Development of phytosanitary treatments: Optimizing the experimental design

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PALABRAS CLAVE: Quarantine standards, Postharvest Treatments, Natural Infestation, Artificial Infestation, Heating Curve, Host Preference.

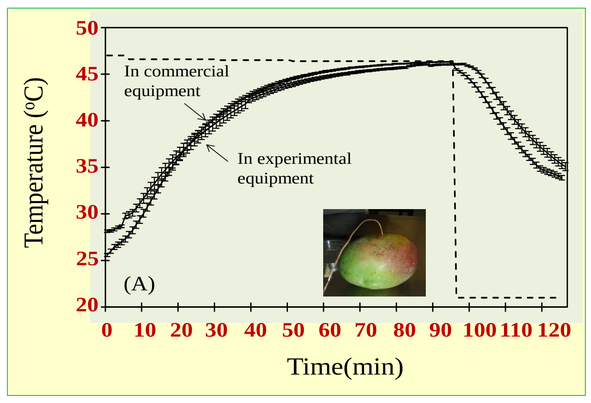
Introduction

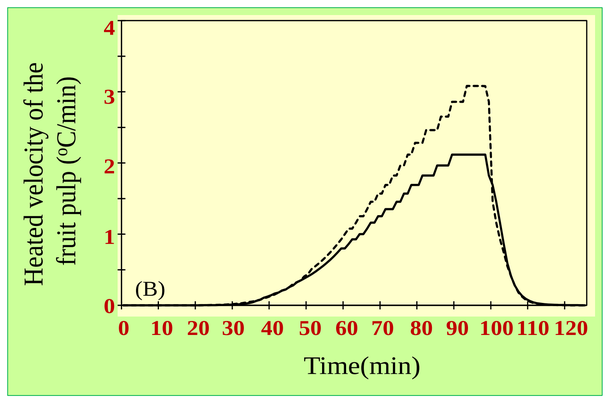
The "Phytosanitary Temperature Treatments Expert Group (PTTEG), FAO" accorded that the development or modification of phytosanitary treatment should be based on and experimental design and some factors that have to take into account: the heating curve of the core fruit throughout treatment and ramp up/down time, artificial vs. natural infestation, host ripening.

Heating curve and r*amp up/down time.*

The temperature ramp-up or ramp-down times affect the treatment efficacy. While heat treatments may be more effective if the heating up period occurs over a short period, decreasing the treatment time. It is necessary to establish the standards for defining treatment time, and when treatment time started? e.g. establish when all vs. 50% temperature probes must reach the target temperature.

The ramp-up/down periods and heat rate must be specified in heat treatment schedules.



