NOT FOR PUBLICATION

1984 RESULTS OF FUNGICIDE AND NEMATICIDE TRIALS ON APPLES IN THE HUDSON VALLEY

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Final 1984 Report

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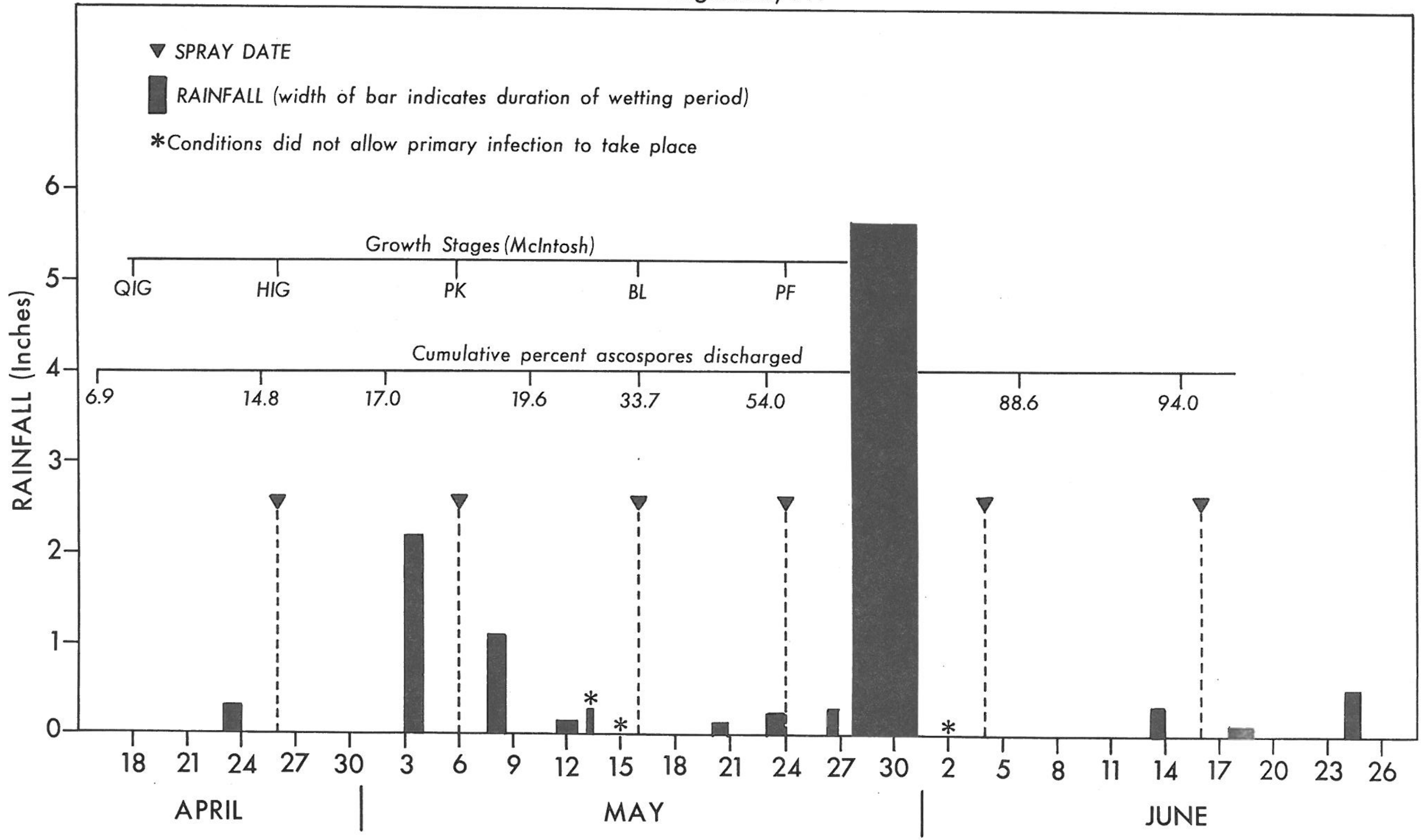
1984 Maximum and Minimum Temperatures and Precipitation, Hudson Valley Lab., Highland, NY

All readings were taken at 0800 on the dates indicated.

	April			May			June			July			August			September		
Date	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip
1	48	27	0.00	72	50	0.00	59	38	0.00	71	64	0.30	85	62	0.00	84	54	0.00
2	57	30	0.00	65	41	0.00	69	54	0.07	72	61	0.86	89	66	0.01	77	54	0.00
3	59	36	0.00	63	37	0.00	69	47	0.01	85	65	0.00	84	68	0.00	70	55	0.18
4	58	37	0.00	64	45	2.20	63	48	0.00	83	59	0.04	84	65	0.00	74	57	0.33
5	54	40	0.00	62	46	0.05	82	54	0.00	86	68	0.00	88	67	0.00	70	46	0.00
6	54	44	3.44	65	41	0.00	87	57	0.00	84	68	0.25	79	65	0.00	69	40	0.00
7	52	40	0.00	70	41	0.00	82	62	0.00	78	66	1.96	88	68	0.00	64	38	0.00
8	50	34	0.00	73	52	0.00	91	65	0.00	78	55	0.02	89	66	0.13	71	41	0.00
9	48	30	0.00	59	47	1.08	93	67	0.00	73	49	0.00	88	70	0.00	73	47	0.00
10	50	30	0.00	60	40	0.00	94	69	0.00	78	53	0.00	81	70	0.00	75	54	0.00
11	50	38	0.00	65	45	0.00	94	68	0.00	79	67	0.00	76	69	0.06	77	62	0.03
12	61	40	0.00	71	53	0.04	95	52	0.00	87	66	0.06	83	69	0.25	82	58	0.17
13	64	35	0.00	70	42	0.11	86	61	0.00	87	60	0.00	82	70	0.12	73	49	0.00
14	55	41	0.00	68	47	0.24	95	65	0.26	87	59	0.00	86	70	0.64	77	55	0.00
15	44	42	0.00	58	34	0.00	86	58	0.00	91	66	0.00	89	71	0.01	74	52	0.05
16	45	40	1.21	57	41	0.03	72	43	0.00	89	71	0.10	88	62	0.00	55	34	0.08
17	50	41	0.23	54	34	0.00	72	53	0.00	88	60	0.01	89	62	0.16	65	38	0.00
18	66	37	0.01	62	36	0.00	71	62	0.00	83	63	1.27	80	60	0.00	67	37	0.00
19	66	45	0.18	66	43	0.00	74	64	0.09	77	56	0.33	76	57	0.00	71	43	0.00
20	51	45	0.00	72	51	0.00	87	54	0.00	79	55	0.00	81	71	0.85	77	49	0.00
21	57	42	0.00	69	52	0.13	81	50	0.00	82	61	0.00	72	48	0.00	82	49	0.00
22	54	30	0.00	75	50	0.01	79	50	0.00	72	59	0.12	77	51	0.00	72	41	0.00
23	55	37	0.00	83	58	0.00	83	54	0.00	83	63	0.00	81	51	0.12	77	50	0.00
24	48	41	0.32	81	48	0.22	82	60	0.00	86	70	0.00	81	57	0.06	82	49	0.01
25	53	45	0.02	74	45	0.01	75	60	0.53	86	55	0.00	74	56	0.00	81	60	0.00
26	55	40	0.00	82	56	0.00	81	55	0.00	79	50	0.00	77	52	0.00	85	63	0.00
27	64	46	0.00	85	51	0.31	76	49	0.00	81	61	0.20	80	52	0.00	71	41	0.05
28	72	44	0.00	72	53	0.02	83	64	0.00	63	59	0.42	80	56	0.00	56	43	0.00
29	71	50	0.02	56	52	1.46	85	62	0.01	74	54	0.00	82	60	0.01	53	44	0.01
30	78	49	0.00	61	52	3.53	80	62	0.33	80	61	0.00	80	70	0.00	63	39	0.00
31				54	48	0.62				79	58	0.00	84	66	0.00			

1984 SPRAY DATES & APPLE SCAB INFECTION PERIODS
Highland, NY



1984 Apple Scab and Cedar Apple Rust
Infection Periods and Fungicide Application Dates
Hudson Valley Laboratory, Highland, NY

