

Maize Hybrids



भा.कृ.अनु.प.-भारतीय मक्का अनुसंधान संस्थान

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Maize Hybrids

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PREFACE

Globally maize is an important cereal crop for food, feed, fodder, and also an important raw material for the starch and ethanol industry. The area, production, and productivity of maize are increasing continuously in India and the World. However, the productivity level across different states in the country varies. The major reason for the variation in maize productivity across India is the varying degree of adoption of improved technologies particularly high-yielding maize hybrids. To meet the growing demand for maize in India, the production and productivity of maize seed is to be enhanced which can be achieved by increasing area under high-yielding maize hybrids. In order to increase the area under maize, the country needs high-yielding single cross maize hybrids. Hybrid technology is one such technology that has impacted significantly on the increase of maize productivity across the globe. In India, the area covered under hybrid technology is around 70% of the total maize area of the country. There is tremendous scope to bring more and more areas of maize under single cross maize hybrids. In this context, the Manual of IIMR Maize Hybrids published by the ICAR-Indian Institute of Maize Research is a significant contribution to accelerating maize production across India. The ICAR-IIMR Maize Hybrids manual covers all the institute-developed maize hybrids including field corn, Quality Protein Maize, baby corn, popcorn and sweet corn. The manual briefly introduces various features of the maize hybrids including its growing season, recommended agroecology, yield potential, and resistance/susceptibility levels to various diseases and insect pests. The live pictures of the hybrids is depicted nicely in the manual.

The support and encouragement from Secretary DARE and DG ICAR, DDG CS and inputs of AICRP partners and most importantly the financial help received from SCSP fund for bringing out this publication is duly acknowledged. The authors expect this manual to be a ready reckoner for various stakeholders including farmers, seed agencies, extension workers, scientists and industrialists.

Authors

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Introduction

Maize (*Zea mays L.*) is one of the most versatile crops with its highest genetic yield potential among the cereals. It has diverse uses and can be grown with elevations ranging from sea level to up to 3000 m above mean sea level under tropical, sub-tropical and temperate conditions. Worldwide maize is cultivated across 169 countries under 194 mha with 1161 mt production of grains (Anonymous, 2023). Besides, it is also cultivated for baby corn, sweet corn, popcorn and for making silage, a nutritionally rich animal feed. In India maize is cultivated in around 10 mha with an annual production of 34 mt. The compound annual growth rates of production and productivity for the last five years are the highest for maize among cereals in India. Maize is primarily being utilized for the synthesis of poultry and animal feed in the country. However, the recent permission issued by Government of India for the use of maize for ethanol production opened up new vistas in maize development. Maize is a rich source of starch and can efficiently be converted to bioethanol to meet the 20% blending target (E20) of petrol as set by the GOI. Owing to the burgeoning growth rate of various maize-consuming sectors, the demand for maize is expected to increase from the current level to up to 50 mt in the next five years. The stupendous growth rate in maize production and productivity depends on high-yielding maize hybrids, more particularly, single cross hybrids both in India and worldwide.

In order to meet the growing demand for maize in the country, production and productivity of maize are to be increased across India. This can only be achieved by the increasing area under single-cross maize hybrids in the maize growing areas. The increasing area under the single cross hybrids will create a high demand for hybrid seeds in the near future. At present, the hybrid seed production of maize is over-dominated by the private sector, more specifically in the assured ecosystems. Due to the monopoly of the private sector, the seed costs are often very high, thus contributing towards the production cost of the crop. The hybrid seeds account for around one-fourth of the total cost of cultivation of maize. By reducing the cost of hybrid seed, the cost of cultivation of maize can be reduced significantly which will help enhance the farmers' income. Often, timely availability of seeds also becomes an issue, more particularly in tribal and remote areas.

The systematic maize research since the beginning of this millennium on single cross maize hybrids in India has resulted in the development of many good hybrids both from public and private sectors. However, the area under maize is predominantly occupied by the private sector. In order to supply good quality seed at a low cost, the need of the hour is to identify new sites for hybrid maize seed production.

Bihar, West Bengal, part of Odisha, Rajasthan, Madhya Pradesh, Jharkhand and Gujarat during Rabi and Punjab, Haryana and western Uttar Pradesh during the spring and kharif are coming up for maize cultivation. Hence, the development of high-yielding maize hybrids of field corn, popcorn, sweet corn and quality protein maize by ICAR-IIMR is going to play an important role.

ICAR-Indian Institute of Maize Research

The ICAR- Indian Institute of Maize Research (ICAR-IIMR) is a premier national institute under the aegis of the Crop Science Division of the Indian Council of Agricultural Research, New Delhi. IIMR is mandated to plan, coordinate and execute the research programmes to augment the production and productivity of maize including fodder and speciality corn in India. It is an ISO 9001:2015 compliant institute.

