**An application for the OICSD seed funding. Fairlie K. Baird**

Can bees improve cotton?

Ecological research to test if improved pollination increases cotton yields and farmer economic returns

**Justification of research.**

In 2014 India became the world’s largest cotton producing country, tripling production between 2002 and 2014 from 13 to 40 million bales (ISAAA Brief No. 49). Yet despite substantial progress, average yields in India remain far behind those obtained by other countries (FAO Stat) resulting in compromised rural livelihoods in addition to displacing land that could be used for food crops or conserved as, or restored to, natural habitat. Furthermore, pesticide use remains high in cotton, impacting both the environment and human health.

While cotton is self-pollinating, yields typically increase with insect pollination. Consequently when pollinator populations are insufficient, there is likely to be a ‘pollination yield gap’ (Forster et al., 2013; Pires et al., 2014). Recent work has suggested that yields on conventional Brazilian farms could be increased by approximately 27% with optimum pollinator populations (Pires et al., 2014). Furthermore, evidence from other crops suggests that pollination can have positive effects on crop quality (Garrett et al., 2013; Klatt et al., 2014). Because similar work has yet to be carried out in India, there is no evidence to advise on the magnitude of the pollinator yield gap for Indian cotton.

This project could open up substantial industry funded research to improve yields, improve biodiversity and improve the economic return to some of India’s poorest farmers.

**Requested funds: TOTAL: £1012**.

**Methods:** The research will take place on FiBL Long Term Experiment trials in Madhya Pradesh, India, from early August for 2 months. The yield data will be collected by FiBL employees later in 2017 when the cotton is ripe for me to analyse offsite. I will use standard pollinator exclusion and hand pollination to test a pollination yield gap, as described in Pires et al (2014). Early stage economic analysis will use standard prices for cotton lint and oil to understand the direct economic impact of improved pollination.

**Project Partners:** I will be working closely with Christelle Ledroit. Christelle is working on the FiBL Long Term Experiment trials in MP on cotton, and has agreed to facilitate both the practical and technical aspects of the project. I have also been in touch with Dr Alfred Gathorne-Hardy (OICSD) and Dr Barbara Smith (Centre for Pollination Studies) about this project, and they are offering further guidance.

**Outputs**: I will provide a report of this project to the OICSD, with photographs, by March 2018. In addition, this research – if successful – should generate a scientific paper for a leading journal.

If successful I hope to facilitate the mainstreaming of better cotton management by working with the OICSD’s contacts including: the Better Cotton initiative (BCI), M&S, and Primark to facilitate improving practises across India. As such, I will keep the OICSD involved with this research to the extent that they want to be.