Spray	Date	Hours Post-infection from	Cortland growth stage	Cumm. % scab spore discharged	Start Date	Start Time	Hrs. duration	Avg. temp	Inches rain	Potential infection periods: Mill's chart 1°	Mill's chart 2°	Cedar apple rust
				0.7 (4/10)								
				6.9 (4/16)								
			QIG (4/18)									
					23 Apr	1500	23	45	0.31	L	-	
POND	26 Apr	64 (4/23)	HIG	14.8 (4/25)								
M.26	27 Apr	88 (4/23)										
				17.0 (5/2)	3 May	1645	21.5	53	2.20	M	-	Yes
BOTH	6 May	67 (5/3)	PINK									
					8 May	0800	21	55	1.08	M	-	Yes
				19.6 (5/10)								
				SPLIT WETTING	12 May	0015	8.5	55	0.04 }	M	-	Yes
					12 May	1700	14	48	0.11 }			
					13 May	2000	10	49	0.24	-	-	
					15 May	1000	3	52	0.03	-	-	
M.26	16 May	86 (5/12)	BLOOM	33.7 (5/16)								
		59 (5/13)										
	DPX 6573 Applied at .156 floz., .313 floz., .516 floz., before wind became too strong to spray.											
M.26	17 May	110 (5/12)	BLOOM									
		83 (5/13)										
	The rest of the materials were applied.											
POND	18 May	134 (5/12)										
		107 (5/13)										
				5/18 Active scab lessions found in M.26 orchard. Secondary infection possible.								
					20 May	1800	17	55	0.14	M	H	Yes
				54.0 (5/23)	23 May	1600	16	57	0.22	M	H	Yes
M.26	24 May	15 (5/23)	PETAL FALL (75%)									
POND	25 May	39 (5/23)										
					26 May	1700	17.5	58	0.31	M	H	Yes
					28 May	0630	79.5	54	5.63	H	H	Yes

Spray	Date	Hours Post-infection from	Cortland growth stage	Cumm. % scab spore discharged	Start Date	Start Time	Hrs. duration	Avg. temp	Inches rain	Potential Infection periods: Mill's chart 1°	Mill's chart 2°	Cedar apple rust
					2 Jun	0500	4	56	0.08	-	-	No
M.26	4 Jun	170 (5/28)										
POND	5 Jun	194 (5/28)		88.6 (6/6)								
					13 Jun	1615	20	70	0.27	H	H	Yes
				94.0 (6/15)	End of Primary scab season.							
BOTH	16 Jun	65 (6/13)			18 Jun	0815	26	70	0.09	-	H	
					24 Jun	1600	16	65	0.53	-	M	
BOTH	27 Jun	65 (6/24)										
					29 Jun	2130	19.5	66	0.41	-	H	
					1 Jul	0500	11	68	1.08	-	L	
					3 Jul	1600	17	66	0.04	-	M	
					5 Jul	1300	21	72	0.25	-	H	
					6 Jul	1715	20	70	1.98	-	H	
M.26	9 Jul	92 (7/5) 64 (7/6)										
POND	10 Jul	116 (7/5) 88 (7/6)										
					12 Jul	0230	6	70	0.06	-	L	
					16 Jul	0430	8	75	0.11	-	M	
					18 Jul	0630	26	66	1.60	-	H	
					21 Jul	1100	23	65	0.12	-	H	
M.26	25, 26, 30 Jul*	Sprays were spread out due to very rapidly changing weather conditions.										
					27 Jul	0400	28	60	0.62	-	H	
Pond	31 Jul											
					1 Aug	2100	12	70	0.01	-	H	
					7 Aug	1615	16	72	0.13	-	H	
					11 Aug	0400	6.5	70	0.06	-	-	
					12 Aug	0000	34	73	0.38	-	H	
					13 Aug	2130	12.5	72	0.63	-	M	
M.26	14 Aug											
POND	15 Aug											

Evaluations of Ergosterol-Biosysthesis Inhibitor Fungicides for Apple Disease Control M26 Orchard Hudson Valley Lab, Highland, New York

Fungicides were evaluated in a block containing four cultivars on M.26 rootstock planted in 1978. Treatments were replicated four times using four-tree plots (containing one tree of each cultivar) except that the Paulared cultivar was present in only three replicates. Fungicides were sprayed to runoff (ca2805 liters/ha or 400 gal/A) using a handgun at 2069 - 2758 kPa (300 - 400 Psi) Spray dates and corresponding Cortland growth stages were April 27 (half-inch green), May 6 (pink), 16-17 (bloom), 24 (petal fall), June 4, 16, 27, July 9, 25-26-30, and August 14. Treatments were not all applied on the same day for the May 16-17 and July 25-26-30 treatment dates because windy spray conditions interrupted application. The varia - tions in spray date had no obvious effects on treatment evaluations: i.e., differences in disease control acheived with the test materials could not be explained by the differences in days the treatments were applied. Our objective was to apply sprays on a postinfection basis during the primary scab season with a minimum of 10 days and a maximum of 14 days between applications, but weather conditions interfered with precise spray timing. The first four sprays were applied 88,67,86-110, and 15 hours after major infection periods. The first infection period occurred April 23 when trees were at the quarter-inch green bud stage. A total of one light, six moderate, and two severe Mill's infection periods were recorded during the primary apple scab season and another 16 secondary scab infection periods occurred between June 18 and August 15. Apple scab pressure was severe in this orchard because of high innoc- ulum levels in overwintering leaves, early ascospore maturity, and favorable weather conditions for both primary and secondary scab development. Cedar branches contain- ing cedar apple rust galls were placed in the Golden Delicious tree in each plot on May 3 and 23, but cedar-apple rust pressure was light. Data were collected from leaves on 20 clusters per tree on June 7 (Cortland) and June 20 (Golden Delicious), from all leaves on 20 terminals per tree on June 25 and August 26 (Cortland), July 10 (Golden Delicious), and July 20(Rome). Leaves were considered infected if any identifiable scab lesions were observed on the leaf or the petiole. Many of the lesions appeared inactivated by the fungicides. Fruit data were collected from 100 fruit per tree at harvest time in September.

Only treatments involving RH-3866 or DPX H6573 provided adequate control of the leaf scab. These compounds continued to provide good scab control throughout the remainder of the season. The standard contact fungicides, Polyram plus Topsin M, performed as well as could be expected for contact fungicides applied on a post- infection schedule. The Funginex plus Polygram treatment probably would have been more effective if intervals between the start of the infection periods and the applications had been held to 72 hours or less. The concentrations of Rubigan used in this test were too low to effectively control scab under the extended spray inter- vals and relatively long postinfection intervals. The two formulations of Rubigan did not differ significantly in their ability to control scab. The addition of TD 2126 to Rubigan provided only marginal improvement in control of leaf scab but sig- nificantly improved control of fruit scab. Many of the infected leaves in Rubigan plots had infections only on the leaf petioles. The prevalence of petiole infections suggests Rubigan moved into and protected petioles less readily than leaf tissue. All treatments provided good control of cedar apple rust on leaves. No Fruit rust infections occurred even in control plots, and powdery mildew pressure was too light to warrant evaluation. All treatments provided some control of flyspeck on fruit. The AS formulation of Rubigan was significantly better than the EC formulation for flyspeck control. None of the treatments caused adverse effects on fruit finish.

