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A CHEMICAL CONTROL OF THE SOYBEAN APHID

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This work proposes a chemical control to soybean aphid by fuzzy linear programming. The soybean aphid, *Aphis glycines* (Hemiptera: Aphididae), has become the devastating insect pest of soybeans in USA. The model includes a fuzzy predator-prey system in order to describe the interaction between the prey, *Aphis glycines* (Hemiptera: Aphididae) - the soybean aphid, and its predator, *Orius insidiosus* (Hemiptera: Anthocoridae), considering biotic (predator) and abiotic (temperature) factors, which affect the soybean aphid population dynamics. Economic thresholds for the soybean aphid have been developed and vary from 250 to 273 aphids per plant, i.e., when an insecticide treatment is warranted. Thus, in this paper we have propose a chemical control in the plantation when the prey population exceeds the economic damage threshold and aphids population increasing. The fuzzy linear programming is to find the minimum (or maximum) values of a linear function under constraints represented by linear inequalities in which the right-hand-side numbers are fuzzy numbers. In this work, the objective function to minimize the quantity of insecticide on the plants and the linear constraints are a conventional method using fuzzy numbers for the economic threshold. The problem has been modeled via Simplex Method in MATLAB. The model suggests that the quantity of insecticide was 89.7% of the quantity recommended by manufacturer. In this way, the model suggests that the quantity of insecticide may be lower than the quantity recommended by manufacturer. The soybean aphid has still not found in Brazil. Therefore, before any eventual invasion, a predictive model to enhance control program is desirable. Brazil is the second largest exporter of soybean at present, after the USA and before Argentina. According to the Bureau of Agriculture of the USA, it has been estimated that Brazil will be the largest soybean exporter in 2023.