

# Morphological Characteristics of ICRISAT-bred Pearl Millet Hybrid Seed Parents (2005-2018)



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# Morphological Characteristics of ICRISAT-bred Pearl Millet Hybrid Seed Parents (2005-2018)

**Edited by**

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and Mahesh Pujar**



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## Foreword

Pearl millet (*Pennisetum glaucum* L.) is a climate resilient and nutritious crop cultivated on about 30 m ha in the semi-arid tropics of Asia and Africa. It is an important food, feed and fodder crop for the millions of rural households in the marginal environments. ICRISAT has a global mandate for enhancing its productivity in Asia and Africa. This is done through collaborative research with multiple partners in the national agriculture research systems (NARS), advanced research institutes, private sector, and non-governmental organizations (NGOs).

It is already proven that hybrids in general have a 20-30% grain yield advantage over Open Pollinated Varieties. Hence, most of the public and private sector pearl millet breeding programs in India are working towards hybrid development. This has resulted into the hybrids occupying about 70% of the total pearl millet cultivated area in India. Pearl millet hybrids are also cultivated in USA, Brazil and some of the central Asian countries, though mostly for forage purpose in these regions. In alignment with the regional priority of the Asia region, pearl millet research at ICRISAT-Patancheru follows a strategy of developing improved breeding lines and potential hybrid parents, leaving the development, testing and release of hybrids to the public and private sector programs. At ICRISAT, these materials are generated and disseminated as international public goods.

ICRISAT-bred male-sterile lines (seed parents) and restorer lines are developed mostly by breeding methods that leave cryptic variability within the lines from which within-line selections can be made with slight modification in plant traits. In view of the increasing awareness of Intellectual Property Rights (IPR) protection, it was considered necessary to characterize ICRISAT-bred parental lines and place them in the public domain to enhance ICRISAT's ability to protect these materials from any possible infringement, and to allow unhindered access by public organizations globally. Earlier, 99 male-sterile lines (A-lines) and their corresponding maintainers developed during the 1981–2004 period were characterized using the descriptors developed for the Distinctiveness, Uniformity and Stability (DUS)–test, and information was published.

Development of designated seed parents is a continuous process in ICRISAT's pearl millet breeding program, and 104 new A/B pairs were developed between 2005 to 2018. ICRISAT developed these (B-lines) from a diverse genetic base and with diverse morphological traits. These lines were designated and disseminated as potential hybrid parents after evaluation for agronomic performance and resistance to diverse pathotypes of downy mildew, in the years they were designated. Although these lines have been developed from diverse genetic backgrounds and with diverse morphological traits, these had not been evaluated for a comprehensive set of morphological traits in common environments.

This document provides detailed characterization of 104 pairs of male sterile lines (A-lines) and their counterpart maintainer lines (B-lines) for the traits stipulated in the DUS-test guidelines, based on their evaluation in two seasons at ICRISAT-Patancheru. The characterization data showed not only the differences among the A/B pairs, but also the extent to which they could be influenced by environmental factors, not to mention a small variability within some of the lines. Such variability among and within the lines provide opportunities for further selection and genetic enhancement; and it has implications in IPR protection as well.

I hope that this publication will be useful to all pearl millet researchers and seed producers worldwide.



**Dr Jacqueline d'Arros Hughes**  
Director General, ICRISAT

## Introduction

Pearl millet (*Pennisetum glaucum* (L) R. Br.) is a major warm-season nutri-cereal grown on ~34 million ha across the world with the majority of area (>95%) in the arid and semi-arid tropical (SAT) regions of Asia (~11 million ha) and Africa (~22 million ha) (FAO, 2020). India is the largest producer with an average production of 9.35 million tonnes and productivity of 1391 kg ha<sup>-1</sup> occupying an area of 7.41 million ha (*Directorate of Millets Development, 2021-22*). It is a highly cross-pollinated crop with an outcrossing rate of more than 85%. The protogynous flowering and wind-borne pollination favor cross-pollination, making open-pollinated varieties (OPVs) as the natural cultivar state of this crop. However, OPVs, are not amenable to achieving as much heterozygosity and the consequent heterosis as possible in single-cross hybrids. Furthermore, OPVs are highly heterogeneous and hence morphologically more variable than single-cross hybrids. It has been observed that single-cross hybrids generally give 20-30% more grain yield than OPVs (*Rai et al. 2006*). Based on these considerations, and with the availability of a commercially exploitable cytoplasmic-nuclear male sterility (CMS), the National Agricultural Research System (NARS) in India took the first significant step in the world to embark on grain hybrid development. With the rapid growth of vibrant seed industry, pearl millet research in India, both in the private and the public sector, is now almost all directed towards hybrid breeding. In alignment with the regional priority in Asia region, ICRISAT's pearl millet improvement research at Patancheru plays a pivotal role in developing diverse range of improved breeding lines and potential hybrid parents, leaving the development, testing and release of hybrids to the NARS and the private sector.

There has been extensive use of ICRISAT-bred hybrid parents, especially seed parents (male-sterile lines), by both NARS and the private sector. Through ICAR-All India Coordinated Research Project on Pearl millet, a total of 175 hybrids (101 public and 74 private sectors) and 62 varieties were identified and released for cultivation in different agro-ecological zones of the country (Project coordinator review, *ICAR-AICRP on pearl millet, 2020*). Among them, 60-70% of the pearl millet hybrids grown in India are based on ICRISAT-bred A-lines, or on proprietary A-lines developed from improved lines bred at ICRISAT (<https://www.icrisat.org/pearl-millet/>). This shows that ICRISAT is playing a pioneer role in the pearl millet improvement program. In view of the increasing awareness of Intellectual Property Rights (IPR) protection, it is necessary to periodically characterize the ICRISAT-bred parental lines and place them in the public domain as international public goods. This would enhance ICRISAT's ability to protect these materials from any possible infringement, and allow unhindered access by public organizations globally. During the 1981-2018, ICRISAT developed about 200 male-sterile lines (A-lines) and their counterpart maintainers (B-lines). These lines were designated and disseminated as potential hybrid parents after evaluation for agronomic performance and resistance to downy mildew (*Sclerospora graminicola* (Sacc.) Schroet.), the most dreaded disease of pearl millet in India. These evaluations, however, were done in the years the lines were developed and designated. Although these lines have been developed from diverse genetic backgrounds and with diverse morphological traits, they need to be evaluated for a comprehensive set of morphological traits in common environments. In 2008, a set of 99 pairs of designated lines (A/B pairs) developed during 1981-2004 were characterized and published (Rai et al 2009). The objective of the present study was to characterize the rest of the 104 A/B pairs developed during the period of 2005-2018 using 17 out of 26 morphological traits designated as DUS (Distinctness, Uniformity and Stability) descriptors as shown in Annexure I (*AICPMIP, 2006*).

## Materials and Methods

### Plant material and field trials

In the pearl millet improvement program at ICRISAT, the first male sterile was developed in 1981 and was designated as 81A. Thereafter and till 1986, the lines were designated with a 3- digit number, the first two digits indicating the year. Since 1988, 5-digit system was followed, where the first two digits refer to the

year in which they are designated and made available for use, followed by three digits (the same number in triplicate) for specific A/B pairs. For example, ICMA/B 97333 refers to the third A/B pair developed and designated in 1997 and ICMA/B 06555 refers to the fifth A/B pair developed and designated in 2006 (Annexure II).

To enhance the cytoplasmic diversification, A/B pairs are developed on A<sub>1</sub>, A<sub>4</sub> and A<sub>5</sub> CMS systems in ICRISAT seed parent breeding program. Out of 104 A/B pairs designated between 2005 to 2018 at ICRISAT, total of 54, 60 and 20 A/B pairs were designated on A<sub>1</sub>, A<sub>4</sub> and A<sub>5</sub> CMS systems, respectively. Till 2011, A/B pairs were designated only on one CMS system, but thereafter A/B pairs have been designated on more than one CMS systems, if available. Of the 104 A/B pairs, 32, 45 and 10 have been designated only on A<sub>1</sub>, A<sub>4</sub> and A<sub>5</sub> CMS systems, respectively. While 12, 4 and 4 A/B pairs were designated simultaneously on two CMS systems: A<sub>1</sub> and A<sub>4</sub>, A<sub>1</sub> and A<sub>5</sub>, and A<sub>4</sub> and A<sub>5</sub>, respectively. Six of A/B pairs were designated simultaneously on three A<sub>1</sub>, A<sub>4</sub> and A<sub>5</sub> CMS systems.

The 104 A-lines in three diverse cytoplasmic backgrounds (only on one CMS system; 46 A<sub>1</sub>, 48 A<sub>4</sub> and 10 A<sub>5</sub>), and their counterpart B-lines were planted in a split-plot design, with 104 genotypes as main plots and two cytoplasms (fertile vs sterile) as sub-plots, in two replications during the 2019 summer (dry or post-rainy) season (February - May) and again in 2019 rainy season (July - October) at ICRISAT, Patancheru (18° N lat; 78° E long.). During the summer season, which was supported with irrigation as per requirement, there was a total rainfall of 50 mm with weekly mean maximum temperature ranging between 31 and 41°C, weekly mean minimum temperature ranging between 16 and 26°C, and relative humidity above 50% (52-94%) (Fig. 1). During the rainy season, there was a total of 640 mm rainfall with the weekly mean maximum temperature ranging between 27 and 33°C, weekly mean minimum temperature ranging between 20 and 23°C, and relative humidity >85% (85-95%) (Fig. 2).

Each line was machine-planted in a single row of 4 m with 60 cm spacing between the rows in the summer season and 75 cm in the rainy season, and 15 cm spacing between the plants in both seasons. The experiment was conducted in Alfisols with applied fertilizer levels of 80 kg ha<sup>-1</sup> N (18% basal and rest as topdressing), and 46 kg ha<sup>-1</sup> P (basal dose) with seven irrigations during the summer season and one irrigation during the rainy season. The standard cultural and agronomic practices were followed that included thinning and manual weeding at 15 days after sowing.

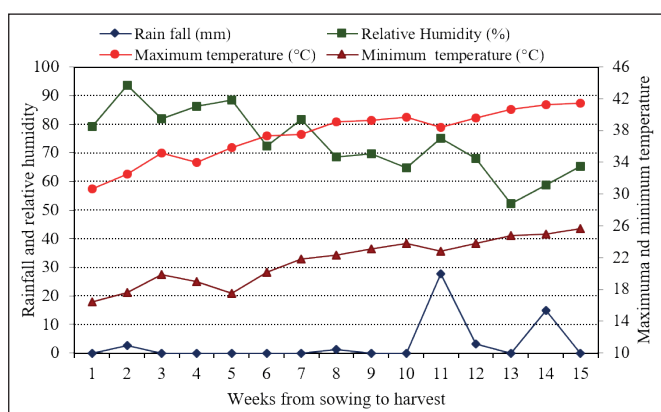


Fig. 1. Weekly distribution of rainfall (mm), maximum and minimum temperature (°C) and relative humidity (%) during 2019 summer (dry) season, ICRISAT, Patancheru.

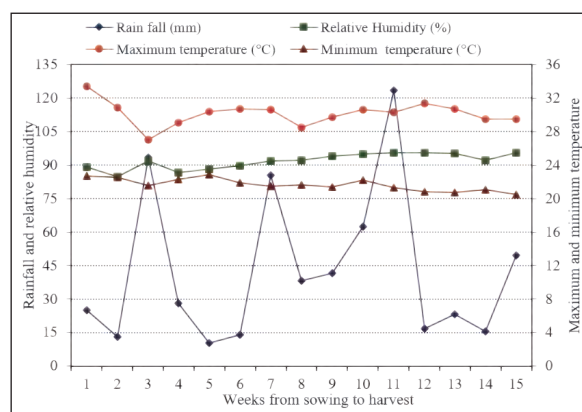


Fig. 2. Weekly distribution of rainfall (mm), maximum and minimum temperature (°C) and relative humidity (%) during 2019 rainy season, ICRISAT, Patancheru.



## Data collection and analysis

The observations on five quantitative traits were taken on 5 random plants in each plot for plant height (cm), panicle length (cm), panicle diameter (cm), number of productive tillers plant<sup>-1</sup>, and 1000-grain weight (g). Days to 50% flowering was recorded on plot basis when the main panicles of 50% of the plants in the plots had full stigma emergence. Data were also taken on 11 other traits. These included anther color, node pigmentation, internode pigmentation, panicle exertion, panicle tip sterility, and presence/absence of bristles in panicle for which data were recorded on the basis of visual assessment of individual plants (or parts of plants) within a plot (VS); or it was based on visual assessment of a group of plants (or parts of plants) in a plot (VG) for traits such as plant growth habit, panicle shape, panicle density, seed color, and seed shape. The mean plot values of the quantitative traits measured were subjected to analysis of variance for each season as well across the two seasons following split-plot design and using GenStat 14 release (VSN International, 2011).

## Results and Discussion

### Germplasm base

In the pearl millet improvement program at ICRISAT, hybrid parental lines (A/B pairs) are developed with considerable morphological diversity and then designated based on agronomic performance and resistance to at least two downy mildew (DM) pathotypes. Designated B-lines are rigorously screened often against five diverse DM pathotypes under high disease pressure in the greenhouse seedling inoculation test (80-90 % disease incidence in susceptible checks) and B-lines with <10% disease incidence are classified as resistant. The parentage of 104 designated seed parental lines is provided in annexure II, which shows the utilization of a wide range of germplasm and improved lines in developing these lines. Among 104 A/B pairs, eight B-lines were directly selected from the composites, one line was derived from crosses that involved germplasm in their parentage and 18 lines had composites in their parentage (Table 1). Thus, there were 27 seed parental lines that had some components of germplasm and /or composite in their parentage, indicating apparently substantial usage of germplasm/ composites in the development of these seed parental lines. The remaining 77 seed parental lines were derived from crosses between elite inbred lines (Table 1). Like any targeted breeding program, where some elite lines occur more frequently in the crosses to derive superior inbred lines, in the present seed parent breeding program also some of the elite lines were involved in more crosses than others in the development of designated B-lines. For instance, ICMB 99555 and 843B, was involved as the first cycle or second cycle parent in 11 and 10 B-lines, respectively. These elite lines are known for their traits such as dwarf height, medium tillering, large seed size, and good combining ability.

Germplasm base	No. of B-lines	Remarks	Genetic base (Code) <sup>1</sup>
Germplasm	-	Inbreeding and selection directly from germplasm	1
Composite	8	Includes composites and open pollinated varieties	2
Germplasm* X Elite line	1	Includes early-generation breeding lines derived from germplasm	3
Composite* X Elite line	18	Includes early-generation breeding lines derived from composites	4
Elite line X Elite line	77	Includes crosses between advanced generation lines	5

\*Includes a line directly derived from a germplasm and similarly for composites. <sup>1</sup>Refer to Annexure II.

**Quantitative traits:** The overall mean for six quantitative characters over both the seasons for all the 104 A/B pairs revealed that characters like plant height and panicle-related characters (panicle length and girth) had increased expression in the rainy season than in the summer (dry) season. The reverse was true for the trait days to 50% flowering and the rest of the two traits such as number of productive tillers plant<sup>-1</sup> and 1000-grain weight which didn't show a large difference in their expression across the two seasons. A- and B-lines are expected to be genetically similar as they differ only for cytoplasm. However, pooled analysis of variance for six quantitative traits revealed that A- and B-lines had significant differences between them for the expression of all the quantitative characters except for the panicle girth under study (Table 2). However, these differences were of small magnitude to have any practical significance. For instance, A- lines on an average, flowered in 48 days, two days earlier than the average number of days taken by B-lines. Similarly, B-lines, on an average were only 0.4 cm taller in plant height and had 0.1 g higher seed weight than A-lines. Thus, the magnitude of the differences mentioned above can increase or decrease with the changes in the environment as the effect of the environment and its interaction with the cytoplasm was highly significant especially for days to 50% flowering and non-significant for the rest of the five traits.

The individual A/B pairs were further studied season-wise for the above traits to examine the contribution of cytoplasm × environment interaction (Annexure III). It was found that 13 A-lines in the rainy season and 29 A-lines in the post-rainy season flowered significantly earlier (3-6 days) than their counterpart B-lines. Amongst these lines, six A-lines ICMA 07888, ICMA 10777, ICMA 13111, ICMA 17333, ICMA 18555 and ICMA 18777 were early in flowering than its B-line in both the seasons, while other A-lines showed earliness in comparison to their counterpart B-lines in one season only. Similarly, for plant height, nine A/B pairs in the rainy season and five pairs in the post-rainy season had significant differences between the A-and B-lines ranging from 9 to 14 cm. Six A-lines out of these nine pairs in rainy season and three A-lines out of five pairs in post-rainy season were shorter than their corresponding B-lines. Out of these, one A-lines ICMA 14555 was found to be shorter in height than its counterpart B- line in both seasons, while other A-lines were shorter in comparison to their counterpart B-lines in one season only. On contrary, three A-lines (ICMA 08444, ICMA 11666 and ICMA 09777) in the rainy season and two A-lines (ICMA 06444 and ICMA 18555) in post-rainy season were found to be taller in height than its counterpart B-line. For panicle length and panicle diameter, none of the A-lines and their counterpart B-lines showed significant variation in both the seasons. In the case of 1000-grain weight, 10 A-lines in rainy and seven A-lines in post-rainy had smaller seed size compared to their counterpart B-lines with a significant difference (in the range of 1.5-3.6 g). Among them, five A/B pairs followed the same trend of response in both seasons. On the contrary, 15 A-lines each in the rainy and post-rainy season had larger seed size compared to their counterpart B-lines (ranging from 1.5-3.8 g). Among them, 10 pairs followed the same trend in both seasons. Thus, although some A/B pairs showed significant differences between them for different characters in different seasons, this behavior was not found consistent across the seasons, indicating the effect of environment and its interactions with the cytoplasm. Such differences could also arise due to incomplete transfer of the entire genome of B-lines into A-lines as the A/B pairs were not developed by plant × plant crossing and pedigree breeding was practised. Bulk pollen collected normally from 4-8 plants of the B-line was crossed onto 3-4 plants of the corresponding backcross progenies and both backcross progenies and B-lines were harvested as bulks for generation advance. We shall henceforth discuss the variability among B-lines in these 104 A/B pairs.

The effect of season on various traits in B-lines was also found to be significant (Annexure III). These include days to 50% flower (47.7 days in rainy and; 51.3 days in post-rainy), plant height (113.3 cm in rainy; 94.7 cm in post-rainy), and panicle diameter (3.1 cm in rainy; 2.7 cm in post-rainy), while other traits such as number of productive tillers plant<sup>-1</sup> (2.7 in rainy and 2.6 in post-rainy), panicle length (21.4 cm in rainy and 20.4 cm in post-rainy), and 1000- grain weight (10.8 g in rainy; 10.5 g in post-rainy) had no significant difference. The extent of variation attributable to the seasonal effect on these lines may vary depending on the environment.

