

APPLE (*Malus × domestica* ‘McIntosh’, ‘Cortland’)
Apple scab; *Venturia inaequalis*
Powdery mildew; *Podosphaera leucotricha*

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Evaluation of fungicide programs for management of apple scab and powdery mildew, 2001.

The experiment was conducted in a 26-year-old orchard planted on MM.106 rootstock in Geneva, NY. Individual plots consisted of two trees, one McIntosh and one Cortland, and were arranged in a randomized complete block design with four replications. Treatments were applied to runoff with a handgun at 350 psi, and cover sprays were applied with an airblast sprayer at 3X concentration. Apple scab incidence (presence/absence) was evaluated on McIntosh trees by examining all leaves on 25 clusters per tree on 21-22 Jun and on the first 10 fully expanded leaves (i.e., oldest leaves) on each of 10 terminal branches on 8 Aug; and 100 fruit per tree on 21 Jun and 8 Aug. Powdery mildew incidence was evaluated on Cortland trees by examining the first 10 fully expanded leaves on each of 10 terminal branches on 8 Aug. Data was transformed with an arcsin transformation and the transformed data were analyzed in an ANOVA. Treatment means were separated using Fisher's protected LSD.

Primary scab pressure (i.e., prior to petal fall) was low due to a lack of precipitation early in the season. Consequently, all fungicide programs provided greater than 90% control of scab on cluster leaves and fruit early in the season (21 Jun) relative to the untreated check, except for Dithane applied at the 1 lb rate (data not shown). Environmental conditions became more favorable for scab development as the season progressed and the individual programs fared differently. Late season fruit scab was nearly 100% in the untreated check. Dithane applied at the 1 lb rate (#22), used for comparative purposes, provided significantly better control than the check. The addition of the strobilurin fungicide Flint in alternation with Dithane at pink and petal fall (#19), or the DMI fungicide Procure mixed with Dithane from tight cluster through first cover (#18) to the schedule did not improve control significantly. However, this was not surprising for the latter given the high frequency of DMI-resistant strains of *V. inaequalis* in this test orchard. Also not performing statistically better than Dithane at the 1 lb rate were the BAS 51602 38WG program at 3.5 oz rate (#21; apparently due to formulation) and MANA#131 at the 0.625 lb rate (#20). Dithane 75WG at the 2 lb rate (#10), Captan 50W at both the 1 and 2 lb rates (#17 & #12), MANA#131 at the 1.25 lb rate (#4), and BAS 51602 at the 4.9 oz rate (#15) provided better than 75% control of late season fruit scab. Incorporating the strobilurin fungicide Sovran 50WG or the anilino-pyrimidine fungicide Vanguard into schedules of Captan, Dithane, or MANA#131 in various combinations often improved late season apple scab numerically but not statistically (#1, #5, #6, #7, & #8). Terminal leaf scab was nearly 100% in the untreated check (#23). Dithane 75WG applied at the 1 or 2 lb rate (#22 & #10), MANA#131 at the 0.625 lb rate (#20), and BAS 51602 applied at the 3.5 or 4.9 oz rate (#21 & #15) provided less than 45% control of terminal leaf scab. Similar to above, Procure mixed with Dithane from tight cluster through first cover (#18) did not improve control significantly. Some improvement in the management of terminal leaf scab was evident in the other programs, but overall the reduction in disease incidence was small and, in some cases, not significantly better than the programs just referenced. Powdery mildew incidence was moderate in the untreated check. All spray programs, except Dithane at the 1 and 2 lb rates (#22 & #10), controlled terminal leaf mildew better than the check, and no program significantly outperformed the others.