M.26 ORCHARD APPLE FUNGICIDE TRIAL
FOLIAR APPLE SCAB DATA

Material and Rate of Formulated Product Per 100 Liters (100 gal)[V]	% Cluster leaves Cortland	% Cluster leaves Golden Delicious	Combined Analysis For Both Cultivars
1. Check	46.1 e[z]	54.8 e	50.4 h
2. Polyram 80W 120 g (1 lb) & Topsin-M 70W (FMC) 15 g (2 oz) thru 4 June Polyram 80W 120 g (1 lb) 16 June to EOS	18.1 d	43.1 e	29.8 g
3. Funginex 18.2%EC 62.5 ml (8.0 floz) & Polyram 80W 90 g (12oz) thru 4 June Polyram 80W 180 g (1.5lb) 16 June to EOS	14.6 d	22.7 d	19.3 f
4. TD 2126 4.5F 5.2 ml (2.5 floz) & Rubigan 5137 1EC 11.7 ml (1.5 floz)	8.5 cd	5.8 c	7.1 de
5. Rubigan 5137 1EC 9.8 ml (1.125 floz)	9.2 cd	8.1 c	8.7 de
6. Rubigan 1AS9.8 ml (1.125 floz)	11.5 d	11.1 c	11.3 e
7. RH-3866 40W 18.7 g (2.5 oz)	2.0 ab	1.1 ab	1.5 c
8. RH-3866 40W 37.4 g (5.0 oz)	0.1 a	0.1 a	Tr a
9. DPX H6573 40%L 1.2 ml (0.16 floz)	4.0 bc	4.9 bc	4.4 d
10. DPX H6573 40%L 2.4 ml (0.31 floz)	2.0 ab	0.4 a	1.0 bc
11. DPX H6573 40%L 4.9 ml (0.63 floz)	0 a	0 a	0 a
12. DPX H6573 40%L 2.4 ml (0.31 floz) & DPX 965 50W 7.5 g (1 oz)	1.2 ab	0.5 a	0.8 abc

	% Terminal Leaves With Scab[W]		
	Cortland		Golden Delic.
	25 June	28 August	10 July
1. Check	47.0 h[z]	100 g	69.2 f
2. Polyram 80W 120 g (1 lb) & Topsin-M 70W (FMC) 15 g (2 oz) thru 4 June Polyram 80W 120 g (1 lb) 16 June to EOS	14.2 g	49.7 e	18.6 e
3. Funginex 18.2%EC 62.5 ml (8.0 floz) & Polyram 80W 90 g (12oz) thru 4 June Polyram 80W 180 g (1.5lb) 16 June to EOS	2.8 cd	19.5 c	5.6 d
4. TD 2126 4.5F 5.2 ml (2.5 floz) & Rubigan 5137 1EC 11.7 ml (1.5 floz)	4.5 de	32.0 d	1.8 c
5. Rubigan 5137 1EC 9.8 ml (1.125 floz)	9.4 fg	55.7 e	3.2 cd
6. Rubigan 1AS 9.8 ml (1.125 floz)	7.0 ef	70.1 f	1.6 bc
7. RH-3866 40W 18.7 g (2.5 oz)	0.6 abc	0.6 a	Tr a
8. RH-3866 40W 37.4 g (5.0 oz)	0.1 a	0.5 a	Tr a
9. DPX H6573 40%L 1.2 ml (0.16 floz)	1.6 bcd	27.4 cd	0.1 ab
10. DPX H6573 40%L 2.4 ml (0.31 floz)	0.3 ab	6.1 b	0 a
11. DPX H6573 40%L 4.9 ml (0.63 floz)	0 a	1.1 a	0.1 ab
12. DPX H6573 40%L 2.4 ml (0.31 floz) & DPX 965 50W 7.5 g (1 oz)	0 a	1.8 ab	Tr a

[z]Means within columns followed by the same letter do not differ significantly (DMRT P=0.05). The arcsin square root % transformation was used for analysis. Tr=trace

Fungicide and Rate of Formulated Product Per 100 Liters (100 gal)[v]	% Leaves with Cedar Apple Rust[w]		
	Golden Delicious[x]		Rome[y]
	Cluster	Terminal	Terminal
1. Check	5.9 b[z]	20.2 b	26.5 c
2. Polyram 80W 120 g (1 lb) & Topsin-M 70W (FMC) 15 g (2 oz) thru 4 June Polyram 80W 120 g (1 lb) 16 June to EOS	0 a	0.3 a	2.1 b
3. Funginex 18.2%EC 62.5 ml (8.0 floz) & Polyram 80W 90 g (12oz) thru 4 June Polyram 80W 180, g (1.5lb) 16 June to EOS	0 a	0.1 a	Tr a
4. TD 2126 4.5F 5.2 ml (2.5 floz) & Rubigan 5137 1EC 11.7 ml (1.5 floz)	0 a	0 a	0.6 ab
5. Rubigan 5137 1EC 9.8 ml (1.125 floz)	0 a	Tr a	0.4 ab
6. Rubigan AS 9.8 ml (1.125 floz)	0 a	0 a	0.1 a
7. RH-3866 40W 18.7 g (2.5 oz)	0 a	Tr a	Tr a
8. RH-3866 40W 37.4 g (5.0 oz)	0 a	Tr a	0 a
9. DPX H6573 40%L 1.2 ml (0.16 floz)	0 a	Tr a	0.3 ab
10. DPX H6573 40%L 2.4 ml (0.31 floz)	0 a	0 a	Tr a
11. DPX H6573 40%L 4.9 ml (0.63 floz)	0 a	0 a	0 a
12. DPX H6573 40%L 2.4 ml (0.31 floz) & DPX 965 50W 7.5 g (1 oz)	0 a	0 a	Tr a

[v]Spray dates 27 April (HIG); 6 May (Pink), 16 May (Bloom) DPX H6573 #9,10,11, 17 May rest of treatments, 24 May (75% Petal Fall); 4, 16 & 27 June; 9, (25,26,30) July; 14 August. Sprays of 16 & 17 May and 25, 26, 30 July spread out due to changing weather conditions.

[w]Cedar apple rust inoculum placed in trees 3, 23 May.

[x]Data collected from 20 cluster/tree/replicate on 20 June and 20 terminals/tree/replicate on 10 July.

[y]Data collected from 20 terminals/tree/replicate on 20 July.

[z]Means within columns followed by the same letter do not differ significantly (DMRT P=0.05). The arcsin square percentage transformation was used for analysis. Tr= <0.05%.

M.26 ORCHARD APPLE FUNGICIDE TRIAL
FRUIT DATA

Material and Rate of Formulated Product Per 100 Liter (100 gal)[v]	% Cortland Fruit with:	
	Apple Scab	Flyspeck
1. Check	99.9 e[z]	20.4 c
2. Polyram 80W 120 g (1 lb) & Topsin-M 70W (FMC) 15g (2 oz) thru 4 June Polyram 80W 120 g (1 lb) 16 June to EOS	8.1 c	0.1a
3. Funginex 18.2%EC 62.5 ml (8.0 floz) & Polyram 80W 90 g (12oz) thru 4 June Polyram 80W 180 g (1.5lb) 16 June to EOS	7.0 c	0.7ab
4. TD 2126 4.5F 5.2 ml (2.5 floz) & Rubigan 5137 1EC 11.7 ml (1.5 floz)	6.6 c	0.6ab
5. Rubigan 5137 1EC 9.8 ml (1.125 floz)	25.9 d	5.6 b
6. Rubigan 1AS (1.125 floz)	32.6 d	0.1a
7. RH-3866 40W 18.7 g (2.5 oz)	1.3ab	2.3ab
8. RH-3866 40W 37.4 g (5.0 oz)	0.1a	3.7ab
9. DPX H6573 40%L 1.2 ml (o.16 floz)	9.7 c	4.0ab
10. DPX H6573 40%L 2.4 ml (0.31 floz)	4.1 bc	2.4ab
11. DPX H6573 40%L 4.9 ml (0.63 floz)	0.1a	0.4ab
12. DPX H6573 40%L 2.4 ml (0.31 floz) & DPX 965 50W 7.5 g (1 oz)	0.5a	0.1a

	% Fruit with Apple Scab		
	Rome	Golden Delicious	Paulared
1. Check	100.00 e	99.0 d	35.9 c
2. Polyram 80W 120 g (1 lb) & Topsin-M 70W (FMC) 15 g (2 oz) thru 4 June Polyram 80W 120 g (1 lb) 16 June to EOS	19.7 c	6.0 c	0.3a
3. Funginex 18.2%EC 62.5 ml (8.0 floz) & Polyram 80W 90 g (12oz) thru 4 June Polyram 80W 180 g (1.5lb) 16 June to EOS	8.3 b	4.1 bc	0.1a
4. TD 2126 4.5F 5.2 ml (2.5 floz) & Rubigan 5137 1EC 11.7 ml (1.5 floz)	11.8 bc	.8ab	0.2a
5. Rubigan 5137 1EC 9.8 ml(1.125 floz)	47.4 d	6.3 c	1.1ab
6. Rubigan 1AS 9.8 ml (1.125 floz)	41.0 d	4.5 bc	3.5 b
7. RH-3866 40W 18.7 g (2.5 oz)	0.7a	0.3a	Tr a
8. RH-3866 40W 37.4 g (5.0 oz)	0.1a	0 a	0.4ab
9. DPX H6573 40%L 1.2 ml (0.16 floz)	15.5 bc	3.9 bc	.7ab
10. DPX H6573 40%L 2.4 ml (0.31 floz)	0.6a	0.1a	Tr a
11. DPX H6573 40%L 4.9 ml (0.63 floz)	0.3a	0 a	0 a
12. DPX H6573 40%L 2.4 ml (0.31 floz) & DPX 965 50W 7.5 g (1 oz)	0.5a	0.1a	0.3a

[z]Means within columns followed by the same letter do not differ significantly (DMRT P=0.05). The arcsin square root % transformation was used for analysis. Tr=Trace.