The utilization of diverse breeding materials in the development of these designated B-lines has resulted into a wide range of variability (Table 3). For instance, days to 50% flowering ranged from 41 to 64 days plant height from 72 to 156 cm, the number of productive tillers plant<sup>-1</sup> from 1 to 9, panicle length from 14 to 37 cm, panicle diameter from 1.7 to 3.8 cm, and 1000-grain weight from 5.4 to 16.0 g in these 104 B-lines.

**Table 2. Mean squares for 6 quantitative traits in pearl millet seed parental lines**

Source of variation	d.f.	Days to 50% flowering	Plant height (cm)	Number of productive tillers	Panicle length (cm)	Panicle diameter (cm)	1000-grain weight (g)
Season	1	2261.04***	72455.62**	7.15	180.94**	36.06*	10.98
Replication/Season	2	1.85	108.16	5.54	1.27	1.03	0.99
Genotype	103	167.29***	2293.05***	7.11***	182.81***	1.53***	28.85***
Genotype x Season	103	22.05***	170.19***	0.62	5.44***	0.08***	0.44
Error (a)	206	2.15	43.29	0.65	2.14	0.05	1.33
Cytoplasm	1	575.23***	27.99	7.78***	0.08	0.45***	1.65
Cytoplasm x Season	1	31.85***	0.07	0.00	0.51	0.07*	0.05
Genotype x Cytoplasm	103	2.46***	24.26***	0.62***	1.57*	0.02	3.02***
Season x Genotype x Cytoplasm	103	1.90***	17.54***	0.28	0.83	0.02	0.35
Error (b)	208	0.77	10.23	0.24	1.18	0.02	0.79

d.f. = Degrees of freedom

\*, \*\*, \*\*\* Significant at 0.05, 0.01 and <0.001 levels, respectively

Table 3. Frequency distribution of designated pearl millet B-lines for grain yield and its component traits

Trait	No. of B-lines in trait classes														Range		Reference B-line
	Trait class	<42	42.1-45	45.1-48	48.1-51	51.1-54	54.1-57	57.1-60					Minimum	Maximum			
Days to 50% flowering	No. of lines	1	20	32	16	14	15	6					41	843B	42		
Plant height (cm)	Trait class	71-80	81-90	91-100	101-110	111-120	121-130	131-140	141-150	>150			72	04888B	75		
	No. of lines	7	17	23	20	21	9	3	3	1			156	92777B	128		
Number of productive tillers plant-1	Trait class	1	1.1-2	2.1-3	3.1-4	4.1-5	5.1-6	>6					1	89111B	4		
	No. of lines	0	30	46	21	5	1	1					9				
Panicle length (cm)	Trait class	<15	15.1-20	20.1-25	25.1-30	30.1-35	>35						14.1	04999B	19.3		
	No. of lines	3	53	32	10	4	2						37.1				
Panicle diameter (cm)	Trait class	<2.0	2.0-2.5	2.6-3.0	3.1-3.5	3.6-4.0							1.7	04888B	3.2		
	No. of lines	2	30	30	38	4							3.8				
1000-grain weight (g)	Trait class	<7.0	7.0-8.0	8.1-9.0	9.1-10.0	10.1-11.0	11.1-12.0	12.1-13.0	13.1-14.0	>14.0			5.4	04888B	13.4		
	No. of lines	4	6	16	14	21	17	12	6	8			16.0				

Thus, immense variability shown among these designated B-lines provides ample opportunity to breed hybrids for specific requirements of different agro-climatic zones in pearl millet. Some of the lines used most widely in commercial seed production provide reference lines for specific traits. For instance, 20 B-lines flowered in 42-45 days and were in the same maturity group as the earliest-flowering commercial seed parent 843B (42 days). This B-line is also popular for its large seed size. There were 26 designated B-lines that had comparable or higher 1000-grain weight than 843B (12.2g). Another commercial seed parent 04888B line is popular for its dwarf height and thick panicles. There were 7 B-lines that were in the same height group as ICMB 04888 (75 cm), and 42 B-lines were in the same or higher panicle diameter group as ICMB 04888 (3.2 cm). ICMB 89111 is the highest-tillering line among the commercial seed parents. There were five B-lines that had tillering ability similar to ICMB 89111 (4 tillers plant<sup>-1</sup>). Two B-lines, ICMB 11444 (5 tillers plant<sup>-1</sup>) and ICMB 15111 (9 tillers plant<sup>-1</sup>) recorded even higher tillering than of ICMB 89111. ICMB 96222 had the longest panicles (21 cm) among the commercial seed parents. There were 31 designated B-lines that had panicle length greater than, and 5 lines had comparable panicle length to ICMB 96222 (21 cm).

### Qualitative and quasi- qualitative traits

Frequency distribution of the 104 A/B pairs for 11 qualitative and quasi- qualitative characters revealed considerable variation for most of the traits except for traits like plant growth habit, presence of bristles in the panicle, and plant internode pigmentation (Annexure III). Majority of the lines (95%) were erect in their growth habit. The green color was most dominant for node (62%) and, purple color (32%) being the next major pigmentation. While all the lines had green internode pigmentation. Majority of the lines had yellow anther color (74%) followed by brown (15%) and purple (11%) color. About 76% of the lines had complete panicle exertion and 8% had partial and 16% had variable panicle exertion. Semi- compact panicles were most common (53%), followed by compact (28%) and some of the lines showed variable expression within a line for compact to semi-compact panicles (11%) and loose to semi-compact (7%) and 2 lines had loose panicles. Similarly, majority of the lines had conical (71%) shape of panicles followed by cylindrical (19%), lanceolate (7%), candle (4%) and one line had oblanceolate type of panicles. Majority of the line had no tip sterility (72%) and very few lines (3%) had both sterile and non-sterile panicle tips. For panicle bristles, predominant lines had no bristles (90%). In case of seed color, grey colored seeds were dominant (57%) followed by deep grey (23%) and cream colored (7%) seeds. Globular seed shape (88%) was most dominant, followed by hexagonal (7%) and obovate (5%) seed shape.

The differences among the A/B pairs varied across the two seasons for some of the quasi-qualitative traits like panicle density and panicle exertion. For panicle density, 19 A/B pairs showed difference in expression across seasons. For instance, ICMA 05666 and ICMB 05666 had compact panicles during the postrainy season and semi-compact panicles during the rainy season. Similarly, three A/B pairs showed differential expression for panicle exertion. For instance, ICMA 06444 and ICMB 06444 had partial exertion during the post-rainy season and complete exertion during the rainy season. The differences in the expression of traits in different seasons suggest that there is substantial effect of environment on these traits in some genetic backgrounds. Therefore, if more number of environments (seasons or locations) were included in this study, there would be every possibility of detecting differences in the expression of other qualitative and quasi-qualitative traits which otherwise might not be possible with only two seasons and one location as used in this study.

Variability within the B-lines was observed even across the two replications for some traits like plant node pigmentation, panicle exertion and panicle density. If alternate phenotype for a particular trait was present in a replication, it was indicated with a superscript "a" on its code (Annexure III). For plant node pigmentation, alternate phenotypes were present in eight B-lines. For instance, ICMB 06777 predominantly had purple nodes but some plant had green nodes. For panicle exertion, 17 B-lines had alternate phenotypes. For instance, ICMB 07333 had complete exertion as predominant class, though

some plants with partial exertion were also present in both the seasons. Following the same trend, 15 B-lines had alternate phenotypes other than the predominant class for panicle density across both the seasons or in a single season. For instance, ICMB 05555 had loose/semi-compact panicles in both the seasons. This within-line variability seems to be due to method of pollination, where bulk pollen from plants of recurrent parent (there may be some out- crossed plant present in the recurrent parent) is taken during backcrossing program during the development of seed parental lines. It is possible that other B-lines which have not shown such within-line variability in this study, might show it if tested with larger sample size, and perhaps in different environments. In the present study, only 20-30 plants per replication per season were evaluated for these qualitative or quasi- qualitative characters, so it may (or may not) be possible to find/detect plants having low frequency of an alternate phenotype in comparison to the predominant class of a particular trait. For instance, if the frequency of a phenotype is 0.5%, then there is a need to study at least 200 plants per replication to detect at least one plant that has particular alternate phenotype. Therefore, if characterization of these seed parental lines are carried out with large number of plants (200-300 plants per replication), it may be possible to detect a few plants that expresses the alternate phenotype of these qualitative (or quasi-qualitative) traits, which otherwise should not be construed as a new phenotype or plant type at any given time.

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## Annexure I. Description of DUS<sup>1</sup> characters and their classification

S. No.	Characters	Status	Node <sup>2</sup>	Stage of Observation <sup>3</sup>	Type of Assessment <sup>4</sup>																																																																																																																								
1	Seedling: Anthocyanin coloration of first leaf sheath	Absent	1	Seedling emergence (3)	VS																																																																																																																								
		Present	9			2	Plant: Growth habit	Erect	1	Panicle emergence (45)	VG	Intermediate	5	Spreading	7	3	Plant: Number of productive tillers	Monoculm	1	Dough (65)	MS	Low (2-3 tiller)	3	Medium (4-6 tiller)	5	High (>6 tiller)	7	4	Plant: Height	Very short (<101 cm)	1	Dough (65)	MS	Short (101-150 cm)	3	Medium (151-200 cm)	5	Tall (201-250 cm)	7	Very tall (>250 cm)	9	5	Plant: Number of nodes	Low (<11)	3	Dough (65)	MS	Medium (11-15)	5	High (>15)	7	6	Plant: Node pubescence	Absent	1	Dough (65)	VS	Present	9	7	Plant: Node pigmentation	Whitish	1	Dough (65)	MS	Green	2	Brown	3	Red	4	Purple	5	8	Plant: Inter node pigmentation (between 3 <sup>rd</sup> & 4 <sup>th</sup> node from top)	Whitish	1	Dough (65)	VS	Green	2	Brown	3	Red	4	Purple	5	9	Leaf: Sheath length	Short (<11 cm)	3	Panicle emergence (45)	MS	Medium (11-15 cm)	5	Long (>15 cm)	7	10	Leaf: Sheath pubescence	Absent	1	Panicle emergence (45)	VS	Present	9	11	Leaf: Blade length	Very short (<41 cm)	1	Panicle emergence (45)	MS	Short (41-50 cm)	3	Medium (51-60 cm)	5	Long (61-70 cm)	7	Very long (>70 cm)	9	12	Leaf: Blade width (at widest point)	Narrow (<3 cm)	3	Panicle emergence (45)	MS
2	Plant: Growth habit	Erect	1	Panicle emergence (45)	VG																																																																																																																								
		Intermediate	5																																																																																																																										
		Spreading	7																																																																																																																										
3	Plant: Number of productive tillers	Monoculm	1	Dough (65)	MS																																																																																																																								
		Low (2-3 tiller)	3																																																																																																																										
		Medium (4-6 tiller)	5																																																																																																																										
		High (>6 tiller)	7																																																																																																																										
4	Plant: Height	Very short (<101 cm)	1	Dough (65)	MS																																																																																																																								
		Short (101-150 cm)	3																																																																																																																										
		Medium (151-200 cm)	5																																																																																																																										
		Tall (201-250 cm)	7																																																																																																																										
		Very tall (>250 cm)	9																																																																																																																										
5	Plant: Number of nodes	Low (<11)	3	Dough (65)	MS																																																																																																																								
		Medium (11-15)	5																																																																																																																										
		High (>15)	7																																																																																																																										
6	Plant: Node pubescence	Absent	1	Dough (65)	VS																																																																																																																								
		Present	9																																																																																																																										
7	Plant: Node pigmentation	Whitish	1	Dough (65)	MS																																																																																																																								
		Green	2																																																																																																																										
		Brown	3																																																																																																																										
		Red	4																																																																																																																										
		Purple	5																																																																																																																										
8	Plant: Inter node pigmentation (between 3 <sup>rd</sup> & 4 <sup>th</sup> node from top)	Whitish	1	Dough (65)	VS																																																																																																																								
		Green	2																																																																																																																										
		Brown	3																																																																																																																										
		Red	4																																																																																																																										
		Purple	5																																																																																																																										
9	Leaf: Sheath length	Short (<11 cm)	3	Panicle emergence (45)	MS																																																																																																																								
		Medium (11-15 cm)	5																																																																																																																										
		Long (>15 cm)	7																																																																																																																										
10	Leaf: Sheath pubescence	Absent	1	Panicle emergence (45)	VS																																																																																																																								
		Present	9																																																																																																																										
11	Leaf: Blade length	Very short (<41 cm)	1	Panicle emergence (45)	MS																																																																																																																								
		Short (41-50 cm)	3																																																																																																																										
		Medium (51-60 cm)	5																																																																																																																										
		Long (61-70 cm)	7																																																																																																																										
		Very long (>70 cm)	9																																																																																																																										
12	Leaf: Blade width (at widest point)	Narrow (<3 cm)	3	Panicle emergence (45)	MS																																																																																																																								
		Medium (3-4 cm)	5																																																																																																																										
		Broad (>4 cm)	7																																																																																																																										

13	Panicle: Time of panicle emergence (50% plants with at least one panicle emerged fully)	Very early (<43days) Early (43-46 days) Medium (47-50 days) Late (51-54 days) Very late (>54 days)	1 3 5 7 9	Panicle emergence (45)	VG
14	Panicle: Length	Very small (< 11cm) Small (11-20 cm) Medium (21-30 cm) Long (31-40 cm) Very long (>40 cm)	1 3 5 7 9	Dough (65)	MS
15	Panicle: Diameter at maximum point (excluding bristles)	Thin (<1.6 cm) Medium (1.6-3.0 cm) Thick (>3.0 cm)	3 5 7	Dough (65)	MS
16	Panicle: Exertion	Partial Complete	1 2	Dough (65)	VS
17	Panicle: Density	Very loose Loose Semi-compact Compact Very compact	1 3 5 7 9	Harvest maturity (75)	VG
18	Panicle: Tip sterility	Absent Present	1 9	Harvest maturity (75)	VS
19	Panicle: Shape	Cylindrical Conical Spindle Candle Lanceolate Dumble Club Oblanceolate Globose	1 2 3 4 5 6 7 8 9	Dough (65)	VG
20	Panicle: Anther color	Yellow Brown Purple	1 2 3	Anthesis (50)	VS
21	Panicle: Anthocyanin pigmentation of glume	Absent Present	1 9	Dough (65)	VS
22	Panicle: Bristle	Absent Present	1 9	Dough (65)	VS
23	Panicle: Bristle color	Green Brown Red Purple	1 2 3 4	Dough (65)	VS
24	Seed: Color	Whitish Cream Yellow Grey Deep grey Grey brown Yellow brown	1 2 3 4 5 6 7	Harvest maturity (75)	VG



25	Seed: Shape	Obovate	1	Harvest maturity (75)	VG
		Elliptical	2		
		Hexagonal	3		
		Globular	4		
26	Seed: Weight of 1000 grains	Very low (<5.0 gm)	1	Harvest maturity (75)	MS
		Small (5.0-7.5 gm)	3		
		Medium (7.6-10.0 gm)	5		
		Bold (10.1- 2.5 gm)	7		
		Very bold (>12.5 gm)	9		

<sup>1</sup>Source: Distinctness, Uniformity, Stability test guidelines and morphological descriptors for pearl millet (2006). Published by AICPMIP (ICAR), ARS, Mandor, Jodhpur - 342304.

<sup>2</sup>Nodes (1-9) are for the purpose of electronic data processing.

<sup>3</sup>Figures in parenthesis indicate the code for growth stages:

3: Seedling emergence stage      45: Panicle emergence stage

50: Anthesis stage                  65: Dough stage

75: Harvest maturity stage

<sup>4</sup>Type of assessment of characteristics:

MS: Measurement of a number of individual plants or parts of plants.

VG: Visual assessment by single observation of a group of plants or parts of plants.

VS: Visual assessment by observation of individual plants or parts of plants.

