



Tropentag, September 20-22, 2023, hybrid conference  
“Competing pathways for equitable food systems transformation:  
Trade-offs and synergies”

## Functional biodiversity in organic and conventional cotton farming systems

CHRISTELLE LEDROIT<sup>1</sup>, BARBARA SMITH<sup>2</sup>, GURBIR BHULLAR<sup>3</sup>

<sup>1</sup>*FiBL - Research Institute of Organic Agriculture, India*

<sup>2</sup>*Coventry University, Agroecology, United Kingdom*

<sup>3</sup>*Bern University of Applied Sciences, School of Agricultural, Forest and Food Sciences (HAFL), Switzerland*

### Abstract

Farmland Biodiversity performs a variety of ecosystem services which are directly linked to food production and sustainable agriculture. The crucial role of ecosystem services has been understudied, especially in the tropics. Cotton is one of the most polluting crops in the world, as it requires high inputs of both pesticides and fertilisers. Globally, India is the second-highest producer of cotton, yet it is also the country with one of the lowest yields per hectare. In 2002, India introduced Bt cotton, it holds genes from *Bacillus thuringiensis* that make the plant resistant to the main cotton pest, the American bollworm. Following this introduction, an outbreak of sucking pests such as jassids and aphids has been observed in these systems. On one side, pesticides which were used to fight the bollworms decreased, but on the other side, the use of sprayed pesticides increased. Studies have shown that sprayed pesticides affect pests as well as non-targeting arthropods. In India, the majority of entomological research on cotton systems has been focused on the pest community and the resistance they have built up over time. There is a strong need to be able to compare the impact of these farming systems on functional biodiversity. My study has been exploring biodiversity indicators present in the soil, above ground and on the cotton canopy. The study has been done on a long-term cotton trial in Madhya Pradesh, comparing four different systems: Bt-conventional, conventional, organic and Biodynamic as well as on farmer's fields, comparing Bt-conventional and organic systems. The results have shown a higher diversity in the organic systems above and below ground. The results from the long-term trial have shown no significant difference between the Bt-conventional and non-Bt-conventional. During this presentation, I will outline the long-term effects of pesticides (as well as fertilisers) on the functional biodiversity in the above-mentioned cotton systems.

**Keywords:** Aboveground, belowground, Biodynamic, Bt-conventional, cotton, functional biodiversity, organic