Evaluations of Ergosterol-Biosynthesis Inhibitor Fungicides in Combination with Captan for Apple Disease Control

Pond Block
Hudson Valley Lab, Highland, New York

Fungicides were evaluated in a block containing four-year old McIntosh and two-year-old Golden Delicious trees on M.7 rootstock. Treatments were replicated four times on plots containing one tree of each cultivar. Fungicides were sprayed to runoff using a handgun at 2069-2758 kPa (300-400 psi). Spray dates and corresponding McIntosh growth stages were April 26 (half-inch green), May 6 (pink), 18 (bloom), 25 (petal fall), June 5,16, 27, July 10, 31, and August 15. Our objective was to apply sprays on a postinfection basis during the primary scab season with a minimum of 10 days and a maximum of 14 days between applications, but weather conditions interfered with precise spray timing. The first four sprays were applied 64, 67, 134 and 39 hours after major infection periods. Apple scab pressure was severe in this orchard because of early ascospore maturity, high inoculum levels in overwintering leaves in an adjoining orchard, and favorable weather conditions for both primary and extended secondary scab development . Cedar branches containing ceder apple rust galls were placed in the Golden Delicious tree in each plot on May 3 and 23, but rust disease pressure was light. Data were collected from leaves on 20 clusters per tree on June 12 (McIntosh) and June 22 (Golden Delicious), from all leaves on 20 terminals per tree on June 29 and August 30 (McIntosh) and July 17 (Golden Delicious), and from all McIntosh fruit (30-100 per tree) in early September. Leaves were considered infected if any identifiable scab lesions, including those inactivated by the fungicide were observed on the leaf or petiole. The plots sprayed with Dichlone, Vangard, or CGA 71818 during the primary scab season received only captan in the cover sprays starting June 16, so late-season ratings from all three of these plots represent the combination of early season control with the test fungicides and control through summer with captan.

None of the treatments totally prevented cluster leaf scab, but all of the test fungicides were more effective than the low rate of captan used for comparison with the combination treatments. The June 29 rating on McIntosh provides the last real comparison for treatments which were changed to captan on June 16 and showed CGA 71818 was slightly less effective than Vangard, and the Baycor-captan combination was more effective than Baycor alone. The August 30 ratings show the combination of Baycor or XE 799 with captan provided better scab control through extended summer spray intervals than either Baycor or captan used alone. Fruit scab on the check trees was so severe that all fruit had dropped prior to harvest. The CGA 71818 treatment allowed more fruit scab than the other test fungicides, but only the Baycor-captan treatment was significantly more effective in controlling fruit scab. There were no significant differences between treatments in control of flyspeck. The Dichlone treatment caused a significant increase in fruit russet, but russet might have been less severe if the Dichlone treatment had been terminated at pink or bloom instead of on June 5.

POND BLOCK APPLE FUNGICIDE TRIAL
FOLIAR APPLE SCAB DATA

Material and Rate of Formulated Product Per 100 Liters (100 gal)	% Cluster Leaves With Scab[x] McIntosh	% Cluster Leaves With Scab[x] Golden Delicious
Check	82.9 c	76.6 c
Captan 50W 120 g (1 lb)	33.2 b	46.9 b
Dichlone 50WDG 60 g (8 oz) thru 5 June Captan 50W 192 g (1.6 lb) from 16 June	4.4 a	13.1 a
Vangard 10W 11.2 g (1.5 oz) + Captan[v]	13.7 a	4.3 a
CGA 71818 10W 18.7 g (2.5 oz) + Captan[v]	13.9 a	4.5 a
Baycor 50W 30 g (4 oz) thru 5 June Baycor 50W 15 g (2 oz) from 16 June	9.5 a	6.5 a
Baycor 50W 30 g (4 oz) + Captan[w] thru 5 June Baycor 50W 15 g (2 oz) + Captan[w] from 16 June	4.0 a	15.7 a
XE 779 25W 6 g (0.8 oz) + Captan[w]	10.4 a	2.0 a

	% Terminal Leaves With Scab[x] McIntosh 29 June	% Terminal Leaves With Scab[x] McIntosh 30 August	% Terminal Leaves With Scab[x] Golden Delic. 17 July
Check	88.8 e	97.3 f	34.7 d
Captan 50W 120 g (1 lb)	30.2 d	58.5 e	16.5 c
Dichlone 50WDG 60 g (8 oz) thru 5 June Captan 50W 192 g (1.6 lb) from 16 June	3.8 abc	18.5 cd	2.3 b
Vangard 10W 11.2 g (1.5 oz) + Captan[v]	1.4 ab	7.3 bc	Tr a
CGA 71818 10W 18.7 g (2.5 oz) + Captan[v]	6.9 c	29.3 d	0.1 ab
Baycor 50W 30g (4 oz) thru 5 June Baycor 50W 15 g (2 oz) from 16 June	5.6 bc	11.8 c	0.4 ab
Baycor 50W 30 g (4 oz) + Captan[w] thru 5 June Baycor 50W 15 g (2 oz) + Captan[w] from 16 June	0.8 a	0.6 a	Tr a
XE 779 25W 6 g (0.8 oz) + Captan[w]	1.6 ab	1.3 ab	0.4 ab

[v]Treatments were combined with Captan 50W 120 g (1 lb) thru 5 June. From 16 June to end of season plots were sprayed only with Captan 50W 192 g (1.6 lb).

[w]Treatments were combined with Captan 50W 120 g (1 lb) for the entire season.

[x]Means within columns followed by the same letter do not differ significantly (DMRT P=0.05). The arcsin square root percentage transformation was used for statistical analysis.

POND BLOCK APPLE FUNGICIDE TRIAL
FOLIAR RUST, FRUIT SCAB, & FLYSPECK DATA

Material and Rate of Formulated Product Per 100 Liters (100 gal)	% Golden Delicious Leaves With Cedar Apple Rust	
	Cluster	Terminal
Check	17.7 c[x]	24.2 e
Captan 50W 120 g (1 lb)	2.3 b	17.5 d
Dichlone 50WDG 60g (8 oz) thru 5 June Captan 50W 192 g (1.6 lb) from 16 June	Tr a	12.2 c
Vangard 10W 11.2 g (1.5 oz) + Captan[v]	Tr a	Tr a
CGA 71818 10W 18.7 g (2.5 oz) + Captan[v]	0.3 a	1.8 b
Baycor 50W 30 g (4 oz) thru 5 June Baycor 50W 15 g (2 oz) from 16 June	Tr a	0 a
Baycor 50W 30 g (4 oz) + Captan[w] thru 5 June Baycor 50W 15 g (2 oz) + Captan[w] from 16 June	0 a	0 a
XE 779 25W 6 g (0.8 oz) + Captan[w]	0 a	0 a

Material and Rate of Formulated Product Per 100 Liters (100 gal)	% McIntosh Fruit With:		
	Apple Scab	Flyspeck	Russet
Check	(100.0)	-	-
Captan 50W 120 g (1 lb)	38.2 c	2.8	2.3 a
Dichlone 50WDG 60 g (8 oz) thru 5 June Captan 50W 192 g (1.6 lb) from 16 June	7.3 ab	1.3	30.6 b
Vangard 10W 11.2 g (1.5 oz) + Captan[v]	4.3 ab	3.7	1.1 a
CGA 71818 10W 18.7 g (2.5 oz) + Captan[v]	13.4 b	7.5	1.0 a
Baycor 50W 30 g (4 oz) thru 5 June Baycor 50W 15 g (2 oz) from 16 June	8.6 ab	4.8	0.4 a
Baycor 50W 30 g (4 oz) + Captan[w] thru 5 June Baycor 50W 15 g (2 oz) + Captan[w] from 16 June	0.3 a	1.2	0.4 a
XE 779 25W 6 g (0.8 oz) + Captan[w]	1.1 ab	2.4	0.2 a

[v]Treatments were combined with Captan 50W 120 g (1 lb) thru 5 June. From 16 June to end of season plots were sprayed only with Captan 50W 192 g (1.6 lb).

