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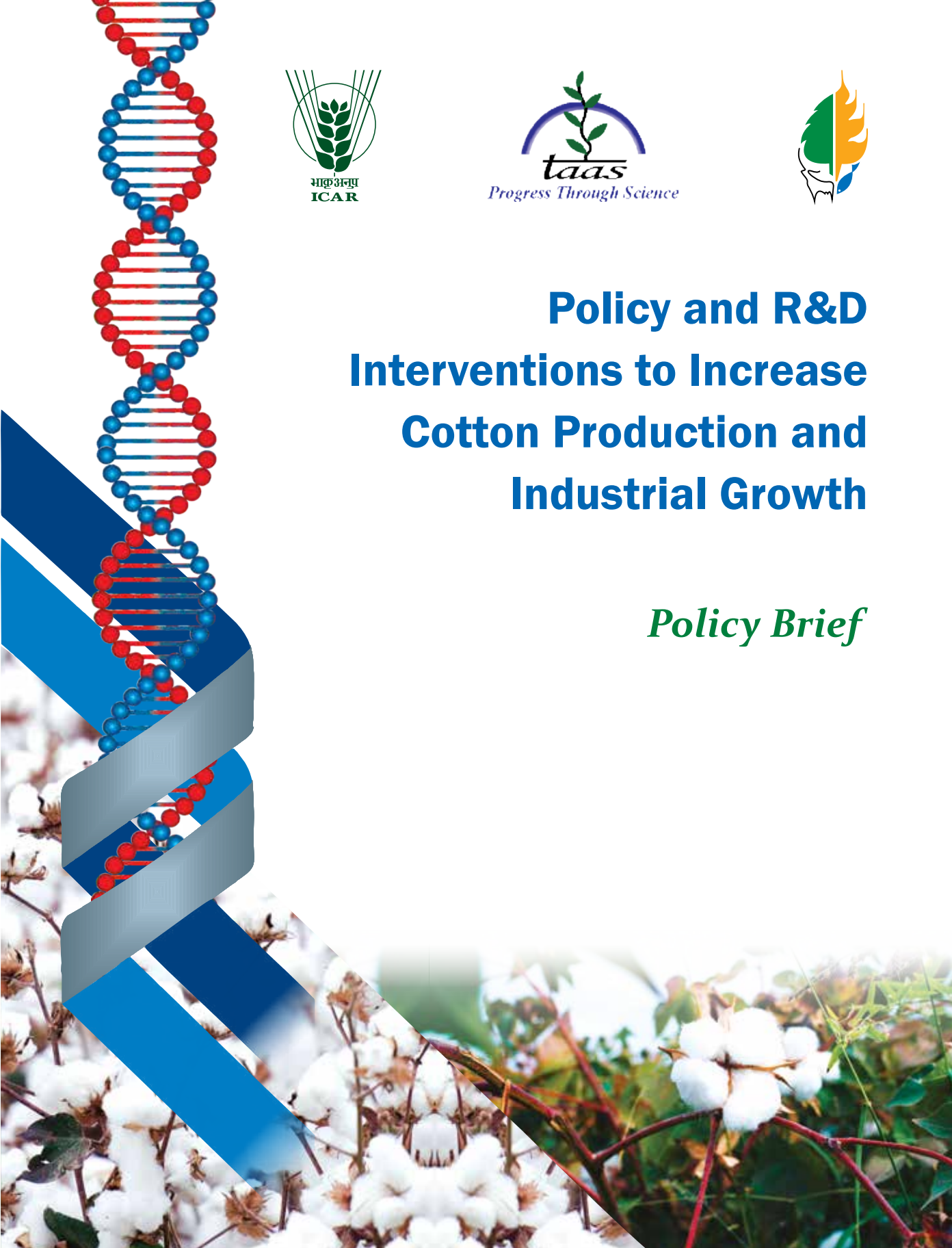
Progress Through Science

Policy and R&D Interventions to Increase Cotton Production and Industrial Growth

Policy Brief



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Preamble

India witnessed Silver Fibre Revolution in the first decade of the current century. Credit for it goes to the bold decision of the government to approve commercial cultivation of Bt cotton in 2002. As a result, in less than one decade, India tripled its cotton production (from around 13 million to 40 million (m) bales by 2013-14) and became an important exporter of cotton in the world. Also, the cotton area increased significantly (8 to 12 mha) on account of the popularity and faster adoption of Bt technology by cotton farmers. Between 2002 and 2020, Bt cotton cultivation resulted in an average increase in the income of cotton farmers by $181.8/ha (about INR 15,000 at current exchange rate in 2023), whereas the consumption of pesticide active ingredient declined by almost 36.4 per cent.