Brief History

Indian Council of Agricultural Research (ICAR) established the first Coordinated Crop Improvement Project on maize (CCIPM) in 1957. Before the inception of the coordinated programme, state economic botanists used to undertake maize research in India as part of their crop improvement activity. Dr. E.W. Sprague, a decorated maize scientist from the Rockefeller Foundation (RF), was the first coordinator of the first-of-its-kind centralised crop improvement programme in India. Dr. N.L. Dhawan, a distinguished plant breeder from ICAR superseded Dr. Sprague. The CCIPM was further strengthened in 1963 through PL 480 funds by appointing new research staff and it was renamed as All Indian Coordinated Maize Improvement Project (AICMIP). It was further upgraded to the Directorate of Maize Research (DMR) in January 1994. On 9th February 2015 DMR was upgraded to ICAR-Indian Institute of Maize Research (ICAR-IIMR) to further consolidate the maize research programme in the country. The headquarters of ICAR-IIMR was shifted from New Delhi to Ludhiana in 2016. The off-season nursery, Winter Nursery Centre (WNC) was established at Amberpet, Hyderabad in 1962 to accelerate the maize improvement programme of north Indian maize research centres where winter temperature is not conducive for maize cultivation. Subsequently, the WNC was shifted to Rajendranagar, Hyderabad in 2008. Realizing the growing importance of winter (rabi) maize in eastern India and to cater the need of seed production a Regional Maize Research and Seed Production Centre (RMRSPC) was established at Kushmahaut, Begusarai, Bihar in 1997.

Location

The headquarter of ICAR-IIMR is located at the Ladhawal campus, Ludhiana. The Ladhawal campus has recently been established on a sprawling area of 185.6 hectares of land. The state-of-the-art new building has been built up on the campus. It is nearly 20 km away from Ludhiana Railway station at Firozpur-Jalandhar bypass known as Ladhawal bypass. The institute has two Regional Centres.

Organization

The organizational set up of the institute as headed by the Director, has two regional centres and one sub-scheme, AICRP on Maize. The institute is the nodal centre which supports its sub-scheme AICRP on Maize comprising of 32 centres in the form of supply of maize germplasm as well as by providing off-season nursery facility for maize improvement programmes. The institute has a total strength of 41 scientists. As of date, a total of 31 scientists are posted at ICAR headquarters and its regional stations.

The institute works under the crop science Division of the ICAR under the Department of Agricultural Research and Education (DARE), Ministry of Agriculture & Farmers Welfare, Govt. of India. The institute has a PME Cell for Prioritization, Monitoring and Evaluation of its projects. The PME Cell receives regular technical inputs from the PME Committee and Institute Research Council (IRC). The institute has an Institute Research Council (IRC) Committee whereby the progress of various in-house and externally funded projects is discussed regularly. New project proposals are discussed and approved in the IRC meetings. Besides, there is an ITMU Cell headed by the Director which deals with the IPR issues and technology identification. The Research Advisory Committee (RAC) yearly reviews and advises on the research activities of the institute. The Chairperson and Members of RAC are appointed by ICAR. The five-yearly review of the institute is conducted by a high-level committee, the Quinquennial Review Team (QRT), constituted by ICAR. Besides, it has an Institute Bio-safety Committee (IBSC), one of the members of the IBSC is a nominee from the Department of Biotechnology (DBT), Ministry of Science and Technology, Govt. of India. IBSC ensures the compliance of bio-safety measures in various research activities. The ARIS cell of the institute ensures the use of ICT in maize R&D along with the use of a Personnel Management System (PMS) and Financial Management System (FMS) developed by ICAR to bring efficiency to administration. The Institute Management Committee (IMC) advises on administrative and finance matters concerning the institute. The institute has a Hindi Cell to promote the use of Hindi in the day-to-day official communication.

Mission

Enhancing the productivity, profitability and competitiveness of maize and maize-based farming systems with economic and environmental sustainability.

Vision

Rapid growth in the food, feed and industrial application of maize and maize-based products, for generation of wealth and employment in farming and industrial sectors, and for all those who are directly or indirectly associated with maize cultivation and utilization.

Mandate

- Basic and strategic research aimed at enhancement of productivity and production of maize, including specialty corn.
- Coordination of multi-disciplinary and multi-location research to identify appropriate technologies for varied agro-climatic conditions.
- Dissemination of improved technologies, capacity building and developing linkages.
- Coordination of the All India Coordinated Research Project (AICRP) on Maize and to carry out extension and outreach programmes.

Objectives

- To carry out basic, strategic and applied research aimed at the enhancement of production and productivity of maize in the country.
- To conduct and coordinate multidisciplinary and multi-location research to identify appropriate technologies for varied agro-climatic conditions in different parts of India.
- Germplasm collection, evaluation, maintenance and enhancement.
- To develop speciality corn cultivars such as quality protein maize, baby corn, sweet corn, bio-fuel etc. towards its diversified uses.
- To conduct training, frontline demonstrations and on-farm research to maximize and accelerate the adoption of research findings and innovative technologies.
- To serve as a core centre for the supply of maize research material and information.

- To develop linkages with the national, international and private sectors for the collaborative research program.
- To provide consultancy services and undertake contractual research.
- Postharvest studies for value addition, quality control and storage.
- To evaluate technologies and transfer them as per the IP policies of ICAR

Facilities

The institute has well-established laboratories of Biochemistry, Biotechnology, Entomology, Plant Pathology and Agronomy. The laboratories are equipped with state-of-the-art modern instruments viz., Ultra Performance Liquid Chromatography, Automatic Protein Analyzer, Automatic Fat Extraction System, Vacuum Concentrator-cum-lyophilizer, Protein Purification System, Gel Documentation System, Plant Growth Chambers, Thermal Cyclers, Atomic Absorption Spectrometer etc. The institute caters to the needs of various AICRP centres and other stake holders for research purposes.

