Chemical and cultivar trials to manage the new Neopestalotiopsis disease in Florida strawberry

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Pestalotiopsis is not necessarily new to strawberry. In fact, Drs. Charles Howard and Earl Albregt, former professors at the U.F. Strawberry Lab in Dover, reported a strawberry fruit rot caused by Pestalotia longisetula (or Pestalotiopsis) for the first time in 1972. More recently, strawberry isolates were identified as Neopestalotiopsis in reports describing a pathogen of strawberry roots and crowns. However, the fungus has always been considered a secondary pathogen. During the past two strawberry seasons (2018-19 and 2019-20), severe outbreaks were reported in Florida commercial fields, where root, crown, petiole, fruit, and leaf symptoms were observed (Figure 1). Yield was severely affected and several acres of strawberry fields were destroyed. Studies performed by our group indicate that isolates from the recent outbreaks are more aggressive and may belong to a new Neopestalotiopsis species.

The disease is considered a new threat to strawberry production by many growers and our group is currently working on trials to understand the disease and determine the best management practices. During the 2019-20 season, we screened Neopestalotiopsis isolates in the laboratory for their sensitivity to different fungicides and evaluated products in two field trials. We also assessed six commercial strawberry cultivars grown in Florida for disease resistance.

In the field trials, strawberry plants were inoculated by spraying a mixed spore suspension of Neopestalotiopsis isolates collected from commercial farms during the outbreaks. Fungicides were sprayed weekly over the plants according to label rates. The inoculated control was sprayed with the pathogen suspension but did not receive any fungicide treatment. For the cultivar experiment, plants were inoculated as described above, and no fungicides were applied. Foliar and fruit disease were evaluated throughout the season (Figure 2).

The fungicides Switch 62.5 WG (fludioxonil + cyprodinil) and Thiram SC (thiram) significantly reduced disease incidence in both fungicide trials (Tables 1 and 2). In the first trial, Bravo (chlorothalonil), Omega (fluazinam), and Miravis Prime (fludioxonil + pydiflumetofen) also significantly reduced disease compared to the non-treated inoculated control. Please note that the letters by the numbers for each treatment indicate whether treatments were significantly different according to the statistical analysis. In the case of the first trial, treatments that do not have an ‘a’ or a ‘b’ were statistically better than the non-treated control which had an ‘ab’. Bravo and Omega are not registered for strawberry production fields but we consider these could be good options for nurseries (Omega is in the process of registration for nursery use). In the second trial, in addition to Switch and Thiram, Manzate Pro -Stick (mancozeb) also decreased disease incidence (Table 2). However, mancozeb is not registered for strawberry (neither fruit nor nursery). In summary, among the products evaluated and that are legally registered for use in strawberry production fields, fludioxonil (in Switch and Miravis) and Thiram were the most effective in reducing disease incidence. Unfortunately, our industry already relies greatly on Switch for control of Botrytis fruit rot (BFR). The overuse of this product can lead to increased selection for fungicide resistance; thus, applications need to be limited to the maximum recommended according to the label, and we need to continue seeking alternatives.

Among the six cultivars evaluated, all were susceptible to the pathogen, but ‘Florida Beauty’ and ‘Florida Brilliance’ were significantly more affected than ‘Sensation’ (Figure 3), which agrees with reports and observations from commercial growers.

This new disease is difficult to control, and we are working hard to develop an integrated disease management approach involving the needs of the strawberry nursery and production industries. We have many on-going studies to understand the origin, pathogenicity, and disease cycle of this pathogen, and to answer growers most frequent questions: “where did this come from”?, “why is it so aggressive”?, “how does it spread”?, “what are the

conditions for the spread"?, "will it survive in Florida fields"?, and ultimately "how can it be managed"?. In the meantime, if you have any questions and want to know more about our findings, do not hesitate to contact us (Juliana Baggio, jbaggio@ufl.edu, 813-419-6629, James Mertely, jcmert@ufl.edu 813-419-6599, or Natalia Peres, nperes@ufl.edu, 813- 419-6602).

Table 1. Effect of different fungicides on disease incidence (% symptomatic fruit) caused by the new *Neopestalotiopsis* sp. (**Field trial 1**).

