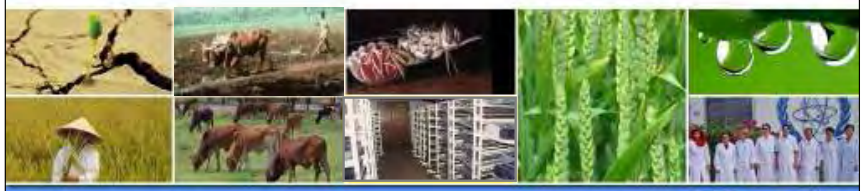
Enhancement of Sterile Male Performance: Nutritional, Semiochemical, and Hormonal Pre-release Treatments for Tephritid Fruit Flies

Rui Pereira, Peter E. A. Teal, Boaz Yuval, Pablo Liedo, Todd E. Shelly and Jorge Hendrichs



Atoms for Food and Agriculture: Meeting the Challenge

IAEA
Joint FAO/IAEA Programme

Outline

1. Introduction
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   - 2.2. Hormonal supplements
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1. Introduction

The need to develop and improve the SIT package to support ongoing fruit fly action programmes.

2. Improving sterile male performance

A six year FAO/IAEA Co-ordinated Research Project has been implemented, involving collaborators from 17 countries, to increase the performance of mass produced sterile males through:

- Nutritional supplements
- Hormonal supplements
- Semiochemicals

2.1. Nutritional supplements

Use of nutritional supplements to adult diets to improve:

- pheromone production
- mating success
- survival of sterile males

for various *Anastrepha, Bactrocera* and *Ceratitis* pest species

2.1. Nutritional supplements

Addition of protein (protein-fed males) to the diet significantly increased the male:

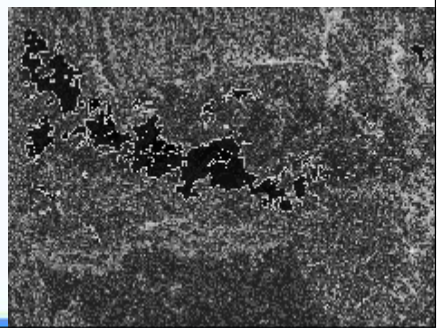
Specie	Pheromone production	Mating success	Survival
Anastrepha fraterculus		✓	✓
A. ludens	✓	✓	✓
A. suspensa		✓	✓
A. obliqua	✓	✓	✓
Bactrocera cucurbitae		✓	✓
B. correcta		✓	
B. dorsalis		✓	
B. philippinensis		✓	
B. tryoni		✓	✓
Ceratitis capitata		✓	✓

Yuval *et al.* 2007; Faria *et al.* 2008; Shelly & Edu 2008; Pereira *et al.* 2009; Haq *et al.* 2010; Segura *et al. in press.*

2.1. Nutritional supplements

Bacteria in the gut contribute to adult fitness by:

- Supporting egg production in females
- Improving the copulatory success of males



Yuval *et al. in press.*

2.2. Hormonal supplements

Use of hormone supplements to :

- accelerate reproductive development
- improve mating performance of sterile males

for various species of *Anastrepha* and *Bactrocera*

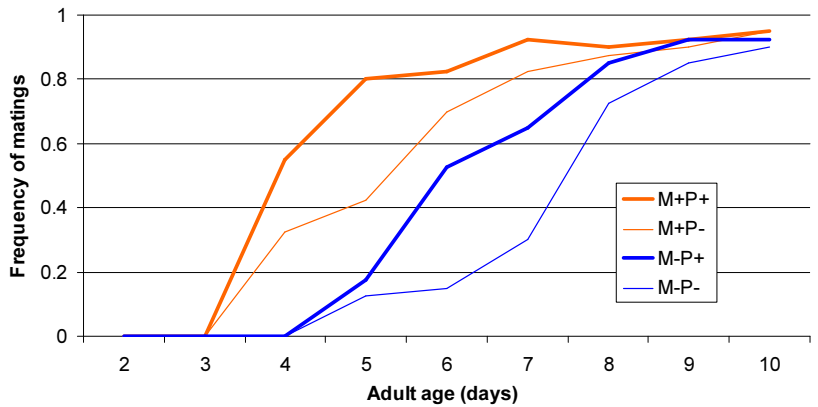
Teal *et al.* 2000; Segura *et al.* 2009; Haq *et al.* 2010; Pereira *et al.* 2010.