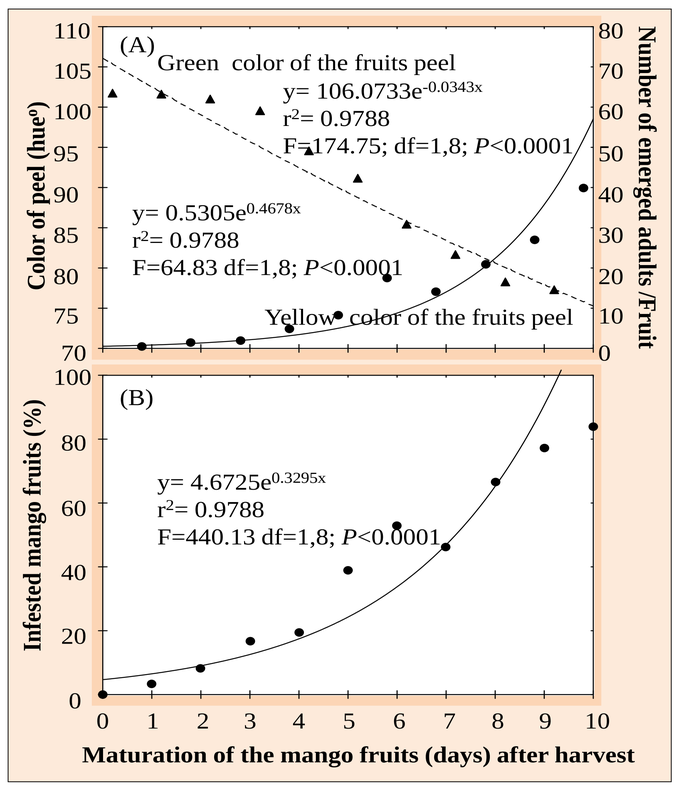


Harder and easiest to infest host

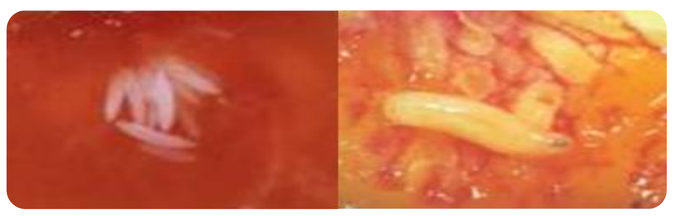
Studies to determine the efficacy of the treatments for harder-to-infest hosts for fruit fly developed on generic treatments species across a host range based on data obtained for the easiest-to-infest need to be investigated.

TREATMENTS

- Cold Treatment (CT)
- Vapor Heat
- Forced Hot Air Treatment
- Hot Water Immersion
- Treatment
- Irradiation



The Most Tolerant Life Stage



Artificial vs. natural infestation

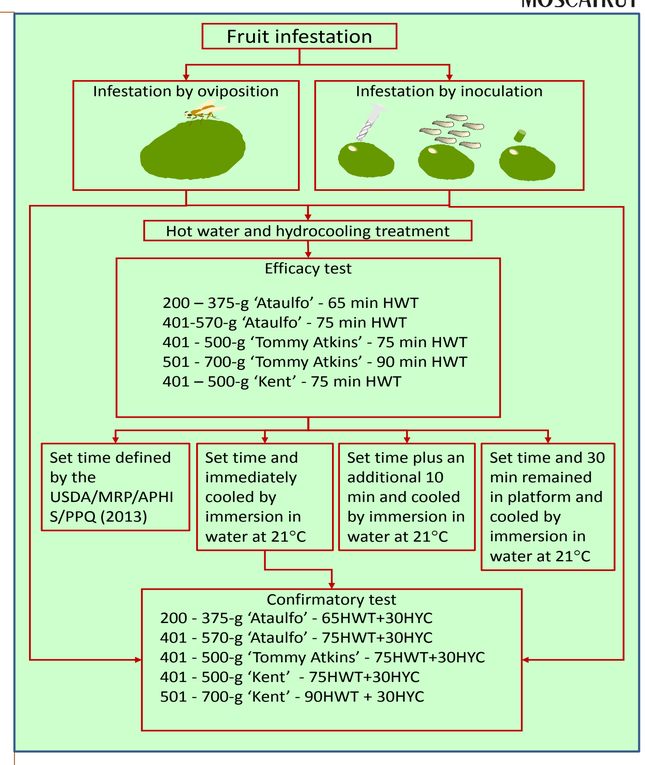
Studies to use artificial infestation during development or adjustment of treatment should be compared with natural infestation. Because practical limitations of naturally infesting some host fruit commodities:

(i) Difficulty to obtain sufficiently high infestation rates to demonstrate treatment efficacy.

(ii) Concerns regarding commodity quality as fruit may not be optimal for infestation at commercially suitable ripening stages

(iii) The lack of precision in determining survival rates when the number of eggs deposited in naturally infested fruit is unknown.

(iv) It requires research to demonstrate that artificial infestation results are more tolerant to the treatment than with natural infestation, include natural infestation alongside the experiments with artificially infested fruit.



Experimental Design and Other Factors

1. Most tolerant life stage and differences among populations and life stages.
2. Tolerance among species and subspecies.
3. Tolerance in colony and wild populations.
4. Differences in susceptibility between larvae reared on diet and fruits.
5. Colony quality effect on treatments efficacy.
6. Host conditions and effects on pest. tolerance to the phytosanitary treatment (e.g. species, cultivar).
7. Acclimation ability.
8. Inoculation rate and methods.
9. Advantages and disadvantages of extrapolating from low test subject numbers.
10. Confidence limits and sample size in quarantine research.
11. Efficacy level calculation required for treatments.
12. Experimental conditions and their variations.

CONCLUSIONS

1. To ensure that the larvae were subjected for the enough time at lethal temperature must record the core temperature of the fruit needs to be recorded throughout treatment.
2. Artificial infestation provides an unique alternative means to develop and assess new phytosanitary treatments for agricultural commodities that are rarely infested by quarantine pests.
3. Infestation by oviposition can avoid the inconvenience of estimating the larval mortality rate once the pupae are present during the treatment as consequence of the infestation by inoculation.
4. Include the effect of the Phytosanitary Treatment on the Quality of the Fruits.

REFERENCIAS

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