[w]Treatments were combined with Captan 50 120 g (1 lb) for the entire season.

[x]Means within columns followed by the same letter do not differ significantly (DMRT P=0.05). The arcsin square root percentage transformation was used for analysis.

REDUCED SAT APPLE FUNGICIDE TRIAL
Entomology Orchard
Hudson Valley Laboratory, Highland, NY

All fungicides were applied at quarter-inch green on April 18 to mature apple trees on M.2 rootstocks. Trees treated with the lower concentration of Bravo 500 received a second application at the same concentration on April 30 when trees were at tight cluster. Treatments were applied with a handgun at 2758 kPa (400 psi) and were replicated four times with one McIntosh and one Cortland tree in each replicate. All trees were treated during bloom (May 15) with Captan 50W 3 lb/A plus Bayleton 50W 2 oz/A and again on June 5 with Captan 50W 4.5 lb/A. Disease pressure in this orchard was extremely high due to heavy scab infection during the preceding season and because of favorable weather conditions for primary scab development. Five primary apple scab infection periods recorded prior to bloom occurred April 23, May 3, 8, 12, and 13. The first two infection periods accounted for most of the cluster leaf scab. The second and third infection periods were accompanied by 2.2 and 1.1 inches of rain respectively. Data were collected by evaluating leaves and fruitlets on 20 clusters per tree on June 8 (McIntosh) and June 12 (Cortland). Twenty McIntosh terminals per tree were also evaluated on June 8.

The single application of Bravo 500 at quater-inch green failed to adequately control scab under the severe conditions present in this trial. Two applications of the lower concentration of Bravo 500 resulted in control equivalent to that provided by Difolatan Sprills. If the follow-up treatment with contact fungicide had been applied at pink on May 6 as is generally recommended for RSAT programs, scab infections on fruit and terminal leaves would have been somewhat lower. However, an earlier follow-up spray using contact fungicides would not have significantly affected cluster leaf scab ratings. The heavy inoculum carry-over and the 2.2-inch rainfall on May 3 may have contributed to the failure of the single application of Bravo 500 and to the poor cluster-leaf scab control observed with the other fungicide treatments.

Material and Rate of Formulated Product/100 Liters (100 gal)	% Cluster Leaves With Scab	
	McIntosh	Cortland
Check	72.7 c[z]	77.1 b
Bravo 500 500 ml (2 qt)	51.4 b	60.6 b
Bravo 500 125 ml (1 pt)	6.7 a	9.4 a
Difolatan Sprils 449 g (3.75 lb)	13.5 a	18.5 a

Material and Rate of Formulated Product/100 Liters (100 gal)	% McIntosh Terminal Leaves with Scab 8 June	% Fuitlets with Scab	
		McIntosh	Cortland
Check	28.1 c	58.5 c	32.0 b
Bravo 500 500 ml (2 qt)	22.9 bc	24.4 b	23.9 b
Bravo 500 125 ml (1 pt)	18.0 b	1.5 a	3.9 a
Difolatan Sprills 449 g (3.75 lb)	8.6 a	0.7 a	2.2 a

[z]Means within columns followed by the same letter do not differ significantly (DMRT P=0.05). The arcsin square root percentage transformation was used for analysis.

The generalized procedure used for the four fungicide tests reported here involved uniformly wounding fruit with three nails mounted in a cork, inoculating prior to treatment by immersing wounded fruit in a spore suspension of Penicillium expansum for 20 seconds, treating fruit by dipping into fungicide or fungicide plus scald inhibitor for 30 seconds, and storing fruit on spring cushion trays for later evaluation. Treatments were replicated four times with 25 fruit in each replicate. The first two trials were designed to further investigate negatively-correlated cross-resistance between the benzimidazoles and diphenylamine(DPA), a storage scald inhibitor used commercially for more than 20 years. The third trial was a test of eight new ergosterol-biosynthesis inhibitor (EBI) fungicides, and the fourth was a repeat of some 1982-83 work evaluating the comparative efficacy of various captan formulations

In Trial I, the two concentrations of Topsin and DPA tested are the upper and the lower registered rates for these materials and were included in the test to determine if the control of Benlate-resistant isolates is rate dependent. To determine if the fungicide-DPA interaction was temperature releated, four replicates were held at ambient temperature and four were stored in regular cold storage. Results showed the DPA treatments contributed to disease control only when apples were held in cold storage. The fungicides alone provided some contol of decay at ambient temperature but had no effect on decay in fruit stored at cold temperatures. DPA alone also failed to provide any decay control. The higher concentration of DPA was more effective than the lower concentration when combined with Benlate or with the low rate of Topsin M, but no DPA rate response was evident at the high rate of Topsin M. The addition of ethoxyquin to the fungicide-DPA mix (as currently recommended for a few highly scald-susceptible strains of Delicious) caused no adverse effect on decay control except with the low rate of Topsin M plus DPA. An excess of wetting agents in some of the postharvest mixes may have caused decreased fungicide residue on the fruit and thus contributed to the inconsistent rate effects observed.

In Trial II, Benlate-resistant and sensitive inoculum were used independently instead of in mixtures and inoculated fruit were again held at both ambient and cold storage temperatures. Because Benlate provided virtually complete control of the sensitive isolate when used alone, we could not determine if the addition of DPA increased the toxicity of Benlate to the sensitive isolates. The Belate-DPA combination again failed to provide any control of decay in apples held at ambient temperatures. DPA alone provided some control of resident isolates but was less effective than the Benlate-DPA combination. The Benlate-DPA combination was less effective in Trial II than in previous trials, possibly because a high proportion of the Benlate -resistant inoculum was from an isolate specifically selected because it was less sensitive to the Benlate-DPA combination in vitro. The results of Trial II verified that the Benlate-DPA interaction is evident in treated apples only when fruit are held in cold storage and showed that DPA alone is less effective than the Benlate-DPA combination even when only Benlate-resistant isolates are involved.

The Delicious fruit used in Trial III were from a commercial orchard, were harvested early, and were more resistant to decay than apples we usually use for postharvest tests. The incidence of decay in the control was therefore relatively low and the fruit had to be held unusually long before significant decay developed in the treatments. RO 15-1297, UBI A815, BAS 454 06F, and Funginex would probably be even less effective under more severe disease-pressure. Efficacy of the EBI fungicides was not affected by the addition of DPA.

In the test of captan formulation, Captec and Agway Captan generally proved more effective than Captan 50W when used alone or when used in combination with DPA. (The difference in activity of the flowable captan formulations in the two years may reflect differences in fruit, chance variation, or aging of the compounds which were stored from one year to the next in a heated storage room.) The ranking of captan formulations by efficacy was different however when Benlate and DPA were added.

Trial I. Percent Empire apples infected with Penicillium expansum following post-harvest dip treatment with fungicides and scald inhibitors and storage at room temperature or 4.4 C.