Regional Maize Research and Seed Production Centre (RMR&SPC)

The Regional Maize Research and Seed Production Centre, Kushmahaut, Begusarai was established on 4th May 1997. It is situated 16 km North of District Head Quarter at the village Kushmahaut. It is approximately 9 km from Lakho village on National Highway-31. The centre is well connected with road & rail. The nearest major railway station is Begusarai (BGS) followed by Barauni (BJU). Patna is the nearest Air Port which is around 150km away. The centre has a total 97.3 acre of land including 83 acres under research and seed production. The centre also has good infrastructure facilities like a spacious office campus with labs, tube wells for irrigation, residential quarters for technical and supporting staff at the farm, three tractors, necessary machinery and equipment, implement sheds and green parks. The climatic conditions at the centre are medium winter, hot and humid summer and normal rainy season which provides a suitable environment for maize cultivation in all three seasons.

A guest house, farmers hostel and residential complex for scientific and technical staff of Regional Maize Research and Seed Production Centre was established on 30th December 2004 on a 3-acre land at Vishnupur in Begusarai City. This campus has 16 residential quarters, green parks, small playground secured with boundary wall.

Winter Nursery Centre (WNC), Hyderabad

Winter Nursery Centre of ICAR-IIMR is presently located at Agricultural Research Institute Campus, Prof. Jayashankar Telangana State Agricultural University, Hyderabad. It was established at Amberpet, Hyderabad in 1962 to cater for the need of north Indian AICRP centres to grow their off-season material. Subsequently, the centre was shifted to the present location of the ARI campus of PJTSAU in 2008 to strengthen the breeding programme of the Institute. The nearest railway station is Nampally which is 15.1 km and 21.6 km from Secunderabad. Rajiv Gandhi International Airport is just 18-22 km from WNC.

Significant Achievements

During the last 10 years, the institute has released a total of 23 hybrids including 10 of field corn, 5 biofortified, 4 popcorn, 4 baby corn and 1 sweet corn. The field corn hybrids are high-yielding and released for commercial cultivation across different agroecologies across India. These hybrids out-yielded the best hybrids including the hybrids developed by leading private organizations in the All India Coordinated (AICRP) trials. The Biofortified Hybrids include Quality Protein Maize (QPM) and Low Phytate hybrids. The QPM hybrids are developed to meet the requirement of essential amino acids viz. as lysine and tryptophan which are deficient in normal maize. The QPM hybrids possess double the quantities of these essential amino acids and meet the requirements of the Food and Agricultural Organization of the United Nations. The low phytate hybrid was developed to enhance the absorption of minerals in maize-consuming subjects. Maize is consumed in various ways as sweet maize, popcorn and baby corn. Baby corn is a young unfertilized cob of maize preferably harvested within 1-3 days of silk emergence. It can be eaten raw and can be consumed in a number of ways as vegetable, salad, pakora, pickles, kheer etc. Popcorn is a special type of corn whose kernels expand and puff up when heated. A popcorn kernel's strong hull contains the seed's hard, starchy shell endosperm with 14–20% moisture, which turns to steam as the kernel is heated. Pressure from the steam continues to build until the hull ruptures, allowing the kernel to expand. Popcorn is becoming a major delicacy of Indian households and has a strong commercial value. Sweet corn is another type of maize grown for human consumption. It has a high sugar content in the milking stage. Sweet corn is the result of a naturally occurring recessive mutation in the genes which control the conversion of sugar to starch inside the endosperm of the corn kernel. Sweet corn is picked when the kernel is still immature, (milking stage) and prepared and eaten raw. Sweet corn must be eaten fresh, canned, or frozen, before the kernels become tough and starchy.

Field Corn Hybrids

IMH 225

Parents: IML 23 (MIL 2-164-1) × HKI 1128

Year of identification: 2023

VIC identification: VIC meeting proceeding at S. No. 4 held in 66th AMW at Pantnagar on Dt: 14/04/2023

Season: Rabi & Spring

Maturity: Medium (Rabi 145-155 days), (Spring 115-125 days)

Yield: 10.25 t/ha

Recommended for cultivation in : Punjab, Haryana, Plains of Uttarakhand, Western Uttar Pradesh and Delhi NCR under irrigated conditions.

Special features: Long cylindrical ears with semi-dent yellow kernels, moderately resistant to Stem borer (*Chilo partellus*), Pink stem borer (*Sesamia inferens*) and Fall armyworm (*Spodoptera frugiperda*) insects. This hybrid also resistant to Maydis leaf blight, Fusarium stalk rot (FSR) and moderately resistant to Charcoal rot, Turcicum leaf blight, diseases. The hybrid has erect leaves that can be accommodated in high density plantation. High seed productivity of female parent. This hybrid is responsive to high inputs.



IMH 226



Parents: IML 17 (MIL 2-457-2) × HKI 1128

Year of identification: 2023

VIC identification: VIC meeting proceeding at S. No. 5 held in 66th AMW at Pantnagar on Dt: 14/04/2023

Season: Rabi & Spring

Maturity: Medium (Rabi 145-155 days), (Spring 115-125 days)

Yield: 9.89 t/ha

Recommended for cultivation in: Punjab, Haryana, Plains of Uttarakhand, Western Uttar Pradesh and Delhi NCR under irrigated conditions.

Special features: Long

cylindrical ears with semi-dent kernels, moderately resistant to Stem borer (*Chilo partellus*), Pink stem borer (*Sesamia inferens*) and Fall armyworm (*Spodoptera frugiperda*) insects. This hybrid also resistant to Fusarium stalk rot (FSR) and moderately resistant to Maydis leaf blight, Charcoal rot, Turcicum leaf blight, diseases. High seed productivity of female parent. This hybrid is responsive to high inputs.



