Indian Farming 75 (06): 34-35; June 2025

Hakam Singh's Bt cotton triumph:

Pests conquered, yields soared

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In the Malwa region of Punjab, cotton cultivation faces a steep decline due to pest infestations and the increasing shift towards water-intensive crops, exacerbating groundwater depletion @0.50 m per year. Amidst this, Sh. Hakam Singh, a farmer from Bathinda, exemplifies resilience through the adoption of Integrated Pest Management (IPM) practices, which have transformed his Bt-cotton cultivation. Overcoming initial challenges of ineffective pesticide use, he collaborated with Punjab Agricultural University (PAU) and adopted eco-friendly techniques, including SPLAT-PBW for pink bollworm management, yellow sticky traps for whiteflies, and community campaigns against pest carryover. His commitment to scientific methods has significantly enhanced his yields from 8.5 to 10.5 q/acre and improved his benefit-cost ratio from 1.90 to 2.59. Hakam's efforts extend to educating fellow farmers, supporting scientific pest monitoring, and organizing awareness camps, making him a beacon of sustainable agriculture and inspiring a revival of cotton cultivation in the region.

Keywords: Bt-cotton cultivation, Cotton farming, Integrated pest management, Punjab, Sustainable agriculture

IN the Malwa region of Punjab, cotton cultivation, historically emblematic of resilience, faces a precarious decline. District Bathinda, central to cotton production, grapples with diminishing fields, attributed to relentless pest attacks by whitefly and pink bollworm. Simultaneously, a significant agricultural shift towards water-intensive crops like rice and spring maize exacerbates groundwater depletion. Over the past decade, groundwater levels have plummeted at a rate of 0.50 m/year, posing severe environmental challenges.

Rice and spring/summer maize are gaining popularity over cotton, leading to underground water depletion at an alarming rate. The area under cotton cultivation in the entire cotton belt of Punjab has witnessed a sharp decline from 248 to just 96 thousand hectares over the last five years. In Bathinda, the cotton-growing region has shrunk from 151 thousand hectares to 12.5 thousand hectares during the same period. This substantial reduction reflects a broader trend of decreasing farmers' interest in cotton cultivation, amplifying the challenges faced by the region's agricultural landscape.

To counter these problems efficiently, Integrated Pest Management (IPM) practices advocated by PAU, Ludhiana, need to be followed. These practices offer economically and environmentally friendly solutions, providing a sustainable pathway for preserving the agricultural heritage of the Malwa region amidst escalating environmental concerns. A balanced and informed approach, emphasizing the resilience of cotton and the implementation of sustainable practices, is imperative to preserve agricultural diversity in the region.

Introduction to farmer: Hakam Singh

Amidst these challenges, Sh. Hakam Singh (46 years) emerges as a pioneer, showcasing that cotton yields can be sustained even under severe pest pressure through the adoption of recommended IPM practices. Hakam Singh has been cultivating cotton on his 5 acre ancestral land in Malkana, District Bathinda, for many years. Despite having only a matriculation education, he has been associated for the last many years with PAU's KVK Bathinda and the State Department of Agriculture and Farmers' Welfare.

Identification of problem and seeking help

His success story began amidst challenges. Initially, he struggled with higher incidences of insect-pests, relying solely on pesticides, often the unrecommended ones. This ineffective approach not only failed to control pests but also escalated input costs. Thereby, recognizing the need for a scientific solution, he sought assistance from the scientists at PAU-KVK, Bathinda and officials of the State Department

of Agriculture and Farmers' Welfare in 2021. PAU-KVK Bathinda conducted a field demonstration on SPLAT-PBW, an eco-friendly, cost-effective mating disruption tool for the management of pink bollworm on cotton.

Adoption of recommended techniques

His journey into effective whitefly management involves a comprehensive approach. He diligently followed recommended *Bt*-cotton hybrids, sowing time, and recommended dose of nitrogenous fertilizers. For managing insect-pests, he embraces eco-friendly IPM techniques.

