

IMPACT OF SOME CROP MANAGEMENT PRACTICES ON TOMATO INFESTATION/INFECTION BY THE WHITEFLY-GEMINIVIRUS COMPLEX IN CUBA

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INTRODUCTION

The whitefly *Bemisia tabaci*, a vector of tomato leaf curl virus (TYLCV), is a serious pest of tomato crop worldwide. In Cuba, where TYLCV-IL [CU] predominates, tomato infection can be > 80% and yield can be reduced by up to 100%, depending on (i) timing of disease occurrence, (ii) cultivar, (iii) sowing date and (iv) crop management. In the framework of the INCO-BETOCARIB Project (2003-2006) we developed a step-by-step approach in order to find alternative solutions to the use of pesticides to manage the problematic whitefly-geminivirus complex in tomato crops. This new management approach is based on ecological and biological knowledge not only of the vector, but also of the crop, its natural enemies and the overall ecosystem functioning. As a first step, we conducted a survey aiming at assessing the impact of cultural practices on the infestation and infection of tomato plots by whitefly (*B. tabaci*)/geminivirus (TYLCV).

MATERIALS AND METHODS

Survey variables

Obtained from producer interviews and field observations

1. General description of the plot and crop management

- Region, type of production (sheltered vs open field; topography)
- Planting and cultivation details (tomato cultivar, planting date, plantlets age at transplanting, insecticide use)
- Plantlets production details (nursery protection)
- Crop management (barrier use, irrigation type, mulch, weeding)

2. Evaluation of whitefly infestation and TYLC disease

- Severity and incidence of TYLCV disease
- Number of whiteflies per plant



Classes of symptoms: 1-no, 2-intermediate, 3-severe

Incidence = $(n2+n3)/(n1+n2+n3)$; Severity = $n3/(n2+n3)$

where n1, n2 and n3 are the number of sampled plants of class 1, 2 and 3.

Study area and evaluated plots



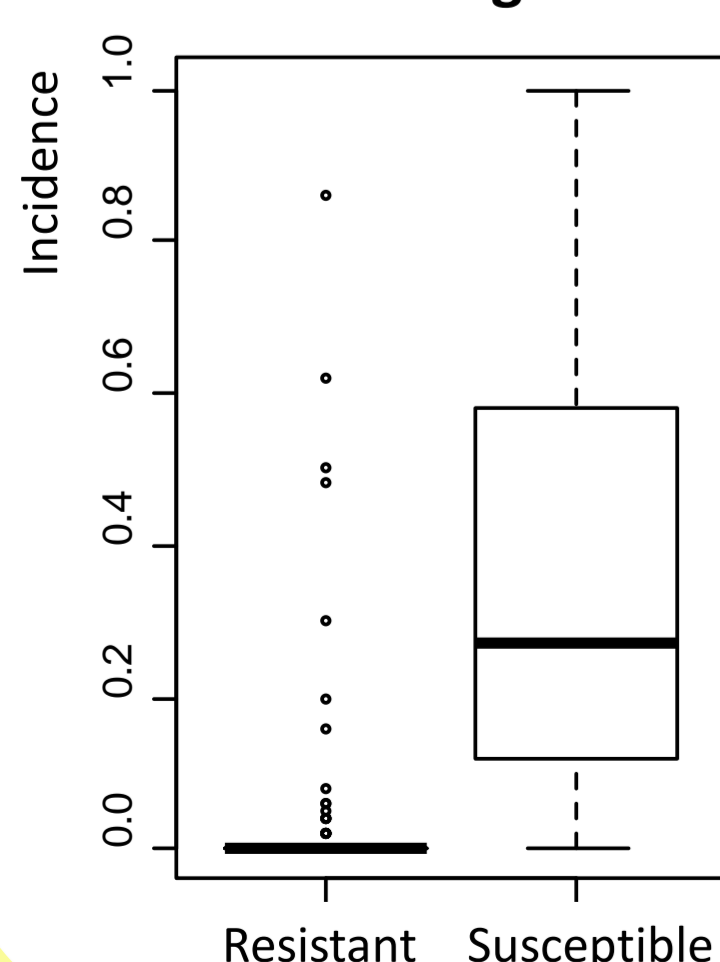
Data analysis: R software (version 2.12.1) was used.

