



2018 Report on Disease Efficacy Trials at HVRL: Fire Blight, Apple Scab, Sooty Blotch & Flyspeck

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1. PRELIMINARY REPORT ON 2018 FIRE BLIGHT EFFICACY TRIAL IN HIGHLAND NY

Apple cultivars. Mature, 17-year-old Honeycrsip trees. On 7 May 2018 trees were at pink growth stage. On 10 May bloom reached 80% due to warm weather. Treatments (spray programs) listed in Table 1 were applied on dates indicated in the table and by using gas-powered backpack air-blast sprayer delivering 50 gal/A (Solo 451 Mist Blower, 3 Gal). To apply the same amount of Apogee which one apple tree receives from a tractor air-blast sprayer in a high-density apple orchard, we divided the rate per acre with 940 trees/A, planted in a high-density system, and used timed applications with our backpack sprayer to apply the appropriate amounts of Apogee per tree (Table 1 below).

Table 1. Treatments and used rates fire blight trial 2018 on Honeycrisp apple. Growth stages and/or dates of application/s: PK i.e. Pink Bud = 7 May; BL 20% = 8 May; BL 50% = 9 May; BL 100% = 13 May; FC = 30 May; SC = 14 June.

No.	Product	Active ingredient	Amount per acre (applied at bloom percent/growth stage)	Dates Applied	Note/ Amount of metallic copper
2	LifeGard WG	Bacillus mycoides isolate J	9 oz/A		Start spraying at PK, every 5-7
3	Double Nickel LC + Cueva	Bacillus amyloliquefaciens strain D747	1 qt /A + 2qt /A	7, 13, 30 May, 14 June	days through bloom. Post Bloom - every 14 days until shoot blight period ends. Target at least 2 applications during bloom.
4	FireWall + Regulaid in bloom; then Apogee program	streptomycin	1.5 lb/A + 1.5 pt/100 (0.1875% v/v) Then Apogee: 36 oz/A	9 May Then 20 May, 3 June	FireWall during bloom. Followed by Apogee at 1- 3", 14 days after
5	Prestop WG low	99% <i>Gliocladium</i> <i>catenulatum</i> * Strain J1446 (1x10 ⁹ CFU/g)	2 x 992 g/A		20%, 50% bloom
6	Prestop WG high	99% Gliocladium catenulatum* Strain J1446 (1x10 ⁹ CFU/g)	2 x 1984 g/A		20%, 50% bloom
7	Copper Sulfate Crystals	99% copper sulfate pentahydrate crystals	2 x 0.784 lb/A	8, 9 May	20%, 50% bloom, 2 x 0.196 lb/A
8	Bordeaux Mixture	99% copper sulfate pentahydrate crystals + hydrated lime + water	2 x 0.784-0.784-50 (0.784 lb copper sulfate + 0.784 lb lime + 50 gal water/A)		20%, 50% bloom, 2 x 0.196 lb/A

