Deutscher Tropentag, October 8-10, 2003, Göttingen

"Technological and Institutional Innovations
for Sustainable Rural Development"

Cotton-Basil Intercropping — Effects on Pest Infestation, Yield and Economical Parameters in a Biodynamically Managed Field in Fayoum, Egypt

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Abstract

In many countries, cotton is traditionally intercropped with other plants in order to increase yields and control pests. We tested the effects of intercropping cotton (*Gossypium barbadense*) and basil (*Ocimum basilicum*) on pest infestation, yields, and economical parameters in the Governorate of Fayoum, Egypt. Basil, which is known for its repellent effect on various insect pests, was mixed with cotton in three different area fractions (no medium and high basil fraction) and two row distances (60 and 90 cm) using a substitutive design. Compared to the non-intercropped plots, cotton-basil intercropping significantly reduced total pest infestation and led to a 50 % reduced abundance of the pink bollworm (*Pectinophora gossypiella*). Our data also show that basil affected the movement and abundance of the beneficial epigeic fauna (e.g., *Coleoptera*, *Araneae*, *Gryllidae*, *Salientia*) into the cotton areas: abundance of the epigeic fauna was 30 % higher in the neighborhood of adjacent basil strips than in the centre of the cotton plots. Since neither basil intercropping nor different row distances affected microclimatic parameters in the experimental plots, we assume that both a basil-induced repellence against pest insects and a stimulation of beneficial epigeic fauna might be responsible for the lower pest infestation in intercropped plots. No correlation between pest infestation and cotton yields could be detected. Despite an up to 33 % reduced area of cultivated cotton in the intercropped plots, seed cotton yield was not affected by intercropping. A wider row distance significantly reduced the number of cotton bolls per area, however increased boll mass and cotton yield per plant thus resulting in similar seed cotton yield per hectare than with narrow row distance. A wide row distance also increased the abundance of spiders and crickets, however did not affect weed abundance. With the exception of the treatment "intercropping with low basil fraction and wide row distance", intercropping resulted in higher total revenues and gross margins compared to single cotton cropping. Our results demonstrate the high potential of intercropping cotton with basil in order to achieve a reduced pest infestation while concurrently increasing gross margins.

Keywords: Cultural pest control, *Earias insulana, Gossypium barbadense*, mixed cropping, *Ocimum basilicum, Pectinophora gossypiella*

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