Treatment and rate of formulated product per per 100 liters (or 100 gal)[t]	Scald inhibitors added: none	No-Scald DPA EC-283[w] 1000 ppm (=ug/ml)	No-Scald DPA EC-283[w] 2000 ppm (=ug/ml)	No-Scald DPA[w] 2000 ppm plus Deccoquin 305 Concentrate 2700 ppm
Room temperature trial[x]				
Water Control	40 b[y]	62 b	43 b	48 b
Benlate 50W 60 g (8 oz)	17 a	8 a	17 a	14 a
Topsin-M 70W 60 g (8 oz)	15 a	14 a	11 a	13 a
Topsin-M 70W 120 g (16 oz)	15 a	12 a	6 a	10 a
Cold storage trial[x]				
Water control	81 a	82 b	63 c	61 c
Benlate 50W 60 g (8 oz)	67 a Z[y]	15 a Y	2 a X	5 a XY
Topsin-M 70W 60 g (8 oz)	61 a Z	28 a Y	5 ab X	23 b Y
Topsin-M 70W 120 g (6 oz)	71 a Z	15 a Y	16 b Y	18 ab Y

[t]All fruit were uniformly wounded with three nails mounted in a cork and were inoculated prior to treatment by dipping in a spore suspension containing 45,000 conidia/ml. The spore suspension contained 11% benomyl-resistant conidia and 89% benomyl-sensitive conidia. Half of the benomyl-resistant conidia were from an isolate also resistant to DPA in laboratory tests.

[w]Diphenylamine

[x]Treatments stored 13 days at 16 to 22 C or 66 days in cold storage (4.4 C)

[y]Means for the same temperature and within columns followed by the same small letters (a, b, c,) or numbers within rows followed by the same capital letters (X, Y, Z) are not significantly different (DMRT, P=0.05). Scald inhibitors caused no significant differences between means in the room temperature trials or for the water control in cold storage. The arcsin square root percentage transformation was used for statistical analysis.

Trial 11. Percent Delicious apples with blue mold decay as affected by postharvest treatments with fungicides or diphenylamine and storage at ambient temperature or 2.2 C.

Treatment and rate of formulated product per 100 liter (or 100 gal)	16 days storage at ambient temperature[w]		113 days storage at 2.2 C	
	benomyl-susceptible inoculum[x]	benomyl-resistant inoculum[x]	benomyl-susceptible inoculum	benomyl-resistant inoculum
Water control	21.8 b[y]	38.9 b	41.8 b	62.8 d
Benlate 50W 60 g (8 oz)	1.0 a	43.7 b	0 a	66.5 d
No-Scald DPA EC-283 2000 ppm	49.0 c	38.9 b	51.0 b	48.0 c
Benlate 50W 60 g (8 oz) & No-Scald DPA EC-283	0 a	30.6 b	0 a	28.6 b
Vangard 10W 45 g (6 oz)	0 a	0 a	0 a	0 a

[w]Storage temperature fluctuated from 16-22 C.

[x]Conidial suspensions of both benomyl-susceptible and -resistant isolates were adjusted to 50,000 conidia/ml and fruit were dipped into inoculum prior to treatment. One-third of the benomyl-resistant inoculum came from an isolate also resistant to DPA in laboratory tests.

[y]Means within columns followed by the same letter are not significantly different (P=0.05, DMRT). The arcsin square root percentage transformation was used for statistical analysis.

Trial III: Percent Delicious fruit infected with Penicillium expansum following postharvest treatment with fungicides and storage at 2.2 C.

Treatment and rate of formulated product per 100 liters (100 gal)[w]	Mean Percent Rotted Fruit: After 124 Days, Without DPA	After 124 Days, With DPA[y]	After 167 Days[x], Without DPA	After 167 Days[x], With DPA	After 167 Days[x], Combined w/wo DPA
Water control	7.6 b[z]	4.4 b	27.9 c	30.4 c	29.2 d
Benlate 50W 60 g (8 oz)	8.3 b	0.3 ab	28.6 c	0.5 a	9.8 bc
Vangard 10W 45 g (6 oz)	0 a	0 a	0 a	0.3 a	Tr a
CGA 71818 10W 45 g (6 oz)	0 a	0 a	0.5 a	0 a	0.1 a
Fungaflor 75W 65 g (8.7 oz)	0 a	0 a	0 a	0 a	0 a
DPX H6573 40%L 4.9 ml (.625 floz)	0 a	0 a	0.3 a	0.3 a	0.3 a
RO 15-1297 500EC 23.4 ml (3 floz)	2.0 ab	0.5 ab	13.9 bc	10.6 b	12.2 bc
UBI A815 50W 100 g (13.4 oz)	0 a	0 a	12.8 bc	2.7 ab	6.9 b
BAS 454 06F 25EC 23.4 ml (3 floz)	0.3 a	0.3 a	8.6 b	6.4 ab	7.5 b
Funginex 50W 120 g (1 lb)	7.4 b	1.5 ab	25.5 bc	13.6 bc	19.0 cd

[w]All fruit were uniformly wounded with three nails mounted in a cork and were inoculated prior to treatment by dipping in a spore suspension containing 50,000 conidia/ml. The spore suspension contained 20% benomyl-resistant conidia and 80% benomyl-sensitive conidia. Half of the benomyl-resistant conidia were from an isolate also resistant to DPA in laboratory tests.

[x]A significant difference exists between the % rotten fruit treated with DPA and not treated with DPA. Mean % rot with DPA 3.5 a and without DPA 7.7 b.

[y]Diphenylamine No-Scald DPA EC-283 was used at 1000 ppm.

[z]Means within columns followed by the same letter are not significantly different (DMRT P=0.05). The arcsin square root percentage transformation was used for statistical analysis.

Trial IV: Comparison of the effectiveness of various captan formulations alone and in combination with benomyl for control of *Penicillium expansum* in stored 'Empire' apples.

Fungicide and rate of formulated product per 100 liters (100 gal)[w]	Percent Decayed Fruit					
	1982-83 After 94 Days			1983-84 After 54 Days		
	Without DPA	No-Scald DPA[x] 1000 ppm	Fungicide-DPA Interaction	Without DPA	No-Scald DPA 1000 ppm	Fungicide-DPA Interaction
Water control	85.4 c[y]	92.4 d	none	58.2 cd	63.2 d	none
Captan 50W 240 g (2 lb)	76.2 c	71.2 c	none	47.0 bc	50.2 cd	none
Captan 80W 150 g (20 oz)	60.1 b	79.5 c	negative	40.0 abc	41.7 bc	none
Captec 4L 250 ml (32 floz)	29.8 a	30.5 b	none	21.7 a	33.6 bc	none
Agway Captan 4F 250 ml (32 floz)	22.5 a	39.8 b	negative	40.8 bc	29.2 ab	none
Benlate 50W 60 g (8 oz)	78.3 c	0 a	positive	66.1 d	27.5 ab	positive
Benlate 50W 60 g (8 oz) & Captan 50W 120 g (1 lb)	33.7 a	0.3 a	positive	35.6 ab	15.1 a	positive
Benlate 50W 60 g (8 oz) & Captan 50W 240 g (2 lb)	33.2 a	1.0 a	positive	--[z]	--	--
Benlate 50W 60 g (8 oz) & Captec 4L 125 ml (16 floz)	--[z]	--	--	31.9 ab	38.0 bc	none
Benlate 50W 60 g (8 oz) & Agway Captan 4F 125 ml (16 floz)	--[z]	--	--	29.8 ab	16.7 a	none

[w]All fruit were uniformly wounded with three nails mounted in a cork and were inoculated prior to treatment by dipping in a spore suspension. 1982-83 spore suspension contained 50,000 conidia/ml with 80% benomyl-susceptible conidia and 20% benomyl-resistant conidia. 1983-84 spore suspension contained 50,000 conidia/ml with 75% benomyl-sensitive conidia and 25% benomyl-resistant conidia. One-third of the benomyl-resistant conidia (1983-84) were from isolate also resistant to DPA in lab. tests.

[x]Diphenylamine No-Scald DPA EC-283 formulation was used at 1000 ppm.

[y]Means within the same column followed by the same letter do not differ significantly (DMRT P=0.05). The arcsin square root percentage transformation was used for analysis.

[z]This combination not tested in this year.

EFFECTS OF TWO SECCESSIVE YEARS OF POSTPLANT NEMATICIDE TREATMENTS ON NEMATODE POPULATIONS, GROWTH AND YIELD OF DELICIOUS APPLE TREES ON MM.106 ROOTSOTCKS, 1982-1984

A commercial orchard of 'Redchief Delicious' apples on MM.106 rootstocks planted in 1974 near New Paltz, New York, was selected for postplant nematicide treatments. The orchard soil type was a well-drained Bath-Nassau complex of gravelly and shaley silt loam. Nematicide treatments were applied to single-tree plots in a randomized block design with five replications for each treatment and 10 replications (two in each block) for the control. The area to be treated around each tree consisted of a 7 x 14 foot rectangle subdivided into two 7 x 7 foot squares. The first square was located entirely within the herbicide treated strip beneath the trees, but was slightly offset so that the treated tree was not centered in the square. The second square was immediately adjacent to the first, but extended 3-4 feet beyond the herbicide strip into the sodded row middles. The sodded area beyond the tree dripline was included in the second square to provide a comparison of nematode control acheived when treatments were applied to sod instead of the virtually bare, herbicide-treated strip.

