Physical barriers

vs Pest

Laboratory for quality control and evaluation of agrotextiles

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LABORATORIO PARA EL CONTROL DE CALIDAD Y EVALUACIÓN DE AGROTEXTILES

**PEST**

*Bemisia tabaci*

*Aphis gossypii*

*Frankliniella occidentalis*

*Trialeurodes vaporariorum*

*Drosophila suzukii*
Greenhouses...

Outdoor crops...

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Major problems

• Wide variety of screens with different densities and geometric of pore.

• There are not standards.

• Use fraudulent of terminologies (anti-thrips) that they do not meet with the expectations generated to the farmers.

• The design criteria followed to the manufacturer is not enough. There are other variables that have influence on the efficacy (air velocity, temperature and sex ratio).

• Wrong use causes climate problems inside of greenhouse.
Efficacy against *F. occidentalis*  
No effective screen

Efficacy against *B. tabaci*  
53% (Effective > 90%)
Major problems

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Efficacy against *B. tabaci*

Calm (0 m s\(^{-1}\))

- 53% (Efficacy > 90%)

(3 m s\(^{-1}\))

- 30% (Efficacy > 90%)
Major problems

• Wide variety of screens with different densities and geometric of pore.

• There are not standards.

• Use of terminologies (anti-thrips) that they do not meet with the expectations generated to the farmers.

• The design criteria followed to the manufacturer is not enough. There are other variables that have influence on the efficacy (air velocity, temperature and sex ratio).

• Wrong use causes climatec problems inside of greenhouse.
Selecting a suitable insect-proof screen

- Morphometric study of the insect pest ($T_x$ and $T_z$)
- Determination of the geometric characteristics of the agrotextiles ($L_{px}$, $L_{py}$, $d_{hx}$, and $d_{hy}$).
- Analysis of the uniformity of the agrotextiles.
- Determination of the theoretical efficacy ($T_x \leq L_{px}$)
- Test to evaluate the efficacy of the insect-proof screen in laboratory conditions. These tests allow controlling the air velocity and temperature.
Determination of the geometric parameters

We obtain digital images and process it to black and white.

Identify vertices and define margins.
Determination of the geometric parameters

Results

Porosity = 45.6 %

$\rho_x = 8.9 \text{ threads/cm}$

$L_{px} = 880.0 \mu m$

$L_{py} = 348.5 \mu m$

$D_{hx} = 247.8 \mu m$

$D_{hy} = 246.6 \mu m$

$A_p = 306,629.2 \mu m^2$

$D_i = 353.7 \mu m$

X

Y

Warp

Weft
Selecting a suitable insect-proof screen

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- Determination of the geometric characteristics of the agrotextiles \( (L_{px}, L_{py}, d_{hx} \text{ y } d_{hy}) \).
- Analysis of the uniformity of the agrotextiles.
- Determination of the theoretical efficacy \( (T_x \leq L_{px}) \)
- Test to evaluate the efficacy of the insect-proof screen in laboratory conditions. These tests allow to control the air velocity and temperature.
The exclusion capacity of insect proof screens

- First compartment
- Second compartment
- Third compartment
- Insects proof screen
- Very dense textile
- Fan
- Anemometer
Percentage of exclusion

\[ e = \left( \frac{n_p}{n_t} \right) \times 100 \]

SEX RATIO
Future

• Creating standards (CTN 40/GT9 “Agrotextiles”).

• Development of specific screens against insects pest target.

• To improve the use of the insects-proof screens. Reduce the pressure on insects (more and more smaller).

• The use of the insect-proof screens have a direct relationship with the climate conditions inside of greenhouse and the biosystem (natural enemy (predator or parasite)-crop-pest).
Evaluate the influence of the use of these agrotexiles in this biosystem.
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