IMH 227



Parents: IML 24 (MIL 2-1510) × BML 6

Year of identification: 2023

VIC identification: VIC meeting proceeding at S. No. 2 held in 66th AMW at Pantnagar on Dt: 14/04/2023

Season: Rabi

Maturity: Medium (142-145days)

Yield: 10.91
t/ha under
irrigated
conditions



Recommended for cultivation in: Eastern UP, Bihar, Jharkhand, Orissa and west Bengal.

Special features: Conico-cylindrical thick ears with semi-dent yellow kernels, moderately resistant to Fall armyworm (*Spodoptera frugiperda*) insects. This hybrid also moderately resistant to Maydis leaf blight, Charcoal rot and Turcicum leaf blight, diseases. High seed productivity of female parent. This hybrid is responsive to high nutrient inputs.

IMH 228



dent yellow kernels, moderately resistant to Fall armyworm (*Spodoptera frugiperda*) insects. This hybrid also moderately resistant to Maydis leaf blight, Charcoal rot and Turcicum leaf blight, diseases. This hybrid is highly responsive to high nutrient inputs.

Parents: IML 18 (MIL 2-883-1) × IML19 (MIL 2- 388-1)

Year of identification: 2023

VIC identification: VIC meeting proceeding at S. No. 2 held in 66th AMW at Pantnagar on Dt: 14/04/2023

Season: Rabi

Maturity: Medium (140-145days)

Yield: 10.57 t/ha under irrigated conditions

Recommended for cultivation in: Eastern Uttar Pradesh, Bihar, Jharkhand, Orissa and west Bengal.

Special features:

Long
Conico-
cylindrical
ears with



IMH 222

Parents: IML 14 × BML 7

Year of release: 2022

Gazette Notification: S.O. 4065 (E) S. No. 71

Season: Rabi & Spring

Maturity: Medium (Rabi 145-155 days) (Spring 115-125 days)

Yield: 10.19 t/ha

Recommended for cultivation in: Punjab, Haryana, Plains of Uttarakhand, Western Uttar Pradesh and Delhi NCR under irrigated conditions.

Special features: Long thick cylindrical ears, bold kernels, moderately resistant to Stem borer (*Chilo partellus*), Pink stem borer (*Sesamia inferens*) and Fall armyworm

(*Spodoptera frugiperda*) insects. This hybrid also resistant to Maydis leaf blight, Fusarium stalk rot (FSR) and moderately resistant to Charcoal rot, Turcicum leaf blight, diseases. High seed productivity of female parent. This hybrid is responsive to high inputs.



IMH 223



Parents: IML 15 × BML 7

Year of release: 2022

Gazette Notification: S.O. 4065 (E) S. No. 72

Season: Rabi & Spring

Maturity: Medium (Rabi 145-155 days) (Spring 115-125 days)

Yield: 10.48 t/ha

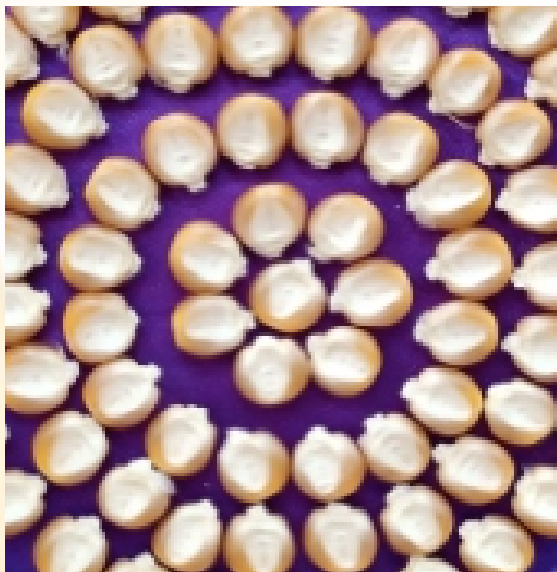
Recommended for cultivation in : Punjab, Haryana, Plains of Uttarakhand, Western Uttar Pradesh and Delhi NCR under irrigated conditions.

Special features: Long ears with flint kernels, moderately resistant to Stem borer (*C h i l o*

partellus), Pink stem borer (*Sesamia inferens*) and Fall armyworm (*Spodoptera frugiperda*) insects. This hybrid also resistant to Maydis leaf blight, Fusarium stalk rot (FSR) and moderately resistant to Charcoal rot, Turcicum leaf blight, diseases. The hybrid is comparatively tolerant to cold stress. This hybrid is responsive to high inputs.



IMH 224



Parents: IML 22 × IML 16

Year of release: 2022

Gazette Notification: S.O. 4065 (E) S. No. 73

Season: Kharif

Maturity: Medium (85-90 days)

Yield: 7.23 t/ha

Recommended for

cultivation in: Eastern Uttar Pradesh, Bihar, Jharkhand, Orissa and west Bengal

Special features:

Conico-cylindrical ears with semi-dent orange

kernels, moderately resistant to Stem borer (*Chilo partellus*), and Fall armyworm (*Spodoptera frugiperda*) insects. This hybrid also resistant to, Fusarium stalk rot (FSR) and moderately resistant to Charcoal rot, Maydis leaf blight, Turcicum leaf blight, diseases. The hybrid has stay green traits. This hybrid is responsive to high inputs.