Nematicide treatments were applied 7 May 1982 and the same treatments were applied again to the same plots on 29 April 1983. Liquid treatments were applied in the equivalent of 32 gallons of solution per treated acre. In 1982, granular materials applied to the herbicide strip were lightly incorporated with a garden rake immediately after application, but neither the granular materials nor the sprayed treatments were incorporated in the sod. In 1983, none of the treatments were incorporated because rain appeared imminent at the time the applications were made. The first rain following the 1982 treatments occurred 12 days after treatments were applied with 0.16 inch recorded at the Hudson Valley Lab six miles to the east. Application of the 1983 teratments was followed within 12 hours by 0.10 inch of rain and within the subsequent three days by another 0.17 inch of rain.

Nematode samples were collected from each single-tree plot on 19 July 1982 and on 7 October 1983. Two samples per plot were collected in 1983: One was taken from within the herbicide strip and one was from the sodded pertrim of each plot. Each sample was a composit from three sites within the sample area. Soil was collected using a shovel to allow sampling across a soil profile from 5 to 15 cm below the soil surface. Nematode extraction and counting was performed at the Cornell Nematode Diagnostic Laboratory where samples were processed like other commercial samples. The log 10 transformation was used for statistical analysis of nematode count data.

Tree trunk diameters were measured prior to initiation of the experiment in April 1982 and again at harvest time in 1982 and 1983. In 1982, 1983 and 1984 harvest data including the number of fruit and total fruit weight were collected by harvesting all fruit from each treated tree and from five control trees (one control tree in each block). Harvest data were statistically analyzed using the April 1982 trunk cross-sectional area as a covariant in the analysis.

Nematicide treatments caused no significant differences in tree growth as determined by statistical analyses of changes in trunk diameter from April 1982 to harvest in 1983. None of the treatments resulted in improved yield in 1982 or 1983, but in both years one of the Furadan treatments resulted in yields significantly lower than that on the untreated control trees. Possibly production on Furadan-treated trees was reduced because of marginal phytotoxicity of the Furadan treatments to tree roots, but no visible phytotoxic symptoms were noted on fruit or foliage during either growing season. Because most trees in the orchard were overcropped in 1983, return bloom was generally reduced in 1984. Trees treated with Furadan and Advantage, however, had significantly greater 1984 yields than trees in the other plots. The increased yield in 1984 was presumably caused by their lighter crop in 1983 which allowed more return bloom. Statistical analysis of the combined yield for 1982, 1983, and 1984 showed treatment had no significant effect on total yield over the three year period.

Split-plot analyses were used to evaluate the combined 1982-83 data from the herbicide strip and also the combined herbicide-strip-plus-sod data for 1983. None of the interaction terms in the split plot analyses were significant. The Duncan's multiple range separations for the grand means for the split plot analyses are shown in the data table.

Nematode count data showed that Nemacur was more effective than the other treatments for controlling Pratylenchus within the herbicide strip except for the Furadan 4F treatment in 1982. However, both formulations of Furadan provided excellent control of Pratylenchus after two years of treatments applied to sod. At the end of two years the Furadan and Advantage treatments had proven more effective than Nemacur of controlling Xiphimena within the herbicide strip. Nemacur was just as effective as other treatments against Xiphinema when treatments were applied to sod. Furadan treatments caused a more rapid decrease in Xiphinema populations than did Advantage (especially the 15G formulation of Advantage), but by the end of two seasons, Furadan and Advantage treatments proved equally effective against Xiphinema.

The effect ground cover on the toxicity of Nemacur against Xiphinema and Furadan against Pratylenchus may reflect differences in how the toxicant reaches the nematodes in the two types of treated area. The ability of Nemacur and Furadan to move systemically in plants would allow these compounds to be rapidly translocated to the roots of the plants in the sodded areas to which the treatments were applied. Thus, the toxicants applied to sod may reach feeding nematodes via plant roots and therefore could act as stomach poisons. The nematicides applied to the bare ground in the herbicide strip, however, probably leach through the soil and act primarily as contact poisons. If these speculations are valid, then our data would suggest that Nemacur is more effective than Furadan as a contact nematicide against Pratylenchus and the reverse is true for Xiphinema, but both materials are effective against both species when the toxicant reaches the nematode as a stomach poison.

Results of this trial indicate postplant nematicides can be used to reduce nematode populations in existing apple plantings, but the nematicide selected must be matches to the species of nematodes to be controlled if the applications are made to bare ground in an herbicide strip beneath trees. The value of these treatments remains in questions, however, because of the treatments resulted in increased yield over the three-year observation period. Results suggest therefore that the nematode populations present in the soils in this orchard were not causing significant feeding damage to the trees.

Mean Yield Per Tree in Kg

Nematicide and rate active ingredient/acre	1982	1983	1984	Three year total
Check	78.3 a*	177.9 a	19.9 b	276.1 a
Furadan 4F 10 lb al	58.8 b	161.9 a	71.3 a	292.0 a
Furadan 15G 10 lb al	67.4 ab	141.7 b	62.9 a	271.9 a
Advantage 4L 10 lb al	74.0 ab	174.1 a	11.7 b	259.8 a
Advantage 15G 10 lb al	82.4 a	176.3 ab	38.7 ab	297.5 a
Nemacur 3 15 lb al	78.6 a	175.1 a	19.4 b	273.1 a
LSD (P-0.05)	15.3	16.5	32.9	NS

*LSD Separations. The Spring 1982 trunk cross sectional area was used as a covariate in all statistical analyses.

Two-Year Trial with Postplant Nematicides on Bearing Apples - New Paltz, NY

Nematicide and rate of active ingredient/acre[v]	Mean number of Pratylenchus per 100 cc soil: Samples from within the herbicide strip 1982[w]	1983[x]	1983 samples from sod[x]	Grand means from split-plot statistical analyses: For 1982 & 1983 counts from herbicide strip	For 1983 counts from sod & from herbicide strip
Check	34.8 b[y]	57.0 b	115.9 c	44.6 c	81.3 e
Furadan 4F 10 lb ai	3.8 a	24.9 b	2.1 a	9.9 b	7.6 ab
Furadan 15G 10 lb ai	14.5 b	43.2 b	3.6 a	25.1 c	12.9 bc
Advantage 4EC 10 lb ai	19.8 b	40.1 b	21.7 b	28.2 c	29.6 cd
Advantage 15G 10 lb ai	26.8 b	33.5 b	79.9 bc	30.0 c	51.7 de
Nemacur 3 15 lb ai	1.6 a	2.1 a	4.7 a	1.8 a	3.2 a

Nematicide and rate of active ingredient/acre[v]	Mean number of Xiphinema per 100 cc soil: Samples from within the herbicide strip 1982[w]	1983[x]	1983 samples from sod[x]	Grand means from split-plot statistical analyses: For 1982 & 1983 counts from herbicide strip	For 1983 counts from sod & from herbicide strip
Check	56.3 c	49.0 b	72.6 c	52.6 c	59.6 c
Furadan 4F 10 lb ai	9.5 a	1.5 a	2.8 a	4.0 a	2.1 a
Furadan 15G 10 lb ai	10.0 a	1.4 a	0.9 a	4.0 a	1.1 a
Advantage 4 EC 10 lb ai	14.5 ab	1.4 a	2.5 a	4.9 ab	1.9 a
Advantage 15G 10 lb ai	33.9 bc	3.0 a	19.0 b	10.5 b	7.8 b
Nemacur 3 15 lb ai	40.3 bc	52.4 b	3.1 a	46.0 c	13.3 b

[v]Nematicides were applied 7 May 1982 and again 29 April 1983 to the same plots.

[w]Data from samples collected 19 July 1982.

[x]Data from samples collected 7 October 1983.