9	Cueva	10% copper octanoate (copper soap)	2 x 1.225 gal /A		20%, 50% bloom, 2 x 0.196 lb/A
10	Champ WG	77% copper hydroxide	2 x 0.392 lb/A		20%, 50% bloom, 2 x 0.196 lb/A
11	COC DF + ZnS	84.04% copper oxychloride + 97% zinc sulfide	2 x 0.392 lb/A + 0.073 oz zinc sulfide/A		20%, 50% bloom, 2 x 0.196 lb/A
12	CS 2005	19.8% copper sulfate pentahydrate	2 x 0.469 gal/A		20%, 50% bloom, 2 x 0.196 lb/A
13	Cuprofix Ultra 40 Disperss	71.1% basic bopper sulfate	2 x 0.49 lb/A		20%, 50% bloom, 2 x 0.196 lb/A
14	Nordox 75 WG	83.9% cuprous oxide (Cu ₂ O)	2 x 0.261 lb/A		20%, 50% bloom, 2 x 0.196 lb/A
15	Badge X2	23.82% copper oxychloride + 21.49%	2 x 0.695 lb/A		20%, 50% bloom,
	U U	copper hydroxide			2 X 0.196 lb/A
16	Cueva	copper hydroxide 10% copper octanoate (copper soap)	2 x 2.45 gal/A		2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.392 lb/A
16 17	Cueva C-O-C-S WDG	copper hydroxide 10% copper octanoate (copper soap) 73.49% copper oxychloride + 13.39% basic copper sulfate	2 x 2.45 gal/A 2 x 0.382 lb/A		2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.392 lb/A 20%, 50% bloom, 2 x 0.196 lb/A
16 17 18	Cueva C-O-C-S WDG Copper Count N	copper hydroxide 10% copper octanoate (copper soap) 73.49% copper oxychloride + 13.39% basic copper sulfate 27.15% copper diammonia diacetate complex	2 x 2.45 gal/A 2 x 0.382 lb/A 2 x 1 qt/A		2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.392 lb/A 20%, 50% bloom, 2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.196 lb/A
16 17 18 19	Cueva C-O-C-S WDG Copper Count N Basic Copper 53	copper hydroxide 10% copper octanoate (copper soap) 73.49% copper oxychloride + 13.39% basic copper sulfate 27.15% copper diammonia diacetate complex 94.33% basic copper sulfate	2 x 2.45 gal/A 2 x 0.382 lb/A 2 x 1 qt/A 2 x 0.37 lb/A		2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.392 lb/A 20%, 50% bloom, 2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.196 lb/A
16 17 18 19 21	Cueva C-O-C-S WDG Copper Count N Basic Copper 53 Harbour + Regulaid	copper hydroxide10% copper octanoate (copper soap)73.49% copper oxychloride + 13.39% basic copper sulfate27.15% copper diammonia diacetate complex94.33% basic copper sulfatestreptomycin	2 x 2.45 gal/A 2 x 0.382 lb/A 2 x 1 qt/A 2 x 0.37 lb/A 1.5lb/A + 3pts/100 gal (0.375% v/v)		2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.392 lb/A 20%, 50% bloom, 2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.196 lb/A 20%, 50% bloom, 2 x 0.196 lb/A 20, 50% bloom

* Fungus *G. catenulatum* is a known fungal antagonist which primarily inhabits soils. The strain J1446 of this fungus in Prestop was isolated from Finnish field soil and has been tested or shown some efficacy in foliar, flower/fruit, and root diseases on tomato, strawberry and raspberry (Karise et al., 2016). On apples, preliminary trials show that Prestop reduces incidence of core rot of apple caused by flower infections of *Fusarium avenaceum* and *Botrytis cinerea*. Primary modes of action of this biocontrol fungus is strong ability to colonize roots, foliage, and flowers, and outcompete the plant pathogenic fungi. Some tests showed that *G. catenulatum* parasitizes certain plant pathogenic fungi, has antagonistic enzyme activity against fungi, and could trigger induction of plant resistance after root treatments.

Inoculation. We inoculated flowers on 10 May 2018 by misting entire 'Honeycrisp' trees with water suspension of 1.8×10^6 CFU/ml of *E. amylovora,* at 80% king bloom using GroundWork[®] rolling cart sprayer (30 PSI, 3 Gal). First ooze before fire blight symptoms was visible on 31 May. We rated blossom blight on 4 June and shoot blight on 13, 25 June and 11 July. Going around the crown, we randomly chose up to 100 flower clusters per tree and counted the number of diseased and healthy clusters. Flower infections migrated into the shoots. We randomly chose 100 shoots per tree and counted infected and healthy shoots. Blossom and shoot blight were calculated as blossom and shoot blight percent on a per tree basis. Mean percent of blossom and shoot blight incidences were calculated for each treatment from 4 single-tree replicates.



Summaries of weather data and four fire blight infection events reported in RIMpro model in 2018, respectively.

Note: 3 May 2018 was the bloom start was for early apple cultivars, while 'Honeycrisp' started flowering on 8 May. Used by permission from RIMpro B.V., Netherlands. Both graphs are formatted by RIMpro Cloud Service, an interactive Decision Support System for pest and disease prediction and management in fruit and grape production.

Results – ALL TREATMENTS/PROGRAMS



*Means followed by different letters are significantly different (LSD test, *p* < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees.



*Means within each treatment line, averaged across all three time points, followed by different letters are significantly different (*P* < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees. Differences apply across A, B and C graphs.



*Means within each treatment line, averaged across all three time points, followed by different letters are significantly different (*P* < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees. Differences apply across A, B and C graphs.

