STRAWBERRY (*Fragaria* x *ananassa* 'Florida127')
Phytophthora crown rot; *Phytophthora cactorum*

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Evaluation of products for Phytophthora crown rot control in annual strawberry, 2019-2020.

On 11 Oct 2019, bare-root strawberry transplants from Canada were set into plots on plastic-mulched beds previously fumigated with Telone C-35 (300 lb/A). The beds were 32-in. wide at the base on 4-ft centers. Treatments were arranged in a randomized complete block design with four blocks in adjacent beds. The plots were 10 ft long and contained 20 plants in two staggered rows of 10 plants each. Plant spacing was 12 in. within and between rows. After transplanting, the experimental area was overhead watered during the day for 10 days to facilitate plant establishment. Plants were subsequently irrigated and fertilized through a central drip tape in each bed. Twelve days after planting (DAP) on 23 Oct, an EZ-Ject Soil Injector was used to deposit 0.6 fl oz of inoculum 2 in. from each plant at a 1.5-in. depth. The inoculum consisted of a mixed suspension totaling 1 x 10^4 zoospores/ml from five isolates of *P. cactorum*. Inoculated and non-inoculated controls were included in the experiment. Treatments were applied from 25 Oct to 17 Dec (14-98 DAP) and consisted of foliar sprays and/or chemigation applications through dedicated drip tapes. Foliar sprays were made with a CO_2 powered back-pack sprayer at 60 psi and 100 gal/A. The sprayer was equipped with two TeeJet® 8002 hollow-cone nozzles spaced 12 in. apart on the wand. Drip applications were made in 0.4 gal water per foot of bed (4,350 gal/A) through drip tapes with 10 emitters at 12-in. intervals. Two tapes were installed per plot, one next to each plant row. All plants in each plot were evaluated for disease incidence (DI) five times at 2-wk intervals from 22 Nov 19 to 17 Jan 20 (42 to 98 DAP). Plants that were dead, partially collapsed, or severely stunted were considered diseased. Fruit were harvested twice weekly from 9 Dec 19 to 30 Jan 20 (14 times). Healthy fruit weighing more than 1/3 oz were used to determine yield. Data were analyzed by two-way ANOVA using the GLM procedure in SAS (SAS Institute, Cary, NC). DI values were arcsine square root transformed prior to analysis with original percentage data presented here.

Average air and soil temperatures were 77.0 and 80.3°F, respectively, during the critical 2-wk period following inoculation on 23 Oct. It is not clear whether these high temperatures, an inefficient inoculation method, or other factors contributed to the low infection rates that were later observed. On 20 Dec (70 DAP), less than 2% of all plants in the trial displayed disease symptoms. *P. cactorum* was isolated from the crowns of 16 of 21 diseased plants collected on 23 Dec from across the trial. Surprisingly, symptomatic plants were collected from both non-inoculated and inoculated control plots, suggesting that the original transplants were naturally infected or infested in the nursery. A second inoculation with infested rice grains was made on 16 Dec (66 DAP) with slightly improved results. When the final evaluation was made on 17 Jan (98 DAP), disease incidence was 6.4% in the inoculated control and 3.8% in the non-inoculated control. No diseased plants were observed in plots treated with Orondis Gold at 28 oz/A. However, this treatment was statistically equivalent to Orondis Gold at 20 fl oz/A, as well as Revus, Ridomil Gold, and TKO + Companion. The phosphite products K-Phite and TKO did little to reduce DI when applied alone, which does not conform to previous trials. However, the treatment combining TKO foliar sprays with drip applications of Companion (*Bacillus subtilis*) was more efficacious than TKO foliar sprays alone. Although the ANOVA for yield was not significant (P = 0.0736), it should be noted that Orondis Gold at 28 fl oz/A produced 8,450 lb/A of marketable fruit compared to 7,550 lb/A in the inoculated control. Phytotoxicity symptoms were not observed in this trial.

Treatments (products and rates/A)	Application type[z]	Application timing (days after planting)[y] 14	28	42	56	70	84	98	Yield (lb/A)	DI (%)[x]
Control, non-inoculated									7656	3.8 a-d[w]
Orondis Gold (Premix) 28 fl oz	drip	x		x		x		x	8450	0.0 a
Revus 2.09SC 8 fl oz	drip	x		x		x		x	6955	1.3 ab
Ridomil Gold 480SL 16 fl oz	drip	x		x		x		x	7624	1.3 ab
Orondis Gold (Premix) 20 fl oz	drip	x		x		x		x	7847	2.6 abc
TKO Phosphite 2.5 pt	spray	x	x	x	x	x	x	x		
Companion 2 pt	drip	x	x	x	x	x	x	x	7057	5.0 abc
K-Phite 7LP 1.5 qt	spray	x	x	x	x	x	x	x		
K-Phite 7LP 2.5 qt	drip	x	x	x	x	x	x	x	6377	8.8 bcd
Presidio 4 fl oz	drip	x		x		x		x	6782	9.0 cd
TKO Phosphite 2.5 pt	spray	x	x	x	x	x	x	x	6811	10.0 d
TKO Phosphite 4.0 pt	spray	x		x		x		x	7239	12.9 d
Control, inoculated[v]									7550	6.5 bcd

[z] Drip application rates were calculated as banded applications made to beds only, which occupied approximately 67% of an acre.
[y] Planting was done 11 Oct 19. Plants were in first bloom from 28-56 DAP, resulting in fruit production from cv. 56 to 98 DAP.
[x] Disease incidence (DI) = percent dead, partially collapsed, or severely stunted plants 98 days after planting on 17 Jan 20. Inoculations were made 12 and 66 days after planting (DAP).
[w] Values in a column followed by the same letter are not significantly different by Fisher's Protected LSD ($\alpha = 0.05$).
[v] Since all treated plots were inoculated, comparisons should be made to the inoculated control at the bottom of the table.