[y]Means within columns followed by the same letter are not significantly different (DMRT P=0.05). The Log (10) transformation was used for statistical analysis.

EFFECT OF FUMIGATION AND POSTPLANT NEMATICIDES ON YIELD OF JONAMAC/MM.111 APPLE TREES IN A REPLANT SITE

Maybrook, New York

ORCHARD SITE AND TREATMENT METHODS: Preplant fumigation with Vorlex and postplant applications of Nemacur and Temik were compared for their effects on growth of newly planted trees and for effects on yield when the trees began bearing. Vorlex at 15, 30, and 40 gallons per treated acre were applied August 28, 1980, to a well-prepared site from which an old orchard had been removed in 1979. The soil types within the block were Bath silt loam and Albia silt loam and gravelly silt loam. Soil in the top 3-4 inches was very dry at the time of treatment, but the fumigant was injected to a depth of 8-10 inches. Fumigant was applied in 8-ft bands over the future row locations using a John Blue applicator with shanks 8 inches apart. Treatments were applied in a randomized block design with four replicates. Each plot contained 11 trees spaced 13 feet apart within the row (167 trees/A). Untreated plots were left for controls and for a postplant Nemacur treatment.

Trees were planted April 27-28, 1981. The Nemacur treatment was applied on May 18, 1981, and April 22, 1982. Nemacur was applied as a spray to a 5 x 5 foot area around each tree using a hand-pumped sprayer calibrated to deliver 32 gallons of spray material per treated acre. Nemacur was not incorporated into the soil. To determine if Temik would provide additional growth stimulation in plots treated with Nemacur and Vorlex, Temik 15G was applied to three of the 11 trees in each plot on the same dates that Nemacur was applied. Temik was applied at the rate of 1 oz per tree in 1981 and 2 oz per tree in 1982 and was incorporated by raking into the soil. The first rain following postplant nematicide applications occurred May 29, 1981 and April 23, 1982.

DATA COLLECTION: In a single pre-treatment nematode sample collected from acrss the block on May 22, 1982, a total of 257 plant parasitic nematodes were detected per 100 cc of soil. One hundred fifty-five of the 257 were *Pratylenchus* species. Post-treatment nematode samples were collected November 4, 1981 and July 29, 1982 from a single site beneath each of the three trees in each plot. Samples from the individual trees were composited to provide a single sample for each plot. Nematode count data for the two years are presented in Table 1. The greatly reduced *Pratylenchus* populations in the control plot as compared to the pre-treatment sample reflects population reductions caused by plowing, discing, and lack of host plants during the time soil was prepared for fumigation. All treatments reduced *Pratylenchus* populations significantly during the first year but no statistically significant differences were detected in 1982. The 15 gallon rate of Vorlex had the highest *Pratylenchus* and total parasitic nematode populations in 1982, and these populations may account for the reduced yeild in this treatment in subsequent years. The only other nematode species present in significant numbers was *Helicotylenchus*.

Total terminal shoot growth was measured for the three Temik-treated trees and for three non-Temik trees in each plot at the end of the 1981 and 1982 seasons, and for all trees in the experimental block in 1983. Data were statistically analyzed using a split-plot design to separate treatments with and without Temik and a split-split plot design to analyze data for the entire three year period. As shown in Table 2, tree growth was not significantly different from the control in either the Vorlex or the Nemacur treatments, but Temik caused a significant increase in growth during both the 1982 and 1983 season and in the grand mean for the three-year period.

All fruit in the experimental block were harvested and weighed in 1983 and 1984. Results of split-split plot statistical analysis are presented in Table 3. Only the use of Temik had a significant effect on 1983 yield, but Temik had no significant effect on yield in 1984 or on the two-year grand means for yield. The low rate of Vorlex resulted in significantly reduced yield in 1984 and this significant difference carried over to the grand means for the two years.

TENTATIVE CONCLUSIONS: Based on data collection and analyses to date, we conclude that neither fumigation nor post-plant nematicides were economically advantageous in this situation. Although Temik stimulated increased tree growth over the first three years the tree were in the ground and increased production during the first harvest season, total production was approximately equal for all treatments at the end of the second harvest. Results of this experiment should not be used to conclude that fumigation and postplant nematicides have no place in Hudson Valley apple culture, but the experiment does suggest that not all sites will benefit significantly from these treatments. At this point we have no method for determining where treatments will prove beneficial.

<u>NOTE</u>: The following data tables should not be considered a final analysis of this experiment as we will be re-examining the nematode data using a log 10 transformation, will use additional statistical procedures (e.g., orthogonal comparisons) for more precise evaluations of the shoot growth and yield data, will continue yield measurements for at least one more season, and will eventually evaluate the economic benefits of all treatments.

Table 1. Effect of treatments on nematode populations in soil samples collected November 4, 1981 and July 29, 1982

Material and rate per treated acre	Numbers of nematodes per 100 cc soil					
	Pratylenchus		*Helicotylenchus*		All parasitic nematodes	
	1981	1982	1981	1982	1981	1982
1. Control	22.5 c	25.0 a	26.3 b	23.5 b	88.3 c	73.8 a
2. Vorlex 15 gal	7.8 ab	30.0 a	2.5 ab	2.5 a	19.3 a	175.5 a
3. Vorlex 30 gal	7.0 ab	13.8 a	1.5 a	1.0 a	20.8 a	39.0 a
4. Vorlex 40 gal	4.5 a	5.8 a	4.8 ab	3.0 a	15.0 a	21.3 a
5. Nemacur 3EC 5 gal	11.8 b	0.3 a	11.5 ab	2.3 a	51.3 b	7.5 a
6. Temik 15G	7.2 ab	4.8 a	6.8 ab	5.8 a	22.3 a	14.5 a

Numbers within columns followed by the same letter are not significantly different (Waller-Duncan's Exact Bayesian K-ratio LSD, P≤0.05).

Table 3. Effect of fumigation and postplant nematicides on the first three years of terminal shoot growth on Jonamac/MM.111 trees planted in an old orchard site in Maybrook, NY

Treatment rate per acr	1981 alone	1981 with Temik	1982 alone	1982 with Temik	1983 alone	1983 with Temik	Three-year grand mean alone	Three-year grand mean with Temik
	Total annual terminal shoot growth per tree in meters							
1. Control	1.4	2.1	5.6	7.7	17.7	22.3	10.2	12.9
2. Vorlex 15 gal	1.4	1.9	6.2	8.7	19.1	19.1	11.2	12.0
3. Vorlex 30 gal	2.3	2.6	8.5	10.2	20.0	25.2	12.2	15.0
4. Vorlex 40 gal	1.9	2.1	8.0	9.9	21.2	22.8	12.7	14.0
5. Nemacur 3EC 5 gal	1.7	2.1	7.2	8.2	19.5	20.7	11.6	12.5
Grand means	1.8	2.2	7.1	8.9	19.5	22.0	11.6	13.3
(Significance)	N.S.		*P=0.05		* P=0.05		*P=0.05	

There were no significant differences between treatments 1-5 in any year and there were no significant interactions.

Table 4. Effect of fumigation and postplant nematicides on the first two years of production from Jonamac/MM.111 trees planted in an old orchard site in Maybrook, NY

Treatment rate per acre	1983 alone	1983 with Temik	1984 alone	1984 with Temik	Two-year grand mean alone	Two-year grand mean with Temik
	Yield in pounds per tree					
1. Control	4.5	8.8	20.4 a**	17.4 ab	18.1 ab	16.5
2. Vorlex 15 gal	3.5	5.7	15.7 b	15.6 b	13.8 b	14.2
3. Vorlex 30 gal	7.2	9.0	20.6 a	21.9 ab	18.5 ab	19.9
4. Vorlex 40 gal	7.4	8.1	21.8 a	22.3 a	19.6 a	20.1
5. Nemacur 3EC 5 gal	6.1	10.5	17.9 ab	16.2 ab	16.2 ab	15.6
Grand means	5.7	8.4	19.3	18.7	17.3	17.3
(Significance)	*P = 0.05		N.S.		N.S.	

**Means within columns followed by the same letter are not significantly different (DMRT, P=0.05). There were no significant differences between treatments in columns with no letter separations, and there were no significant interactions.