



Tropentag, October 7-9, 2008, Hohenheim

“Competition for Resources in a Changing World:
New Drive for Rural Development”

Biological Control of the Diamondback Moth, Reduced Pesticide Use and Impact on Farmers' Health in Crucifer Production in Kenya and Tanzania

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Abstract

Previous assessments of classical biological control (BC) of the diamondback moth concentrated on the impact of the BC agent, *Diadegma semiclausum*, on production costs, yield and revenue in cabbage production in Kenya and Tanzania. Results showed that BC led to a reduction of pesticide use and increased revenue for farmers who did not use pesticides. Farmers who use pesticides as well as having the BC agent established do not maximise the full benefit of BC due to a negative interaction between the two control strategies. This paper expands the impact assessment to the human health dimension of cabbage farmers first and then extends to kale producers.

The health assessment is based on a random sample of 1250 cabbage farmers from Kenya and Tanzania; the extension covers 249 randomly sampled kale farmers from Kenya. Both surveys capture the production with and without the presence of the BC agent. The analysis is conducted by using a non-linear zero-inflated Poisson regression model.

Results in cabbage production show that the BC agent reduces the incidence of pesticide-related acute illness symptoms within a household by about 20%, all other factors being equal. Use of more toxic pesticides (as per WHO definition) as well as not washing hands after application increase health problems. Surprisingly increased use of protective clothing increases health symptoms, too. However, this is supported by the literature and explained by e.g. inappropriate material for protective clothing. Preliminary results indicate a higher positive health impact of the BC in kale production since the crop remains longer in the field and thus relies on a higher number of pesticide applications.

In sum, the findings show that by assessing only the direct financial impact of a BC program, the overall impact is underestimated. Findings further stress the need to assign an economic value to such indirect non-financial impacts of an intervention. From a development perspective findings indicate the need to increasing farmers' knowledge on appropriate production systems, which maintain the BC, appropriate handling of pesticides and personal hygiene after spraying.

Keywords: Biological control, East Africa, economic impact assessment, health impact, horticulture, pest management