## Annexure II. Pedigree and CMS system details of ICRISAT-bred designated pearl millet A/B-lines developed during 2005 to 2018 at ICRISAT, Patancheru, India

S. No	Designation	Pedigree	Cytoplasm	Genetic base (Code <sup>1</sup> )
1	ICMA 05111	ICMB 05111 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
2	ICMB 05111	[{(ICMB 89111 × ICMB 88004) × (ICMB 88006 × ICMB 88005)}-2-1-1-4]-101 × B-bulk]-5-B-B		5
3	ICMA 05222	ICMB 05222 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
4	ICMB 05222	(ICMR 312 S1-8-3-3-B × HHVBC)-9-4-1-1		4
	ICMA 05333	ICMB 05333 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
6	ICMB 05333	(MC 94 S1-30-2-B × HHVBC)-16-3-1-1		5
7	ICMA 05444	ICMB 05444 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
8	ICMB 05444	(HTBLN/95-98 × ICMB 89111)-8-B		5
9	ICMA 05555	ICMB 05555 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
10	ICMB 05555	[(BSECBPT/91-39 × SPF3/S91-116)-15-2-1-4-4 × B-bulk]-1-B-4-1		5
11	ICMA 05666	ICMB 05666 backcrossed to 89111A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
12	ICMB 05666	[(BSECBPT/91-40 × SPF3/S91-3)-1-2-2-3 × B-bulk]-2-B-1-1		5
13	ICMA 05777	ICMB 05777 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
14	ICMB 05777	(D2BLN/95-98 × EEBC C1-1)-7-B-B		4
15	ICMA 05888	ICMB 05888 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
16	ICMB 05888	(SRC II C3 S1-1-1-2 × HHVBC)-5-1-1-2		4
17	ICMA 05999	ICMB 05999 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
18	ICMB 05999	(HTBLN/95-98 × ICMB 89111)-1-B-B-1		5
19	ICMA 06111	ICMB 06111 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
20	ICMB 06111	(ICMR 312 S1-8-3-3-B × HHVBC)-13-2-1		4
21	ICMA 06222	ICMB 06222 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
22	ICMB 06222	(ICMR 312 S1-1-5-2-B × HHVBC)-10-2-1-2-3		4
23	ICMA 06333	ICMB 06333 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
24	ICMB 06333	[D2BLN/95-100 × (ICMB 96333 × HHVBC)]-12-B		4
25	ICMA 06444	ICMB 06444 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
26	ICMB 06444	EEBC S1-407-1-B-B-B-B-1		2
27	ICMA 06555	ICMB 06555 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
28	ICMB 06555	[{{{843B × (843B × 700651)-11-1-2-B} × 1163B} × ICMB 89111 × ICMB 88005)}]-27+ × B-bulk]-3-B-B-10		5
29	ICMA 06666	ICMB 06666 backcrossed to 89111A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
30	ICMB 06666	[(BSECBPT/91-40 × SPF3/S91-3)-1-2-2-3 × B-bulk]-7-B-3-3		5
31	ICMA 06777	ICMB 06777 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
32	ICMB 06777	(ICMB 96333 × HHVBC-2-D2-HS-259-2)-4-B		4
33	ICMA 06888	ICMB 06888 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	

S. No	Designation	Pedigree	Cytoplasm	Genetic base (Code <sup>1</sup> )
34	ICMB 06888	[(BSECBPT/91-40 × SPF3/S91-514)-7-2-1-B × B-bulk]-2-B-1-1		5
35	ICMA 06999	ICMB 06999 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
36	ICMB 06999	(HTBC 48-B-1-1-1-5 × B-bulk)-1-B-B-8		5
37	ICMA 07111	ICMB 07111 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
38	ICMB 07111	(ICMB 96111 × 4038-4-2-B)-2-1-5-4		5
39	ICMA 07222	ICMB 07222 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
40	ICMB 07222	(D2BLN/95-262 × EEBC C1-3)-12-B-1-B-B-4		4
41	ICMA 07333	ICMB 07333 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
42	ICMB 07333	[ICMB 97444 × (D2BLN/95-98 × EEBC C1-1)-7-B-B]-34-2-4-B-B		5
43	ICMA 07444	ICMB 07444 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
44	ICMB 07444	[(MC 94 S1-81-1-B × HHVBC)-4-4-1 × (MC 94 S1-81-1-B × HHVBC)-4-2-4]-7-1-1-B		5
45	ICMA 07555	ICMB 07555 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
46	ICMB 07555	[(843B × ICTP 8202-161-5)-20-3-B-B-3 × B-bulk]-2-B-1		5
47	ICMA 07666	ICMB 07666 backcrossed to 89111A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
48	ICMB 07666	[ARD-288-1-10-1-2 (RM)-3 × B-bulk]-14-B-1-1		5
49	ICMA 07777	ICMB 07777 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
50	ICMB 07777	{ICMB 99555 × [(78-7088/3/SER3 AD//B282/ (3/4 EB) × PBLN/S95-359)-19-5-B-B]-13-2-B-B-B-B		5
51	ICMA 07888	ICMB 07888 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
52	ICMB 07888	[HTBLN/95-98 × (SPF3/S91-544 × SPF3/S91-5)-5-1-2]-3-B-B-1-B-1-B		5
53	ICMA 07999	ICMB 07999 backcrossed to 81A (A <sub>5</sub> ) cytoplasm source	A <sub>5</sub>	
54	ICMB 07999	(HTBC 48-B-1-1-1-5 × B-bulk)-25-1-B-B		5
55	ICMA 08111	ICMB 08111 backcrossed to 88004A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
56	ICMB 08111	(DMR 133 × HTBC 48-B-1-1-1-5)-4		5
57	ICMA 08222	ICMB 08222 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
58	ICMB 08222	[78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359]-19-2-B-1-B-B-3		5
59	ICMA 08333	ICMB 08333 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
60	ICMB 08333	[ICMB 97444 × (843B × 405B)-4]-1-2-B-B-B		5
61	ICMA 08444	ICMB 08444 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
62	ICMB 08444	HHVBC II D2 HS-410-1-2-4-1-3-B-2-2-3-2		2
63	ICMA 08555	ICMB 08555 backcrossed to 88004A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
64	ICMB 08555	(ICMB 96555 × IP 10437)-2-4-2-B-6-1		3
65	ICMA 08666	ICMB 08666 backcrossed to 88004A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
66	ICMB 08666	[(D2BLN/95-93 × SPF1/K95-3213-20)-10 × (91777B × HHVBC)]-7-B-1-B-B-4-B-1		5
67	ICMA 08777	ICMB 08777 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	

S. No	Designation	Pedigree	Cytoplasm	Genetic base (Code <sup>1</sup> )
68	ICMB 08777	(HTBC 48-B-1-1-1-5 × B-bulk)-1-B-B-5-1		5
69	ICMA 08888	ICMB 08888 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
70	ICMB 08888	(SRC II C3 S1-19-3-2 × HHVBC)-27-2-2-1-2-2		4
71	ICMA 08999	ICMB 08999 backcrossed to 81A (A <sub>5</sub> ) cytoplasm source	A <sub>5</sub>	
72	ICMB 08999	[ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-10-2-B-2]-19-2-B-B-B-B		5
73	ICMA 09111	ICMB 09111 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
74	ICMB 09111	[78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359]-7-4-B-B-2-B-B		5
75	ICMA 09222	ICMB 09222 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
76	ICMB 09222	[ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-10-2-B-2]-18-3-B-B-B-B		5
77	ICMA 09333	ICMB 09333 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
78	ICMB 09333	[(SRC II C3 S1-103-1-1 × HHVBC)-20 × (81B × ICMP 451)-5-4-2-3]-5-2-1-B-B-3-B		5
79	ICMA 09555	ICMB 09555 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
80	ICMB 09555	[(ICMB 95111 × 9035/S92-B-3)-17-1-B-B-B-B		5
81	ICMA 09666	ICMB 09666 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
82	ICMB 09666	(ICMB 95444 × ICMB 94555)-18-3-B-4-2		5
83	ICMA 09777	ICMB 09777 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
84	ICMB 09777	(ICMB 94555 × ICMB 92111)-17-2-B-1		5
85	ICMA 09888	ICMB 09888 backcrossed to 81A (A <sub>5</sub> ) cytoplasm source	A <sub>5</sub>	
86	ICMB 09888	NC D2 S1-2-2-2-3-2-B-2		2
87	ICMA 09999	ICMB 09999 backcrossed to 81A (A <sub>5</sub> ) cytoplasm source	A <sub>5</sub>	
88	ICMB 09999	(81B × 4025-3-2-B)-8-1-B		5
89	ICMA 10111	ICMB 10111 backcrossed to 88004A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
90	ICMB 10111	[(D2BLN/95-93 × SPF1/K95-3213-20)-10 × (91777B × HHVBC)]-7-B-1-B-B-2-B		5
91	ICMA 10222	ICMB 10222 backcrossed to 88004A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
92	ICMB 10222	(ICMB 01888 × ICMB 01222)-15-2-B-2-3		5
93	ICMA 10444	ICMB 10444 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
94	ICMB 10444	[78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359]-7-4-B-B-2-B-B		5
95	ICMA 10555	ICMB 10555 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
96	ICMB 10555	(ICMB 95444 × ICMB 94555)-18-3-B-4-2		5
97	ICMA 10666	ICMB 10666 backcrossed to 88004A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
98	ICMB 10666	[ICMB 97444 × (843B × EEBC S1-407)-12-4-B-B]-6-1-B-B-B-B		5
99	ICMA 10777	ICMB 10777 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
100	ICMB 10777	(ICMB 01666 × ICMB 01222)-27-3-B-3		5
101	ICMA 10888	ICMB 10888 backcrossed to 88004A (A <sub>5</sub> ) cytoplasm source	A <sub>5</sub>	

S. No	Designation	Pedigree	Cytoplasm	Genetic base (Code <sup>1</sup> )
102	ICMB 10888	[ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-10-2-B-2]-18-3-B-B-B-B		5
103	ICMA 10999	ICMB 10999 backcrossed to 81A (A <sub>5</sub> ) cytoplasm source	A <sub>5</sub>	
104	ICMB 10999	NC D2 S1-17-2-1-1-2-2-B-4		2
105	ICMA 11111	ICMB 11111 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
106	ICMB 11111	[EBC-GEN-S1-40-2-2-1 × B-bulk]-19-B-B-2-B-B-3		2
107	ICMA 11222	ICMB 11222 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
108	ICMB 11222	(ICMB 95444 × ICMB 93333)-24-2-B-2-B		5
109	ICMA 11333	ICMB 11333 backcrossed to 81A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
110	ICMB 11333	[ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-10-2-B-2]-8-1-B-2-B-B		5
111	ICMA 11444	ICMB 11444 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 88004A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>4</sub>	
112	ICMB 11444	[ICMB 97444 × (843B × EEBC S1-407)-12-4-B-B]-6-1-B-B-B-B		5
113	ICMA 11555	ICMB 11555 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 81A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>4</sub>	
114	ICMB 11555	[(MC 94 S1-81-1-B × HHVBC)-4-4-1 × (MC 94 S1-81-1-B × HHVBC)-4-2-4]-10-3-1-B-1		5
115	ICMA 11666	ICMB 11666 backcrossed to 81A (A <sub>5</sub> ) cytoplasm source	A <sub>5</sub>	
116	ICMB 11666	(MC 94 S1-34-1-B × HHVBC)-16-2-1-4-2-B		4
117	ICMA 11777	ICMB 11777 backcrossed to 88004A (A <sub>1</sub> and A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> <sup>*</sup> , A <sub>4</sub>	
118	ICMB 11777	[ICMB 97444 × (843B × 405B)-4]-1-2-B-B-B-B		5
119	ICMA 11999	ICMB 11999 backcrossed to 81A (A <sub>1</sub> , A <sub>4</sub> and A <sub>5</sub> ) Cytoplasm source	A <sub>1</sub> <sup>*</sup> , A <sub>4</sub> , A <sub>5</sub>	
120	ICMB 11999	(DMR 133 × HTBC 48-B-1-1-1-5)-9-1-B-B-1		5
121	ICMA 12111	ICMB 12111 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 81A (A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>5</sub>	
122	ICMB 12111	(ICMB 95444 × ICMB 93333)-24-2-B-B		5
123	ICMA 12222	ICMB 12222 backcrossed to 81A (A <sub>1</sub> , A <sub>4</sub> and A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> <sup>*</sup> , A <sub>4</sub> , A <sub>5</sub>	
124	ICMB 12222	(ICMB 95444 × ICMB 92111)-4-B-4-3-B-B		5
125	ICMA 12333	ICMB 12333 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 81A (A <sub>4</sub> and A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>4</sub> <sup>*</sup> , A <sub>5</sub>	
126	ICMB 12333	[HHV-S1-24-3-B-3-2 × (ICMB 91777 × HHVBC)]-5-B-1-1-B-B-B		5
127	ICMA 12444	ICMB 12444 backcrossed to 81A (A <sub>1</sub> and A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> <sup>*</sup> , A <sub>5</sub>	
128	ICMB 12444	(ICMB 95444 × ICMB 93333)-24-2-B-4-B-B-B		5
129	ICMA 12555	ICMB 12555 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
130	ICMB 12555	[ICMB 97444 × (D2BLN/95-98 × EEBC C1-1)-7-B-B]-34-2-4-B-B-5-B-B		5
131	ICMA 13111	ICMB 13111 backcrossed to 81A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
132	ICMB 13111	[78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359]-7-4-B-B-6-1-B-1-B-1-B-B-B		5
133	ICMA 13222	ICMB 13222 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 02111A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>4</sub>	
134	ICMB 13222	[(ICMB 95111 × 9035/S92-B-3)-17-5-1-B-B-B × ICMB 99111]-3-2-1-3		5

S. No	Designation	Pedigree	Cytoplasm	Genetic base (Code <sup>1</sup> )
135	ICMA 13444	ICMB 13444 backcrossed to 02111A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
136	ICMB 13444	[(D2BLN/95-93 × SPF1/K95-3213-20)-10 × (91777B × HHVBC)]-7-B-1-B-B-4-B-B-B-B-2		5
137	ICMA 13555	ICMB 13555 backcrossed to 97333A (A <sub>1</sub> and A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> *, A <sub>4</sub>	
138	ICMB 13555	(EEDBC S1-425-2-1-2-3-B-1-B-7-1 × B-bulk (3981-4011/S06 G1))-2-2-3		5
139	ICMA 13666	ICMB 13666 backcrossed to 97444A (A <sub>1</sub> ) and 03111A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> *, A <sub>4</sub>	
140	ICMB 13666	IC-CZBC-C0-166-2-1-3-B		2
141	ICMA 13777	ICMB 13777 backcrossed to 81A (A <sub>5</sub> ) cytoplasm source	A <sub>5</sub>	
142	ICMB 13777	(ICMB 01888 × ICMB 01222)-16-1-2-2-1-B-B		5
143	ICMA 14111	ICMB 14111 backcrossed to 88004A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
144	ICMB 14111	(HTBLN/95-98 × ICMB 89111)-8-B-B-B-B-2-B		5
145	ICMA 14222	ICMB 14222 backcrossed to 95444A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
146	ICMB 14222	IC-CZBC-C0-166-2-1-B-B-P3		2
147	ICMA 14333	ICMB 14333 backcrossed to 99666 A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
148	ICMB 14333	{(MC 94 S1-81-1-B × HHVBC)-4-4-1 × (MC 94 S1-81-1-B × HHVBC)-4-2-4-10-3-1--B-B-B × ICMB 02777}-81-1		5
149	ICMA 14444	ICMB 14444 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 88004A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>4</sub>	
150	ICMB 14444	(B × B) F2 (G-6)-86-1-1-3		5
151	ICMA 14555	ICMB 14555 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 81A (A <sub>4</sub> and A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>4</sub> *, A <sub>5</sub>	
152	ICMB 14555	(ICMB 97444 × ICMB 00888)-52-1-1-B-4-2-B		5
153	ICMA 14666	ICMB 14666 backcrossed to 98555A (A <sub>1</sub> ), 06999A (A <sub>4</sub> ) and 02555A (A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> *, A <sub>4</sub> , A <sub>5</sub>	
154	ICMB 14666	[(ICMB 95111 × 9035/S92-B-3)-17-5-1-B-B-B × ICMB 99111]-3-2-1-2		5
155	ICMA 15111	ICMB 15111 backcrossed to 95444A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
156	ICMB 15111	[(843B × ICMPS 900-9-3-2-2)-41-2-5-5 S2-34-1-2-1-1 × B-bulk]-18-B-B		5
157	ICMA 15222	ICMB 15222 backcrossed to 03666A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
158	ICMB 15222	{EEDBC S1-109-1-4-2-1-B-B-B-1-1 × 3981-3989 G1}-2-3-2		5
159	ICMA 15333	ICMB 15333 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 02111A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>4</sub>	
160	ICMB 15333	{(MC 94 S1-34-1-B × HHVBC)-12-1-2-2-2-B-1-B-B × [ICMB 95111 × (D2BLN/95-107 × EEBC C1-1)-6-B]-24-4-1-B-B-B-B}-8-2-2-2		5
161	ICMA 15444	ICMB 15444 backcrossed to 03999A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
162	ICMB 15444	(ICMB 95111 × EEBC S1-407-1-B-B)-17-3-1-B-B-B-B-4-B × 3981-4011 G2}-1-4-2		5
163	ICMA 15555	ICMB 15555 backcrossed to ICMA 04999 (A <sub>1</sub> ) and 03333A (A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> , A <sub>5</sub>	
164	ICMB 15555	[{(ICMB 96555 × IP 10437)-9-B-B-B-B-B × IP 14758-2-2}-19-1-B × (ICMB 96555 × IP 10437)-3-4-1-2-2-1-B-2-B-3]-3-3-2-1-4		5
165	ICMA 15666	ICMB 15666 backcrossed to 99666A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
166	ICMB 15666	(ICMB 01666 × ICMB 01222)-49-1-2-B-2-2-P1		5

S. No	Designation	Pedigree	Cytoplasm	Genetic base (Code <sup>1</sup> )
167	ICMA 15777	ICMB 15777 backcrossed to 06999A (A <sub>4</sub> ) and 10999A (A <sub>5</sub> ) cytoplasm source	A <sub>4</sub> *, A <sub>5</sub>	
168	ICMB 15777	IC-CZBC-C0-26-3-1-1-B-2		2
169	ICMA 16111	ICMB 16111 backcrossed to 98555A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
170	ICMB 16111	(BSECBPT/91-38 × SPF3/S91-529)-10-1-7-1		5
171	ICMA 16222	ICMB 16222 backcrossed to 97555A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
172	ICMB 16222	(ICMB 04888 × ICMB 02333)-3-1-3-1		5
173	ICMA 16333	ICMB 16333 backcrossed to 01222A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
174	ICMB 16333	(ICMB 96555 × IP 10437)-3-4-1-2-8 × {(96555B × LaGrap C2 S1-32-1)-10} × IP 14758-2-1]-8-3-2-1-2-2		5
175	ICMA 16444	ICMB 16444 backcrossed to 95444A (A <sub>1</sub> ) and 03111A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> *, A <sub>4</sub>	
176	ICMB 16444	(ICMB 04888 × ICMB 00444)-7-1-3-2		5
177	ICMA 16555	ICMB 16555 backcrossed to 00222A (A <sub>1</sub> ) and 0699A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> *, A <sub>4</sub>	
178	ICMB 16555	[(ICMB 95111 × 9035/S92-B-3)-17-5-1-B-B-B × ICMB 99111]-3-2-3-B		5
179	ICMA 16666	ICMB 16666 backcrossed to 97444A (A <sub>1</sub> ) and 07999A (A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> *, A <sub>5</sub>	
180	ICMB 16666	(ICMB 04888 × ICMB 99222)-10-3-1-3		5
181	ICMA 17222	ICMB 17222 backcrossed to 97555A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
182	ICMB 17222	(HHVDBC HS-246-1-2-1-2 × ICMB 99555)-1-3-1-1		5
183	ICMA 17333	ICMB 17333 backcrossed to 96333A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
184	ICMB 17333	[[[ICMV 88908-11-12-3-2-B × B-bulk]-8-B-3 × {(843B × ICMPS 900-9-3-2-2)-41-2-5-5 S2-34-1-2-1-1 × B-bulk]-5-B-B]-11-1-1-B-B × ICMB 04111]-127-1-3-4		5
185	ICMA 17444	ICMB 17444 backcrossed to 97555A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
186	ICMB 17444	EBC-Gen-S1-40-2-2-1 × B-line bulk]-28-B-B-3-B-B-3		5
187	ICMA 17555	ICMB 17555 backcrossed to 01555A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
188	ICMB 17555	{(EEDBC S1-425-2-1-2-3-B-2-2-1 × NC D2 BC7F4-22-2-4-1-3-3 1-B) × (HHVDBC Dwarf HS-155-1-1-1-2-2-3 × HHVDBC		5
189	ICMA 17666	ICMB 17666 backcrossed to 03111A (A <sub>4</sub> ) and 02444A (A <sub>5</sub> ) cytoplasm source	A <sub>4</sub> *, A <sub>5</sub>	
190	ICMB 17666	{(MC 94 S1-81-1-B × HHVBC)-4-4-1 × (MC 94 S1-81-1-B × HHVBC)-4-2-4-10-3-1--B-B-B × ICMB 02777}-3-3-B-2		5
191	ICMA 17777	ICMB 17777 backcrossed to 05444A (A <sub>1</sub> ), 05111A (A <sub>4</sub> ) and 02444A (A <sub>5</sub> ) cytoplasm source	A <sub>1</sub> *, A <sub>4</sub> , A <sub>5</sub>	
192	ICMB 17777	[(ICMB 95111 × 9035/S92-B-3)-17-5-1-B-B-B × ICMB 99111]-3- 2-4-B		5
193	ICMA 18111	ICMB 18111 backcrossed to 05444A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
194	ICMB 18111	[{(ICMB 96555 × IP 10437)-9-B-B-B-B-B-B × IP 14758-2-2]-19-1-B × (ICMB 96555 × IP 10437)-3-4-1-2-2-1-B-2-B-3]-3-3-2-1-5		5
195	ICMA 18222	ICMB 18222 backcrossed to 97555A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
196	ICMB 18222	[{(843B × (843B × 700651)-11-1-2-B) × 1163B} × (ICMB 89111 × ICMB 88005)]-5-2-2-B-18		5
197	ICMA 18333	ICMB 18333 backcrossed to 97555A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	