These achievements are commendable, but since 2015, there has been a steady decline in total production (from 40 m to 31 m bales) and stagnancy in yield due to the resurgence of pests, and the prevalence of adverse climatic conditions. At the same time, the national average cotton productivity (433 kg/ha) remains lower than the global average of 768 kg/ha, requiring further efforts towards cotton genetic improvement and the adoption of good agronomic practices. Further, we shall need around 45 m bales to meet the demand of the Indian textile industry by 2026. We, therefore, need a clear Road Map and its speedy implementation to remain a global leader in cotton production and export.

Productivity and Quality Constraints

Development of resistance to Bt toxin in pink bollworm and outbreaks of other pests like white fly, and diseases like boll rot and viruses are causing significant production losses in cotton. The planting of Bt cotton without non-Bt refuge has been an added factor in the development

of resistance in bollworm and the reduction in lint harvest. Cotton leaf curl virus and tobacco streak virus transmitted through insects, seeds, and mechanically, have emerged as major threats to cotton cultivation. On the other hand, the increased use of insecticides for sucking pests has also created increased environmental pollution. Similarly, weed infestation is a serious problem in cotton fields and manual weeding is becoming challenging due to the high cost, prolonged wet spells and non-availability of labour.

Unfortunately, after launching the second generation Bt cotton technology (Bollgard II) in 2006, there has been no approval of any new biotech trait in cotton in India whereas other countries have moved faster with the introduction of cotton with stacked bollworm resistance (BGII) and herbicide tolerance (Roundup Ready - RR) and lately the BGII and Roundup Ready Flex (RRF) technology. By deploying the next-generation BGII RRF cotton to control bollworm as well as weeds, India can achieve a higher yield increase than has been possible with the currently deployed biotech innovations.

Low ginning outturn of lint at 33-35 per cent against 40-45 per cent obtained in other countries where lint-based marketing is prevalent is another critical factor adversely affecting the production of cotton in the country.

Cotton cultivation has been expanding in India over the years and now in 2022-23 covers 12.5 mha which include even those areas that are not well-suited for its cultivation. About 65 per cent of the cotton growing area, mainly in the central and southern zones, is rainfed and most of it has soils that have low water storage capacity, poor fertility, shallow depth and low accessibility to water resources for irrigation. As a result, 72 per cent of the cotton area comes under the low (<300 kg/ha) and medium (370-455 kg/ha) productivity categories. Deterioration in soil health due to continuous monocropping, imbalanced and inadequate nutrient application, and untimely field operations are the other causes limiting cotton productivity in the country.

Most of the major cotton growing countries, including China, USA and Australia grow cotton at a 90 × 10 cm distance (high-density planting system – HDPS), or even closer, while in India the planting distance used is 90 × 60 cm. HDPS is still at the experimental stage in the country and specific plant types suited to such cultivation need to be developed and promoted. The textile industry finds Indian cotton

contaminated with multiple items of trash. Hence, clean picking and pre-cleaning of cotton would be essential to improve the cleanliness of cotton. Mechanization of cultivation and management of the plant canopy with the use of growth regulators and defoliators have been suggested as the way out to obtain quality harvest with acceptable levels of trash content and to reduce the cost of cultivation.

There is a demand in international markets for traceability of the source, fair trade practices (FTP), labelling, organic cotton and production through sustainable agricultural practices. Conformity with the required processes would enhance the value of products like yarn, fabric and garment and consequently the profitability of farmers and the textile industry.

The National Workshop

Keeping in view the above-mentioned diverse challenges to cotton production and industry, a "National Workshop on Enabling Technological and Policy Interventions to Increase Cotton Production and Stimulate Industrial Growth" was organized by the Trust for Advancement of Agricultural Sciences (TAAS) in collaboration with Indian Council of Agricultural Research (ICAR) and National Academy of Agriculture Science (NAAS) and supported by the Federation of Seed Industry of India (FSII) at NASC Complex, Pusa Campus, New Delhi on 25 February 2023. The objectives of the workshop were to: i) have an understanding of the challenges and possible options for enhancing production and productivity; ii) assess the expected benefits of new and next-generation cotton production and processing technologies; and iii) suggest a way forward for enabling policies to accelerate the growth of cotton production and its export.

A total of 85 participants from the seed industry, textile industry, scientists from cotton and textile research institutions, farmers/FPOs, machinery manufacturers, ginning and spinning industry, and pesticide industry-related sectors attended the Workshop. It was inaugurated by Dr. Ramesh Chand, Member (Agriculture), NITI Aayog.

Recommendations

The participants in the workshop were unanimous in expressing the urgent need and resolve to enhance productivity, improve product quality, and take other steps that lead to increasing the international competitiveness of Indian cotton and cotton products. It was emphasized that the Indian cotton sector requires multi-

pronged research, development, and policy interventions of all concerned stakeholders, including ministries, R&D institutions, and industry. The major cotton-growing and cotton-industry states must also align with the emerging policy and developmental interventions. Hence, to ensure prompt action by all the key stakeholders, it was decided to bring out this Policy Brief outlining the policy, developmental, and research recommendations on which urgent action is required for India to become, besides the largest, the most competitive cotton and textile producing and exporting country of the world.