IMH 221

Parents: IML 187 × BML 6

Year of release: 2022

Gazette Notification: S.O. 1056 (E) S. No. 69

Type of corn: Field

Season: Kharif

Yield: 7.5 t/ha



Maturity: Short duration

Recommended for cultivation in: Jammu & Kashmir

Special features: High yielding short duration field corn, having attractive grain colour, semi dent, and cylindrical cob. It has shown tolerance to Turcicum leaf blight, maydis leaf blight and common rust diseases of maize. IMH 221 has also performed well in AICRP rainfed trials. It has shown tolerance to Chilo partellus insect in the AICRP as well as station trials of maize. This hybrid found responsive to nutrients application.



DMRH 1305



Parents: V373 × HKI1105

Year of release: 2018

Gazette Notification: S.O. 6318(E) Dated 26.12.2018

Season: Kharif

Yield: 6.0-6.5t/ha

Maturity: Early (80-85days; in hill, 95-100days)

Recommended for cultivation in: Jammu & Kashmir, Himachal Pradesh, Uttarakhand (Hill 1region), Meghalaya, Sikkim, Assam, Tripura,

Nagaland, Manipur and Arunachal Pradesh.

Special features: Short duration (80-85 days), attractive orange grain colour, high yielding female line, tolerant to Turcicum leaf blight, maydis leaf blight, curvularia leaf spot, and Banded leaf and sheath blight diseases, due to short duration it can be fit in many cropping system, responsive to high inputs.



DMRH 1301

Parents: BML6 × IML418-1

Year of release: 2017

Gazette Notification: S.O.399(E) Dated 24.01.2018

Season: Rabi



Yield: 9.0 - 10.0t/ha

Maturity: Medium (125-145days)

Recommended for cultivation in:

Eastern UP, Bihar, Jharkhand, West Bengal, Odisha, Rajasthan, Gujarat, Chhattisgarh and Madhya Pradesh.

Special features: Medium maturing (Rabi: 125-145 days), yellow grain colour, high yielding female line, tolerant to Turcicum leaf blight and charcoal rot diseases of maize, responsive to high inputs.



DMRH 1308



Parents: BML6 × HKI163

Year of release: 2017

Gazette Notification: S.O.399(E) Dated 24.01.2018

Season: Rabi

Yield: 9.5-10.5t/ha

Maturity: Medium
(130-150 days)

**Recommended for
cultivation in:**
Bihar, Rajasthan,
G u j a r a t ,
Chhattisgarh and
Madhya Pradesh.

Special features:
Medium maturing

(Rabi: 130-150 days), attractive yellow grain colour, high yielding female line, tolerant to Turcicum leaf blight and charcoal rot diseases of maize, responsive to high inputs.



Baby Corn Hybrids

IBCH 401

Parents: IML 101 (MIL 2-1062-1-2) × LM 13

Year of identification: 2023

VIC identification: VIC meeting proceeding at S. No. 24 held in 66th AMC at Pantnagar on Dt: 14/04/2023

Season: Kharif

Maturity: Medium (57 days in Peninsular Zone), Medium (53 days in Central Western Zone)

Yield: 1.583 t/ha in P Zone, 1.627 t/ha in CW Zone



Recommended for cultivation in:

Peninsular Zone (PZ): Comprising the states of Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu, Telangana. Central Western Zone (CWZ) Comprising the states of Rajasthan, Gujarat, Madhya Pradesh & Chhattisgarh

Special features: Good quality creamy white baby corn (7.5 to 12 cm long), Resistant to CLS, Moderately Resistance to Turcicum leaf blight (TLB), Charcoal rot (C. Rot) and Fusarium stalk rot (FSR) diseases. Moderately resistance to Chilo partellus and Fall Armyworm insects. Lodging tolerant, High yielding and multiple ear of female parent.



LBCH3

Parents: V 373 × HKI 1105

Year of identification: 2020

Gazette Notification: S.O.3482 (E) Dated 07.10.2020

Season: Kharif

Maturity: Early

Yield: 1.3 t/ha (de-husked baby corn)



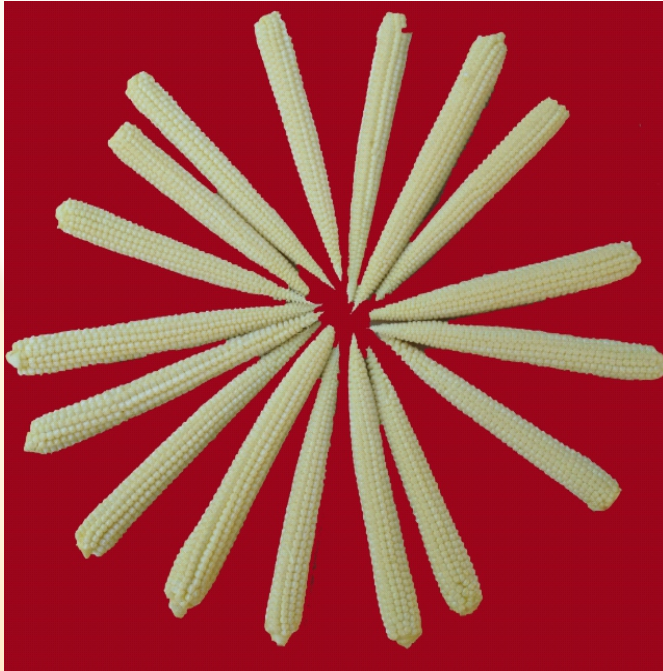
Recommended for cultivation in: J&K, Himachal Pradesh, Uttarakhand, Meghalaya, Sikkim, Assam, Tripura, Nagaland, Manipur, Arunachal Pradesh

Special features:

This hybrid has shown significant baby corn yield superiority (14.3%) over the best check over three years of testing in AICRP trials of NHZ; Responsive to high inputs. Length of baby corn is 9.6-11.6 cm and fodder yield of 17.0-21.0 t/ha in the recommended zone.