S. No	Designation	Pedigree	Cytoplasm	Genetic base (Code <sup>1</sup> )
198	ICMB 18333	[ICMB 97444 × (D2BLN/95-98 × EEBC C1-1)-7-B-B]-34-2-4-B-B-B-5		5
199	ICMA 18444	ICMB 18444 backcrossed to 98555A (A <sub>1</sub> ) cytoplasm source	A <sub>1</sub>	
200	ICMB 18444	(BSEC BPT/91-38 × SPF3/S91-529)-10-1-7-18		5
201	ICMA 18555	ICMB 18555 backcrossed to 02111A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
202	ICMB 18555	{HHVDBC HS-10-1-2-1-1-4 × [ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-19-5-B-B]-13-2-B-B-B}-22-3-2-2-1-B-18		
203	ICMA 18666	ICMB 18666 backcrossed to 06999A (A <sub>4</sub> ) cytoplasm source	A <sub>4</sub>	
204	ICMB 18666	{(HHVDBC HS-246-1-2-1-2 × ICMB 99555)-2-2-2-1 × {(MC 94S1-34-1-B × HHVBC)-16-2-1-1-1-1-B-B-5 × (MC 94 S1-34-1-B × HHVBC)-10-4-1-2-1-B-B-1-30-2-4-2-6-2-4)-15-3-5-1		5
205	ICMA 18777	ICMB 18777 backcrossed to 96333A (A <sub>1</sub> ) and 01555A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> <sup>*</sup> , A <sub>4</sub>	
206	ICMB 18777	[HHVDBC HS-120-1-2-1-1-3-B × (SRC II C3 S1-19-3-2 × HHVBC)-3-5-1-1-1-B]-20-1-2-2		5
207	ICMA 18888	ICMB 18888 backcrossed to 94555A (A <sub>1</sub> ) and 06999A (A <sub>4</sub> ) cytoplasm source	A <sub>1</sub> <sup>*</sup> , A <sub>4</sub>	
208	ICMB 18888	(ICMB 04888 × HHVDBC HS-10-1-2-1-1-1-2-B)-1-2-3-2		5

1: Refer to Table 1, \* Planted A-line of marked cytoplasm during evaluation of trail but CMS line available for other cytoplasm also.

Decoding of abbreviations used in pedigree of some of the B-lines	
Designation	Pedigree
1163B	BKM-1163 maintainer of AKM 1163 (KSU, Hays, Kansas)
3/4 EB	Used with IRAT material to signify dwarf material derived from a first backcross to landrace population Ex Bornu from north-east Nigeria
405B	Seed parent developed by CCS HAU, Hisar
9035/S92	{(ICMB 89111 X ICMB 88004) X (ICMB 88006 X ICMB 88005)-2-1-1-4}-101
ARD-288	Iniadi germplasm accession ARD (Appa Rao, Rai and Djaney) 288 from Togo
B282	A d2 dwarf restorer
BKM	B line Kansa Millet
BSEC BPT/91-39	Bold Seeded Early Composite B Line Parental Trial 1991 Entry No 39
D2BLN/95-100	D2 Dwarf B Line Nursery 1995 Entry No 100
D2BLN/95-107	D2 Dwarf B Line Nursery 1995 Entry No 107
D2BLN/95-262	D2 Dwarf B Line Nursery 1995 Entry No 262
D2BLN/95-93	D2 Dwarf B Line Nursery 1995 Entry No 93
D2BLN/95-98	D2 Dwarf B Line Nursery 1995 Entry No 98
D2BLN/95-98	D2 Dwarf B Line Nursery 1995 Entry No 98
DMR 133	{843B × (843B × 700651)}-11-1-2-B]-96-2-3-4
EEBC	Extra Early B Composite



HHVBC	High Head Volume B-lines Composite developed by random mating 38 progenies derived from pedigree breeding in summer 1990. All these lines were of African origin.
HTBLN/95-98	{(ICMB 89111 X ICMB 88004) X (ICMB 88006 X ICMB 88005)-2-1-1-4}-101-B-3
IC-CZBC	ICRISAT-CAZRI B line Composite
ICMP 451	LCSN 72-1-2-1-1
ICMPS 900	[EB 137-I-1 x EB 117-2-1]
ICMR 312	ICMR 312 was developed from 113 FAO designated material and the Bold Seeded Early Composite (BSEC). BSEC (Bold Seeded Early Composite) was developed at Patancheru, Parents = ICTP 8202, ICTP 8203, selected Togo progenies, ICTP A82, EGP-H8401 from EC II and ICGP 8501.
ICMV 87901	Recombination of S1 plants selection from ICMP 87906 (BSEC C3 female bulk) at ICRISAT
ICMV 88908 (Okashana 1)	Mass selection variety from the cross between BSEC C4 and ICMV 87901
ICTP 8202	Breed from 5 S2 progenies of land race introduction from Togo in 1982
IVC	Inter Varietal Composite
LaGrap C2	Large Grain Population Cycle 2
LCSN	Selection from ICRISAT late composite (LC) made in upper volta
MC 94	Medium composite 94
NC D2	Nigerian composite dwarf
PBLN/S95-359	Potential B Line Nursery 1995 Entry No 359
SPF1/K95-3213	Seed Parent Filial 3 Nursery summer 1995 Entry No 3213
SPF3/S91-116	Seed Parent Filial 3 Nursery summer 1991 Entry No 166
SPF3/S91-5	Seed Parent Filial 3 Nursery summer 1991 Entry No 5
SPF3/S91-514	Seed Parent Filial 3 Nursery summer 1991 Entry No 514
SPF3/S91-529	Seed Parent Filial 3 Nursery summer 1991 Entry No 529
SPF3/S91-544	Seed Parent Filial 3 Nursery summer 1991 Entry No 544
SRC II	Smut Resistant Composite II (Formed by merging IVC and SRC)

**Annexure III. Morphological characteristics of pearl millet A/B pairs during 2019 summer season (E1) and rainy season (E2) at ICRISAT, Patancheru, India**

A/B Pairs	Days to 50% flowering				Number of productive tillers				Plant height (cm)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMA 05111	45.5	44.0	44.8	3	3.9	4.9	4.4	5	73.0	92.0	82.5	1
ICMB 05111	51.0	45.0	48.0	5	3.9	3.7	3.8	5	77.0	95.0	86.0	1
ICMA 05222	50.0	45.0	47.5	5	2.5	2.7	2.6	3	91.5	103.0	97.3	1
ICMB 05222	54.0	47.5	50.8	7	1.6	2.4	2.0	3	90.5	95.5	93.0	1
ICMA 05333	50.5	47.5	49.0	5	1.2	1.3	1.3	1	79.5	91.0	85.3	1
ICMB 05333	53.5	48.0	50.8	7	1.4	1.3	1.4	1	84.5	93.4	88.9	1
ICMA 05444	45.0	39.5	42.3	3	3.7	4.2	4.0	5	99.0	122.0	114.8	3
ICMB 05444	46.5	42.0	44.3	3	2.8	3.7	3.3	3	107.5	127.5	113.3	3
ICMA 05555	46.5	45.0	45.8	5	2.3	2.7	2.5	3	88.5	105.5	97.0	1
ICMB 05555	47.5	47.0	47.3	5	1.9	2.5	2.2	3	93.0	105.0	99.0	1
ICMA 05666	49.0	44.5	46.8	5	2.0	3.4	2.7	3	69.5	93.0	81.3	1
ICMB 05666	49.0	46.0	47.5	5	3.2	3.0	3.1	3	73.0	89.5	81.3	1
ICMA 05777	45.0	40.5	42.8	3	3.1	3.5	3.3	3	99.5	126.5	113.0	3
ICMB 05777	46.5	41.0	43.8	3	3.3	3.0	3.2	3	100.5	120.5	110.5	3
ICMA 05888	53.5	45.0	49.3	5	1.4	3.4	2.4	3	108.0	121.5	114.8	3
ICMB 05888	54.0	46.5	50.3	5	1.6	3.0	2.3	3	111.5	114.0	112.8	3
ICMA 05999	44.0	42.5	43.3	3	5.4	4.9	5.2	5	80.0	94.5	87.3	1
ICMB 05999	45.5	45.0	45.3	3	5.0	4.8	4.9	5	82.0	96.5	89.3	1
ICMA 06111	46.5	44.5	45.5	5	2.5	2.1	2.3	3	88.5	101.0	94.8	1
ICMB 06111	48.0	46.0	47.0	5	2.0	2.8	2.4	3	89.0	99.0	94.0	1
ICMA 06222	48.5	44.0	46.3	5	1.7	2.0	1.9	3	67.5	84.5	76.0	1
ICMB 06222	47.5	46.0	46.8	5	1.5	2.4	2.0	3	68.0	88.0	78.0	1
ICMA 06333	43.5	42.0	42.8	3	3.8	2.5	3.2	3	79.5	102.5	91.0	1
ICMB 06333	45.5	42.0	43.8	3	3.8	3.6	3.7	5	80.5	104.0	92.3	1
ICMA 06444	43.5	39.0	41.3	3	2.5	4.0	3.3	3	101.5	88.0	94.8	1
ICMB 06444	45.5	37.0	41.3	3	1.9	2.8	2.4	3	92.5	89.0	90.8	1
ICMA 06555	55.5	45.0	50.3	5	2.6	2.4	2.5	3	104.5	115.5	110.0	3
ICMB 06555	57.0	47.5	52.3	7	1.9	2.4	2.2	3	106.5	114.0	110.3	3
ICMA 06666	43.0	42.0	42.5	3	3.7	3.4	3.6	5	73.0	84.5	78.8	1
ICMB 06666	44.5	45.0	44.8	3	4.0	3.4	3.7	5	78.0	86.0	82.0	1
ICMA 06777	44.5	41.5	43.0	3	3.1	2.7	2.9	3	89.0	113.0	101.0	3

A/B Pairs	Days to 50% flowering				Number of productive tillers				Plant height (cm)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMB 06777	45.5	42.0	43.8	3	3.6	3.0	3.3	3	89.0	118.5	103.8	3
ICMA 06888	46.5	43.5	45.0	3	3.5	2.1	2.8	3	75.0	85.0	80.0	1
ICMB 06888	48.5	45.0	46.8	5	2.8	3.6	3.2	3	74.0	95.5	84.8	1
ICMA 06999	44.5	44.5	44.5	3	3.2	4.6	3.9	5	99.0	119.5	109.3	3
ICMB 06999	47.5	46.0	46.8	5	4.3	4.3	4.3	5	101.0	119.0	110.0	3
ICMA 07111	52.5	49.5	51.0	7	5.3	4.6	5.0	5	90.0	123.5	106.8	3
ICMB 07111	54.5	49.5	52.0	7	4.1	3.7	3.9	5	95.5	122.0	108.8	3
ICMA 07222	46.0	40.5	43.3	3	3.6	3.4	3.5	5	81.5	94.0	87.8	1
ICMB 07222	47.0	41.0	44.0	3	3.3	3.5	3.4	3	81.5	86.9	84.2	1
ICMA 07333	56.5	47.5	52.0	7	3.0	3.3	3.2	3	99.0	128.5	113.8	3
ICMB 07333	58.0	52.5	55.3	7	3.3	3.6	3.5	3	107.0	131.5	119.3	3
ICMA 07444	56.0	52.0	54.0	7	2.9	2.9	2.9	3	96.0	113.0	104.5	3
ICMB 07444	60.0	53.0	56.5	9	1.9	2.4	2.2	3	101.0	112.5	106.8	3
ICMA 07555	43.5	40.5	42.0	3	1.6	2.6	2.1	3	73.5	104.0	88.8	1
ICMB 07555	45.5	43.0	44.3	3	2.6	2.9	2.8	3	81.0	101.5	91.3	1
ICMA 07666	42.0	46.5	44.3	3	2.4	3.1	2.8	3	77.5	102.5	90.0	1
ICMB 07666	43.5	48.0	45.8	5	2.2	2.8	2.5	3	71.5	107.5	89.5	1
ICMA 07777	44.5	45.0	44.8	3	2.5	2.3	2.4	3	82.0	83.5	82.8	1
ICMB 07777	45.5	44.5	45.0	3	2.2	1.8	2.0	3	81.5	86.0	83.8	1
ICMA 07888	46.5	42.0	44.3	3	2.5	3.8	3.2	3	113.0	132.5	122.8	3
ICMB 07888	51.0	45.0	48.0	5	2.9	3.4	3.2	3	112.5	135.5	124.0	3
ICMA 07999	48.0	44.0	46.0	5	2.7	3.0	2.9	3	98.0	108.5	103.3	3
ICMB 07999	49.0	43.5	46.3	5	3.9	2.6	3.3	3	96.0	109.0	102.5	3
ICMA 08111	47.0	45.5	46.3	5	3.4	2.1	2.8	3	101.5	131.0	116.3	3
ICMB 08111	47.5	46.0	46.8	5	2.8	2.0	2.4	3	101.0	133.0	117.0	3
ICMA 08222	46.5	45.0	45.8	5	1.7	1.5	1.6	3	121.5	146.5	136.5	3
ICMB 08222	49.0	45.0	47.0	5	1.5	1.8	1.7	3	126.5	160.0	140.8	3
ICMA 08333	49.0	44.0	46.5	5	3.4	3.4	3.4	3	86.0	109.0	97.5	1
ICMB 08333	54.5	44.0	49.3	5	2.6	2.3	2.5	3	83.5	108.5	96.0	1
ICMA 08444	49.5	45.0	47.3	5	1.9	3.1	2.5	3	101.5	118.5	110.0	3
ICMB 08444	51.0	45.0	48.0	5	1.8	2.3	2.1	3	96.5	108.5	102.5	3
ICMA 08555	48.5	46.0	47.3	5	1.9	2.1	2.0	3	94.5	113.0	103.8	3
ICMB 08555	52.5	47.5	50.0	5	1.7	1.7	1.7	3	92.0	115.1	103.6	3

A/B Pairs	Days to 50% flowering				Number of productive tillers				Plant height (cm)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMA 08666	51.0	47.5	49.3	5	2.7	2.1	2.4	3	92.5	102.0	97.3	1
ICMB 08666	54.5	49.0	51.8	7	2.2	2.7	2.5	3	94.0	99.5	96.8	1
ICMA 08777	45.5	45.0	45.3	3	4.3	4.7	4.5	5	98.5	119.5	109.0	3
ICMB 08777	47.0	46.0	46.5	5	4.7	4.4	4.6	5	103.5	125.0	114.3	3
ICMA 08888	50.5	54.0	52.3	7	2.0	1.7	1.9	3	100.5	137.0	118.8	3
ICMB 08888	53.5	54.0	53.8	7	1.6	1.6	1.6	3	99.5	130.0	114.8	3
ICMA 08999	51.0	53.0	52.0	7	3.9	2.9	3.4	3	103.5	134.0	118.8	3
ICMB 08999	51.5	52.0	51.8	7	2.9	2.9	2.9	3	105.0	131.0	118.0	3
ICMA 09111	46.5	47.0	46.8	5	2.0	2.6	2.3	3	92.0	96.5	94.3	1
ICMB 09111	48.5	47.5	48.0	5	1.8	2.0	1.9	3	88.5	93.5	91.0	1
ICMA 09222	43.0	40.0	41.5	3	2.0	3.1	2.6	3	70.5	74.0	72.3	1
ICMB 09222	44.5	42.0	43.3	3	2.3	2.5	2.4	3	69.0	74.0	71.5	1
ICMA 09333	60.5	57.0	58.8	9	2.9	2.9	2.9	3	125.5	130.5	128.0	3
ICMB 09333	62.5	61.0	61.8	9	2.6	2.3	2.5	3	127.0	129.5	128.3	3
ICMA 09555	46.5	44.5	45.5	5	1.4	2.8	2.1	3	100.5	113.0	106.8	3
ICMB 09555	47.0	42.5	44.8	3	1.7	2.1	1.9	3	103.0	122.5	112.8	3
ICMA 09666	45.5	43.5	44.5	3	3.9	4.1	4.0	5	84.0	109.0	96.5	1
ICMB 09666	45.5	44.5	45.0	3	3.9	3.6	3.8	5	83.5	110.0	96.8	1
ICMA 09777	46.5	39.5	43.0	3	2.4	3.2	2.8	3	87.5	114.0	100.8	3
ICMB 09777	49.0	43.0	46.0	5	3.1	2.4	2.8	3	85.0	105.0	95.0	1
ICMA 09888	52.0	53.0	52.5	7	4.0	4.8	4.4	5	114.0	150.5	132.3	3
ICMB 09888	53.0	53.0	53.0	7	3.3	4.5	3.9	5	109.0	150.0	129.5	3
ICMA 09999	59.5	52.5	56.0	9	2.7	2.5	2.6	3	104.5	115.0	109.8	3
ICMB 09999	63.5	53.0	58.3	9	1.8	2.4	2.1	3	97.5	110.5	104.0	3
ICMA 10111	46.5	41.5	44.0	3	2.9	3.3	3.1	3	84.5	100.5	92.5	1
ICMB 10111	48.0	41.5	44.8	3	2.3	2.8	2.6	3	81.0	99.0	90.0	1
ICMA 10222	47.0	42.5	44.8	3	3.5	3.9	3.7	5	79.5	111.0	95.3	1
ICMB 10222	47.5	44.0	45.8	5	3.0	2.9	3.0	3	80.5	104.5	92.5	1
ICMA 10444	48.0	46.0	47.0	5	1.4	1.6	1.5	3	84.0	93.0	88.5	1
ICMB 10444	49.5	48.0	48.8	5	1.2	1.8	1.5	3	83.0	97.0	90.0	1
ICMA 10555	47.0	44.0	45.5	5	4.0	3.0	3.5	5	89.0	102.0	95.5	1
ICMB 10555	47.5	45.0	46.3	5	3.7	3.9	3.8	5	87.5	108.0	97.8	1
ICMA 10666	46.0	42.5	44.3	3	4.6	3.7	4.2	5	69.5	83.5	76.5	1

