

Maize research in India - historical prospective and future challenges

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ABSTRACT

All India Coordinated Maize Improvement Project (AICMIP) was established in 1957, and with the inception of AICMIP, maize improvement in India has gone through many phases. The initial emphasis was on development of double crosses followed by a shift from the double crosses to open pollinated varieties in 1967. Thereafter, the shift from composites to three-way crosses and from three-way crosses to double-crosses and then combinations of composites, three-way and double crosses was continued till 1996. During that period >50 composites and around 15 double, top and three-way crosses were released. In 1996, the first single cross hybrid 'Paras' was released, but due to some limitations in hybrid seed production it did not get the acceptance. Even after 1996 the emphasis on composites was continued but at the same time the several single cross hybrids were also released. The improvement gained through double, double top, three-way crosses and composite varieties were not significant as compared to present day single cross hybrids. With the cultivation of less productive OPVs and multi parent crosses, area, production and productivity remained stagnant during 1967-1987 in this country. However, the strategy to switch over to single cross hybrids in 2006-07 has paid rich dividends. There has been tremendous increase in acreage, production and productivity in recent years. Single cross hybrids being most productive have shown better adaptability to new set of cropping systems and management practices. This has resulted in sudden increase in the constant annual growth rate (CAGR) of maize production (12.89%) during 2007-2011; this is mainly because of the significant increase in the maize CAGR of productivity. In spite of increased production and productivity of maize in recent years there is continued increase in maize demand both normal maize and specialty corn from poultry and food processing industries respectively. To cope up with these challenges there is need to supply sufficient quantity of quality hybrid seed and application of novel tools and techniques to further enhance the maize productivity.

Key words: Composite, Double cross hybrid, Inbred, Single cross hybrid, Specialty corn

Maize (*Zea mays* L.) is an important cereal food crop of the world with highest production and productivity as compared to rice and wheat. It is the most versatile crop which is being grown in more than 166 countries across the globe including tropical, sub tropical and temperate regions from sea level to 3000 m amsl. Maize is the third most important cereal after rice and wheat for human food by contributing almost 9 % to India's food basket and 5 % to World's dietary energy supply. Its production has increased more than 12 times from a mere 1.73 million tons 1950-51 to 21.73 million tons in 2010-11 (ASG, 2011) and presently it occupies 8.55 million hectare area with the mean yield of 2.54 tons/hectare (Fig.1). This achievement is remarkable despite ~75% maize area is under rainfed and low input condition, which often faces vagaries of monsoon.

In India, it is being estimated that maize demand will continue to increase in view of increasing demand in poultry and livestock sectors in the country and growing non-

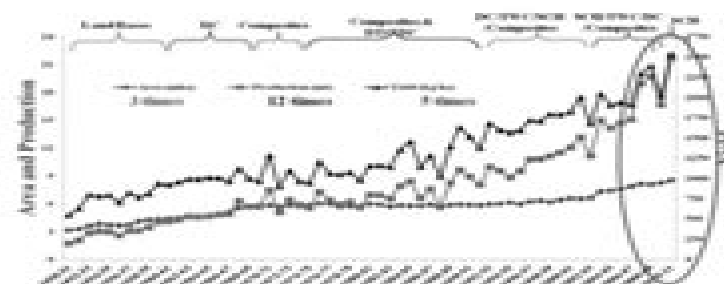


Fig. 1. Breeding strategies vis-a-vis productivity in maize

vegetarian population and changing food habits. To meet the growing demand, enhancement of maize yield in coming years across all the growing locations in India is the big challenge in the era of climate change. Meeting such challenge will only be possible through science based technological interventions like single cross hybrid technology and application of novel molecular tools and techniques in maize improvement.

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Trajectory of 75 years of Indian Agriculture after Independence P. K. Ghosh, Anup Das, Raka Saxena, Kaushik Banerjee, Gouranga Kar, D. Vijay, 2023-08-28 This edited book focus on highlighting the evolution of Indian agriculture over the past 75 years of independence covering every sector viz crop science horticulture management of biotic abiotic stress post harvest quality management livestock fisheries mechanization marketing and human resource development The book has 30 chapters from most experienced researchers and academicians who are actively engaged in research work on the subject area of the book The book is in line with the strategy for new India 75 brought out by NITI Ayog It highlights India s success stories in innovation technology enterprise and efficient management together to achieve overall growth while making available food required nutrition and others ecological services It also asses the India s preparedness in terms of commitment toward sustainable development goal SDG The book is a relevant reading material for both students and researchers and policy makers

Transforming Agriculture in South Asia Ashok K. Mishra, Anjani Kumar, Pramod K. Joshi, 2020-12-30 Debates about public expenditure in the agricultural sector have reopened in many developing and emerging economies because of high budget deficits and changes in public opinion As a result agricultural policy in many of these countries is beginning to take a more market oriented approach to agrarian problems most notably through the introduction of contract farming This book explores the policy issues around contract farming and its transformative potential and addresses the lack of empirical research on this topic by focusing on South Asia principally India Bangladesh and Nepal The book first addresses the effects of contract farming vertical coordination on productivity food security indicators yield consumption expenditures prices employment and input usage Then it draws lessons from the South Asian case studies on the impact of institutional changes like contract farming on income and food security of smallholder households The core of the book includes case study chapters on several commodities that are produced under contract farming including vegetables and fisheries in Bangladesh low value crops in Nepal and coffee in India Other chapters also explore contracts storage input usage and technical efficiency in these cases This book serves as an essential guide to academics researchers students legislative liaisons and think tank groups interested in agrarian issues agricultural economics and agricultural policy in emerging economies and particularly in South Asia