IMHB-1532



Parents: IML 127-1 × IML 242-1

Year of identification: 2018

Gazette Notification: S.O.6318(E) Dated 26.12.2018

Season: Kharif

Maturity: Medium (55-60 days baby corn crop)

Yield: 1.5-2.0t/ha (De-husked baby corn)

Recommended for cultivation in: Punjab, Haryana, Delhi, Uttarakhand, U.P. (Western region), Rajasthan, Gujarat, Madhya Pradesh & Chhattisgarh

Special features: Medium duration (55-60 days baby corn crop), attractive creamy colour baby corn, prolific, high yielding female line, tolerant to curvularia leaf spot and charcoal rot diseases.



IMHB-1539

Parents: HKI 1105 × IML 127-1

Year of identification: 2018

Gazette Notification: S.O.6318(E) Dated 26.12.2018

Season: Kharif

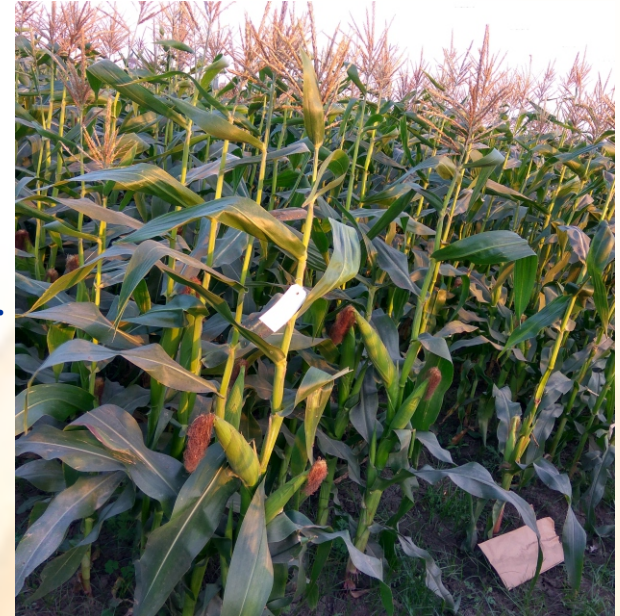
Maturity: Early (50-55 days baby corn crop)

Yield: 1.3-1.5t/ha (De-husked baby corn)



Recommended for cultivation in: Jammu & Kashmir, Himachal Pradesh, Uttarakhand (Hill region), Meghalaya, Sikkim, Assam, Tripura, Nagaland, Manipur and Arunachal Pradesh.

Special features: Short duration (50-55 days baby corn crop), attractive creamy colour baby corn, prolific, high yielding female line, tolerant to Turcicum leaf blight, maydis leaf blight, charcoal rot and Banded leaf and sheath blight diseases, due to short duration it can be fit in many cropping system.



Popcorn Hybrids

LPCH 2



Parents: JP-8 × Dpcl 292

Year of identification: 2020

Gazette Notification: S.O.3482(E) Dated 07.10.2020

Season: Kharif; but also can does well during rabi

Maturity: Early (80-85 days)

Yield: 3.0 t/ha (in Kharif)

Recommended for cultivation in: Rajasthan, Madhya Pradesh, Chhattisgarh & Gujarat

Special features: LPCH2 showed significant overall grain yield superiority of 15.9% over the best check in the AICRP trials. Highest Popping percentage (up to 95 %) with a mean of 86.1. Shown 7.6% superiority in Poppiness to the best check in AICRP trials. The highest Popping expansion (PE) is reported up to 1:23 in AICRP trial with mean of 1: 16.6.



LPCH 3



Parents: Dpcl 15-90 × Dpcl 117

Year of identification: 2020

Gazette Notification: S.O.3482(E) Dated 07.10.2020

Season: Kharif; but also can does well during rabi

Maturity: Early (80-85 days)

Yield: 3.5-4.0 t/ha (in Kharif)

Recommended for cultivation in: Bihar, Jharkhand, Uttar Pradesh, Odisha, West Bengal, Telangana, Andhra Pradesh, Tamilnadu, Karnataka, Maharashtra, Rajasthan, Madhya Pradesh, Chhattisgarh & Gujarat

Special features: LPCH3 showed significant overall grain yield superiority of 18.1 % over the best check in the AICRP trials. Highest Popping percentage (up to 96.0 %) with a mean of 89.8 % in AICRP trial. Shown 12.2 % superiority in Poppiness to the best check in AICRP trials. The highest Popping expansion (PE) is reported up to 1:20 with mean of 1: 14.6.



IPCH-501

Parents: PIL11 × PIL12

Year of identification: 2023

VIC identification: 66th Annual Maize Workshop held on 14.04.2023 at GBPUAT, Pantnagar



Season: Rabi

Maturity: 103 to 104 days (87 to 117 days)

Yield: 4771 kg/ha (3313 to 5963 kg/ha)

Recommended for cultivation in: Peninsular Zone (PZ) comprises the states of Tamil Nadu, Andhra Pradesh, Telangana, Maharashtra, Karnataka and Kerala.