A/B Pairs	Days to 50% flowering				Number of productive tillers				Plant height (cm)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMB 10666	48.5	43.0	45.8	5	4.6	4.5	4.6	5	72.0	85.5	78.8	1
ICMA 10777	51.0	48.5	49.8	5	2.3	2.7	2.5	3	115.5	128.5	122.0	3
ICMB 10777	56.5	54.0	55.3	7	1.5	1.8	1.7	3	114.0	127.0	120.5	3
ICMA 10888	44.5	42.5	43.5	3	2.4	2.1	2.3	3	68.0	75.5	71.8	1
ICMB 10888	45.0	42.5	43.8	3	1.4	2.1	1.8	3	70.5	77.5	74.0	1
ICMA 10999	57.0	55.0	56.0	9	1.9	2.6	2.3	3	100.0	127.5	113.8	3
ICMB 10999	58.0	54.5	56.3	9	1.9	2.2	2.1	3	101.0	126.0	113.5	3
ICMA 11111	47.5	46.0	46.8	5	3.7	2.8	3.3	3	91.5	117.0	104.3	3
ICMB 11111	48.5	47.5	48.0	5	3.5	2.4	3.0	3	95.0	115.5	105.3	3
ICMA 11222	55.5	52.0	53.8	7	2.4	3.0	2.7	3	88.0	119.5	103.8	3
ICMB 11222	57.5	53.0	55.3	7	1.9	2.6	2.3	3	98.0	128.0	113.0	3
ICMA 11333	44.0	43.5	43.8	3	2.7	1.8	2.3	3	86.0	92.5	89.3	1
ICMB 11333	45.5	45.5	45.5	5	2.2	1.4	1.8	3	79.0	97.5	88.3	1
ICMA 11444	41.5	43.0	42.3	3	2.9	4.2	3.6	5	73.0	86.0	79.5	1
ICMB 11444	42.0	45.0	43.5	3	4.4	5.8	5.1	5	75.5	88.5	82.0	1
ICMA 11555	52.5	46.5	49.5	5	2.2	2.8	2.5	3	91.5	111.0	101.3	3
ICMB 11555	54.5	48.5	51.5	7	2.1	2.7	2.4	3	91.0	113.5	102.3	3
ICMA 11666	53.5	53.0	53.3	7	1.9	2.9	2.4	3	79.0	85.0	82.0	1
ICMB 11666	57.0	54.0	55.5	9	1.6	2.9	2.3	3	73.0	73.5	73.3	1
ICMA 11777	53.5	41.5	47.5	5	3.2	3.3	3.3	3	91.5	105.5	98.5	1
ICMB 11777	55.5	41.5	48.5	5	2.6	2.9	2.8	3	84.0	106.0	95.0	1
ICMA 11999	42.0	41.0	41.5	3	4.2	4.8	4.5	5	79.5	112.0	95.8	1
ICMB 11999	45.5	40.0	42.8	3	4.2	4.1	4.2	5	88.0	117.5	102.8	3
ICMA 12111	53.0	53.5	53.3	7	5.4	4.1	4.7	5	115.0	153.5	134.3	3
ICMB 12111	55.0	53.5	54.3	7	3.8	3.1	3.5	3	110.5	151.0	130.8	3
ICMA 12222	45.5	46.0	45.8	5	5.0	4.9	5.0	5	85.0	110.0	97.5	1
ICMB 12222	49.0	47.0	48.0	5	3.5	3.5	3.5	5	90.0	109.5	99.8	1
ICMA 12333	49.5	45.0	47.3	5	1.9	2.1	2.0	3	83.5	98.0	90.8	1
ICMB 12333	52.5	47.0	49.8	5	1.4	2.2	1.8	3	83.0	95.5	89.3	1
ICMA 12444	53.5	45.0	49.3	5	2.9	3.4	3.2	3	120.5	139.5	130.0	3
ICMB 12444	55.0	45.0	50.0	5	2.1	3.7	2.9	3	117.0	139.0	128.0	3
ICMA 12555	54.5	48.5	51.5	7	3.6	3.4	3.5	5	95.5	126.0	110.8	3
ICMB 12555	56.0	51.5	53.8	7	3.5	3.6	3.6	5	101.5	125.5	113.5	3

A/B Pairs	Days to 50% flowering				Number of productive tillers				Plant height (cm)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMA 13111	47.5	45.5	46.5	5	1.8	1.9	1.9	3	66.5	86.0	76.3	1
ICMB 13111	51.0	51.5	51.3	7	1.6	2.2	1.9	3	69.5	82.0	75.8	1
ICMA 13222	54.0	54.5	54.3	7	1.9	2.6	2.3	3	126.0	170.0	148.0	3
ICMB 13222	56.5	54.5	55.5	9	1.5	2.4	2.0	3	130.0	170.5	150.3	3
ICMA 13444	43.5	NA	43.5	3	3.3	NA	3.3	3	92.5	NA	92.5	1
ICMB 13444	47.0	NA	47.0	5	1.7	NA	1.7	3	88.0	NA	88.0	1
ICMA 13555	49.0	42.5	45.8	5	4.0	3.7	3.9	5	95.0	112.5	103.8	3
ICMB 13555	52.5	42.0	47.3	5	2.8	2.9	2.9	3	91.0	115.5	103.3	3
ICMA 13666	43.5	41.0	42.3	3	3.1	3.0	3.1	3	85.5	98.0	91.8	1
ICMB 13666	45.5	41.5	43.5	3	2.8	3.2	3.0	3	83.5	107.0	95.3	1
ICMA 13777	59.0	46.0	52.5	7	2.5	3.1	2.8	3	101.5	109.5	105.5	3
ICMB 13777	57.0	47.0	52.0	7	2.6	2.8	2.7	3	98.0	110.0	104.0	3
ICMA 14111	44.0	41.5	42.8	3	5.4	3.7	4.6	5	91.0	121.0	106.0	3
ICMB 14111	46.0	43.0	44.5	3	3.5	3.7	3.6	5	95.5	121.5	108.5	3
ICMA 14222	49.0	47.5	48.3	5	3.4	3.3	3.4	3	95.5	113.0	104.3	3
ICMB 14222	51.0	49.0	50.0	5	2.9	2.6	2.8	3	89.5	105.5	97.5	1
ICMA 14333	58.0	52.5	55.3	7	2.3	2.0	2.2	3	105.0	116.0	110.5	3
ICMB 14333	60.0	52.5	56.3	9	1.7	1.9	1.8	3	106.0	119.5	112.8	3
ICMA 14444	49.0	44.0	46.5	5	2.9	2.9	2.9	3	97.5	123.0	110.3	3
ICMB 14444	50.0	44.5	47.3	5	2.5	2.9	2.7	3	103.5	119.0	111.3	3
ICMA 14555	47.0	47.0	47.0	5	1.7	2.3	2.0	3	112.0	135.5	128.5	3
ICMB 14555	49.0	49.0	49.0	5	2.1	1.8	2.0	3	121.5	145.0	128.5	3
ICMA 14666	NA	44.5	45	3	NA	2.9	2.9	3	NA	149.0	149.0	3
ICMB 14666	NA	46.5	47	5	NA	2.1	2.1	3	NA	149.5	149.5	3
ICMA 15111	55.0	55.5	55	7	5.1	6.9	6.0	5	89.5	105.5	97.5	1
ICMB 15111	57.5	55.0	56	9	9.2	9.1	9.2	7	92.0	107.0	99.5	1
ICMA 15222	45.5	38.5	42	3	2.5	3.5	3.0	3	101.5	119.0	110.3	3
ICMB 15222	46.0	39.0	43	3	2.7	3.1	2.9	3	101.0	121.5	111.3	3
ICMA 15333	45.0	39.5	42	3	2.2	2.4	2.3	3	96.5	118.0	107.3	3
ICMB 15333	46.5	41.0	44	3	1.7	2.5	2.1	3	101.0	126.5	113.8	3
ICMA 15444	47.0	46.5	47	5	3.2	2.5	2.9	3	111.0	134.5	122.8	3
ICMB 15444	47.0	48.0	48	5	3.7	2.0	2.9	3	114.5	136.5	125.5	3
ICMA 15555	51.5	48.5	50	5	1.4	2.5	2.0	3	111.0	137.5	124.3	3

A/B Pairs	Days to 50% flowering				Number of productive tillers				Plant height (cm)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMB 15555	52.5	49.0	51	7	1.4	2.3	1.9	3	112.0	141.0	126.5	3
ICMA 15666	54.5	55.0	55	7	2.3	1.6	2.0	3	90.0	88.5	89.3	1
ICMB 15666	57.5	56.0	57	9	1.8	1.9	1.9	3	89.5	88.5	89.0	1
ICMA 15777	50.0	45.5	48	5	3.1	3.0	3.1	3	78.5	96.0	87.3	1
ICMB 15777	52.0	46.5	49	5	1.6	2.4	2.0	3	72.0	90.5	81.3	1
ICMA 16111	49.5	44.0	47	5	2.4	2.6	2.5	3	81.5	103.5	92.5	1
ICMB 16111	50.0	45.5	48	5	2.6	2.2	2.4	3	85.0	101.0	93.0	1
ICMA 16222	46.0	44.0	45	3	2.4	1.9	2.2	3	102.5	134.5	118.5	3
ICMB 16222	47.0	45.5	46	5	3.1	2.3	2.7	3	105.0	126.0	115.5	3
ICMA 16333	52.0	54.0	53	7	1.8	1.4	1.6	3	113.0	142.0	127.5	3
ICMB 16333	52.5	60.5	57	9	1.4	1.5	1.5	1	116.0	146.0	131.0	3
ICMA 16444	43.5	42.0	43	3	2.4	2.9	2.7	3	90.0	116.5	103.3	3
ICMB 16444	45.0	42.5	44	3	2.7	2.3	2.5	3	86.5	116.0	101.3	3
ICMA 16555	57.0	46.0	52	7	2.8	3.3	3.1	3	122.0	147.5	134.8	3
ICMB 16555	59.5	48.0	54	7	2.4	3.0	2.7	3	122.5	146.5	134.5	3
ICMA 16666	46.0	NA	46	5	2.6	NA	2.6	3	109.5	NA	109.5	3
ICMB 16666	47.5	NA	48	5	2.4	NA	2.4	3	118.5	NA	118.5	3
ICMA 17222	48.5	50.5	50	5	1.5	1.6	1.6	3	88.0	109.0	98.5	1
ICMB 17222	50.5	50.5	51	7	1.5	1.2	1.4	1	94.5	120.5	107.5	3
ICMA 17333	56.0	49.5	53	7	3.4	3.7	3.6	5	98.5	112.5	105.5	3
ICMB 17333	59.5	53.0	56	9	2.7	3.4	3.1	3	106.0	110.0	108.0	3
ICMA 17444	50.0	44.0	47	5	2.0	2.9	2.5	3	90.5	101.0	95.8	1
ICMB 17444	54.0	45.0	50	5	1.8	2.9	2.4	3	90.5	104.0	97.3	1
ICMA 17555	51.5	51.5	52	7	2.0	2.2	2.1	3	112.5	126.5	119.5	3
ICMB 17555	52.5	53.0	53	7	2.3	2.2	2.3	3	110.5	129.5	120.0	3
ICMA 17666	54.5	54.0	54	7	1.5	2.1	1.8	3	93.5	109.5	101.5	3
ICMB 17666	57.5	54.0	56	9	1.4	1.5	1.5	1	96.0	114.0	105.0	3
ICMA 17777	58.0	54.0	56	9	1.4	2.7	2.1	3	140.5	176.5	158.5	5
ICMB 17777	61.5	54.0	58	9	1.8	2.8	2.3	3	140.0	172.5	156.3	5
ICMA 18111	53.0	49.0	51	7	2.1	2.7	2.4	3	99.0	138.0	118.5	3
ICMB 18111	58.5	49.0	54	7	2.1	2.3	2.2	3	104.0	142.5	123.3	3
ICMA 18222	49.5	51.0	50	5	2.4	1.8	2.1	3	73.5	81.5	77.5	1
ICMB 18222	53.5	53.0	53	7	2.0	2.4	2.2	3	77.5	82.0	79.8	1

A/B Pairs	Days to 50% flowering				Number of productive tillers				Plant height (cm)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMA 18333	57.0	49.0	53	7	1.8	2.0	1.9	3	90.5	99.5	95.0	1
ICMB 18333	59.0	53.5	56	9	1.2	1.4	1.3	1	89.0	99.0	94.0	1
ICMA 18444	46.5	45.0	46	5	1.5	2.6	2.1	3	85.0	96.0	90.5	1
ICMB 18444	47.0	46.0	47	5	2.1	1.6	1.9	3	89.5	98.5	94.0	1
ICMA 18555	56.5	61.0	59	9	2.1	1.0	1.6	3	116.0	126.8	121.4	3
ICMB 18555	62.0	65.0	64	9	1.5	1.5	1.5	1	106.5	119.5	113.0	3
ICMA 18666	55.0	56.5	56	9	1.9	2.2	2.1	3	94.0	111.0	102.5	3
ICMB 18666	59.0	57.0	58	9	2.0	2.1	2.1	3	92.0	106.0	99.0	1
ICMA 18777	56.5	54.0	55	7	1.3	1.3	1.3	1	105.0	125.5	115.3	3
ICMB 18777	60.5	57.5	59	9	1.3	1.2	1.3	1	106.0	120.5	113.3	3
ICMA 18888	47.5	49.0	48	5	1.7	2.2	2.0	3	89.0	109.0	99.0	1
ICMB 18888	48.5	49.5	49	5	1.9	2.1	2.0	3	92.0	110.0	101.0	3

E1: Mean data of 2019 summer season

E2: Mean data of 2019 rainy season

\*: Refer to Annexure I



## Annexure III Contd.

A/B Pairs	Panicle length (cm)				Panicle diameter (cm)				1000-grain weight (g)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMA 05111	14.5	15.8	15.2	3	2.1	2.7	2.4	5	8.5	7.9	8.2	5
ICMB 05111	15.1	16.1	15.6	3	2.2	2.5	2.4	5	9.0	8.2	8.6	5
ICMA 05222	25.3	26.8	26.1	5	3.0	3.3	3.2	7	11.1	12.2	11.7	7
ICMB 05222	24.8	27.2	26.0	5	2.9	3.3	3.1	7	10.0	9.8	9.9	5
ICMA 05333	25.1	24.4	24.8	5	3.1	3.1	3.1	7	7.8	8.8	8.3	5
ICMB 05333	24.2	25.6	24.9	5	3.0	3.5	3.2	7	9.1	9.6	9.4	5
ICMA 05444	20.9	19.9	20.4	3	2.4	2.6	2.5	5	10.3	10.5	10.4	7
ICMB 05444	18.5	20.7	19.6	3	2.1	2.8	2.4	5	8.1	9.4	8.8	5
ICMA 05555	23.7	26.6	25.2	5	2.6	3.6	3.1	7	11.1	11.2	11.1	7
ICMB 05555	24.3	27.9	26.1	5	2.7	3.8	3.2	7	11.8	12.6	12.2	7
ICMA 05666	18.4	19.7	19.1	3	3.0	3.3	3.1	7	11.4	11.8	11.6	7
ICMB 05666	16.1	18.0	17.1	3	2.5	2.8	2.7	5	8.9	10.2	9.5	5
ICMA 05777	14.5	14.8	14.7	3	2.2	2.8	2.5	5	11.1	10.4	10.7	7
ICMB 05777	13.8	14.6	14.2	3	2.3	2.7	2.5	5	11.7	11.3	11.5	7
ICMA 05888	37.8	33.1	35.5	7	2.0	2.4	2.2	5	6.2	6.0	6.1	3
ICMB 05888	36.7	35.6	36.2	7	2.4	2.4	2.4	5	5.7	6.2	6.0	3
ICMA 05999	14.5	17.0	15.8	3	2.1	2.8	2.4	5	11.8	12.5	12.2	7
ICMB 05999	14.9	16.9	15.9	3	2.3	2.7	2.5	5	8.1	9.3	8.7	5
ICMA 06111	21.7	23.8	22.8	5	2.8	3.4	3.1	7	13.0	13.0	13.0	9
ICMB 06111	22.2	22.5	22.4	5	2.9	3.1	3.0	5	9.8	9.7	9.7	5
ICMA 06222	22.7	24.9	23.8	5	2.8	3.1	2.9	5	6.6	6.8	6.7	3
ICMB 06222	22.2	25.6	23.9	5	2.9	3.1	3.0	5	6.4	6.3	6.3	3
ICMA 06333	15.6	17.6	16.6	3	2.5	2.7	2.6	5	10.7	10.7	10.7	7
ICMB 06333	16.0	17.6	16.8	3	2.5	2.7	2.6	5	11.2	10.5	10.8	7
ICMA 06444	19.9	16.4	18.2	3	2.8	2.2	2.5	5	12.2	10.8	11.5	7
ICMB 06444	16.3	14.4	15.4	3	2.7	2.6	2.7	5	14.2	14.5	14.3	9
ICMA 06555	18.7	19.0	18.9	3	2.5	3.1	2.8	5	12.2	12.6	12.4	7
ICMB 06555	18.8	18.0	18.4	3	2.8	3.0	2.9	5	10.7	10.7	10.7	7
ICMA 06666	15.6	16.0	15.8	3	2.4	2.5	2.5	5	9.6	9.8	9.7	5
ICMB 06666	17.1	15.9	16.5	3	2.5	2.6	2.5	5	11.3	12.1	11.7	7
ICMA 06777	19.2	20.5	19.9	3	2.6	3.1	2.9	5	8.7	9.2	9.0	5
ICMB 06777	19.0	19.4	19.2	3	2.5	3.3	2.9	5	9.3	7.3	8.3	5
ICMA 06888	14.4	14.9	14.7	3	2.4	2.9	2.7	5	12.0	12.2	12.1	7
ICMB 06888	14.1	15.7	14.9	3	2.5	2.8	2.7	5	11.7	11.7	11.7	7
ICMA 06999	15.1	17.5	16.3	3	2.1	2.7	2.4	5	10.2	10.1	10.1	7
ICMB 06999	16.2	17.6	16.9	3	2.3	2.7	2.5	5	8.8	9.1	8.9	5
ICMA 07111	21.9	20.3	21.1	5	2.1	2.4	2.3	5	9.2	11.0	10.1	7
ICMB 07111	23.2	22.2	22.7	5	2.2	2.5	2.4	5	10.4	10.1	10.3	7
ICMA 07222	14.1	13.5	13.8	3	2.2	2.2	2.2	5	10.8	10.3	10.6	7
ICMB 07222	14.4	13.8	14.1	3	2.3	2.4	2.3	5	12.7	12.6	12.7	9
ICMA 07333	16.8	18.7	17.8	3	2.1	2.9	2.5	5	10.2	10.0	10.1	7
ICMB 07333	16.6	18.4	17.5	3	2.5	3.0	2.7	5	12.0	11.7	11.9	7
ICMA 07444	29.9	30.9	30.4	5	2.8	3.2	3.0	5	10.9	11.2	11.0	7

