

Evaluation of products for the control of powdery mildew in annual strawberry, 2016-2017.

On 17 Oct 2016, bare-root, green-top strawberry plants from Canada were transplanted into plastic-mulched, raised beds in a high plastic tunnel. Transplants were irrigated by overhead sprinkler for 10 days to facilitate establishment, then irrigated and fertilized through drip tape. The beds were 28-in. wide on 4-ft centers and were fumigated with Telone C-35 (300 lb/A) at bed formation. Each bed contained two rows of plants 12-in. apart; plant spacing within rows was 15 in. Selected plants were removed in November to form 14-plant plots that were 9 ft long, separated by 3- to 4-ft of empty bed. Treatments were arranged in a randomized complete block design with four blocks in adjacent beds. Most treatments were applied with a CO₂ backpack sprayer delivering 100 gal/A at 60 psi through a wand fitted with two TeeJet disc-core hollow-cone nozzles. Applications were made on 7- to 14-d schedules over a 7 week period from 25 Nov to 6 Jan. One Rhyme treatment was applied through two dedicated drip tapes/plot in 5,440 gal water per treated acre. Foliar colonization by *P. aphanis* was evaluated by removing one leaflet from each of 10 plants/plot on 4 Jan and evaluating 10 microscopic fields/leaflet for mycelial growth at 25X. Leaflets were similar in age, having been removed from leaves tagged on 21 Dec during the petiole elongation stage. The number of fields per leaflet that showed mycelial growth was averaged for all 10 leaflets/plot and expressed as a percentage representing mycelial coverage of the foliage. Fruit were harvested twice weekly from 12 Dec to 13 Jan (9 harvests). Healthy fruit weighing more than 10 g were considered marketable and weighed to determine yield. Fruit with visible powdery mildew growth on more than 25% of the achenes were not considered marketable, and were enumerated along with other unmarketable fruit. Fruit disease incidence was expressed as a percentage of all marketable and unmarketable fruit. Data were analyzed by two-way ANOVA in SAS (SAS Institute, Cary, NC).

Powdery mildew developed quickly, with disease pressure increasing in Nov and Dec due to consistently mild temperatures and the effects of growth in a high tunnel. Leaves for disease observations were tagged on 21 Dec, 2 d before the third complete set of treatments was applied. Leaflets were collected from tagged leaves for observations on 4 Jan, 2 d before the fourth complete set of treatments was applied. The decision to collect leaflets was based on the progress of foliar colonization in control plots, which approached 90% coverage of tagged leaves just before the collection date. Under these conditions, less than half the treatments reduced foliar coverage. Treatments with significant control included Quintec alternated with several other products, Prolivo 5 fl oz, GWN-10411 at all rates tested, and foliar treatments with Rhyme including Rhyme 7 fl oz alternated with Fracture. A Rhyme chemigation treatment was not effective, possibly due to a 1-wk delay in the application schedule. All treatments that reduced foliar colonization also reduced powdery mildew incidence on the fruit. Several additional treatments, i.e., Prolivo 4 fl oz, Kenja 13.5 fl oz, STK73 12 fl oz, and Quintec/Fracture/Torino also reduced fruit disease incidence. Yield of marketable fruit was significantly increased by nearly all treatments that reduced foliar coverage or fruit disease incidence. The alternation of Quilt Xcel and Quintec produced a substantial reduction in foliar disease, but relatively poor yield response. This may be related to the plant growth regulator effect of propiconazole observed in previous trials, as well as relatively less effective control of powdery mildew on the fruit. Propiconazole is one of the active ingredients in Quilt Xcel. No visible symptoms of phytotoxicity were noted in this trial.

Products and rates/A ^z	Application schedule ^y	Yield (lb/A)	% Diseased fruit ^x	% Foliar coverage ^w
Quilt Xcel 14 fl oz alt Quintec 6 fl oz	QX1,Q3,QX5,Q7	5879 c-g	20.3 a-e	36.8 a ^v
Rhyme 7 fl oz	1,3,5,7	7759 ab	21.8 b-e	44.5 ab
GWN-10411 6 fl oz	1,3,5,7	6888 a-d	10.1 ab	44.9 ab
Quintec 6 fl oz alt Torino 3.4 fl oz	Q1, T3, Q5, T7	7561 ab	15.5 a-d	50.6 abc
Quintec 6 fl oz alt Rhyme 7 fl oz	Q1, R3, Q5, R7	7924 a	13.4 abc	51.3 abc
GWN-10411 4 fl oz	1,3,5,7	7770 ab	11.3 ab	53.8 a-d
GWN-10411 8 fl oz	1,3,5,7	7165 abc	6.7 a	54.3 a-d
Rhyme 5 fl oz	1,3,5,7	6715 a-e	26.5 c-g	61.3 b-e
Prolivo 300SC 5 fl oz + OS adjuvant 9 fl oz	1,3,5,7	6737 a-e	22.1 b-f	66.1 b-f
Rhyme 7 fl oz alt Fracture 24.4 fl oz	R1, F3, R5, F7	6283 b-f	27.1 c-g	66.5 b-f
Kenja 400SC 15.5 fl oz + OS adjuvant 9 fl oz	1,3,5,7	5849 c-g	28.9 d-h	71.0 c-g
Quintec 6 fl oz alt Fracture 24.4 fl oz	Q1, F3			
Torino 3.4 fl oz alt Fracture 24.4 fl oz	T5, F7	6844 a-d	22.5 b-g	72.2 c-g
Prolivo 300 SC 4 fl oz + OS adjuvant 9 fl oz	1,3,5,7	5912 c-g	24.3 b-g	73.0 c-g
Rhyme 5 fl oz alt Fracture 24.4 fl oz	R1, F3, R5, F7	5902 c-g	29.2 d-h	75.4 d-g
Kenja 400SC 13.5 fl oz + OS adjuvant 9 fl oz	1,3,5,7	5153 fgh	20.4 a-e	78.3 efg
Timorex Gold 12 fl oz	1 - 7	5236 e-h	36.6 f -j	81.4 efg
Rhyme 7 fl oz, chemigation application ^u	2,4,6	4855 fgh	44.2 ij	86.2 fg
STK73 12 fl oz	1 - 7	5878 c-g	24.4 b-g	86.3 fg
Fracture 24.4 fl oz	1 - 7	4461 gh	49.9 j	86.8 fg
STK73 24 fl oz	1 - 7	5540 d-h	33.5 e-i	91.5 g
Timorex Gold 16 fl oz	1 - 7	4955 fgh	36.9 g-j	92.9 g
Control		4269 h	42.7 hij	90.3 g

^z Alt indicates an alternation of products applied.

^y Week of application in a series of 7 weekly applications from 25 Nov 2016 to 6 Jan 2017; Products are indicated by their first letter.

^x Percent of fruit with conspicuous powdery mildew growth on more than 25% of the achenes.

^w Percent of leaf area covered with powdery mildew based on microscopic observations at 25x.

^v Means in a column followed by the same letter are not significantly different by Fisher's Protected LSD test ($\alpha = 0.05$).

^u One Rhyme treatment was applied to the soil through drip tapes at 7 fl oz per treated acre.