2.2. Hormonal supplements

Use of hormone supplements
(methoprene, juvenile hormone analog)

2.2. Hormonal supplements

Maturation of *Anastrepha ludens*



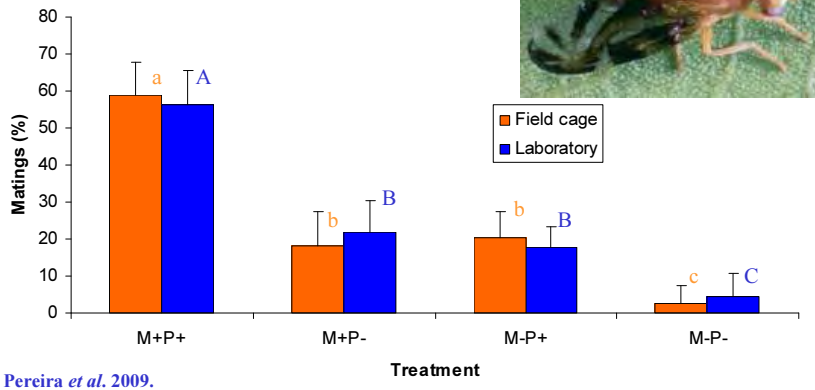
2.2. Hormonal supplements

Use of hormone supplements now
applied for *Anastrepha ludens* in Mexico

Mating performance tests under semi-natural conditions

2.2. Hormonal supplements

Male sexual performance of *Anastrepha suspensa*



Pereira *et al.* 2009.

2.3. Semiochemicals

Use of semiochemicals, such as methyl-eugenol, ginger root oil or citrus oils to:

- improve the sexual performance of males
- pheromone quality

of *Bactrocera* spp. and *C. capitata*

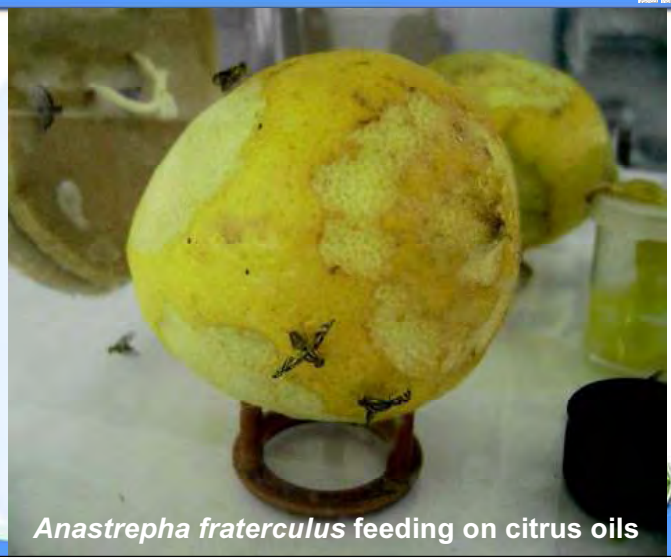
Papadopoulos *et al*, 2006; Paranhos *et al*, 2008; Shelly & Edu, 2008: Shelly *et al*, 2008; Vera *et al*, *in press.*

Attractiveness of *Bactrocera philippinensis* to sweet basil

2.3. Semiochemicals

Ginger root oil (GRO) is now used routinely in the *Ceratitis capitata* release facilities (aromatherapy):

2.3. Semiochemicals



***Anastrepha fraterculus* feeding on citrus oils**

3. Conclusion

- Nutrition and hormonal supplements, and semiochemical significantly increase the performance of several tephritid fruit flies males and consequently their SIT effectiveness.