Treatment	***Neopestalotiopsis* fruit rot incidence (%)**	
Switch 62.5WG (14 oz)	9.5	de
Thiram SC (2.6 qt)	13.0	cde
Bravo Weather Stik (1.5 pt)	13.8	cd
Omega 500F (20 fl oz)	14.7	cd
Miravis Prime SC (13.4 fl oz)	14.7	cd
Rhyme (7 fl oz)	16.4	bc
Captan Gold 4L (3 qt)	17.9	abc
Mettle 125ME (5 fl oz)	18.4	abc
Oso (=Tavano) (13 fl oz)	20.5	abc
Protexio SC (19 fl oz)	24.2	ab
Abound Flowable (15.5 fl oz)	25.8	ab
Control, inoculated	25.9	ab
Oxidate 2.0 (1% max = 1 gal)	26.0	ab
Topsin 4.5FL (20 fl oz)	26.7	a
Pr > F	<0.0001	

Table 2. Effect of different fungicides on disease incidence (% symptomatic fruit) caused by the new *Neopestalotiopsis* sp. (**Field trial 2**).

Treatment	***Neopestalotiopsis* fruit rot incidence (%)**	
Thiram SC (2.6 qt) + NuFilm P (12 fl oz)	13.8	gf
Switch 62.5WG (14 oz)	16.0	efg
Thiram SC (2.6 qt)	16.7	defg
Manzate Pro-Stick (2 lb)	17.3	cdefg
Inspire (7 fl oz)	18.6	bcdef
Aprovia (10.5 fl oz)	20.1	abcde
Thymox (0.5% = 2 qt)	20.8	abcde
Cueva 1.5 gal)	22.1	abcde
Suffa (1 gal)	22.9	abcd
Tilt (4 fl oz)	23.0	abcd
Rovral 4F (2 pt)	23.0	abcd
Quadris Top (14 fl oz)	23.1	abcd
Uptake (12.5 fl oz)	23.1	abc
Control, inoculated	23.8	ab
Procure 480SC (8 fl oz)	24.1	ab
Actigard 50WG (0.5 oz)	24.4	ab
Rhyme (7 fl oz)	24.5	ab
Inspire Super (20 fl oz)	26.2	a
Pr > F	0.0002	

Figure 1. Symptoms caused by the new *Neopestalotiopsis*. **A**, overall symptoms in the field (stunted plants and symptomatic leaves). **B**, light to dark brown spots on the leaves. **C**, leaf spots containing black strutctures of the fungus. **D**, fruit showing symptoms and signs of the fungus. Photo credits: Juliana Baggio and James Mertely.

Figure 2. Fungicide efficacy trials at GCREC: strawberry plants inoculated with *Neopestalotiopsis*. **A**, Non-treated strawberry plants; **B**, plants treated with Switch. Photo credits: Juliana Baggio.

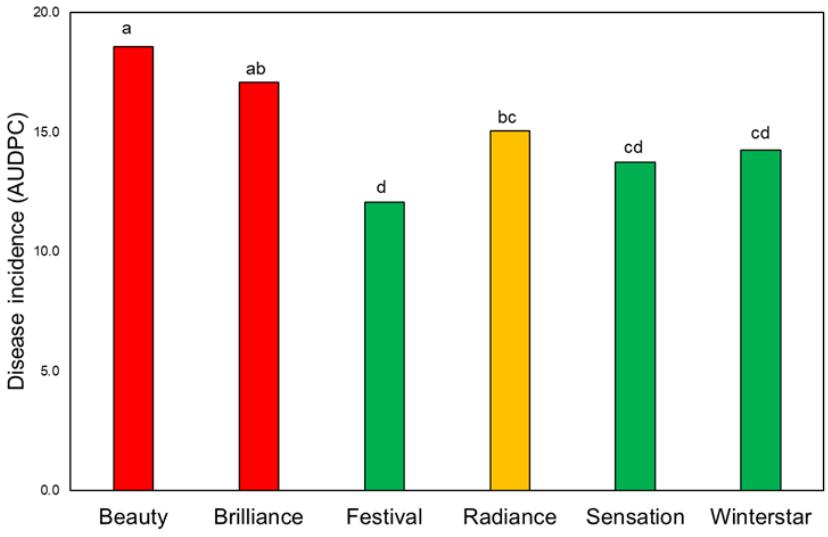

Figure 3. Disease incidence on leaves of different strawberry cultivars inoculated with the new Neopestalotiopsis sp.