SURVEY RESULTS

Table 1. Crop system and tomato cultivars in Western and Central region

Region	Crop system (% of plots)	Cultivars (% of plots)
Western	Open field (63%)	<u>Susceptible</u> (78%) : Amalia, Colorado, HC 3880, Lignon <u>Resistant</u> (22%) : Vyta, ARO 8479F1
	Sheltered Cultivation (37%)	<u>Resistant</u> (100%) : HC 3105F1, HA 3019F1, Fa 180F1
Central	Open field (80%)	<u>Susceptible</u> (66%) : Rilia, Mara, M 82, Amalia, INIFAT 28 <u>Resistant</u> (34%) : Vyta, ARO 8479F1
	Sheltered Cultivation (20%)	<u>Resistant</u> (100%) : HA 3019F1, Pernod F1, HA 3108F1

Fig. 1. Incidence of TYLCV disease according to cultivars



- Both resistant and susceptible cultivars were cultivated in open fields while only resistant cultivars were cultivated in sheltered plots.
- TYLC disease incidence (Fig.1) and severity were significantly higher on susceptible cultivars, compared to resistant cultivars. As a result, almost no disease occurred in the sheltered plots with resistant cultivars.

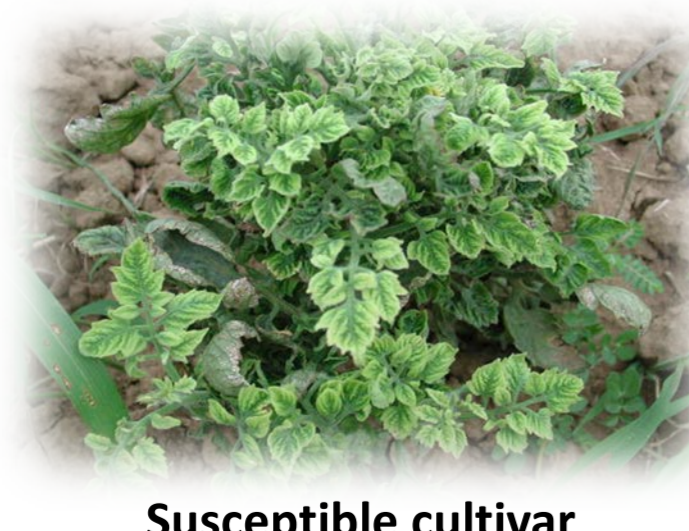
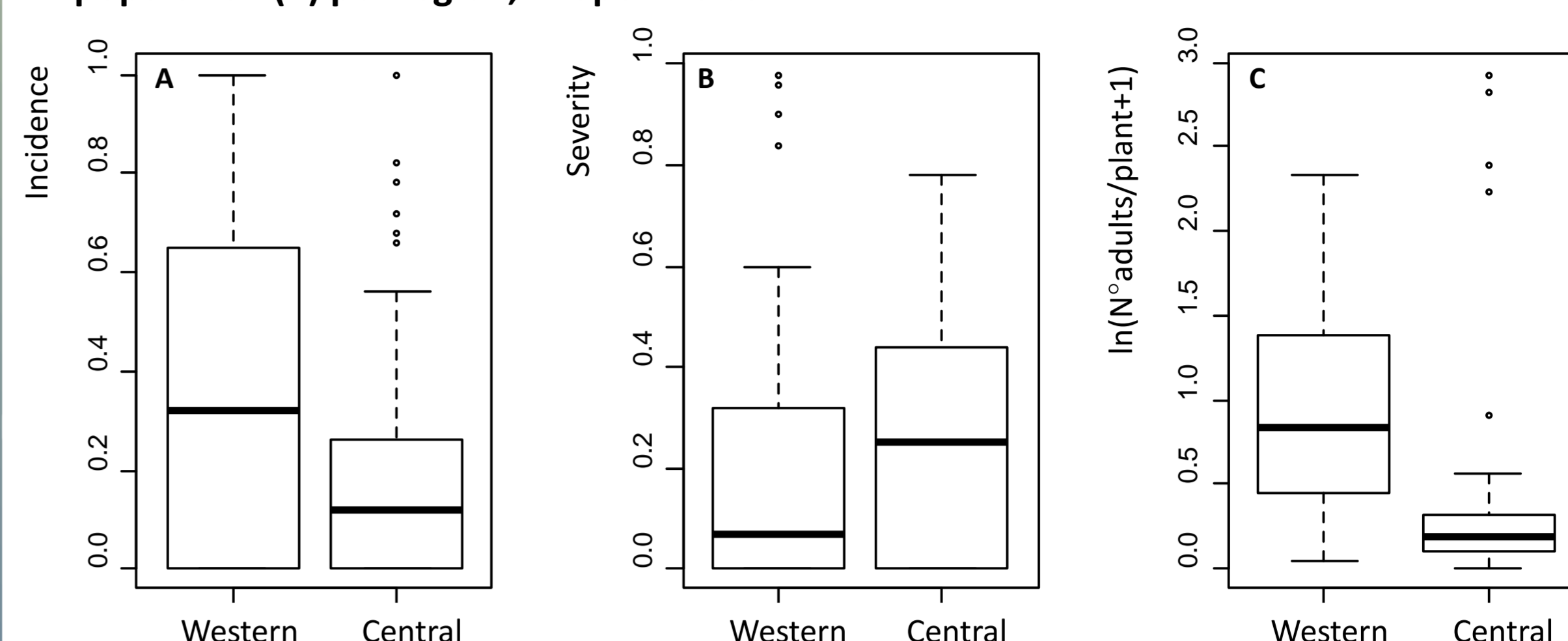
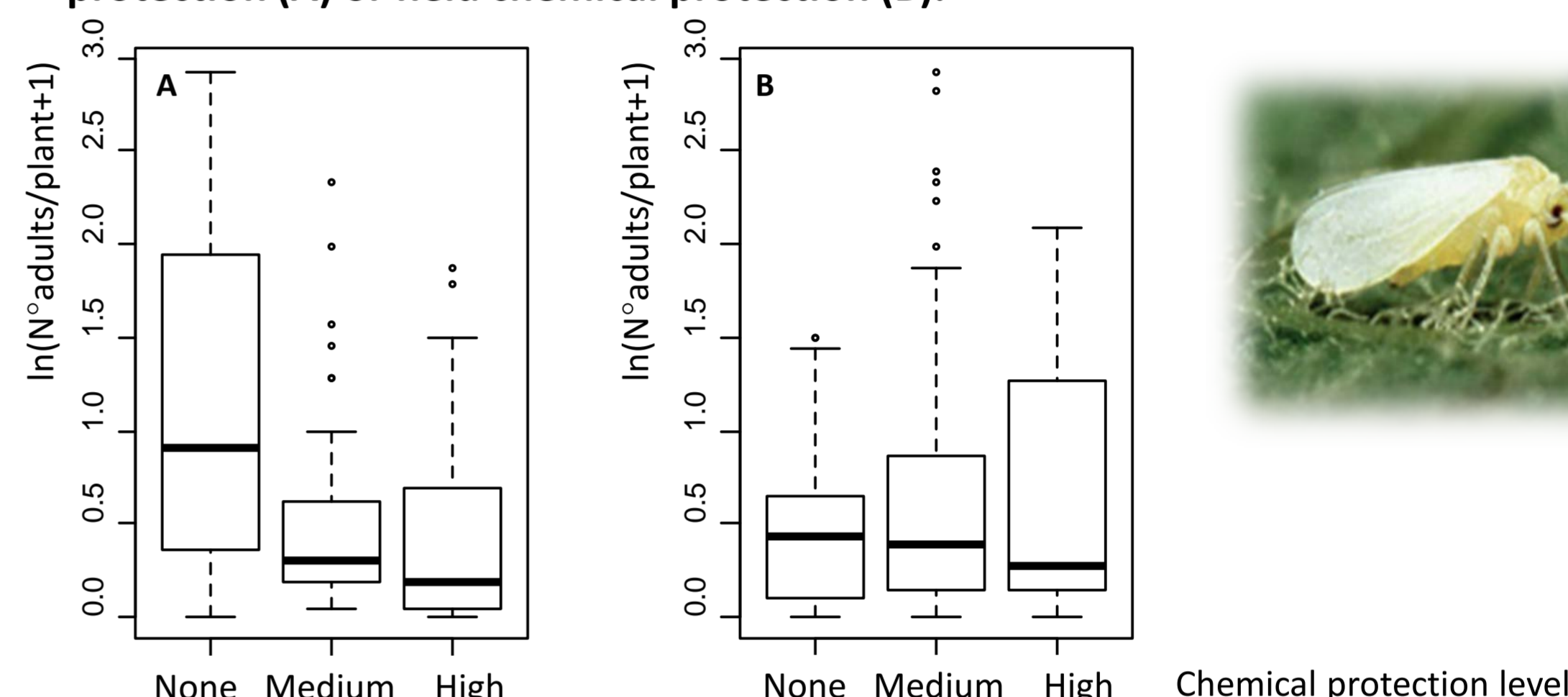


Fig. 2. Incidence of TYLCV disease (A), severity of TYLCV disease (B) and *B. tabaci* population (C) per region, in open fields .