CERTIS PROGRAMS ALONE



Figure 1. Blossom blight was rated on 4 June 2018. Bars representing incidence means followed by different letters are significantly different (P < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees (Product rates are the same as in Figure 2 below).



Means within each treatment line, averaged across all three time points, followed by different letters are significantly different (*P* < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees.

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Conclusion

The 2018 had extremely favorable weather conditions for fire blight. These conditions continued through the rest of May allowing inoculum to quickly build up and established intense flower infections. The second major trait of 2018 was rapid flower development from pink bud on 7 May, to 20% bloom on 8 May, to 50% bloom on 9 May, and to 80% bloom on 10 May. Due to assumed lack of natural inoculum in the experimental plot, the fact that 'Honeycrisp' trees were just at Pink Bud growth stage on 7 May, and a known fact that model(s) overestimate prediction of early bloom infections (4 and 6 May), treatment applications were made to prevent the predicted first major infections on 10 and 11 May (flowers were inoculated on 10 May). Based on historical data for 2018 in the RIMpro fire blight model, it is possible that few natural infections did take place on few early open flowers during what was largely Pink Bud growth stage with rains on 6 May (not the 4 May), before all the treatments were applied. That could have contributed significantly to fire blight infection onset and overlap. Thus, the achieved high disease levels after inoculation led to unexpected failure of even grower standard treatments with streptomycin. This data as the outcome of this trial show that even infections on few open flowers during what was Pink Bud growth stage can contribute to fire blight outbreak in an efficacy trial. Under this high infection pressures from natural and artificial inoculum infections even streptomycin can fail in blossom blight control if not timed properly. The results for some treatments showed better shoot blight control only due to overall very low number of flower clusters in each tree replicate in these treatments, which significantly impacted the frequency of shoot blight incidence. Hence results from these treatments are not reliable. Based on raw data collected that show low number of flower clusters per tree, these treatments are: 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 19 on pages 5-7. Streptomycin treatments (4 and 21) performed somewhat better in shoot blight control by probably preventing onset of more infections on healthy shoots other than the ones infected by internal fire blight spread from inoculated flower clusters.

2. PRELIMINARY REPORT ON 2018 APPLE SCAB EFFICACY TRIAL IN HIGHLAND NY

Apple scab inoculum. Natural infection pressure from the 2017 growing season leaf litter V*enturia inaequalis* inoculum.

Apple scab fungus ascospore release detected in Highland NY with spore tower in HVRL: available online at: <u>3/31/2018</u>: <u>Apple Scab Ascospores Are Mature in Leaf Litter at Highland, NY – Farms in Lower Hudson</u> <u>Valley Set your Scab Biofix</u>

Apple varieties. Jersey Mac, Cortland 'RedCort), Golden Delicious 'Smoothee' as mature 23-yr-old trees on M.9 rootstock planted in discrete three-cultivar replicated plots at 25 ft. between rows, 10 ft. between trees within rows, and 20 feet between plots within rows. Treatments were replicated four times using a complete randomized design (CRD). Each replicate plot consisted of all three cultivars listed above. The percent scab infection incidence on spur leaves was calculated from the number of leaves with scab lesions versus the leaves without lesions on 20 randomly selected spur leaf clusters per tree. The percent incidence on fruit was calculated from the number of fruit with scab lesions versus the fruit without lesions on 20 randomly selected to LSD and Tukey's tests, respectively (α =0.05), for a completely randomized design.

Equipment. Treatments were sprayed dilute (300 gal/A) to drip using a tractor-carried handgun sprayer (Rear's Pak-Tank 100-gal sprayer, 250 PSI) to secure good coverage with the spray solution.

Maintenance sprays. Various insecticides according to entomologist Peter Jentsch's recommendations: <u>https://blogs.cornell.edu/jentsch/</u>. Standard herbicides and fertilizers.