Policy

1. Establishment of a Cotton Development Board on lines of other cash commodities like coffee, tea, rubber, tobacco, and spices is urgently needed to address under one umbrella the diverse policy, development and trade-related issues of cotton and its products.

2. Also, there is an urgent need to revisit the earlier Technology Mission on Cotton (TMC–2002-10) and implement its second phase to catalyse existing cotton production, productivity, quality, and marketing network. The second phase of TMC should involve the Ministries of Agriculture and Farmers Welfare, Science and Technology, Environment and Forests, and Textiles and Commerce with an active participation of concerned cotton growing states and other key stakeholders.

3. Higher research investment is critical to becoming a true global leader in cotton. For this, there is full justification to double the R&D allocation in cotton both by the Government and the private sector institutions. To ensure effective private sector investment and to scale new innovations, the government may consider withdrawing price control on cotton seeds and to provide IP protection for new technology events in cotton varieties/ hybrids. Also, the agreed license fees between parties for trait development, seed production and distribution be respected in the larger public interest.

4. To encourage investment in the development of high-ginning outturn/HDPS-suited varieties/ hybrids and their adoption, there is an urgent need to: i) incentivise seed companies to invest in cotton research for developing varieties/hybrids with higher-

ginning outturn and suited for HDPS, ii) incentivise farmers to grow cotton varieties/hybrids with higher ginning outturn, and iii) offer differentiated minimum support price (MSP) for cotton with higher ginning outturn. Also, there is a need to urgently review the existing process of registration of varieties/hybrids, requiring deposition of parental seeds and their field testing by the PPV&FRA.

5. Appropriate incentives need to be provided to farmers, custom hiring centres, FPOs, entrepreneurs and service providers to improve cotton production efficiency and to increase the income of cotton farmers.

6. Crop protection industry needs to ensure the required supply of plant growth regulators and defoliants to enable HDPS and mechanical harvesting to become a reality for large scale adoption.

7. The biotechnology regulatory system (RCGM and GEAC) should ensure quick decision-making process that is transparent and time-bound. Also, the present requirement of state NOCs for the field testing of GEAC-approved products for environmental release is rather unnecessary and be dropped in the national interest.

Development

8. Urgent attention is needed on approval and availability of defoliants, custom hiring of cotton pickers, modernising ginneries to handle machine-picked cotton by designing and installing additional line of pre-cleaners to remove trash, incentivise additional cost in the processing of machine-picked cotton, spinning and textile industry to facilitate the development of the cotton value chain, and developing infrastructure for labelling, traceability, etc. to meet the international standards of cotton quality and trade practices.

9. The Ministry of Environment, Forests and Climate Change (MoEF&CC) is urged to announce the long pending decisions on the next-generation cotton insect and weed management GM events. In this regard, immediate adoption of HtBt cotton is required to overcome the current losses by the farmers. Towards this, a round table dialogue be organised at the earliest jointly by the Heads of ICAR and DBT, involving senior officials/scientists of concerned Ministries and the representatives of the private sector to decide future Road map.

10. Concerted efforts are needed to strengthen science-based public awareness by both central and state governments on the usefulness and safety of new events of new breeding technology (NBT) innovations, like HtBt cotton, that are likely to help cotton farmers and other stakeholders save costs and protect the environment.

11. To realize full economic potential of cotton plant, the value of cotton seed as a source of oil, animal feed and bioenergy be also given focused attention.

12. There is an urgent need to encourage, incentivise and promote the adoption of Good Agricultural Practices (GAPs) for cotton cultivation. Region-specific best package of practices for HDPS and mechanised cotton farming needs to be developed and promoted.

Research

13. There is an urgent need to intensify efforts on acquisition, characterisation and evaluation of wild and cultivated germplasm from abroad possessing fibre quality and biotic and abiotic stress tolerance traits.

14. Breeding efforts also need to be accelerated for improved lint yield and quality, higher ginning outturn, resistance to current and emerging pests and diseases, and tolerance to abiotic stresses (drought, high temperature, water logging and salinity).

15. Concerted efforts are needed towards the introduction of new and desirable traits in cotton through new breeding technologies (NBTs), including GM, genome editing and haplotype breeding.

16. To remain global leader, in addition to the use of current HtBt hybrids, there is an urgent need to harness the potential of new RRF and BG3 innovations.

17. Much needed thrust should be given for the development of plant types suitable for high-density planting systems (HDPS), use of defoliants to reduce trash content and adoption of mechanical harvesting.

18. To save on cost of seed, we also need to accelerate the development of public sector cotton varieties rather than hybrids and for higher income have coloured and specialty cotton varieties bred and promoted.

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