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In 2017, Pakistan achieved a 96% adoption rate of Bt cotton, or 3 million hectares of the national total area planted to cotton which was 3.11 million hectares.

Around 725,000 smallholder cotton farmers in Pakistan planted and benefited from Bt cotton in 2017, which was the eighth year of commercial planting in the country.

It was estimated that the economic gains from Bt cotton

in Pakistan for 2010 to 2016 was US\$4.8 billion, and US\$483 million for 2016 alone.

ADOPTION OF BIOTECH CROPS IN PAKISTAN

IR cotton has been consistently adopted by cotton farmers in Pakistan since 2010. Punjab province was the first to adopt large IR cotton area, followed by Sindh, Khyber Pakhtunkhwa, and Balochistan

in the subsequent years. In 2017, IR cotton cultivation in Pakistan reached an all-time high of 3 million hectares. This increase was possible through the introduction of a substantial support package for farmers including fertilizer subsidies, reduced loan interest rates, and other measures introduced by the Pakistan Government.

During the 48th meeting of the Punjab Provincial Seed Council (PSC) in March 2017, four additional varieties of IR cotton expressing the *cry1Ac* gene were approved, including event MON 531.

Other IR cotton varieties and hybrids expressing single and double gene(s) such as *cry1Ac* or pyramided *cry1Ac* and *cry2A* genes developed by both public and private sector institutions were awaiting commercial approval, but were deferred due to non-provision of commercialization certificate by the National Biosafety Committee (NBC). (Khan et. al, 2017).





Single and stacked IR/HT maize varieties were approved for commercial cultivation in 2016. In 2017, field performance trials of IR/HT maize hybrids were conducted as part of the regulatory requirements for varietal registration. Maize farmers in Pakistan are expected to plant for the first time the IR/HT maize developed by Monsanto Pakistan and DuPont Pioneer in the autumn growing season of 2018.

BENEFITS OF BIOTECH COTTON

Smallholder farmers in Pakistan have benefited from IR cotton for the last eight years.

In 2017, Spielman et al. published two new research studies which examined the effectiveness of IR cotton and evaluated the impacts of IR cotton on profitability, productivity, and farm inputs in Pakistan. The studies carefully looked at the concerns about the prevalence of IR cotton varieties possessing weak or non-performing insect-resistance traits conferred by the *cry* gene. The analysis, drawn from a sample of 593 cotton households from six agroclimatic zones spanning 28 districts in Pakistan

in 2013, as well as measurements of Cry protein levels in cotton tissue samples collected from the sampled households' main fields, revealed a wide variability both in farmers' beliefs about presence and absence of *cry* gene and its adequate expression to effectively control insect pests (Spielman et al., 2017).

Another study on the impacts of IR cotton on profitability, productivity, and farm inputs in Pakistan estimated the benefits from adopting IR cotton seeds in Punjab over two cropping seasons – 2008 and 2009. Results indicate that, on average, IR adopting farmers receive 9% higher yields per hectare, reduce per hectare pesticide use by 21.7%, and increase per hectare use of irrigation water by 6%. The study concluded that allowing more IR cotton varieties and ensuring the availability of quality IR cotton seeds in the market is likely to lead to further benefit increases (Bakhsh, 2017).

CONCLUSION

Biotech area in Pakistan reached an all-time high in 2017, which would help increase cotton production by 14.04 million bales. This indicates farmer

satisfaction on Bt technology that can be replicated in the upcoming adoption of biotech maize in the country, which will not only spur the tremendous growth of adoption of IR/HT maize, but also drive the approval and adoption of next generation biotech crops in the Pakistan in 2018 onwards.

SOURCE

ISAAA. 2017. Global Status of Commercialized Biotech/GM Crops in 2017: Biotech Crop Adoption Surges as Economic Benefits Accumulate in 22 Years. *ISAAA Brief* No. 53. ISAAA: Ithaca, New York.

For more information, contact:

ISAAA *SEAsia* Center
GS Khush Hall, IRRRI
Los Baños, Laguna 4031 Philippines
Telefax: +63 49 5367216
Email: knowledge.center@isaaa.org



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