Spray dates. Dates of the treatments according to the protocol from BASF and Bayer Crop Sciences:

4/24/2018 – ½" GREEN (1.5 lb of Manzate-Pro stick applied) 5/1/2018 – TC 5/5/2018 – PK 5/7/2018 – Early BL 5/9/2018 – Mid BL 5/14/2018 – PF 5/25/2018 – 1C 6/6/2018 - 2C 6/26/2018 - 3C 7/16/2018 - 4C 7/23/2018 - 5C 8/4/2018 – 6C

Spur Leaf Scab Rating: July 5 – 12, 2018

Fruit Scab Rating: August 7 – 10, 2018

Treatments/Programs (*BAS 75007F is Revysol[®] - mefentrifluconazole, proposed FRAC 3, DMI - demethylation inhibitor):

1- Check - UTC (Untreated Control) 2- Check - Only cover sprays applied (no early spring scab sprays) (no primary scab fungicides applied) followed by 4 cover sprays - 3 lbs Captan 80WG/acre (we had more than 4 covers due to rain) 3- BAS 75007F* @ 4.0 fl oz/acre & LI-700 @ 16 fl oz/ 100 gal A-TC, B-early bloom, C-mid-bloom, D- petal fall followed by 4 cover sprays - 3 lbs Captan 80WG/acre 4- BAS 75007F* @ 5.0 fl oz/acre & LI-700 @ 16 fl oz/ 100 gal A-TC, B-early bloom, C-mid-bloom, D- petal fall followed by 4 cover sprays - 3 lbs Captan 80WG/acre 5- Rhyme @ 6.5 fl oz/acre & LI-700 @ 16 fl oz/ 100 gal A-TC, B-early bloom, C-mid-bloom, D- petal fall followed by 4 cover sprays - 3 lbs Captan 80WG/acre 6- Rally 40W @ 5.0 oz/acre & LI-700 @ 16 fl oz/ 100 gal A-TC, B-early bloom, C-mid-bloom, D- petal fall followed by 4 cover sprays - 3 lbs Captan 80WG/acre 7- Inspire Super @ 12.0 fl oz/acre & LI-700 @ 16 fl oz/ 100 gal A-TC, B-early bloom, C-mid-bloom, D- petal fall followed by 4 cover sprays - 3 lbs Captan 80WG/acre 8- Sercadis @ 4.5 fl oz/acre & Manzate Pro Stick 75WG @ 3 lbs/acre & LI-700 @ 16 fl oz/ 100 gal A-TC, B-early bloom, C-mid-bloom, D- petal fall followed by 4 cover sprays - 3 lbs Captan 80WG/acre 9- BAS 75007F* @ 5.0 fl oz/acre + Manzate Pro Stick 3 lb /A & LI-700 @ 16 fl oz/ 100 gal A-TC, B-early bloom, C-mid-bloom, D- petal fall followed by 4 cover sprays - 3 lbs Captan 80WG/acre

- 10- Inspire Super @ 12.0 fl oz/acre + Manzate Pro Stick @ 3 lb/A
 - & LI-700 @ 16 fl oz/ 100 gal
 - A-TC, B-early bloom, C-mid-bloom,
 - D- petal fall
 - followed by 4 cover sprays 3 lbs Captan 80WG/acre
- 11 Aprovia 5.5 oz/acre & Manzate Pro-Stick 75WG @ 3 lbs/acre
 - & LI-700 @ 16 fl oz/ 100 gal

A-TC, B-early bloom, C-mid-bloom,

D- petal fall

followed by 4 cover sprays - 3 lbs Captan 80WG/acre

- 12- 1) Manzate Pro Stick 3 lb + Indar 6 fl oz @ TC, then Manzate Pro Stick 3 lb + Rally 5 oz/A @ PK
 - 2) Luna Sensation 5 oz/a + 3 lb/a Manzate Pro Stick 3 lb/A @ BLOOM, PETAL FALL
 - 3) Captan 2.5 lb + Flint Xtra 2FL/A (or captan + Topsin M 1 lb/ A or Sovran 4 oz/A), OR captan alone 3 lb/A @ other Covers (FC-onward)
- 13- 1) Manzate Pro Stick 3 lb/A + Indar 6 fl oz/A @ TC, then Manzate Pro Stick 3 lb/A + Rally 5 oz/A @ PK
 - 2) Luna Tranquility 11.2 oz/a + 3 lb/a Manzate Pro Stick 3 lb/A @ BLOOM, PETAL FALL
 - 3) Captan 2.5 lb + Flint Xtra 2FL/A (or captan + Topsin M 1 lb/A or Sovran 4 oz/A) OR captan alone 3 lbs @ other Covers (FC-onward)

Summaries of weather conditions and apple scab infection periods in 2018, respectively:





Note: Graphs are used by permission from RIMpro B.V., Netherlands. Both graphs are formatted by RIMpro Cloud Service, an interactive Decision Support System for pest and disease prediction and management in fruit and grape production.