Special features: The mean popping % is 93%. The popping expansion ratio is 16. Moderate resistance (MR), the turcicum leaf blight (TLB) with disease ratings of 4.2 and 5.0, respectively. IPCH 1901 showed resistance (R) reaction to fall armyworm (FAW) ear damage with an ear damage rating of 3.0, whereas the hybrid showed moderate resistance (MR) to susceptible (S) reaction to leaf damage by FAW with a leaf injury rating of 5.0 and 5.8, respectively.

DMRHHP 1402

Parents: JP8 × Dpcl117

Year of identification: 2017

Gazette Notification: S.O.399 (E) Dated 24.01.2018

Season: Kharif, but also suitable for rabi

Maturity: Early (75-80 days in kharif)

Yield: 3.0-3.5t/ha in kharif; 4.5-5.0t/ha in rabi (Popcorn)



Recommended for cultivation in:

Punjab, Haryana, Delhi, Uttarakhand, U.P. (Western region), Rajasthan, Gujarat, Madhya Pradesh & Chhattisgarh



Special features: India's first early maturing popcorn hybrid (75-80 days), attractive grain colour with high popping percentage (>90-95%), high yielding, tolerant to charcoal rot and fusarium stalk rot diseases, responsive to high inputs, due to short duration it can be fit in many cropping system.

Biofortified Maize Hybrids

QPMH 6



Parents: LM13-Q6 × LM19-Q3T2

Year of identification: 2023

VIC identification: 66th Annual Maize Workshop held on 14.04.2023 at GBPUAT, Pantnagar

Season: Kharif

Maturity: 89 to 92 days

Yield: 6417 kg/ha (6368 to 6466 kg/ha)

Recommended for cultivation in: North-eastern Plains Zone (NEPZ) comprises the states of Eastern Uttar Pradesh, Bihar, Jharkhand, Odisha, and West Bengal.

Special features: An improved version of PMH 6 with enhanced levels of lysine and tryptophan. The tryptophan and lysine content in the QPMH 6 were increased by 119 and 62 per cent, respectively. The improved version, QPMH 6 showed a similar and comparable reaction as that of its origin hybrid PMH 6 for maydis leaf blight (MLB). Also showed a statistically similar reaction as that of the origin hybrid, PMH 6 to major insect pests namely *Chilo partellus* (Swinhoe) and Fall armyworm.



PMH1-LP

Parents: LM 13-LP3 × LM 14-LP4

Year of release : 2022

Gazette Notification: S.O.4065 (E)
Dated 31.08.2022

Season: Kharif

Maturity: Long (95-100days)

Yield: 9.0 to 10.0 t/ha

Recommended for cultivation in:
North Western Plains Zone (NWPZ)
comprising the states of Punjab,
Haryana, Uttar Pradesh (Western
region), Uttarakhand (Plains) and Delhi.

Special features: PMH1-LP, an improved version of PMH 1 anti-nutritional factor phytic acid (PA). The PA content in the PMH1-LP is 1.89 mg/g of endosperm, whereas in the original hybrid PMH 1 it was 2.94 mg/g. The inorganic phosphate (Pi) content in PMH1-LP is 0.66 mg/g and in original hybrid PMH 1, it was 0.26 mg/g. Moderate resistant (MR) to major diseases of north western plains zone (NWPZ) namely maydis leaf blight (MLB) and charcoal rot (ChR). Also showed similar resistance (R) reaction as that of original hybrid PMH 1 to Fall armyworm and moderately resistance (MR) to leaf injury by Chilo partellus.



LQMH1



Parent: IML-343-1 × HKI 163

Year of identification: 2020

Gazette Notification: S.O.3482 (E) Dated 07.10.2020

Season: Kharif

Maturity: Early (100 days in NHZ; 80-85 Days in others)

Yield: 7.5-8.0 t/ha

**Recommended for
cultivation in:**

Northern Hill Zone
(NHZ) comprising the
states of Jammu &
Kashmir, Himachal
Pradesh, Uttarakhand,
Meghalaya, Sikkim,

Assam, Tripura, Nagaland, Manipur, Arunachal Pradesh

Special features: Early maturity single cross hybrid shown significant yield superiority (22.4 %) over the relevant best check in Northern Hill Zone during three years of testing in AICRP trials of maize. Exhibited high Tryptophan (0.75-0.80%) and Lysine content (3.0-3.5%) in endospermic protein.



IQMH 202



Parent: DQL 2209 × DMRQPM 106

Year of identification: (CSC on CSN & RVAC): 2020, (Dated Nov.9, 2020)

Gazette Notification: S.O.500 (E) Dated 29.01.2021

Season: Kharif

Maturity: Early (96 days in NWPZ during Kharif)

Yield: 7.2-8.0t/ha in the recommended ecology

Recommended for cultivation in: Punjab, Haryana, Delhi, Uttarakhand Plain, and Western Uttar Pradesh

Special features: Medium maturity single cross hybrid shown

significant yield superiority (13.35%) over the relevant best check in North Western Plain Zone during three years of testing in AICRP trials of maize. Exhibited high Tryptophan (0.66%) and Lysine content (3.05%) in endospermic protein. This hybrid responds to high inputs, due to medium duration it can be fit better in any maize-based cropping system.



