Beneficial Aspect of Maize (*Zea Mays* L.) For The Health of Human

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***Abstract*—Maize (*Zea mays* L.) is a principal cereal crop in India, providing significant nutritional, medicinal, and economic benefits. It has been widely studied for its role in food and nutritional security, livestock feed, industrial uses, and health-promoting bioactive components. Indian research has especially focused on nutrient quality improvement including biofortified maize varieties (e.g., provitamin-A maize and Quality Protein Maize), organic production systems, and nutrient management strategies to enhance productivity and nutritional value. Several studies by ICAR and allied institutions have evaluated maize cultivars for yield, nutrient content, and biofortification potential, highlighting its multifunctional value. This review synthesizes findings from Indian and international literature on maize's nutritional composition, medicinal properties, and economic significance, emphasizing implications for sustainable agriculture, health, and rural livelihoods in the Indian context.**

***Index Terms*—Maize, *Zea mays*, nutritional quality, medicinal benefits, biofortification, Indian research**

I. INTRODUCTION

Maize (*Zea mays* L.), commonly known in India as *Makka* or *Barajovar*, is a versatile cereal crop of the Poaceae family. It plays a central role after rice and wheat in Indian agriculture, serving as a major source of carbohydrates, proteins, and essential micronutrients. Its adaptability to diverse agro-ecological zones and short crop cycle have facilitated its extensive cultivation across the country. Indian research institutions such as the Indian Council of Agricultural Research (ICAR), Indian Institute of Maize Research (IIMR), Indian Agricultural Research Institute (IARI), and others have made significant contributions toward improving maize productivity and quality through breeding, biofortification, and integrated crop management strategies.

II. ORIGIN, DISTRIBUTION AND CULTIVATION IN INDIA

Although maize originated in the Americas, it is now cultivated globally. In India, the crop is widely grown in states including Karnataka, Andhra Pradesh, Telangana, Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh, and Maharashtra. Its versatility allows it to be produced under both rainfed and irrigated systems. Maize endosperm types such as flint, dent, sweet, waxy, and QPM have been developed to address both agricultural and nutritional needs.

III. NUTRITIONAL COMPOSITION OF MAIZE

Maize is a valuable energy source due to its high carbohydrate content. It also contains significant amounts of proteins, dietary fiber, and fats. Research at ICAR has led to the development of hybrid maize with enhanced nutritional traits, including provitamin-A biofortified lines and quality protein maize rich in lysine and tryptophan, which are essential for human health. Indian Council of Agricultural Research+1

3.1. VITAMINS AND MICRONUTRIENTS

Biofortification efforts in maize have focused on increasing provitamin-A, iron, zinc, and essential amino acids to combat micronutrient deficiencies. Indian breeding programs coordinated by ICAR-IIMR and ICAR-IARI aim to develop nutrient-dense cultivars suitable for human consumption. ICAR-IIrr

IV. MEDICINAL PROPERTIES AND THERAPEUTIC USES

Maize and maize by-products have been used in traditional systems of medicine. Corn silk, especially, contains bioactive compounds such as flavonoids, phenols, and saponins, which have diuretic, antioxidant, and anti-inflammatory properties. While much of the pharmacological evidence comes from global studies, Indian investigations have also begun to explore the potential of maize constituents for health benefits and disease mitigation. Pharmaceutical Research Journal

V. ECONOMIC IMPORTANCE OF MAIZE

Maize supports multiple industrial sectors in India. Maize oil is widely used in cooking and soap manufacturing. Corn starch has applications in food processing, pharmaceuticals, textiles, and paper industries. Corn syrup and fermented products contribute to value-added food industries, while maize residues serve as livestock feed. Maize also supports ethanol production as part of India's renewable energy initiatives, with ICAR-led projects developing appropriate technologies for value addition. India Science and Technology

VI. INDIAN RESEARCH ON MAIZE: PRODUCTIVITY AND QUALITY

6.1. INTEGRATED NUTRIENT MANAGEMENT AND YIELD QUALITY

Studies on nutrient management under conservation agriculture systems and integrated nutrient formulations have demonstrated improvements in maize yield, nutrient uptake, and economic efficiency. Indian Agricultural Research Journals+1

6.2. ORGANIC PRODUCTION AND CULTIVAR EVALUATION

Indian research evaluating maize under organic systems has identified suitable cultivars with higher protein content and yield, providing insights into sustainable maize production strategies. Indian Agricultural Research Journals

6.3. BREEDING FOR QUALITY PROTEIN MAIZE

Research on breeding quality protein maize (QPM) has been a major focus, addressing essential amino acid deficiencies and improving nutritional quality for human and animal diets. Indian Agricultural Research Journals

VII. CONCLUSION AND FUTURE PROSPECTS

Maize (*Zea mays* L.) remains a crop of immense nutritional, medicinal, and economic importance in India. Indian research has contributed significantly to biofortification, integrated crop management, and cultivar evaluation to enhance its value. Continued research efforts are needed to explore its phytochemical properties, nutraceutical applications, and value-added product development to maximize maize's potential for health and socioeconomic benefits.

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TABLE 1. NUTRITIONAL TRAITS OF MAIZE (*ZEA MAYS* L.) EMPHASIZED IN ICAR RESEARCH PROGRAMMES

Trait / Component	Approximate Range / Improvement	ICAR Research Focus / Remarks
Carbohydrates (%)	70–75	Primary energy source; major component of maize grain
Protein (%)	8–11 (Normal maize)	Baseline protein content in conventional hybrids
Protein (%) – QPM	9–12 (with improved quality)	ICAR-IIMR developed Quality Protein Maize (QPM) with enhanced protein quality
Lysine (%)	0.20–0.25 (Normal maize)	Limiting amino acid in conventional maize
Lysine (%) – QPM	0.35–0.45	Improved through *opaque-2*–based breeding
Tryptophan (%)	0.04–0.06 (Normal maize)	Another limiting essential amino acid
Tryptophan (%) – QPM	0.08–0.10	Enhanced in QPM hybrids released by ICAR
Fat / Oil (%)	3–5	Higher than rice and wheat; important for energy
Dietary fibre (%)	2–4	Increased emphasis in specialty and waxy maize
Starch (%)	60–65	Focus on industrial and food processing uses
Provitamin-A (μg g^{-1})	2–5 (Normal maize)	Low in conventional varieties
Provitamin-A maize	8–15	Biofortified maize developed under ICAR programmes
Iron (mg kg^{-1})	20–35	Targeted for nutritional security
Zinc (mg kg^{-1})	15–30	Improved through biofortification breeding
Vitamin B-complex	Moderate	Important for metabolism and nervous system
Corn silk potassium (%)	High	Studied for medicinal and diuretic properties
Antioxidants (phenolics, flavonoids)	Present	Focus of nutraceutical and medicinal studies