A/B Pairs	Panicle length (cm)				Panicle diameter (cm)				1000-grain weight (g)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMB 07444	30.5	33.2	31.9	7	3.1	3.5	3.3	7	8.5	8.3	8.4	5
ICMA 07555	17.2	16.6	16.9	3	2.5	2.8	2.7	5	13.7	13.9	13.8	9
ICMB 07555	16.2	17.1	16.7	3	2.5	2.9	2.7	5	12.2	12.3	12.2	7
ICMA 07666	15.0	17.7	16.4	3	2.5	3.1	2.8	5	9.0	8.9	8.9	5
ICMB 07666	16.8	17.5	17.2	3	2.5	3.1	2.8	5	9.0	8.6	8.8	5
ICMA 07777	21.4	21.7	21.6	5	3.4	4.0	3.7	7	9.1	9.2	9.1	5
ICMB 07777	21.0	21.8	21.4	5	3.4	3.7	3.5	7	10.2	10.7	10.4	7
ICMA 07888	14.0	16.0	15.0	3	2.9	3.1	3.0	5	10.7	10.4	10.5	7
ICMB 07888	14.9	16.3	15.6	3	2.8	3.3	3.1	7	10.7	9.8	10.3	7
ICMA 07999	18.0	18.1	18.1	3	2.2	2.5	2.3	5	11.5	10.8	11.1	7
ICMB 07999	19.3	18.3	18.8	3	2.3	2.5	2.4	5	10.6	12.2	11.4	7
ICMA 08111	21.6	25.2	23.4	5	2.6	3.1	2.9	5	14.2	14.5	14.3	9
ICMB 08111	21.4	25.1	23.3	5	2.7	3.2	3.0	5	13.7	13.3	13.5	9
ICMA 08222	20.5	22.3	21.4	5	2.9	3.6	3.3	7	10.3	10.3	10.3	7
ICMB 08222	20.8	24.5	22.7	5	3.1	3.7	3.4	7	10.4	11.5	11.0	7
ICMA 08333	15.6	18.3	17.0	3	2.5	3.0	2.7	5	9.0	9.8	9.4	5
ICMB 08333	15.7	18.0	16.9	3	2.6	3.0	2.8	5	8.2	9.0	8.6	5
ICMA 08444	23.6	24.8	24.2	5	2.9	3.3	3.1	7	9.3	10.3	9.8	5
ICMB 08444	23.0	23.4	23.2	5	2.9	3.3	3.1	7	9.6	11.0	10.3	7
ICMA 08555	18.9	18.9	18.9	3	2.9	3.3	3.1	7	13.4	13.8	13.6	9
ICMB 08555	19.6	19.4	19.5	3	2.9	3.2	3.1	7	11.9	11.0	11.4	7
ICMA 08666	17.3	19.7	18.5	3	2.9	3.4	3.1	7	9.9	10.1	10.0	5
ICMB 08666	18.2	18.3	18.3	3	2.9	3.3	3.1	7	10.8	10.7	10.8	7
ICMA 08777	16.6	19.5	18.1	3	2.1	2.8	2.5	5	10.1	9.9	10.0	5
ICMB 08777	17.8	20.0	18.9	3	2.2	2.9	2.5	5	9.8	10.9	10.3	7
ICMA 08888	33.2	36.8	35.0	7	2.6	2.9	2.7	5	8.7	8.5	8.6	5
ICMB 08888	32.4	35.6	34.0	7	2.7	2.9	2.8	5	8.3	8.8	8.5	5
ICMA 08999	18.2	20.3	19.3	3	2.2	2.9	2.6	5	10.0	9.8	9.9	5
ICMB 08999	18.9	20.5	19.7	3	2.3	2.9	2.6	5	8.3	8.1	8.2	5
ICMA 09111	25.1	23.4	24.3	5	3.3	4.3	3.8	7	12.4	12.3	12.4	7
ICMB 09111	24.6	22.1	23.4	5	3.5	4.1	3.8	7	13.5	13.0	13.2	9
ICMA 09222	17.2	20.3	18.8	3	2.5	3.0	2.7	5	8.9	8.6	8.7	5
ICMB 09222	18.1	21.0	19.6	3	2.7	3.1	2.9	5	8.3	8.1	8.2	5
ICMA 09333	37.9	35.3	36.6	7	2.2	2.4	2.3	5	8.8	9.0	8.9	5
ICMB 09333	38.6	35.6	37.1	7	2.2	2.5	2.3	5	7.3	8.0	7.7	5
ICMA 09555	29.2	32.8	31.0	7	2.2	2.4	2.3	5	8.7	9.0	8.8	5
ICMB 09555	29.7	33.4	31.6	7	2.3	2.4	2.3	5	8.6	9.3	9.0	5
ICMA 09666	15.4	18.1	16.8	3	2.2	2.7	2.4	5	9.5	10.1	9.8	5
ICMB 09666	15.1	18.8	17.0	3	2.1	2.6	2.4	5	10.0	10.2	10.1	7
ICMA 09777	18.3	18.8	18.6	3	2.2	2.5	2.4	5	11.4	11.9	11.7	7
ICMB 09777	15.9	17.3	16.6	3	2.0	2.5	2.2	5	11.4	11.9	11.7	7
ICMA 09888	25.9	26.9	26.4	5	2.1	2.6	2.4	5	11.8	12.4	12.1	7
ICMB 09888	24.6	24.2	24.4	5	2.2	2.5	2.4	5	8.1	9.4	8.8	5
ICMA 09999	30.1	27.2	28.7	5	1.7	1.9	1.8	5	8.5	8.4	8.5	5

A/B Pairs	Panicle length (cm)				Panicle diameter (cm)				1000-grain weight (g)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMB 09999	26.6	25.5	26.1	5	1.7	1.9	1.8	5	6.9	7.4	7.1	3
ICMA 10111	16.6	17.1	16.9	3	2.7	3.1	2.9	5	11.1	11.1	11.1	7
ICMB 10111	16.7	18.1	17.4	3	2.8	3.2	3.0	5	12.1	12.3	12.2	7
ICMA 10222	16.3	16.7	16.5	3	2.4	2.7	2.5	5	10.6	11.1	10.9	7
ICMB 10222	16.3	17.0	16.7	3	2.3	2.7	2.5	5	11.5	11.8	11.7	7
ICMA 10444	23.2	25.0	24.1	5	3.3	4.0	3.6	7	12.4	12.8	12.6	9
ICMB 10444	23.7	24.0	23.9	5	3.3	4.0	3.7	7	13.1	14.3	13.7	9
ICMA 10555	15.5	17.1	16.3	3	2.1	2.5	2.3	5	9.8	9.9	9.8	5
ICMB 10555	15.8	18.3	17.1	3	2.2	2.6	2.4	5	10.5	9.2	9.8	5
ICMA 10666	13.8	14.0	13.9	3	2.4	2.6	2.5	5	13.1	13.9	13.5	9
ICMB 10666	15.5	15.7	15.6	3	2.4	2.6	2.5	5	13.1	12.9	13.0	9
ICMA 10777	22.8	22.9	22.9	5	2.7	3.2	3.0	5	10.2	11.2	10.7	7
ICMB 10777	22.0	22.0	22.0	5	2.9	3.5	3.2	7	10.6	10.3	10.5	7
ICMA 10888	18.0	21.0	19.5	3	2.7	3.1	2.9	5	8.1	8.3	8.2	5
ICMB 10888	19.9	20.4	20.2	3	2.8	3.1	3.0	5	9.3	9.5	9.4	5
ICMA 10999	29.2	36.2	32.7	7	1.5	1.8	1.7	5	7.3	7.3	7.3	3
ICMB 10999	30.6	36.6	33.6	7	1.6	1.9	1.7	5	7.5	7.6	7.6	5
ICMA 11111	18.2	20.1	19.2	3	2.1	3.0	2.5	5	12.9	12.9	12.9	9
ICMB 11111	17.3	19.8	18.6	3	2.3	2.8	2.5	5	12.3	12.9	12.6	9
ICMA 11222	25.9	28.8	27.4	5	3.1	3.6	3.4	7	8.6	8.8	8.7	5
ICMB 11222	25.4	28.0	26.7	5	3.3	3.6	3.5	7	9.3	9.8	9.5	5
ICMA 11333	27.6	28.1	27.9	5	2.3	2.7	2.5	5	7.0	7.5	7.3	3
ICMB 11333	25.5	27.4	26.5	5	2.2	2.8	2.5	5	7.4	7.0	7.2	3
ICMA 11444	17.5	17.0	17.3	3	2.4	2.7	2.6	5	12.4	14.3	13.3	9
ICMB 11444	17.0	18.0	17.5	3	2.5	2.7	2.6	5	14.1	15.1	14.6	9
ICMA 11555	27.2	30.4	28.8	5	3.1	3.4	3.3	7	9.2	8.7	9.0	5
ICMB 11555	27.8	31.6	29.7	5	3.1	3.5	3.3	7	7.8	8.2	8.0	5
ICMA 11666	16.3	19.1	17.7	3	3.1	3.4	3.3	7	8.5	7.8	8.1	5
ICMB 11666	16.1	17.2	16.7	3	3.2	3.6	3.4	7	5.0	5.8	5.4	3
ICMA 11777	18.6	17.1	17.9	3	2.3	2.7	2.5	5	11.2	10.1	10.6	7
ICMB 11777	16.9	17.5	17.2	3	2.2	2.8	2.5	5	11.2	11.4	11.3	7
ICMA 11999	14.9	16.2	15.6	3	2.2	2.6	2.4	5	12.3	12.5	12.4	7
ICMB 11999	15.7	16.2	16.0	3	2.2	2.7	2.4	5	11.3	12.1	11.7	7
ICMA 12111	30.0	30.3	30.1	5	2.1	2.6	2.3	5	8.6	9.9	9.2	5
ICMB 12111	30.2	29.0	29.6	5	2.1	2.6	2.3	5	9.4	9.7	9.5	5
ICMA 12222	17.1	18.8	18.0	3	2.1	2.7	2.4	5	12.4	12.4	12.4	7
ICMB 12222	17.0	18.8	17.9	3	2.0	2.6	2.3	5	12.1	11.9	12.0	7
ICMA 12333	24.0	24.3	24.2	5	3.2	3.8	3.5	7	11.3	11.6	11.5	7
ICMB 12333	23.4	22.4	22.9	5	3.3	3.8	3.5	7	12.6	13.4	13.0	9
ICMA 12444	17.8	17.9	17.9	3	2.8	2.9	2.9	5	10.0	9.7	9.8	5
ICMB 12444	18.2	18.3	18.3	3	2.8	3.0	2.9	5	10.4	10.6	10.5	7
ICMA 12555	17.1	17.8	17.5	3	2.2	2.9	2.5	5	9.4	9.8	9.6	5
ICMB 12555	17.3	18.5	17.9	3	2.4	2.9	2.7	5	9.9	10.9	10.4	7
ICMA 13111	20.7	21.7	21.2	5	2.8	3.7	3.2	7	8.7	8.9	8.8	5

A/B Pairs	Panicle length (cm)				Panicle diameter (cm)				1000-grain weight (g)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMB 13111	21.8	20.8	21.3	5	3.2	3.8	3.5	7	10.0	10.8	10.4	7
ICMA 13222	21.2	21.3	21.3	5	3.0	3.7	3.3	7	12.9	13.2	13.0	9
ICMB 13222	21.8	20.3	21.1	5	2.8	3.7	3.3	7	12.1	12.1	12.1	7
ICMA 13444	16.3	NA	16.3	3	2.3	NA	2.3	5	12.2	NA	12.2	7
ICMB 13444	16.9	NA	16.9	3	2.7	NA	2.7	5	9.1	NA	9.1	5
ICMA 13555	17.9	18.3	18.1	3	2.1	2.4	2.3	5	14.3	14.7	14.5	9
ICMB 13555	16.9	18.8	17.9	3	2.1	2.7	2.4	5	14.4	14.7	14.6	9
ICMA 13666	16.5	19.3	17.9	3	2.1	2.8	2.5	5	10.2	11.0	10.6	7
ICMB 13666	17.8	19.9	18.9	3	2.2	2.9	2.6	5	9.0	8.8	8.9	5
ICMA 13777	21.2	21.4	21.3	5	2.8	3.1	3.0	5	11.5	11.0	11.2	7
ICMB 13777	21.1	22.3	21.7	5	2.8	3.2	3.0	5	10.6	11.1	10.9	7
ICMA 14111	17.6	23.7	20.7	5	2.2	2.9	2.5	5	12.5	11.4	11.9	7
ICMB 14111	18.3	22.1	20.2	3	2.2	2.7	2.5	5	10.7	11.2	10.9	7
ICMA 14222	20.6	19.4	20.0	3	3.0	3.3	3.1	7	11.4	11.3	11.3	7
ICMB 14222	17.9	18.0	18.0	3	3.0	3.4	3.2	7	10.2	9.7	9.9	5
ICMA 14333	21.8	23.3	22.6	5	3.0	3.6	3.3	7	12.6	12.3	12.4	7
ICMB 14333	21.9	22.9	22.4	5	3.4	3.7	3.5	7	12.0	11.7	11.8	7
ICMA 14444	19.5	21.6	20.6	5	2.8	3.0	2.9	5	11.9	12.3	12.1	7
ICMB 14444	20.7	20.1	20.4	3	2.8	3.0	2.9	5	13.4	14.2	13.8	9
ICMA 14555	19.1	21.6	20.4	3	2.7	3.5	3.1	7	12.3	13.1	12.7	9
ICMB 14555	20.5	22.2	21.4	5	3.1	3.5	3.3	7	13.0	13.8	13.4	9
ICMA 14666	NA	21.3	21.3	5	NA	3.3	3.3	7	NA	11.6	11.6	7
ICMB 14666	NA	21.3	21.3	5	NA	3.3	3.3	7	NA	12.4	12.4	7
ICMA 15111	16.7	19.2	18.0	3	1.9	2.7	2.3	5	8.8	9.5	9.2	5
ICMB 15111	19.8	20.6	20.2	3	1.9	2.7	2.3	5	9.0	9.1	9.0	5
ICMA 15222	14.6	16.4	15.5	3	2.4	2.7	2.6	5	15.2	15.5	15.3	9
ICMB 15222	14.6	16.5	15.6	3	2.4	2.7	2.6	5	15.3	16.7	16.0	9
ICMA 15333	16.8	16.9	16.9	3	2.3	2.5	2.4	5	12.7	13.2	13.0	9
ICMB 15333	17.6	17.7	17.7	3	2.3	2.5	2.4	5	13.7	13.6	13.6	9
ICMA 15444	15.1	16.2	15.7	3	2.5	2.8	2.7	5	9.6	10.4	10.0	5
ICMB 15444	16.4	17.8	17.1	3	2.6	3.0	2.8	5	10.5	11.5	11.0	7
ICMA 15555	21.3	21.2	21.3	5	3.2	3.6	3.4	7	12.9	14.6	13.8	9
ICMB 15555	19.2	20.5	19.9	3	3.1	3.7	3.4	7	13.4	15.1	14.2	9
ICMA 15666	22.9	23.4	23.2	5	3.1	3.7	3.4	7	8.6	9.0	8.8	5
ICMB 15666	24.1	22.4	23.3	5	3.3	3.7	3.5	7	9.0	8.4	8.7	5
ICMA 15777	19.0	18.4	18.7	3	3.0	3.4	3.2	7	11.9	12.4	12.2	7
ICMB 15777	17.8	17.4	17.6	3	3.0	3.2	3.1	7	11.0	11.7	11.3	7
ICMA 16111	17.8	20.1	19.0	3	2.8	3.4	3.1	7	10.8	11.2	11.0	7
ICMB 16111	19.4	20.1	19.8	3	3.1	3.5	3.3	7	10.6	10.9	10.7	7
ICMA 16222	16.7	18.6	17.7	3	2.6	3.1	2.9	5	12.7	12.0	12.4	7
ICMB 16222	17.8	17.7	17.8	3	2.7	2.9	2.8	5	12.2	10.9	11.6	7
ICMA 16333	27.0	20.4	23.7	5	3.6	3.4	3.5	7	13.4	13.1	13.3	9
ICMB 16333	25.6	22.3	24.0	5	3.4	3.5	3.4	7	13.8	14.8	14.3	9
ICMA 16444	16.8	18.5	17.7	3	2.9	3.4	3.2	7	12.0	12.9	12.5	7