Harnessing Crop Biofortification for Sustainable Agriculture Siddharth Tiwari, Baljeet Singh, 2024-08-31 This edited volume provides insights into the current state of food and nutritional security highlights the significance of micronutrients for human health offers a historical perspective on biofortification and covers current strategies and challenges This book explores the role of multidisciplinary approaches to cope up with the challenges of major nutrient deficiency Hidden hunger aka micronutrient deficiencies a prevalent global issue refers to the chronic deficiency of essential micronutrients despite sufficient caloric intake With over 2 billion affected individuals particularly women and children in low income countries it impairs physical and cognitive

development increases disease susceptibility and diminishes productivity. Despite economic progress, undernourishment remains prevalent in the developing countries including India. Among all nutrients, the deficiencies of iron, zinc, iodine, and vitamin A are highly prevalent. Crop biofortification seems a sustainable solution to reduce the global burden of hidden hunger. Previous reports examined the genetic diversity related to micronutrients in germplasm of staple crops and their wild relatives. A number of biofortified crops have been developed by utilizing genetic diversity and biotechnological approaches. This book explores crop specific biofortification initiatives and diverse approaches encompassing both traditional and genomics driven enhancements. It also enlightens the efficacy of biofortification, bioavailability, and future thrust. This book serves as a valuable resource for researchers, academics, extension workers, policymakers, students, and all those involved in agriculture, nutrition, and health. It focuses on promoting diets that are rich in nutrition, benefiting everyone along the value chain.

Contract farming, productivity and fertilizer usage: Empirical evidence from specialty crop production

Mishra, Ashok K., Kumar, Anjani, Joshi, Pramod Kumar, D'Souza, Alwin, Tripathi, Gaurav, 2018-11-14. This study investigates the impact of contract farming (CF) in baby corn production on yield, irrigation costs, fertilizer costs, and usage of chemical fertilizer. We find that adoption of CF by baby corn smallholders, after controlling for characteristics of both control and treatment groups, leads to higher yields and lower spending on fertilizers and irrigation. Additionally, CF in baby corn farming leads to a reduction in the use of chemical fertilizers (Urea and DAP). Thus, CF intervention benefits the livelihood of smallholders, reduces environmental degradation, and reduces stress on groundwater without compromising yield.

Flavors for Nutraceutical and Functional Foods M. Selvamuthukumar, Yashwant Pathak, 2018-08-06. Flavors are an integral part of nutraceutical formulations. Flavors offer significant advantage to Nutraceuticals when it comes to palatability and get an edge over other products in an extremely competitive nutraceutical market. Flavors for Nutraceuticals and Functional Foods addresses different natural ingredients/botanicals used in various functional foods and nutraceutical products. The techniques of incorporating flavors in Nutraceutical products can be classified as conventional and using recently developed modern techniques such as nanotechnology, which are also covered in different chapters. These techniques are mainly used for masking the taste of nutraceutical and functional food products. The book discusses the basics of flavors and the significance of the flavor industry in relation to Nutraceuticals. This book covers various processes involved in incorporating flavor and improving product acceptability. It provides an overview on the potential applications of the main terpene based flavors as part of nutraceutical formulations. This book will serve as a reference to academicians and industry people who are involved in Nutraceutical formulations and marketing.

Current Literature on Science of Science, 2001

Maize Research In India

S.L. Jat, 2021-06-22. This book, *Maize Research in India: Retrospect, Prospect*, focuses on 60 years of maize research in India through the first All India Coordinated Research Project (AICRP) of the country. The book chapters, compiled from different parts of the country, having contemporary and historical importance of maize research for development in the country. These state

wise chapters offering a comprehensive overview and provides a detailed information about trend of the major growing areas maize based industries cropping systems agricultural practices AICRP achievements constraints in maize production package of practices yield gaps climatic patterns and key R4D challenges and their probable solutions Overall it demonstrates the options for future progress and thrust of maize with special reference to nutritional and industrial quality improvement hybrid seed production cultivation of specialty corn value addition biotic and abiotic stress management etc The book also has a chapter on the recent worldwide R4D in maize molecular breeding and frontier technologies in maize improvement like genomic selection transgenic phonemics doubled haploid DH technology etc for making plausible future strategy of maize R4D

India's Food Resources & Population P. C. Bansil,1958 **Encyclopedia of Grain Science** Colin W. Wrigley,Harold Corke,Charles Walker,2004 *Food Research Institute Studies in Agricultural Economics, Trade and Development* ,1972 **Bibliography of the History of Medicine** , **Food Research Institute Studies in Agricultural Economics, Trade and Development** Stanford University. Food Research Institute,1972 **Industrial & Mining Standard** ,1926 *Bibliography of Agriculture* ,1998 George Broomhall's Corn Trade News ,1941 *Sorghum Bibliography, 1977-80* ,1984 **America, History and Life** ,1989 Article abstracts and citations of reviews and dissertations covering the United States and Canada **AARP, Art and Archaeology Research Papers** ,1972 **World Agricultural Economics and Rural Sociology Abstracts** ,1995 Rural Development Abstracts ,2012

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