IQMH 203

Parent: DQL 2209 × DMRQPM 106

Year of identification: 2020, (Dated Nov.9, 2020)

Gazette Notification: S.O.500 (E) Dated 29.01.2021

Season: Kharif

Maturity: Medium (89 days)

Yield: 6.3



Recommended for cultivation in: Central Western Zone comprising states Rajasthan, Madhya Pradesh, Chhattisgarh & Gujarat



Special features: IQMH 203 (IIMRQPMH-1705) medium maturity single cross hybrid shown significant yield superiority (29.0, 35.7 and 28.0 %) over the relevant best checks in Central Western Zone during three years of testing in AICRP trials of maize. It exhibited high Tryptophan (0.77 %) and Lysine content (3.48 %) in endospermic protein. This hybrid is responsive to high inputs, due to medium duration it can be fit better in maize based cropping system.

Sweet Corn Hybrids

ISCH 601

Parent: SIL21 × SIL22

Year of identification: 2023

VIC identification: 66th Annual Maize Workshop held on 14.04.2023 at GBPUAT, Pantnagar

Season: Kharif

Maturity: 70 to 88 days



Yield: 12917 kg/ha (11529 to 14444 kg/ha) (with husk); 10510 kg/ha (8806 to 13769 kg/ha) (without husk)

Recommended for cultivation in: Northeastern Plains Zone (NEPZ) comprises the states of Eastern Uttar Pradesh, Bihar, Jharkhand, Odisha, and West Bengal.

Special features: Total soluble solids is 15% brix. Showed moderate resistance (MR) to banded leaf and sheath blight (BLSB) in the peninsular zone (PZ) and curvularia leaf spot (CLS) in the central-western zone (CWZ). Showed resistance (R) reaction to fall armyworm (FAW) in NHZ and moderately resistant in northeastern plains zone (NEPZ). Showed moderate resistance to Chilo partellus (Swinhoe), spotted stem borer and fall armyworm across all zones of India basis.

Table: List of private hybrids under cultivation in different Agro-climatic zones of India

S. No.	Hybrids	Maturity	Year of release	Ecology/ Zone	Season	Av. Yield (t/ha)	Company
1.	P3355	Late	2018	NEPZ	Rabi	12.0-14.0	Coretva/Pioneer
2.	P3302	Late	2020	NWPZ & PZ	Kharif	7.0	Coretva/Pioneer
3.	P3524	Late	2021	PZ	Irrigated Kharif	7.5	Coretva/Pioneer
4.	PAC751	Late	2011	NWPZ & CWZ	Kharif	7.0-7.5	UPL Advanta
5.	PAC764	Late	2019	NWPZ	Kharif	9.0	UPL Advanta
6.	ADV768	Late	2021	PZ & CWZ	Kharif	8.75	UPL Advanta
7.	Bio 9544	Medium	2018	All Zones	Kharif/Rabi	7.4	Bioseed
8.	Bio 9546	Medium	2016	All Zones	Kharif	8.5	Bioseed
9.	Bio 9788	Late	2018	All Zones	Kharif	9.5	Bioseed
10.	Bio 9792	Late	2019	PZ	Kharif/Rabi	9.5	Bioseed
11.	Bio 9766	Late	2022	PZ & CWZ	Kharif/Rabi	9.8	Bioseed
12.	Bio 9544	Medium	2018	All Zones	Kharif/Rabi	7.4	Bioseed
13.	5101	Late	2010	PZ	Kharif	9.0-10	Hytech Seeds
14.	5402	Medium	2013	PZ	Kharif	6.0	Hytech Seeds
15.	5404	Late	2014	PZ	Kharif	6.0	Hytech Seeds
16.	5801	Late	2013	NEPZ & PZ	Kharif/Rabi	9.5	Hytech Seeds
17.	5108	Late	2013	PZ	Kharif	8.0	Hytech Seeds
18.	5202	Medium	2014	PZ	Rabi	10.0	Hytech Seeds
19.	5109	Late	2016	PZ	Kharif	8.0	Hytech Seeds

S. No.	Hybrids	Maturity	Year of release	Ecology/ Zone	Season	Av. Yield (t/ha)	Company
20.	5203	Late	2017	PZ	Kharif	7.5	Hytech Seeds
21.	5252	Late	2018	NWPZ	Kharif	8.0	Hytech Seeds
22.	CP 333	Medium	2012	NWPZ,NEPZ, PZ,CWZ	Kharif/Rabi	10-11.0	CP Seeds
23.	CP 858	Medium	2015	NWPZ,NEPZ, PZ,CWZ	Kharif/Rabi	10.0	CP Seeds
24.	CP 838	Medium	2015	NWPZ,NEPZ, PZ,CWZ	Kharif/Rabi	10.0	CP Seeds
25.	CP 999	Medium	2015	NWPZ,NEPZ, PZ,CWZ	Kharif/Rabi	10.0	CP Seeds
26.	CP 201	Medium	2016	NWPZ,NEPZ, PZ,CWZ	Kharif/Rabi	10.0	CP Seeds
27.	CP 509	Medium	2020	NWPZ,NEPZ, PZ,CWZ	Kharif/Rabi	10.0	CP Seeds
28.	S 6668	Late	2011	Across India	Kharif	6.0	Syngenta
29.	NK7328	Medium	2017	Across India	Kharif	6.0	Syngenta
30.	NK30	Medium	2008	Across India	Kharif	5.0	Syngenta
31.	NK6514	Late	2018	PZ	Kharif/Rabi	6.0	Syngenta
32.	NK7720	Late	2012	NEPZ	Rabi	10.0	Syngenta
33.	NK6702	Medium	2015	NEPZ	Rabi	10.0	Syngenta
34.	DKC7074	Early	2009	Across India	Kharif	6.0	Bayer/Monsanto

