

## Evolution of Bt cotton production costs and effectiveness in Northern China over a decade

Transgenic cotton made resistant to target pest with Bt gene (Bt cotton) have been used for almost twenty years in a handful of countries to which belongs China. In 1997, Bt cotton has been commercially released in China, firstly in a limited number of Northern provinces and particularly in Hebei province.

The use of Bt cotton has given rise mainly, if not exclusively, to short term assessment of its effectiveness and profitability in various countries and particularly in developing countries. In India and in China where most assessment studies were conducted, differences in production costs and profitability were appraised between Bt cotton and conventional cotton few years after the commercial release of Bt cotton and when both types of cotton were still in use. Most studies have provided evidence on Bt effectiveness and profitability, although their scientific rigor was seldom perfect.

There are few if any studies to appraise the mid-term effectiveness and profitability of Bt cotton use. One reason is the generalized use of Bt cotton that prevents implementing comparison of Bt and conventional cotton in the same way than in short term studies. Indeed, in most countries having adopted Bt cotton, the short term effectiveness has led producers to stop growing conventional cotton varieties.

The generalized use of Bt cotton almost two decades after their commercial launch does not necessarily mean that its short term effectiveness and profitability have been maintained. Varieties of conventional cotton might not be grown for lack of availability of corresponding seeds, as observed in many countries. The effectiveness and profitability have been altered by the phenomenon of pest complex shift, in the sense that some pests have shifted from the status of secondary pests to that of primary ones. The phenomenon is particularly documented for lygus in several countries, including China.

This communication is a contribution to mid-term appraisal of Bt cotton use through an alternative method. Since Bt cotton effectiveness and profitability can no longer be implemented through comparison to conventional cotton as long as this latter is absent, they are assessed through the evolution of Bt cotton production costs and profitability over a period, as well as the evolution of cotton producers' perception of Bt cotton use.

The alternative method of mid-term appraisal of Bt cotton use has been applied in Hebei province, Northern China, where yearly surveys have been conducted to cover production campaigns dating back to 2002/03. Data collected through surveys encompassed production costs and returns, producers' opinions on Bt cotton effectiveness and profitability as well as their feelings about the changes of pest infestations.

Results indicate producers' perceptions of the evolution of pest infestation that are consistent with the phenomenon of pest complex shift. This phenomenon leads producers to less acknowledge Bt cotton effectiveness and profitability, because pest control costs have been increasing and yield stagnating.