A/B Pairs	Panicle length (cm)				Panicle diameter (cm)				1000-grain weight (g)			
	E1	E2	Mean	Node*	E1	E2	Mean	Node*	E1	E2	Mean	Node*
ICMB 16444	15.9	18.8	17.4	3	3.1	3.4	3.3	7	12.2	12.8	12.5	7
ICMA 16555	19.3	19.8	19.6	3	2.9	3.1	3.0	5	12.2	12.6	12.4	7
ICMB 16555	19.3	19.7	19.5	3	3.0	3.4	3.2	7	12.0	12.3	12.1	7
ICMA 16666	16.5	NA	16.5	3	2.8	NA	2.8	5	10.6	NA	10.6	7
ICMB 16666	17.3	NA	17.3	3	2.9	NA	2.9	5	9.4	NA	9.4	5
ICMA 17222	22.9	25.2	24.1	5	2.9	3.6	3.3	7	9.4	9.7	9.5	5
ICMB 17222	24.2	25.4	24.8	5	3.1	3.7	3.4	7	11.3	11.1	11.2	7
ICMA 17333	21.8	22.7	22.3	5	2.1	2.4	2.3	5	11.4	11.2	11.3	7
ICMB 17333	21.9	21.6	21.8	5	2.3	2.5	2.4	5	11.7	10.6	11.2	7
ICMA 17444	17.5	18.3	17.9	3	2.7	2.9	2.8	5	9.6	9.7	9.7	5
ICMB 17444	17.6	18.2	17.9	3	2.8	3.0	2.9	5	10.2	9.5	9.8	5
ICMA 17555	26.5	28.0	27.3	5	3.5	3.9	3.7	7	11.8	12.0	11.9	7
ICMB 17555	25.9	28.1	27.0	5	3.5	3.7	3.6	7	10.9	11.0	11.0	7
ICMA 17666	26.1	27.9	27.0	5	2.9	3.6	3.2	7	9.3	9.6	9.5	5
ICMB 17666	26.6	28.1	27.4	5	3.0	3.5	3.2	7	9.7	9.9	9.8	5
ICMA 17777	21.3	21.5	21.4	5	2.9	3.6	3.2	7	11.7	12.2	11.9	7
ICMB 17777	22.8	22.3	22.6	5	3.0	3.6	3.3	7	12.3	12.7	12.5	7
ICMA 18111	22.3	21.5	21.9	5	3.2	3.6	3.4	7	12.9	14.1	13.5	9
ICMB 18111	22.4	22.1	22.3	5	3.2	3.9	3.5	7	14.3	14.5	14.4	9
ICMA 18222	18.4	19.9	19.2	3	2.7	3.3	3.0	5	10.7	10.5	10.6	7
ICMB 18222	18.3	19.2	18.8	3	2.9	3.4	3.1	7	10.6	11.1	10.8	7
ICMA 18333	22.7	23.0	22.9	5	3.3	3.9	3.6	7	8.2	9.5	8.8	5
ICMB 18333	23.2	24.2	23.7	5	3.4	3.8	3.6	7	8.0	7.6	7.8	5
ICMA 18444	17.7	19.4	18.6	3	3.1	3.4	3.3	7	9.7	9.9	9.8	5
ICMB 18444	18.7	19.1	18.9	3	3.3	3.4	3.4	7	10.9	10.9	10.9	7
ICMA 18555	21.7	21.5	21.6	5	3.2	3.4	3.3	7	6.8	7.0	6.9	3
ICMB 18555	22.2	20.8	21.5	5	3.1	3.5	3.3	7	6.6	7.0	6.8	3
ICMA 18666	22.3	21.7	22.0	5	3.3	3.5	3.4	7	8.6	9.4	9.0	5
ICMB 18666	23.1	21.5	22.3	5	3.4	3.4	3.4	7	9.5	10.0	9.8	5
ICMA 18777	27.3	26.1	26.7	5	3.2	3.6	3.4	7	11.2	10.3	10.7	7
ICMB 18777	26.9	26.1	26.5	5	3.4	3.5	3.5	7	11.2	12.5	11.8	7
ICMA 18888	19.2	20.3	19.8	3	3.2	3.4	3.3	7	14.3	14.0	14.1	9
ICMB 18888	19.0	19.2	19.1	3	3.0	3.4	3.2	7	14.8	15.4	15.1	9

E1: Mean data of 2019 summer season

E2: Mean data of 2019 rainy season

\*: Refer to Annexure I

### Annexure III Contd.

A/B Pairs	Plant growth habit			Panicle anther color			Plant node pigmentation			Plant inter-node pigmentation			Panicle shape			Panicle density		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMA 05111	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 05111	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 05222	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	3	3	3
ICMB 05222	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	3	3	3
ICMA 05333	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 05333	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 05444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 05444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 05555	1	1	1	2	2	2	4	4	4	2	2	2	5	5	5	3 <sup>a</sup>	5 <sup>a</sup>	3-5
ICMB 05555	1	1	1	2	2	2	4	4	4	2	2	2	5	5	5	3 <sup>a</sup>	5 <sup>a</sup>	3-5
ICMA 05666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	5	5-7
ICMB 05666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	5	5-7
ICMA 05777	1	1	1	2	2	2	1 <sup>a</sup>	2 <sup>a</sup>	1-2	2	2	2	2	2	2	7	7	7
ICMB 05777	1	1	1	2	2	2	1 <sup>a</sup>	2 <sup>a</sup>	1-2	2	2	2	2	2	2	7	7	7
ICMA 05888	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	7	5	5-7
ICMB 05888	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	7	5	5-7
ICMA 05999	5	5	5	2	2	2	3	3	3	2	2	2	2	2	2	7	7	7
ICMB 05999	5	5	5	2	2	2	3	3	3	2	2	2	2	2	2	7	7	7
ICMA 06111	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5	5	5
ICMB 06111	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5	5	5
ICMA 06222	1	1	1	3	3	3	2	2	2	2	2	2	1	1	1	5	5	5
ICMB 06222	1	1	1	3	3	3	2	2	2	2	2	2	1	1	1	5	5	5
ICMA 06333	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 06333	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 06444	1	1	1	2	2	2	5	5	5	2	2	2	4	4	4	5	5	5
ICMB 06444	1	1	1	2	2	2	5	5	5	2	2	2	4	4	4	5	5	5
ICMA 06555	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 06555	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 06666	1	1	1	2	2	2	5	5	5	2	2	2	4	4	4	5	5	5
ICMB 06666	1	1	1	2	2	2	5	5	5	2	2	2	4	4	4	5	5	5
ICMA 06777	1	1	1	2	2	2	5 <sup>a</sup>	5 <sup>a</sup>	5 <sup>a</sup>	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMB 06777	1	1	1	2	2	2	5 <sup>a</sup>	5 <sup>a</sup>	5 <sup>a</sup>	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMA 06888	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	7	5-7
ICMB 06888	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	7	5-7
ICMA 06999	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 06999	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 07111	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMB 07111	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMA 07222	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7

A/B Pairs	Plant growth habit			Panicle anther color			Plant node pigmentation			Plant inter-node pigmentation			Panicle shape			Panicle density		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMB 07222	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 07333	1	1	1	1	1	1	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 07333	1	1	1	1	1	1	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 07444	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 07444	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 07555	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMB 07555	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMA 07666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 07666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 07777	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
ICMB 07777	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
ICMA 07888	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMB 07888	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMA 07999	1	1	1	2	2	2	3 <sup>a</sup>	3 <sup>a</sup>	3 <sup>a</sup>	2	2	2	1	1	1	5	7	5-7
ICMB 07999	1	1	1	2	2	2	3 <sup>a</sup>	3 <sup>a</sup>	3 <sup>a</sup>	2	2	2	1	1	1	5	5	5
ICMA 08111	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 08111	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 08222	1	1	1	2	2	2	1 <sup>a</sup>	2	1-2	2	2	2	2	2	2	5	5	5
ICMB 08222	1	1	1	2	2	2	1 <sup>a</sup>	2	1-2	2	2	2	2	2	2	5	5	5
ICMA 08333	1	1	1	2	2	2	5	5	5	2	2	2	1	1	1	5	5	5
ICMB 08333	1	1	1	2	2	2	5	5	5	2	2	2	1	1	1	5	5	5
ICMA 08444	1	1	1	2	2	2	3 <sup>a</sup>	2	2-3	2	2	2	2	2	2	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMB 08444	1	1	1	2	2	2	3 <sup>a</sup>	2	2-3	2	2	2	2	2	2	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMA 08555	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 08555	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 08666	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 08666	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 08777	5	5	5	2	2	2	5	5	5	2	2	2	2	2	2	3 <sup>a</sup>	5 <sup>a</sup>	3-5
ICMB 08777	5	5	5	2	2	2	5	5	5	2	2	2	2	2	2	3 <sup>a</sup>	5 <sup>a</sup>	3-5
ICMA 08888	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 08888	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 08999	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	5	5	5
ICMB 08999	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	5	5	5
ICMA 09111	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5	7	7	7
ICMB 09111	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5	7	7	7
ICMA 09222	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMB 09222	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMA 09333	5	5	5	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 09333	5	5	5	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 09555	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 09555	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5

A/B Pairs	Plant growth habit			Panicle anther color			Plant node pigmentation			Plant inter-node pigmentation			Panicle shape			Panicle density		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMA 09666	1	1	1	2	2	2	3	3	3	2	2	2	2	2	2	5	5	5
ICMB 09666	1	1	1	2	2	2	3	3	3	2	2	2	2	2	2	5	5	5
ICMA 09777	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 09777	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 09888	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMB 09888	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMA 09999	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	7	7	7
ICMB 09999	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	7	7	7
ICMA 10111	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMB 10111	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMA 10222	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 10222	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 10444	1	1	1	2	2	2	2	2	2	2	2	2	8	8	8	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMB 10444	1	1	1	2	2	2	2	2	2	2	2	2	8	8	8	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMA 10555	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMB 10555	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMA 10666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 10666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 10777	1	1	1	3	3	3	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	2	2	2	2	2	2	5	5	5
ICMB 10777	1	1	1	3	3	3	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	2	2	2	2	2	2	5	5	5
ICMA 10888	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 10888	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 10999	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 10999	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 11111	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 11111	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 11222	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5	7	7	7
ICMB 11222	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5	7	7	7
ICMA 11333	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 11333	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 11444	1	1	1	2	2	2	5	5	5	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMB 11444	1	1	1	2	2	2	5	5	5	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMA 11555	1	1	1	3	3	3	2	2	2	2	2	2	5	5	5	5	5	5
ICMB 11555	1	1	1	3	3	3	2	2	2	2	2	2	5	5	5	5	5	5
ICMA 11666	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5	5	5
ICMB 11666	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5	5	5
ICMA 11777	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 11777	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 11999	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 11999	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 12111	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	7	7	7



A/B Pairs	Plant growth habit			Panicle anther color			Plant node pigmentation			Plant inter-node pigmentation			Panicle shape			Panicle density		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMB 12111	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1	7	7	7
ICMA 12222	1	1	1	3	3	3	3 <sup>a</sup>	3 <sup>a</sup>	3 <sup>a</sup>	2	2	2	2	2	2	5	5	5
ICMB 12222	1	1	1	3	3	3	3 <sup>a</sup>	3 <sup>a</sup>	3 <sup>a</sup>	2	2	2	2	2	2	5	5	5
ICMA 12333	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5 <sup>a</sup>	7 <sup>a</sup>	5-7
ICMB 12333	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5 <sup>a</sup>	7 <sup>a</sup>	5-7
ICMA 12444	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 12444	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 12555	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 12555	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 13111	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	5
ICMB 13111	1	1	1	1	1	1	2	2	2	2	2	2	5	5	5	5	5	5
ICMA 13222	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 13222	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 13444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 13444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 13555	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 13555	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 13666	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMB 13666	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMA 13777	1	1	1	3	3	3	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 13777	1	1	1	3	3	3	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 14111	5	5	5	3	3	3	4	4	4	2	2	2	2	2	2	5	5	5
ICMB 14111	5	5	5	3	3	3	4	4	4	2	2	2	2	2	2	5	5	5
ICMA 14222	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 14222	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 14333	1	1	1	3	3	3	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 14333	1	1	1	3	3	3	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 14444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 14444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 14555	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 14555	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 14666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 14666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 15111	5	5	5	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 15111	5	5	5	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 15222	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 15222	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 15333	1	1	1	2	2	2	5	5	5	2	2	2	1	1	1	7	7	7
ICMB 15333	1	1	1	2	2	2	5	5	5	2	2	2	1	1	1	7	7	7
ICMA 15444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7 <sup>a</sup>	5 <sup>a</sup>	5-7
ICMB 15444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7 <sup>a</sup>	5 <sup>a</sup>	5-7

A/B Pairs	Plant growth habit			Panicle anther color			Plant node pigmentation			Plant inter-node pigmentation			Panicle shape			Panicle density		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMA 15555	1	1	1	2	2	2	5	5	5	2	2	2	1	1	1	5	5	5
ICMB 15555	1	1	1	2	2	2	5	5	5	2	2	2	1	1	1	5	5	5
ICMA 15666	1	1	1	3	3	3	2	2	2	2	2	2	5	5	5	7	7	7
ICMB 15666	1	1	1	3	3	3	2	2	2	2	2	2	5	5	5	7	7	7
ICMA 15777	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5 <sup>a</sup>	7 <sup>a</sup>	5-7
ICMB 15777	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5 <sup>a</sup>	7 <sup>a</sup>	5-7
ICMA 16111	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5	5	5
ICMB 16111	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5	5	5
ICMA 16222	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 16222	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 16333	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 16333	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 16444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMB 16444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMA 16555	1	1	1	1	1	1	1 <sup>a</sup>	2 <sup>a</sup>	1-2	2	2	2	2	2	2	5	5	5
ICMB 16555	1	1	1	1	1	1	1 <sup>a</sup>	2 <sup>a</sup>	1-2	2	2	2	2	2	2	5	5	5
ICMA 16666	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 16666	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 17222	1	1	1	3	3	3	2	2	2	2	2	2	5	5	5	5 <sup>a</sup>	7 <sup>a</sup>	5-7
ICMB 17222	1	1	1	3	3	3	2	2	2	2	2	2	5	5	5	5 <sup>a</sup>	7 <sup>a</sup>	5-7
ICMA 17333	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 17333	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 17444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMB 17444	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	5	5	5
ICMA 17555	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 17555	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 17666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 17666	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 17777	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 17777	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 18111	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5	5	5
ICMB 18111	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5	5	5
ICMA 18222	1	1	1	3	3	3	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 18222	1	1	1	3	3	3	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 18333	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 18333	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 18444	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMB 18444	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	5 <sup>a</sup>	3 <sup>a</sup>	3-5
ICMA 18555	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMB 18555	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 18666	1	1	1	3	3	3	2	2	2	2	2	2	2	2	2	5	5	5

A/B Pairs	Plant growth habit			Panicle anther color			Plant node pigmentation			Plant inter-node pigmentation			Panicle shape			Panicle density		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMB 18666	1	1	1	3	3	3	2	2	2	2	2	2	2	2	2	5	5	5
ICMA 18777	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMB 18777	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	7	7	7
ICMA 18888	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7
ICMB 18888	1	1	1	2	2	2	5	5	5	2	2	2	2	2	2	7	7	7

a Predominant class but also indicates presence of other classes

## Annexure III Contd.

A/B Pairs	Panicle tip sterility			Panicle exertion			Panicle bristle			Seed color			Seed shape		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMA 05111	1	1	1	2	2	2	9	9	9	4	4	4	4	4	4
ICMB 05111	1	1	1	2	2	2	9	9	9	4	4	4	4	4	4
ICMA 05222	1	1	1	2	2	2	9	9	9	4	4	4	4	4	4
ICMB 05222	1	1	1	2	2	2	9	9	9	4	4	4	4	4	4
ICMA 05333	9	9	9	2	2	2	1	1	1	7	7	7	4	4	4
ICMB 05333	9	9	9	2	2	2	1	1	1	7	7	7	4	4	4
ICMA 05444	1	1	1	2	2	2	1	1	1	7	7	7	4	4	4
ICMB 05444	1	1	1	2	2	2	1	1	1	7	7	7	4	4	4
ICMA 05555	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 05555	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 05666	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4
ICMB 05666	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4
ICMA 05777	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 05777	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 05888	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 05888	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 05999	1	1	1	2	2	2	9	9	9	7	7	7	4	4	4
ICMB 05999	1	1	1	2	2	2	9	9	9	7	7	7	4	4	4
ICMA 06111	1	1	1	2	2	2	1	1	1	6	6	6	4	4	4
ICMB 06111	1	1	1	2	2	2	1	1	1	6	6	6	4	4	4
ICMA 06222	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 06222	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 06333	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMB 06333	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMA 06444	9	9	9	2 <sup>a</sup>	1 <sup>a</sup>	1-2	1	1	1	5	5	5	4	4	4
ICMB 06444	9	9	9	2 <sup>a</sup>	1 <sup>a</sup>	1-2	1	1	1	5	5	5	4	4	4
ICMA 06555	1	1	1	2	2	2	9	9	9	5	5	5	4	4	4
ICMB 06555	1	1	1	2	2	2	9	9	9	5	5	5	4	4	4
ICMA 06666	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 06666	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 06777	1	1	1	1 <sup>a</sup>	2 <sup>a</sup>	1-2	1	1	1	4	4	4	4	4	4
ICMB 06777	1	1	1	1 <sup>a</sup>	2 <sup>a</sup>	1-2	1	1	1	4	4	4	4	4	4
ICMA 06888	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 06888	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 06999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 06999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 07111	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 07111	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 07222	1	1	1	2	2	2	1	1	1	1	1	1	4	4	4
ICMB 07222	1	1	1	2	2	2	1	1	1	1	1	1	4	4	4

A/B Pairs	Panicle tip sterility			Panicle exertion			Panicle bristle			Seed color			Seed shape		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMA 07333	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 07333	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMA 07444	9	9	9	1	1	1	9	9	9	4	4	4	4/1	4/1	4/1
ICMB 07444	9	9	9	1	1	1	9	9	9	4	4	4	4/1	4/1	4/1
ICMA 07555	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	4	4	4	3	3	3
ICMB 07555	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	4	4	4	3	3	3
ICMA 07666	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	2	2	2	4	4	4
ICMB 07666	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	2	2	2	4	4	4
ICMA 07777	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 07777	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 07888	1	1	1	1 <sup>a</sup>	2 <sup>a</sup>	1-2	9	9	9	4	4	4	4	4	4
ICMB 07888	1	1	1	1 <sup>a</sup>	2 <sup>a</sup>	1-2	9	9	9	4	4	4	4	4	4
ICMA 07999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 07999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 08111	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMB 08111	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMA 08222	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 08222	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 08333	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMB 08333	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMA 08444	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 08444	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 08555	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMB 08555	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMA 08666	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 08666	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 08777	1/9	1/9	1-9	2	2	2	1	1	1	2	2	2	4	4	4
ICMB 08777	1/9	1/9	1-9	2	2	2	1	1	1	2	2	2	4	4	4
ICMA 08888	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 08888	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMA 08999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 08999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 09111	1	1	1	1	1	1	1	1	1	5	5	5	4	4	4
ICMB 09111	1	1	1	1	1	1	1	1	1	5	5	5	4	4	4
ICMA 09222	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 09222	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 09333	9	9	9	2	2	2	9	9	9	5	5	5	4	4	4
ICMB 09333	9	9	9	2	2	2	9	9	9	5	5	5	4	4	4
ICMA 09555	9	9	9	2	2	2	1	1	1	4	4	4	1/4	1/4	1/4
ICMB 09555	9	9	9	2	2	2	1	1	1	4	4	4	1/4	1/4	1/4
ICMA 09666	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4
ICMB 09666	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4