Results:



1. JERSEY MAC

*Incidence means followed by different letters are significantly different (*p* < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees.



*Incidence means followed by different letters are significantly different (p < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees.

2. RED CORT



* Incidence means followed by different letters are significantly different (*p* < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees.



*Incidence means followed by different letters are significantly different (p < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees.



3. GOLDEN DELICIOUS 'SMOOTHEE'

* Incidence means followed by different letters are significantly different (p < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees.



*Incidence means followed by different letters are significantly different (p < 0.05). Error bars represent standard error of the mean (SEM). Each mean consists of 4 replicate trees.

3. PRELIMINARY REPORT ON 2018 SOOTY BLOTCH & FLYSPECK (SBFS) EFFICACY TRIAL IN HIGHLAND NY

Apple Cultivars: 20-year old block of Ginger Gold, McIntosh, Golden Delicious. Experimental design Completely Randomized Design (CRD). Each treatment consisted of 5 replicates where one replicate consisted of tree of each cultivar's tree - Ginger Gold, McIntosh, Golden Delicious.

SBFS inoculum. Natural infection pressure from surrounding forest vegetation.

Equipment: Treatments were sprayed dilute (300 gal/A) to drip using a tractor-carried handgun sprayer (Rear's Pak-Tank 100-gal sprayer, 250 PSI).

Maintenance sprays: Apple scab and cedar apple rust at the beginning of the season plus the following:

5/18/2018 3oz Rally + 3lbs Manzate 5/31/2018 3oz Rally 6/19/2018 3oz Rally

These sprays above were applied with the goal of controlling rust/scab in the block to allow later only SBFS development. Various insecticides according to entomologist Peter Jentsch's recommendations: https://blogs.cornell.edu/jentsch/. Standard herbicides and fertilizers.

Spray dates for all treatments/ programs:

6/11/2018 6/25/2018 7/9/2018 7/21/2018 7/23/2018 8/4/2018 8/18/2018 8/31/2018 - Golden Del. & McIntosh only 9/11/2018 - Golden Del. & McIntosh only

The general aim of the treatment applications was on a 14-day schedule unless 2 inches of rain occurred before the end of this period resulting in the removal of all residues. Whenever 2 or more inches of rain occurs the application was repeated i.e. sprays were made at a shorter time interval. Each treatment/ program was sprayed on five replicates, each consisting of one tree of Ginger Gold, one tree of McIntosh, One tree of Golden Delicious. FungOUT concentrate was shaken in the container for 10 seconds vigorously before pouring needed amount into the tank. Apple fruit were harvested at the usual times when each of the above stated cultivars mature in NY conditions. Ginger Gold fruit were harvested on 30 August. The incidence of SB and FS symptoms on was first rated on this cultivar from 1-4 Sep (harvest rating) and then on 18-19 September after 2-weeks long incubation in moist chamber. McIntosh fruit were harvested on 9/21/2018 and rated on 22-24 September (harvest rating). Golden Delicious fruit were harvested on 9/29/2018 and rated for SB&FS on 1-2 October (harvest rating). Each cultivar's fruit were incubated at ca. 70 F. in bagged crates with moist paper towels on the cratebottoms to create a high humidity environment that promotes SB&FS development. McIntosh fruit was rated 2-weeks postharvest on 8-11 Oct. Golden Delicious fruit was rated 2-weeks postharvest on 16-20 Oct. We randomly harvested and rated 50 fruits per tree. The percent incidence of both diseases on fruit was calculated from the number of fruit with SB or FS versus the fruit without these symptoms.

