



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

The Changing Face of Indian Biotechnology and a Focus on Bio-agriculture Segment

Rakesh Singh Chauhan*, Prof. (Dr.) A. R. Singh

Department Of Botany, S.G.S. Govt. P.G. College (A. P. S. University, Rewa), Sidhi 486661 (M.P.)

Manuscript Info

Manuscript History:

Received: 14 April 2015
Final Accepted: 22 May 2015
Published Online: June 2015

Key words:

Biotechnology, Transgenic,
Insecticide, Stress resistance.

*Corresponding Author

Rakesh Singh Chauhan

Copy Right, IJAR, 2015.. All rights reserved

Abstract

Biotechnology is being regarded as new biological science. It has been specially fruitful in the area of medicine but looking at increasing demand of food, it will also be useful in agriculture sector. From 1986 to as of now there has been considerable change in Indian biotech sector. Current review focuses specially on bioagri segment and challenges ahead in Indian biotech sector and govt. of India initiatives.

Introduction

India's biotechnology sector is now poised at a defining movement. On the one hand it must find affordable solutions to pressing national needs in agriculture, health, and energy, but on the other, it must stay competitive in international markets. The Indian govt. established an independent Department of biotechnology (DBT) within ministry of science and technology in 1986, much before biotechnology become a buzz word^{2,6}. Government funding increased by 16 times from 8th to 11th five year plane. While DBT has been the major mover in terms of policy and fiscal support, DST, CSIR, ICMR, ICAR also contributed significantly. This resulted in strengthening education and research in biological science and sustaining 15-20 R & D institutions^{1,6}.

Abbreviations

GMOs: Genetically modified organisms; r & d: Research and development; DST: Department of science and technology; CSIR: Council of scientific and industrial research; ICMR: Indian Council of medical research; ICAR: Indian Council of agriculture research; SMEs: Small micro enterprises.

The Review

The Indian Biotech Industry

While there was no direct govt. funding of R&D in industry in this period, indirect incentives were extended in terms of relaxed price control for drugs subsidies on capital limits, and tax holiday for R&D spending. The past five years have witnessed a spectacular growth rate of more than 30% for India biotech sector. The sector crossed the 2.5 billion dollar mark during 2007-08. Bio-pharma (67%), bio-services (15%), agri-biotech (12%), bioindustrial-4%, bioinformatics-2% have shares in it^{1,7}.

The Bioagri Segment

It faces the challenge of producing more farm commodities for our growing population from diminishing per capita arable land and water resources. Bt cotton, approved in march 2002 is the first and until now the only biotech crop in India that has been released for commercial cultivation. Most of area under transgenic cotton feature Bt genes sourced from Monsanto, but bred into local hybrids. From some 50000 ha in 2002, the acreage reached 7.6 million ha in 2008¹. The 1st indigenous Bt cotton variety *Bikaneri Narma* has been developed by central institute of cotton

research and university of agricultural science, Dharwad. Parallel with the introduction of Bt cotton, which protects it from bollworms, cotton yield increased from 308 kg/ha in 2001-02 to 560 kg/ha in 2007-08. It has generated impressive economic gains for Indian farmers, halved insecticide requirements and enabled India to emerge as a net exporter of cotton from being a net importer. The private sector investment in agri-biotech is still low in India^{5,11}.

Research Emphasis In Bioagri Segment

National research emphasis has been on genomics of rice, wheat and tomato, and on tolerance to biotic-(disease and pests) and abiotic-(drought salinity) stress. A number of public funded r & d focuses on identification of quantitative trait loci and genes and their deployment into cultivars, Nutrition enhancement (beta carotene in rice and mustard and protein quality in potato and improvement of shelf life in potato through *ama 1* gene^{1,6}.

Challenges Ahead

In its march towards discovery and innovation India recognizes several hurdles that need to be overcome in terms of quality human resource, lack of skills, fragile public private partnership, risk averse industry and a regulatory system that has been considerably improved but can still be perked up. Indian biotech sector faces challenge to r & d; creation of investment capital; technology transfer; absorption and diffusion; management of intellectual property; regulatory issues; building public confidence; and human capital for all these^{3,4,10}.

Govt. Of India Initiatives

National biotech development strategy approved in September 2007 seeks to build coherence and connectivity between disciplines⁹. Beside it, a decision to dedicate 30% of DBT budget to PPP research, small business innovation research initiative for helping SMEs, better governmental coordination through a high powered inter ministerial committee, building world class human capital (e.g., through reentry fellowship such as DBT- Welcome Trust PD fellowship and Ramalingaswami fellowship to foreign Indian scholars, establishing cluster of institution, DST inspire fellowship etc. are other initiative in this regard.), a new national biotech regulatory authority as a single window system for biosafety evaluation etc^{1,2,8}.

Conclusion

Though govt. has already put in place improved guidelines for bio-similar, strengthened its ethics committee, streamlined registration and ramped up the monitoring system but a vision and tenacity of scientific leadership, fulfilling future food demands by building public confidence (about GMOs) is still a great challenge in this regard. The enactment of right govt. policies, adequate funding, a transparent regulatory setup are still the need of the hour to enhance this sector, and to match with the other parts of world.

Acknowledgement

We are thankful to Dr. A. P. Singh, deptt. of Botany, Govt Science College Rewa, for his valuable inputs in preparing this paper. We are also thankful to other departmental staff for their coordination.

References

1. Natesh, S. and Bhan, M.K. (April, 2009). Indian biotechnology, The changing face. Biotech News, volume 4, No. 2: 3-7.
2. Padmanabhan G. (2009). Biotechnology in India, Then and Now. Biotech News, volume 4, No. 2: 10-13.
3. Rath Satyajit, Purkayastha Prabir (April 2010). Genetically Modified Crops, Public Perceptions. Biotech News, volume 5, No. 2: 100-103.
4. Shantharam Shanthu. (April 2010). Regulating GM Crops, Global Best Practices. Biotech News, volume 5, No. 2: 84-87.
5. Anand Kumar P. (December 2010). Bt Brinjal. A pioneering Push. Biotech News, volume 4, No. 6: 108-111.
6. Natesh S. (February 2011). 25 Years of DBT, Looking Back on Early Years. Biotech News, volume 6, No. 1: 14-17.
7. Chaudhary Bhagirath and Gau Kadambini (April, 2009). Agri-biotech in India, a new surge. Biotech news, volume 4: 30-33.
8. Jain Amit Kumar and Suhane Amit. (2013). Biotechnology: A way to Control Environmental Pollution by Alternative Lubricants. Research in Biotechnology, 4(3): 38-42.
9. Siddiq E.A. (April 2010). Development of GM crops, Need for a clear cut policy. Biotech News, volume 5, No. 2: 112-115.
10. Dunfield K E, and J J Germida, 2004, Impact of GM crops on soil and plant mediated microbial communities. *J Environ. Qual.*, 33:806-815.
11. Snow, A A, (2002), Transgenic crops- Why gene flow matters. Nature Biotechnology, 20:542