.0 e	710.5 f	21.2 a
		Orondis Opti 2.5 pt/A	AE			
		Ranman 2.75 fl oz/A	BF			
		Bravo Weather Stik 2 pt/A	BF			
		Previcur Flex 1.2 pt/A	C			
		Bravo Weather Stik 2 pt/A	C			
		Zampro 14 fl oz/A	D			
12	Chaperon	Bravo Weather Stik 2 pt/A	D	15.8 de	1372.8 cd	20.4 ab

[z]Application code based on application date: A = 30 Aug, B = 6 Sep, C = 15 Sep, D = 20 Sep, E= 27 Sep, F= 4 Oct

[y]Disease rating based on percent necrotic foliage caused by *P. cubensis*, 7 weeks after planting.

[x]Area under disease progress curve AUDPC = $\sum_{i=1}^{n-1} \frac{y_i+y_{i+1}}{2} x(t_{i+1} - t_i)$

[w]Treatments followed by the same letter(s) within a column are not statistically different (*P*=0.05, Fisher's Protected LSD).