

Biological Control

EFFECT OF KAOLIN (SURROUND) ON WESTERN TENTIFORM LEAFMINER
AND ITS PRINCIPAL PARASITOID, *PNIGALIO FLAVIPES*

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Surround particle film (kaolin) is being tested extensively in Washington pome fruits for pest suppression and sunburn protection. This test was primarily for sunburn but was modified to address concerns regarding the effect of Surround on leafminer parasitoid (*Pnigalio flavipes*) activity. Reports from previous field tests indicated that parasitism of leafminers was suppressed where Surround was used, even though there was some direct suppression of leafminer populations also. The current study was a test of a strategy to minimize the impact of Surround on *P. flavipes* by delaying the first application in the first and second leafminer generations until the *P. flavipes* was protected inside the mines.

This test was performed in a 24-yr-old commercial ‘Granny Smith’/M.26 apple orchard near Orondo, WA. The experimental design was a RCB with 5 treatments and 4 replicate blocks, with each block ca. 0.8 acres. Pesticide applications were made by the grower using airblast equipment. Surround WP was applied at a rate of 50 lb/acre in 200 gpa (with the exception of the 15 June application, 62.5 lb in 250 gpa). The treatments were 1) full season [6 applications, petal fall to late June]; 2) early season [4 applications, petal fall to early June]; 3) late season [3 applications, mid-June to late July]; 4) delayed early [4 applications, late May {during peak tissue feeder stage} to mid-July]; and 5) untreated check (no sunburn control, and no leafminer control except late-season oil applications). Codling moth were controlled with mating disruption supplemental border sprays of azinphosmethyl. Carzol was applied during bloom for western flower thrips, and Provado was applied in mid-August to two of the treatments (early season and untreated check) to control white apple leafhopper.

Leafminer and parasitoid samples were taken once during each of the first three generations, when the generation was nearly complete. Population density was estimated by a 5-min search (1st gen) or by counting the mines on a 50-leaf (2nd gen) or 25-leaf sample (3rd gen). Parasitism was estimated by opening 50 mines and counting the numbers that were parasitized or “host-fed” (included dead leafminers but no parasitoid was present).

While not definitive, this test provides some preliminary evidence for suppression of leafminer parasitoid activity by Surround (Table 1). There also appears to be suppression of leafminer populations, but the net effect by the end of the season (3rd generation) was a higher leafminer density in the Surround plots than in the check. There is also very preliminary evidence for repellency of female parasitoids suppressing host feeding (versus host masking, or the inability to find larvae to parasitize) as the primary mechanism of interference.

Table 1. Leafminer population densities and parasitism status, Auvil orchard, 2000

Treatment	Gen. 1 Mines/5 min 8-Jun	Gen. 2 Mines/leaf 19-Jul	Gen. 3 Mines/leaf 1-Sep
Full Season Surround	30.8 ab	2.10 a	7.95 a
Early Season Surround	22.3 b	2.41 a	7.75 a
Late Season Surround	44.8 a	1.83 a	5.35 b
Delayed Early Surround	33.8 ab	2.37 a	6.11 ab
Check	36.5 ab	1.63 a	4.71 b

% Parasitism			
Treatment	8-Jun	19-Jul	1-Sep
Full Season Surround	8.0 b	8.0 a	45.0 a
Early Season Surround	8.0 b	12.5 a	42.5 a
Late Season Surround	15.0 ab	11.5 a	37.5 a
Delayed Early Surround	13.0 ab	11.0 a	36.5 a
Check	24.5 a	17.0 a	36.0 a

% Host-fed mines			
Treatment	8-Jun ^x	19-Jul	1-Sep
Full Season Surround	0.0 a	4.5 b	15.5 ab
Early Season Surround	0.0 a	10.5 b	15.5 ab
Late Season Surround	0.5 a	4.5 b	9.5 b
Delayed Early Surround	1.0 a	6.5 b	10.5 b
Check	2.5 a	33.0 a	23.0 a

Total % mortality			
Treatment	8-Jun	19-Jul	1-Sep
Full Season Surround	8.0 b	12.5 b	60.5 a
Early Season Surround	8.0 b	23.0 b	58.0 a
Late Season Surround	15.5 ab	16.0 b	47.0 a
Delayed Early Surround	14.0 ab	17.5 b	47.0 a
Check	27.0 a	50.0 a	59.0 a