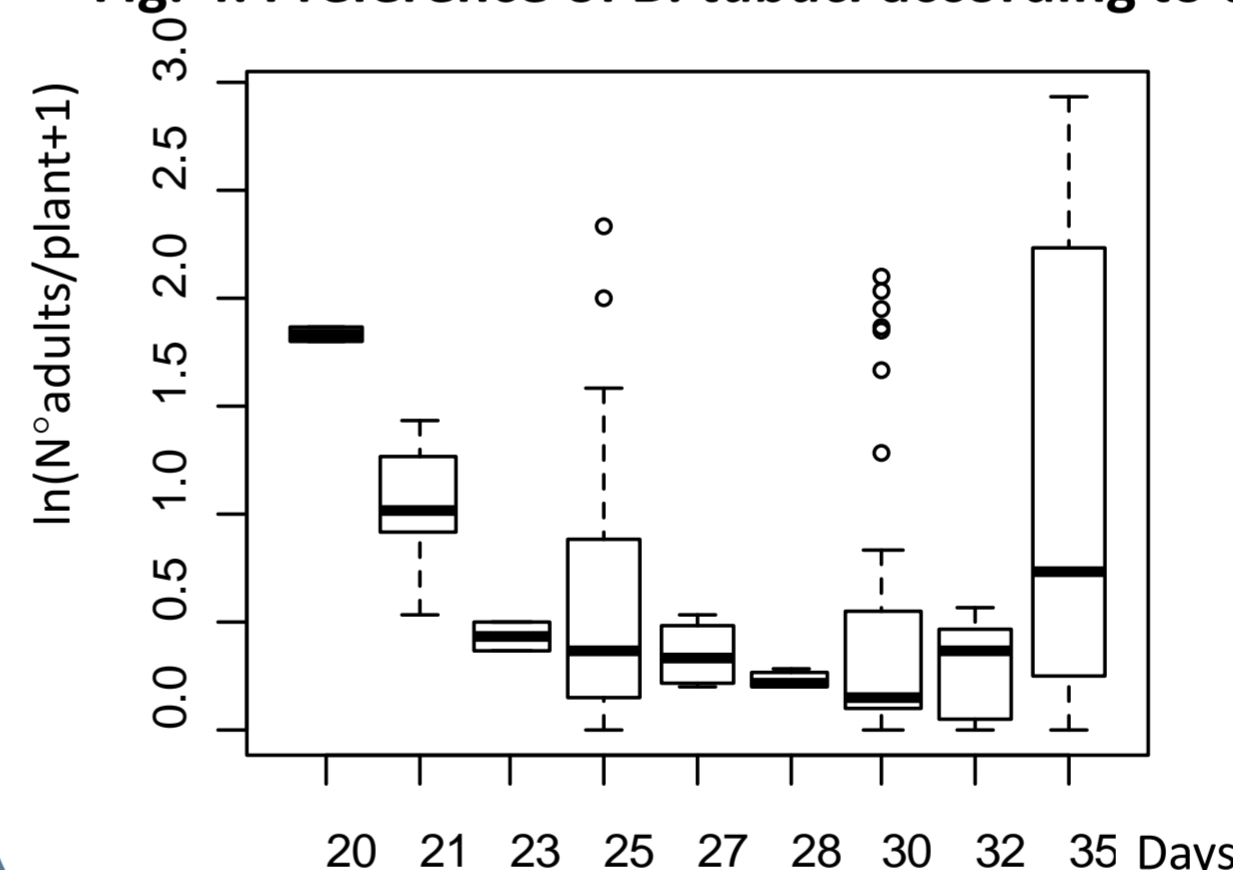
- TYLCV disease incidence (Fig. 2A) and *B. tabaci* population (Fig. 2C) were higher in the Western region.
- TYLCV disease severity was higher in the Central region (Fig. 2B).

Fig. 3. Behavior of *B. tabaci* population in open fields , using nursery chemical protection (A) or field chemical protection (B).



- Whitefly infestation in open fields was higher when no chemical protection measure was applied in the nursery (Fig. 3A).
- Whitefly infestation in open fields tended to be higher with chemical protection which might be an indirect indication that chemical protection negatively affected natural regulation processes (Fig. 3B).
- Infestation of whitefly on vegetable farms might be controlled by developing Integrated Pest Management (IPM).

Fig. 4. Preference of *B. tabaci* according to transplanting age in open fields .



- The lowest population was found at 28 days, thus being the optimal timing for transplanting (Fig. 4).

CONCLUSIONS

1. The use of Begomovirus resistant/tolerant cultivars was the main factor controlling TYLCV incidence and severity on tomato in Cuban conditions.
2. These cultivars should be grown during 28 days in the nursery to get the lowest incidence of *B. tabaci*-TYLCV complex.
3. It is possible to get a clean tomato production in spite of begomovirus infection using environmentally friendly cultural practices.

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