Assessing the risk of spotted wing drosophila, *Drosophila suzukii*, infestation to tomatoes

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Introduction:
Spotted wing drosophila (SWD); Fig. 1, appeared in NY in 2011 and has become of major concern to small fruit growers. Unlike other fruit flies, it has a serrated ovipositor that allows it to penetrate intact fruit and lay eggs just prior to harvest. Known hosts of SWD include soft skinned fruit like raspberries, blueberries, and strawberries. The potential for expansion of SWD onto other soft skinned fruit or vegetables is still unknown and no research has been conducted to evaluate the threat of SWD to tomatoes, *Solanum lycopersicum*, a major crop in NY.

Objectives:
- Collect SWD emergence data from 15 varieties of cracked and intact tomatoes grown in the field.
- Conduct no-choice tests on tomato varieties, both cracked and intact fruit, collected from the field.
- Determine skin firmness for tomato varieties, cultivated hosts, and wild hosts.
- Determine if there is a correlation between skin firmness and SWD emergence.

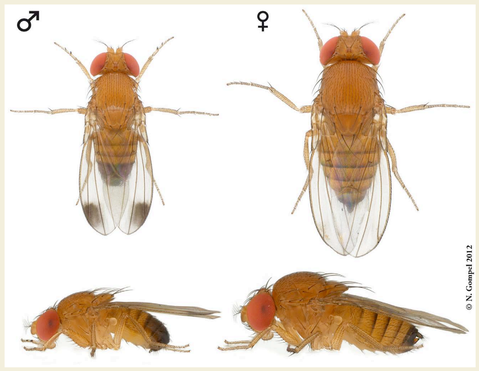

Figure 1. Male and female SWD

Figure 2. Rearing cups containing one of the 15 tomato varieties with adult SWD.

Procedures:
- Fifteen tomato varieties were planted in a randomized complete block design consisting of three replicates.
- Intact fruit from 11 varieties and cracked fruit from 14 varieties were brought into the lab and placed into rearing containers (Fig. 2) to see if any SWD would emerge.
- Intact and cracked fruit from the fifteen tomato varieties were placed into individual rearing containers with adult SWD. Adults remained in containers for one week to allow for oviposition, then removed (Figs 3 & 4).
- A TA.XT plus texture analyzer was used to evaluate the skin firmness or penetration force (in grams) of tomatoes, known cultivated hosts, and known wild hosts.

Figure 3. SWD egg laid in crack of tomato

Figure 4. SWD egg laid on skin of intact tomato, will not develop

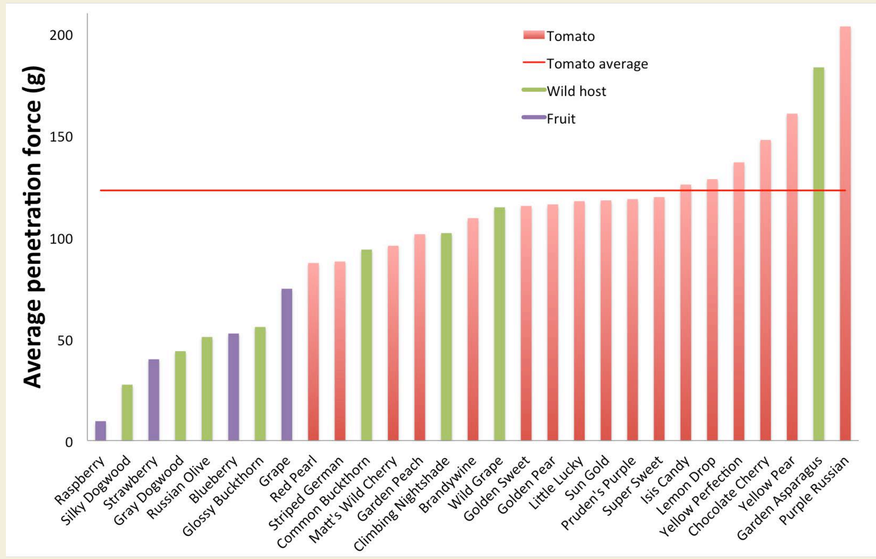

Figure 5. Average force (g) required to penetrate the skin of seventeen different tomato varieties, eight known wild hosts and 4 known cultivated fruit hosts of SWD. The solid red line indicates the average penetration force of all tomatoes.

Results:
- No SWD emerged from any intact tomatoes collected from the field. Four percent of cracked tomatoes collected from the field had SWD emerge.
- When adult SWD were placed on intact tomatoes in the lab 12% had SWD emerge and when placed on cracked tomatoes 61% had SWD emerge.
- Average penetration force for all fruit is shown in Figure 5.
- The proportion of tomato fruit with SWD emergence decreased as the skin firmness or penetration force increased. (r = 0.49; see Figure 6).

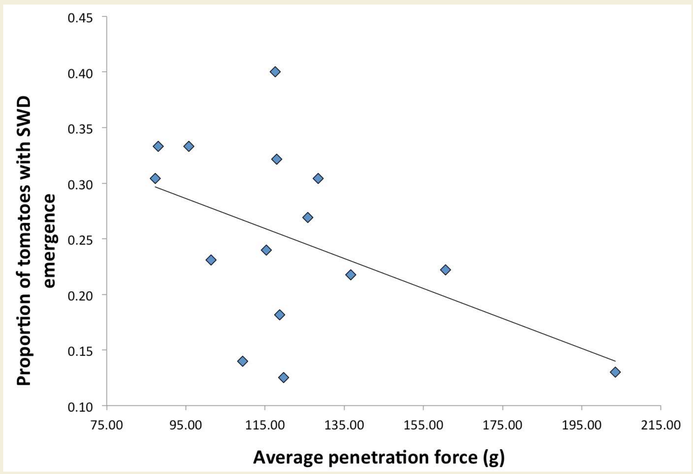

Figure 6. The correlation between the average penetration force and the proportion of tomatoes with SWD emergence (R^2 = .239, $F_{1, 13}$ = 4.09, p=0. 06) for both intact and cracked fruit that had adult SWD placed into rearing cups.

Discussion:
Intact tomatoes grown in the field did not have any SWD emerge, however cracked tomatoes in the field provided a suitable oviposition site for SWD. It is therefore recommended that cracked tomatoes that are no longer marketable be removed from the field to decrease the potential of SWD laying and developing. This is especially true for growers with more susceptible fruit, such as raspberries or strawberries nearby.

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SWD Photo credit: N. Gompel 2012