Material, rate/100 gal	Timing**	Apple Scab*		Powdery Mildew*
		Fruit [% control]	Terminal [% control]	Terminal [% control]
1. Captan 50W, 2 lb	1-3			
<u>then</u> Sovran 50WG, 1 oz	4-6	9.25 f [91]	49.8 def [49]	3.75 bcd [87]
2. Dodine 400F, 0.67 qts	1,2			
<u>then</u> Polyram, 1lb + Nova 40W, 1.67 oz	3,4			
<u>then</u> Sovran 50WG, 1 oz	5,6	9.75 f [90]	46.0 ef [52]	6.25 bcd [78]
3. Captan 50W, 2 lb	1			
<u>then</u> Sovran 50WG, 1.33 oz	2,3,6			
<u>then</u> Rubigan 1E, 3 fl oz + Captan 50W, 1 lb	4,5	12.8 ef [87]	43.0 fg [56]	2.75 bcd [90]
4. MANA#131, 1.25 lb	1-6			
<u>then</u> Topsin M 70W, 3 oz + MANA#131, 0.625 lb	7	12.8 ef [87]	31.3 g [68]	7.75 bcd [73]
5. Vangard 75WG, 1 oz + Dithane 75 WG, 1 lb	1,2			
<u>then</u> Vangard 75WG, 1 oz + Sovran 50 WG, 1 oz	3,4			
<u>then</u> Sovran 50WG, 1 oz	5,6	13.0 ef [87]	41.3 fg [57]	3.00 cd [89]
6. Sovran 50WG, 0.5 oz + Captan 50W, 1 lb	1-7	14.3 ef [86]	40.5 fg [58]	6.50 bcd [77]
7. Sovran 50WG, 1 oz	1,2,5,6			
<u>then</u> Captan 50W, 2 lb	3,4,7	14.5 ef [86]	40.5 fg [58]	10.3 bcd [64]
8. Sovran 50WG, 0.5 oz + MANA#131, 0.625 lb	1-7	16.3 ef [84]	41.0 fg [58]	2.75 bcd [90]
9. Sovran 50WG, 1.33 oz	2,6			
<u>then</u> Procure 50WS, 3.33 oz + Dithane 75WG, 1 lb	3-5	17.0 ef [83]	44.8 f [54]	4.75 bcd [83]
10. Dithane 75WG, 2 lb	1-6	17.5 ef [83]	59.3 b-e [39]	13.0 abc [54]
11. Syllit 65W, 0.67 lb	1,2			
<u>then</u> Polyram, 1 lb + Nova 40W, 1.67 oz	3,4			
<u>then</u> Sovran 50WG, 1 oz	5,6	18.3 def [82]	51.0 c-f [47]	5.25 bcd [82]
12. Captan 50W, 2 lb	1-6	19.3 def [81]	42.5 fg [56]	9.25 bcd [67]
13. Dithane 75WG, 2 lb	1,2,4			
Flint 50WG, 0.67 oz	3,5	20.5 def [79]	41.0 fg [58]	5.00 bcd [82]
14. Vangard 75WG, 1 oz + Dithane 75WG, 1 lb	1,2			
<u>then</u> Nova 40WP, 1.67 oz + Dithane 75WG, 1 lb	3,4			
<u>then</u> Sovran 50WG, 1 oz	5,6	21.3 def [79]	41.5 fg [57]	11.3 bcd [60]
15. BAS 51602 38WG, 4.9 oz	1-6	21.8 def [78]	61.8 bcd [36]	10.0 bcd [65]
16. Vangard 75WG, 1 oz + Dithane 75 WG, 1 lb	1,2			
<u>then</u> Nova 40WP, 1.67 oz + Dithane 75WG, 1 lb ...	3-6	23.3 c-f [77]	53.0 b-f [45]	2.00 d [93]
17. Captan 50W, 1 lb	1-6	24.5 c-f [76]	51.0 c-f [47]	10.5 bcd [63]
18. Procure 50WS, 3.33 oz + Dithane 75WG, 1 lb	2-6	29.5 b-e [70]	63.3 bc [35]	7.00 bcd [75]
19. Dithane 75WG, 2 lb	1,2,4			
Flint 50WG, 0.67 oz	3,5	29.8 b-e [70]	44.0 fg [55]	8.00 bcd [72]
20. MANA#131, 0.625 lb	1-6			
<u>then</u> Topsin M 70W, 3 oz + MANA#131, 0.625 lb	7	30.5 b-e [70]	62.3 bcd [36]	3.75 bcd [87]
21. BAS 51602 38WG, 3.5 oz	1-6	40.5 bcd [60]	53.5 b-f [45]	4.75 bcd [83]
22. Dithane 75WG, 1 lb	1-6	46.5 b [54]	61.5 bcd [36]	9.25 bcd [68]
23. Untreated check		99.3 a	96.8 a	28.5 a

* Mean disease incidence values from four replicate plots per treatment are shown. All data were collected on 8 Aug. Means within a column not followed by a common letter are significantly different from each other according to Fishers protected LSD ($P < 0.05$). Bracketed values denote percent control relative to the untreated check.

** Timing designations are as follows: #1 = Apr 19 (1/4-inch green); #2 = Apr 26 (tight cluster); #3 = May 4 (pink); #4 = May 10 (bloom); #5 = May 16 (petal fall); and #6 = May 24 (first cover). Unless otherwise noted, four (#8-#11) or five (#7-#11) additional cover sprays of Topsin M 70W (3 oz/100gal) plus Captan 50W (1 lb/100gal) were applied on 4, 14, 29 Jun and 12, 27 Jul.