Reviving Trap Crops: The Forgotten Shield Saving Cotton from Pest Crisis

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Abstract

Cotton farming in India's key belts—Punjab, Haryana, Rajasthan, Maharashtra, and Telangana—faces a silent crisis. Pest attacks, especially from pink bollworm (PBW), sucking insects like aphids, jassids, whiteflies, and thrips, have driven kharif acreage down by 9-12% in recent seasons, with farmers switching to safer pulses, millets, and oilseeds. Amid this, a proven, low-cost strategy—trap cropping—is fading from memory. Once a staple in integrated pest management (IPM), trap crops like marigold, castor, okra, sorghum, cowpea, and roselle draw pests away from cotton, protecting fields while slashing chemical use. Yet, heavy reliance on Bt cotton hybrids and quick-fix sprays has led farmers to "forget" this eco-friendly tactic, risking pest resurgence, debt traps, and soil degradation.

How Trap Crops Shield Cotton Fields

Trap crops work by exploiting pests' preferences: they release attractants (volatiles, colors, nectar) that pull insects like whiteflies or bollworms at 2-5 times the rate of cotton itself. Planted as borders (4-10% of field area), intercrops, or row mixtures, they act as "sacrificial sinks," concentrating pests in manageable spots for targeted removal or predation. In Maharashtra trials, roselle (Ambadi) or cowpea mixed at 10% seeding rate lured 80-90% of bollworms, letting natural enemies like ladybirds, lacewings, and spiders multiply unchecked. Benefits extend beyond pests: they improve soil fertility via nitrogen fixation (cowpea, pigeonpea), suppress weeds, and enhance biodiversity, cutting pesticide costs by 30-50% while boosting yields 10-20%.

For sucking pests—rampant in North India—they're game-changers. Jassids and aphids swarm okra or castor borders, sparing cotton seedlings during vulnerable 15–30-day stages. Studies show 90-98% field protection with minimal trap area, far outperforming sprays alone. In Telangana's rainfed zones, where your expertise in plant breeding shines, hybrid trap varieties could tailor solutions, resist local biotypes while fit smallholder economics.

Why Farmers Are Abandoning Trap Crops

Bt cotton's 95%+ adoption since 2002 promised bollworm-proof fields, sidelining traps as "old-fashioned." Easy access to subsidized sprays fueled this shift, but PBW resistance emerged post-2017, devastating crops—losses hit ₹15,000 crore in Punjab alone. Surveys reveal low uptake: only 15-20% of Haryana farmers use border crops like pigeonpea or sorghum, preferring deep ploughing or AI-pheromone traps (now piloted by ICAR-CICR, reducing PBW 38%). Labour shortages, narrow sowing windows, and extension gaps compound this: training focuses on chemicals over agronomy.

Pest shifts exacerbate forgetting. Climate change advances sucking pest cycles, with thrips thriving in warmer winters, yet farmers chase monoculture yields over diversification. Echoing Andhra Pradesh's 1990s pesticide tragedy—where sprays killed predators, sparking suicides—North India's debt cycles mirror this, as input costs soar 20-30% yearly. Acreage crashed 1 million hectares in 2024; without traps, cotton risks further exodus.

Reviving Traps: Practical Steps and Gains

Early planting: Sow marigold/sorghum borders 10-15 days before cotton; monitor with yellow sticky traps (1/acre). Ratios: 4-8% okra/cowpea rows for whiteflies; castor for PBW. Timing: Destroy traps at peak infestation (spray or uproot). NIPHM's IPM package endorses this, projecting 25% pesticide savings.

Punjab pilots blend AI traps with borders, dropping PBW below 10%—scalable via your PJTSAU/ANGRAU networks. Pair with CRISPR-edited cotton for dual resistance. Long-term: biochar from residues (stubble link), medicinal intercrops like tulsi for markets. Farmers gain healthier soils, resilient yields, and halved bills—vital for Telangana's black cotton soils.

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