For managing whiteflies, he used low-cost yellow sticky traps during initial stages to keep populations below economic thresholds (≥6 per leaf). Additionally, he prepared homemade neem extract at home, a recommended botanical solution from PAU, to repel whitefly effectively. Regular surveys and maintaining records of pest populations demonstrate his commitment to meticulous monitoring. He also campaigned against weeds, known alternate hosts for whiteflies, showcases his ability to rally fellow farmers. Hakam's keen eye distinguishes between beneficial and harmful insects, contributing to a balanced crop ecosystem.

To combat the pink bollworm menace, he initiated a campaign for the destruction of cotton crop residue, where the larvae diapause during winters. Collaborating with fellow farmers, he motivated the community to manage residue before February, preventing the carryover of pests. Pheromone traps have become an integral part of his strategy, allowing him to monitor and manage pink bollworm populations effectively. Hakam's commitment extends to spraying recommended pesticides only when pest levels breach established thresholds (5% infested flowers or bolls). He also gives 4 sprays of 2% potassium nitrate (13:0:45) solution starting at flower initiation at a weekly interval as per PAU's recommendations which is helpful in ball development leading to improved yield.

Outcome

The adoption of recommended crop management and IPM practices yielded impressive results. Hakam revealed a reduction in crop management expenses, resulting in a higher benefit-cost ratio of 2.59, compared to the pre-adoption ratio of 1.90. His yield increased from 8.5 to an impressive 10.5 q/acre in 2024, higher than the state and district average yield. The net return surges to ₹47,200/-, reflecting a substantial improvement from the previous ₹22,178/-.

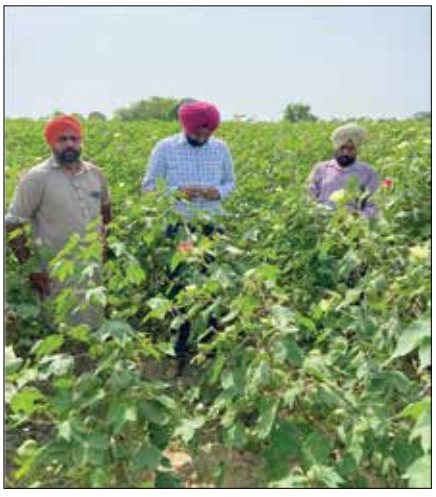
Table 1. Important economic indices of cotton cultivation during the previous years

Particulars	2021	2022	2023	2024
Hakam's cotton avg. yield (q/acre)	8.5	9.8	10.3	10.5
Gross cost (₹/acre)	24,700/-	25,200/-	25,900/-	30,000/-
Goss income (₹/acre)	46,878/-	56,115/-	62,624/-	77,720/-
Avg. net income (₹/acre)	22,178/-	30,915/-	36,724/-	47,200/-
Benefit cost ration (B:C)	1.90	2.23	2.41	2.59

His success was not restricted to his own fields but it also transcended and inspired his fellow farmers. He served as a scout for the state department of agriculture and actively participated in technology demonstrations provided by KVK and the state department of agriculture. Serving as a resource person for the scientific community, he keeps them informed about pest flare-ups through timely telephone alerts. His initiatives also extended in organizing awareness camps on IPM in his village and adjoining areas.

SUMMARY

Hakam Singh's transformative journey is a testament to the efficacy of IPM in *Bt*-cotton cultivation. By dispelling myths, adopting recommended practices, while also fostering community collaboration, he not only revitalized cotton cultivation but also becomes a beacon of inspiration for sustainable agriculture. His story resonated beyond his fields, illustrating the potential for harmony between agricultural practices and ecological well-being. Hakam Singh stands as a pioneer, cultivating not just crops but also a legacy of resilience and sustainability in Punjab's agricultural landscape.



Hakam Singh monitoring his crop with fellow farmers

Hakam Singh installing a pheromone trap in his cotton field

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