Treatments/programs:

- 1- Check UTC
- 2- FungOut @ 3.75 GL/A (9 sprays)
- 3- FungOut @ 3.75 GL/A + Captan 80 WDG @ 2.5 LB/A (9 sprays)
- 4- Captan 80 WDG @ 2.5 LB/A (9 sprays)
- 5- Grower Standard applied on these dates consisted of:

6/11/2018 and 6/25/2018: Captan 80 WDG @ 2.5 LB/A + Prophyt @ 64 FL/A 7/9/2018, 7/21/2018, 7/23/2018* and 8/4/2018**: Captan 80 WDG @ 2.5 LB/A + & Topsin M @ 1 LB/A 8/18/2018 and 8/31/2018: Captan 80 WDG @ 2.5 LB/A + Merivon @ 5.5 FL/A 9/11/2018***: Captan 80 WDG @ 3 LB/A

*Spray from 21 July was repeated on 23 July because of 2.2 inches of rain after 21 July. We used Topsin on 23 July as the second Topsin spray on 21 July was washed off completely. This has not exceeded the 4lb/acre label restriction.

** We applied the third spray of Topsin to avoid more than 2 sprays Merivon at end of trial. We have not exceeded the 4lb/A/season limit of Topsin. Fruit were 55-65 mm in size at this date.

*** Applications on Golden Delicious and McIntosh trees only. Spray from 31 August was repeated on 11 September after 2 inches of rain fell between these dates.

Results



2018 SB&FS Incidence on Ginger Gold Fruit at

Treatment/ Program *Means of sooty blotch (SB) incidence followed by upper-case letters are significantly different (*t*-test, *p* < 0.05). Means of flyspeck (FS) incidence followed by lower-case letters are significantly different (*t*-test, *p* < 0.05). This rating was done immediately after fruit were harvest. Error bars represent standard error of the mean (SEM). Each mean consists of 5 replicate trees. Fruit were harvested on 8/30/2018.



*Means of sooty blotch (SB) incidence followed by upper-case letters are significantly different (*t*-test, p < 0.05). Means of flyspeck (FS) incidence followed by lower-case letters are significantly different (*t*-test, p < 0.05). This rating was done immediately after fruit were harvest. Error bars represent standard error of the mean (SEM). Each mean consists of 5 replicate trees.



*Means of sooty blotch (SB) incidence followed by upper-case letters are significantly different (*t*-test, *p* < 0.05). Means of flyspeck (FS) incidence followed by lower-case letters are significantly different (*t*-test, *p* < 0.05). This rating was done immediately after fruit were harvest. Error bars represent standard error of the mean (SEM). Each mean consists of 5 replicate trees. Fruit were harvested on 9/21/2018.



*Means of sooty blotch (SB) incidence followed by upper-case letters are significantly different (*t*-test, p < 0.05). Means of flyspeck (FS) incidence followed by lower-case letters are significantly different (*t*-test, p < 0.05). This rating was done immediately after fruit were harvest. Error bars represent standard error of the mean (SEM). Each mean consists of 5 replicate trees.



*Means of sooty blotch (SB) incidence followed by upper-case letters are significantly different (*t*-test, *p* < 0.05). Means of flyspeck (FS) incidence followed by lower-case letters are significantly different (*t*-test, *p* < 0.05). This rating was done immediately after fruit were harvest. Error bars represent standard error of the mean (SEM). Each mean consists of 5 replicate trees. Fruit were harvested on 9/29/2018.



*Means of sooty blotch (SB) incidence followed by upper-case letters are significantly different (*t*-test, p < 0.05). Means of flyspeck (FS) incidence followed by lower-case letters are significantly different (*t*-test, p < 0.05). This rating was done immediately after fruit were harvest. Error bars represent standard error of the mean (SEM). Each mean consists of 5 replicate trees.

Incidence on Golden Del Fruit Two-weeks Postharvest (Tukey's test, 0.05)

Fruit rots rating on the same fruit from SB&FS trial



Cited Literature

Karise, R., Dreyersdorff, G., Jahani, M., Veromann, E., Runno-Paurson, E., Kaart, T., Smagghe, G., Mänd, M., 2016. Reliability of the entomovector technology using Prestop-Mix and *Bombus terrestris* L. as a fungal disease biocontrol method in open field. Scientific Reports 6: 31650.

Report compiled by Dr. Srdjan G. Acimovic, plant pathologist at Cornell University's Hudson Valley Research Laboratory. Weather data for Highland NY during 2018 can be provided upon request. This report is available from November 2018 on this link: <u>https://blogs.cornell.edu/acimoviclab/pesticide-efficacy-trials/</u>

From: 7/21/2018 – 11/2/2018