

Horizontal distribution of *Aphis gossypii* Glover (Hemiptera: Aphididae) within cotton cultivars with colored fibers.

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1 - Introduction

The naturally-colored cotton plant (*Gossypium hirsutum* Linnaeus) has emerged as an alternative socio-economic status, contributing to income of farmers and industrial workers. But this crop can be affected by lots of insects pests. *Aphis gossypii* Glover (Hemiptera: Aphididae) is the main cotton pest in Brazil (Ramalho 1994) and various other countries (Leclant and Deguine 1994, Wu and Guo 2005).

A. gossypii can be attracted for many plants. According to Ghovlanov (1976) the influence of the host plant on the success of a phytophagous insect species can be measured from three aspects: stimuli that lead insects to locate and choose the plant; plant conditions that lead to the initiation and maintenance of feeding; and finally the nutritional characteristics of the plant, which enable the development of the insect and its progeny. Sucrose is the only sugar found in cotton phloem sap and *A. gossypii* converts most of the sucrose it ingests into oligosaccharides. Carbohydrate concentration and content vary with the age of the plant (Wells 2002).

On cotton plants *A. gossypii* is generally found most often in the upper and middle parts of the plant, possibly due to the softness of the leaf tissue, which substantially facilitates carbohydrate extraction by aphids (Weathersbee and Hardee 1994, Fernandes et al. 2001). In this direction, the study about horizontal distribution of *A. gossypii* according to the age of colored-fiber cotton it necessary, because it may help improve decision making in integrated management programs for this pest. Accordingly, the aim of this study was to describe the horizontal distribution of the cotton aphid, *A. gossypii* within a cotton plant in two cotton cultivars (BRS Safira and BRS Rubi) with colored fiber, over the time.

2 - Material and Methods

The study was carried out at Experimental Station of the Embrapa Algodão, Campina Grande, Paraíba State, Brazil. A randomized block experimental design was used, with two treatments composed of colored-fiber cotton cultivars (*G. hirsutum* L.) BRS Safira and BRS Rubi, distributed in five replications, with each experimental unit composed of 25 plants. Measurements of aphid population distribution in the cotton plants were taken in intervals of seven days, from the moment of plant emergence until the

appearance of the first open bolls. The number of apterous or alate aphids and their specific locations were recorded, using as a reference point the location of nodes on the mainstem of the plant (from node zero until the last node) and also those on the leaves/nodes of vegetative/fruiting branches from inside leaf toward outside. The mean numbers of apterous and alate aphids recorded on the first leaves originating from nodes on the mainstem were submitted to Student-Newman-Keuls tests, with $P < 0.05$ of the Sas Institute (2006).

3 - Results and Discussion

More apterous aphids were found (BRS Safira: 88.2% and BRS Rubi: 87.4% (Fig. 1) and alate aphids (BRS Safira: 92.3% and BRS Rubi: 81.1%) on the structures produced by positions 1 and 2 of the vegetative and fruit branches than in the other positions of the cotton cultivars.

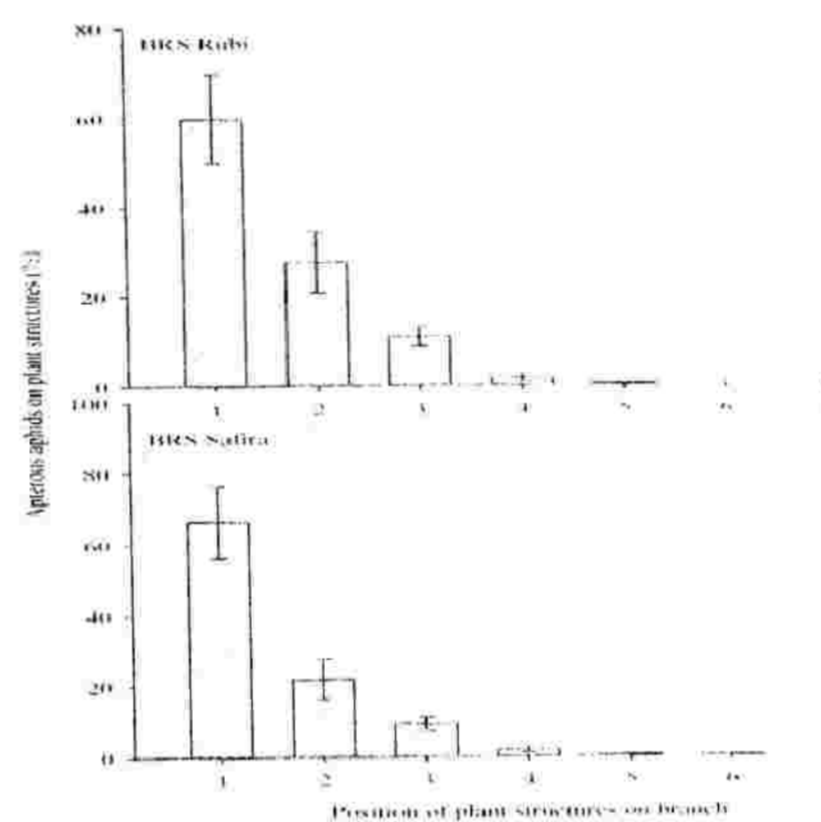


Figure 1. Horizontal distribution (%) of apterous aphids within BRS Safira and BRS cotton plants based on position of plant structures¹ on branch from inside leaf (leaf 1, including bud) toward outside cotton plants. ¹All plant structures (leaves, squares, flowers and bolls).

Since the occurrence of apterous (BRS Safira: $y = 92.34 - 37.08x + 3.51x^2$, $F_{(2, 4)} = 16.67$, $R^2 = 0.96$, $P < 0.0151$ and BRS Rubi: $y = 86.36 - 33.46x + 3.09x^2$, $F_{(2, 4)} = 41.15$, $R^2 = 0.97$, $P < 0.0030$) and alate (BRS Safira: $y =$

$98.05 - 20.26x - 3.87x^2$, $F_{(2,4)} = 117.54$, $R^2 = 0.93$, $P < 0.0062$ and BRS Rubi: $y = 79.06 - 29.63x + 2.69x^2$, $F_{(2,4)} = 31.94$, $R^2 = 0.97$, $P < 0.0048$) aphids (Fig. 2) was concentrated in branch positions 1 and 2, quadratic models were the best fit to represent the decrease in percentage of apterous or alate aphids found in structures produced by branch positions beginning in the inside part of plants and extending to outside part.

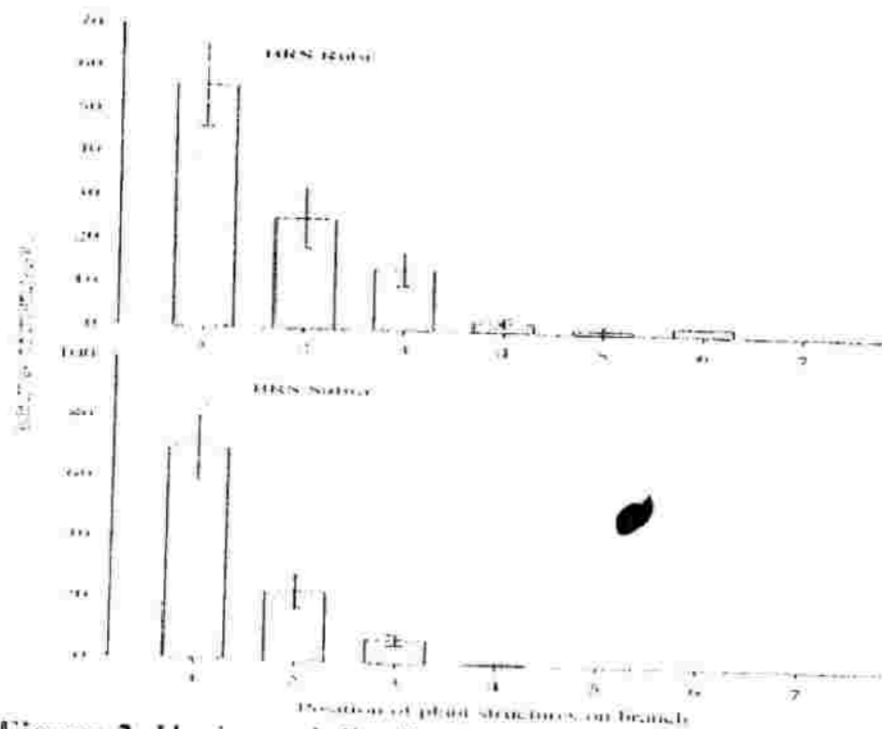


Figure 2. Horizontal distribution (%) of alate aphids within BRS Safira and BRS Rubi cotton plants based on position of plant structures¹ on branch from inside leaf (leaf 1 including bud) toward outside cotton plants. ¹All plant structures (leaves, squares, flowers and bolls).

The pattern of the horizontal distribution on branches was similar for apterous (PROC MIXED of Sas for equality of linear coefficient: $t_{(1,243)} = 1.12$, $P > 0.1018$) or alate (PROC MIXED of Sas for equality of linear coefficient: $t_{(1,243)} = 0.912$, $P > 0.1029$) aphids comparing the linear coefficients of the models between BRS Safira and BRS Rubi cultivars.

The concentration of aphids on leaves, and particularly at positions 1 and 2 of the plants, may be related to availability of glucose, fructose and sucrose. However, sucrose production depends on concentration of glucose plus fructose, establishing an inversely proportional relationship, and consequently altering total sugar content in aphids (Slosser et al. 2004). A study conducted by Gomez et al. (2006) showed that sugar levels found in cotton leaves are affected by the daylight period. This is mainly due to non-structural daily variations in carbohydrate levels and photosynthesis rates in the host plants (Gomez et al. 2006). They also found that the quantity of sucrose produced by aphids varies throughout the day. Fructose is produced in large scale by aphids, while glucose and sucrose account for the lowest amounts in honeydew (Gomez et al. 2006). The aphids preferentially select host plants or feeding sites that are nutritionally superior, on which their rate of growth and reproduction and their survival are highest (Auclair 1976). Under natural conditions, the act of selection of host plants, but more probably the selection of specific feeding sites on a particular plant, and eventually the establishment of aphid colonies of economic importance are influenced markedly, among other things, by the nutritional superiority of the host, in which amino acids may contribute significantly.

The results of this study may contribute with others research about horizontal distribution of *A. gossypii* on naturally-colored cotton plants. They may also help to reduce costs and save time spent on pest monitoring and control activities.

4 - Acknowledgments

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Palavras

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