A/B Pairs	Panicle tip sterility			Panicle exertion			Panicle bristle			Seed color			Seed shape		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMA 09777	1	1	1	2	2	2	1	1	1	3	3	3	4	4	4
ICMB 09777	1	1	1	2	2	2	1	1	1	3	3	3	4	4	4
ICMA 09888	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 09888	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 09999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 09999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 10111	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 10111	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 10222	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMB 10222	1	1	1	2	2	2	1	1	1	2	2	2	4	4	4
ICMA 10444	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	5	5	5	4	4	4
ICMB 10444	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	5	5	5	4	4	4
ICMA 10555	9	9	9	1	1	1	1	1	1	4	4	4	4	4	4
ICMB 10555	9	9	9	1	1	1	1	1	1	4	4	4	4	4	4
ICMA 10666	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 10666	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMA 10777	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 10777	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 10888	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 10888	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 10999	1/9	1/9	1-9	1	1	1	1	1	1	5	5	5	4	4	4
ICMB 10999	1/9	1/9	1-9	1	1	1	1	1	1	5	5	5	4	4	4
ICMA 11111	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4
ICMB 11111	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4
ICMA 11222	9	9	9	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 11222	9	9	9	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMA 11333	9	9	9	2	2	2	1	1	1	4/5	4/5	4-5	4	4	4
ICMB 11333	9	9	9	2	2	2	1	1	1	4/5	4/5	4-5	4	4	4
ICMA 11444	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 11444	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 11555	9	9	9	2	2	2	9	9	9	4	4	4	4/1	4/1	4/1
ICMB 11555	9	9	9	2	2	2	9	9	9	4	4	4	4/1	4/1	4/1
ICMA 11666	1	1	1	2	2	2	1	1	1	6	6	6	4	4	4
ICMB 11666	1	1	1	2	2	2	1	1	1	6	6	6	4	4	4
ICMA 11777	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 11777	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 11999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 11999	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 12111	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 12111	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 12222	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 12222	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4

A/B Pairs	Panicle tip sterility			Panicle exertion			Panicle bristle			Seed color			Seed shape		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMA 12333	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 12333	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 12444	9	9	9	2	2	2	1	1	1	6	6	6	4/3	4/3	4/3
ICMB 12444	9	9	9	2	2	2	1	1	1	6	6	6	4/3	4/3	4/3
ICMA 12555	1	1	1	2	2	2	1	1	1	4	4	4	4/1	4/1	4/1
ICMB 12555	1	1	1	2	2	2	1	1	1	4	4	4	4/1	4/1	4/1
ICMA 13111	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 13111	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 13222	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 13222	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 13444	1	1	1	2	2	2	1	1	1	4	4	4	4/3	4/3	4/3
ICMB 13444	1	1	1	2	2	2	1	1	1	4	4	4	4/3	4/3	4/3
ICMA 13555	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 13555	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 13666	1	1	1	2	2	2	1	1	1	4	4	4	4/3	4/3	4/3
ICMB 13666	1	1	1	2	2	2	1	1	1	4	4	4	4/3	4/3	4/3
ICMA 13777	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 13777	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 14111	1	1	1	2	2	2	9	9	9	4	4	4	4	4	4
ICMB 14111	1	1	1	2	2	2	9	9	9	4	4	4	4	4	4
ICMA 14222	1	1	1	1	1	1	1	1	1	4	4	4	4/1	4/1	4/1
ICMB 14222	1	1	1	1	1	1	1	1	1	4	4	4	4/1	4/1	4/1
ICMA 14333	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 14333	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 14444	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 14444	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 14555	9	9	9	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 14555	9	9	9	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMA 14666	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 14666	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 15111	1	1	1	2	2	2	1	1	1	7	7	7	4	4	4
ICMB 15111	1	1	1	2	2	2	1	1	1	7	7	7	4	4	4
ICMA 15222	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 15222	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 15333	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 15333	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 15444	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 15444	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 15555	1	1	1	2	2	2	1	1	1	7	7	7	4	4	4
ICMB 15555	1	1	1	2	2	2	1	1	1	7	7	7	4	4	4
ICMA 15666	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	6	6	6	4	4	4
ICMB 15666	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	6	6	6	4	4	4

A/B Pairs	Panicle tip sterility			Panicle exertion			Panicle bristle			Seed color			Seed shape		
	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean	E1	E2	Mean
ICMA 15777	1	1	1	2	2	2	9	9	9	4	4	4	4	4	4
ICMB 15777	1	1	1	2	2	2	9	9	9	4	4	4	4	4	4
ICMA 16111	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	5	5	5	4	4	4
ICMB 16111	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	5	5	5	4	4	4
ICMA 16222	1	1	1	2	2	2	1	1	1	4/5	4/5	4-5	4	4	4
ICMB 16222	1	1	1	2	2	2	1	1	1	4/5	4/5	4-5	4	4	4
ICMA 16333	9	9	9	2	2	2	1	1	1	4	4	4	4/3	4/3	4/3
ICMB 16333	9	9	9	2	2	2	1	1	1	4	4	4	4/3	4/3	4/3
ICMA 16444	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 16444	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 16555	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 16555	9	9	9	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 16666	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 16666	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 17222	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 17222	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 17333	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 17333	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 17444	1	1	1	2	2	2	1	1	1	4/5	4/5	4-5	4/3	4/3	4/3
ICMB 17444	1	1	1	2	2	2	1	1	1	4/5	4/5	4-5	4/3	4/3	4/3
ICMA 17555	9	9	9	2	2	2	1	1	1	4	4	4	4/1	4/1	4/1
ICMB 17555	9	9	9	2	2	2	1	1	1	4	4	4	4/1	4/1	4/1
ICMA 17666	1/9	1/9	1-9	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 17666	1/9	1/9	1-9	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 17777	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 17777	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 18111	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 18111	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 18222	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 18222	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMA 18333	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 18333	1	1	1	2 <sup>a</sup>	2 <sup>a</sup>	2 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMA 18444	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 18444	1	1	1	2	2	2	1	1	1	4	4	4	4	4	4
ICMA 18555	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMB 18555	1	1	1	2	2	2	1	1	1	5	5	5	4	4	4
ICMA 18666	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMB 18666	1	1	1	1 <sup>a</sup>	1 <sup>a</sup>	1 <sup>a</sup>	1	1	1	4	4	4	4	4	4
ICMA 18777	9	9	9	2	2	2	1	1	1	5	5	5	4/3	4/3	4/3
ICMB 18777	9	9	9	2	2	2	1	1	1	5	5	5	4/3	4/3	4/3
ICMA 18888	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4
ICMB 18888	9	9	9	2	2	2	1	1	1	4	4	4	4	4	4

<sup>a</sup> Predominant class but also indicates presence of other classes



## **Key Characteristics of Seed Parents**

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## SEED PARENTS

**ICMA 05111:** ICMB 05111 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 05111:** [(ICMB 89111 × ICMB 88004) × (ICMB 88006 × ICMB 88005)-2-1-1-4]-101 × B-bulk]-5-B-B

## Key Characteristics

	ICMA 05111	ICMB 05111
Growth habit	Erect	Erect
Days to 50% flowering	Early (45 d)	Medium (48 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (83 cm)	Very short (86 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Small (15 cm)	Small (16 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.4 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.2 g)	Medium (8.6 g)



## SEED PARENTS

**ICMA 05222:** ICMB 05222 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 05222:** (ICMR 312 S1-8-3-3-B × HHVBC)-9-4-1-1

## Key Characteristics

	ICMA 05222	ICMB 05222
Growth habit	Erect	Erect
Days to 50% flowering	Medium (48 d)	Late (51 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (97 cm)	Very short (93 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (26 cm)	Medium (26 cm)
Panicle diameter	Thick (3.2 cm)	Thick (3.1 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Loose	Loose
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.7 g)	Medium (9.9 g)



## SEED PARENTS

**ICMA 05333:** ICMB 05333 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 05333:** (MC 94 S1-30-2-B × HHVBC)-16-3-1-1

## Key Characteristics

	ICMA 05333	ICMB 05333
Growth habit	Erect	Erect
Days to 50% flowering	Medium (49 d)	Late (51 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (85 cm)	Very short (89 cm)
Number of productive tillers plant <sup>-1</sup>	Monoculm (1)	Monoculm (1)
Panicle exertion	Complete	Complete
Panicle length	Medium (25 cm)	Medium (25 cm)
Panicle diameter	Thick (3.1 cm)	Thick (3.2 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey/Yellow brown	Grey/ Yellow brown
Seed shape	Globular	Globular
1000-grain weight	Medium (8.3 g)	Medium (9.4 g)



## SEED PARENTS

**ICMA 05444:** ICMB 05444 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 05444:** (HTBLN/95-98 × ICMB 89111)-8-B

## Key Characteristics

	ICMA 05444	ICMB 05444
Growth habit	Erect	Erect
Days to 50% flowering	Early (42 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (115 cm)	Short (113 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (20 cm)	Small (20 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.4 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Yellow brown	Yellow brown
Seed shape	Globular	Globular
1000-grain weight	Bold (10.4 g)	Medium (8.8 g)



## SEED PARENTS

**ICMA 05555:** ICMB 05555 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 05555:** [(BSECBPT/91-39 × SPF3/S91-116)-15-2-1-4-4 × B-bulk]-1-B-4-1

## Key Characteristics

	ICMA 05555	ICMB 05555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Red	Red
Plant height	Very short (97 cm)	Very short (99 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (25 cm)	Medium (26 cm)
Panicle diameter	Thick (3.1 cm)	Thick (3.2 cm)
Panicle shape	Lanceolate	Lanceolate
Panicle density	Loose/ Semi-compact	Loose/ Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.1 g)	Bold (12.2 g)



## SEED PARENTS

**ICMA 05666:** ICMB 05666 backcrossed to 89111A (A<sub>4</sub>) cytoplasm source

**ICMB 05666:** [(BSECBPT/91-40 × SPF3/S91-3)-1-2-2-3 × B-bulk]-2-B-1-1

### Key Characteristics

	ICMA 05666	ICMB 05666
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (48 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (81 cm)	Very short (81 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Partial	Partial
Panicle length	Small (19 cm)	Small (17 cm)
Panicle diameter	Thick (3.1 cm)	Medium (2.7 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.6 g)	Medium (9.5 g)



## SEED PARENTS

**ICMA 05777:** ICMB 05777 backcrossed to 81A (A4) cytoplasm source

**ICMB 05777:** (D2BLN/95-98 × EEBC C1-1)-7-B-B

### Key Characteristics

	ICMA 05777	ICMB 05777
Growth habit	Erect	Erect
Days to 50% flowering	Early (43 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	White/ Green	White/ Green
Plant height	Short (113 cm)	Short (111 cm)
Number of productive tillers plant-1	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (15 cm)	Small (14 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.7 g)	Bold (11.5 g)





## SEED PARENTS

**ICMA 05888:** ICMB 05888 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 05888:** (SRC II C3 S1-1-1-2 × HHVBC)-5-1-1-2

## Key Characteristics

	ICMA 05888	ICMB 05888
Growth habit	Erect	Erect
Days to 50% flowering	Medium (49 d)	Medium (50 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (115 cm)	Short (113 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Long (35 cm)	Long (36 cm)
Panicle diameter	Medium (2.2 cm)	Medium (2.4 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Small (6.1 g)	Small (6 g)



## SEED PARENTS

**ICMA 05999:** ICMB 05999 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 05999:** (HTBLN/95-98 × ICMB 89111)-1-B-B-1

## Key Characteristics

	ICMA 05999	ICMB 05999
Growth habit	Intermediate	Intermediate
Days to 50% flowering	Early (43 d)	Early (45 d)
Anther color	Brown	Brown
Node pigmentation	Brown	Brown
Plant height	Very short (87 cm)	Very short (89 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (5)	Medium (5)
Panicle exertion	Complete	Complete
Panicle length	Small (16 cm)	Small (16 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Yellow brown/ Grey	Yellow brown/ Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.2 g)	Medium (8.7 g)



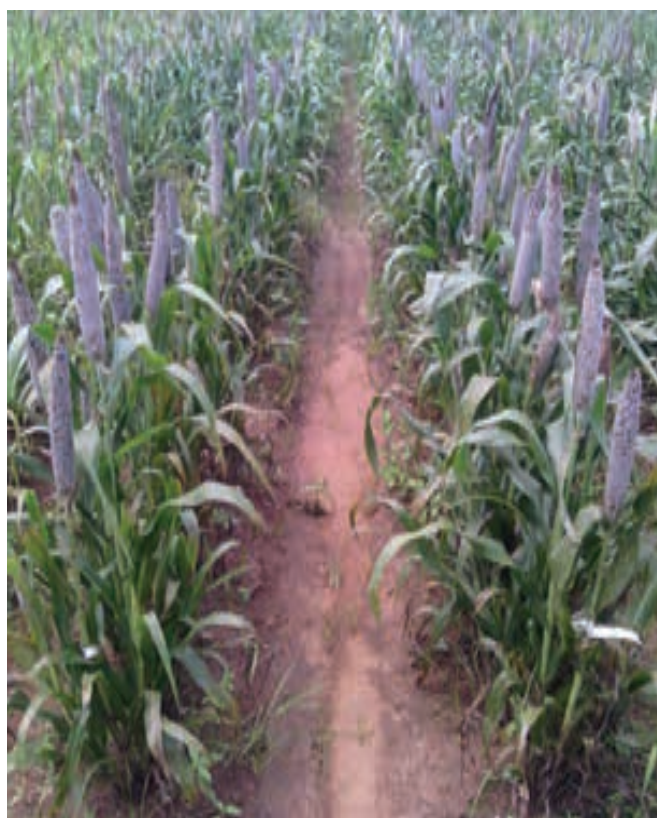
## SEED PARENTS

**ICMA 06111:** ICMB 06111 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 06111:** (ICMR 312 S1-8-3-3-B × HHVBC)-13-2-1

## Key Characteristics

	ICMA 06111	ICMB 06111
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (95 cm)	Very short (94 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (23 cm)	Medium (22 cm)
Panicle diameter	Thick (3.1 cm)	Medium (3 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey brown	Grey brown
Seed shape	Globular	Globular
1000-grain weight	Very bold (13 g)	Medium (9.7 g)



## SEED PARENTS

**ICMA 06222:** ICMB 06222 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 06222:** (ICMR 312 S1-1-5-2-B × HHVBC)-10-2-1-2-3

### Key Characteristics

	ICMA 06222	ICMB 06222
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (47 d)
Anther color	Purple	Purple
Node pigmentation	Green	Green
Plant height	Very short (76 cm)	Very short (78 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (24 cm)	Medium (24 cm)
Panicle diameter	Medium (2.9 cm)	Medium (3 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Small (6.7 g)	Small (6.3 g)



## SEED PARENTS

**ICMA 06333:** ICMB 06333 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 06333:** [D2BLN/95-100 × (ICMB 96333 × HHVBC)]-12-B

## Key Characteristics

	ICMA 06333	ICMB 06333
Growth habit	Erect	Erect
Days to 50% flowering	Early (43 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (91 cm)	Very short (92 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Small (17 cm)	Small (17 cm)
Panicle diameter	Medium (2.6 cm)	Medium (2.6 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Cream	Cream
Seed shape	Globular	Globular
1000-grain weight	Bold (10.7 g)	Bold (10.8 g)



## SEED PARENTS

**ICMA 06444:** ICMB 06444 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 06444:** EEBC S1-407-1-B-B-B-B-1

### Key Characteristics

	ICMA 06444	ICMB 06444
Growth habit	Erect	Erect
Days to 50% flowering	Early (41 d)	Early (41 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (95 cm)	Very short (91 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Partial/ Complete	Partial/ Complete
Panicle length	Small (18 cm)	Small (15 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.7 cm)
Panicle shape	Candle	Candle
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.5 g)	Very bold (14.3 g)



## SEED PARENTS

**ICMA 06555:** ICMB 06555 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 06555:** [{{{843B × (843B × 700651)-11-1-2-B} × 1163B} × ICMB 89111 × ICMB 88005)}-27+ × B-bulk]-3-B-B-10

### Key Characteristics

	ICMA 06555	ICMB 06555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (50 d)	Late (52 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (110 cm)	Short (110 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (19 cm)	Small (18 cm)
Panicle diameter	Medium (2.8 cm)	Medium (2.9 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.4 g)	Bold (10.7 g)



## SEED PARENTS

**ICMA 06666:** ICMB 06666 backcrossed to 89111A (A<sub>4</sub>) cytoplasm source

**ICMB 06666:** [(BSECBPT/91-40 × SPF3/S91-3)-1-2-2-3 × B-bulk]-7-B-3-3

### Key Characteristics

	ICMA 06666	ICMB 06666
Growth habit	Erect	Erect
Days to 50% flowering	Early (43 d)	Early (45 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (79 cm)	Very short (82 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Small (16 cm)	Small (17 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Candle	Candle
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (9.7 g)	Bold (11.7 g)





## SEED PARENTS

**ICMA 06777:** ICMB 06777 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 06777:** (ICMB 96333 × HHVBC-2-D2-HS-259-2)-4-B

## Key Characteristics

	ICMA 06777	ICMB 06777	
Growth habit	Erect	Erect	
Days to 50% flowering	Early (43 d)	Early (44 d)	
Anther color	Brown	Brown	
Node pigmentation	Purple	Purple	
Plant height	Short (101 cm)	Short (104 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)	
Panicle exertion	Partial/ Complete	Partial/ Complete	
Panicle length	Small (20 cm)	Small (19 cm)	
Panicle diameter	Medium (2.9 cm)	Medium (2.9 cm)	
Panicle shape	Cylindrical	Cylindrical	
Panicle density	Loose/ Semi-compact	Loose/ Semi-compact	
Seed color	Grey	Grey	
Seed shape	Globular	Globular	
1000-grain weight	Medium (9 g)	Medium (8.3 g)	

## SEED PARENTS

**ICMA 06888:** ICMB 06888 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 06888:** [(BSECBPT/91-40 × SPF3/S91-514)-7-2-1-B × B-bulk]-2-B-1-1

## Key Characteristics

	ICMA 06888	ICMB 06888
Growth habit	Erect	Erect
Days to 50% flowering	Early (45 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (80 cm)	Very short (85 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (15 cm)	Small (15 cm)
Panicle diameter	Medium (2.7 cm)	Medium (2.7 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.1 g)	Bold (11.7 g)



## SEED PARENTS

**ICMA 06999:** ICMB 06999 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 06999:** (HTBC 48-B-1-1-1-5 × B-bulk)-1-B-B-8

### Key Characteristics

	ICMA 06999	ICMB 06999
Growth habit	Erect	Erect
Days to 50% flowering	Early (45 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (109 cm)	Short (110 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Small (16 cm)	Small (17 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.1 g)	Medium (8.9 g)



## SEED PARENTS

**ICMA 07111:** ICMB 07111 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 07111:** (ICMB 96111 × 4038-4-2-B)-2-1-5-4

## Key Characteristics

	ICMA 07111	ICMB 07111
Growth habit	Erect	Erect
Days to 50% flowering	Late (51 d)	Late (52 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (107 cm)	Short (109 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (5)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Medium (23 cm)
Panicle diameter	Medium (2.3 cm)	Medium (2.4 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Loose/ Semi-compact	Loose/ Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.1 g)	Bold (10.3 g)



## SEED PARENTS

**ICMA 07222:** ICMB 07222 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 07222:** (D2BLN/95-262 × EEBC C1-3)-12-B-1-B-B-4

## Key Characteristics

	ICMA 07222	ICMB 07222
Growth habit	Erect	Erect
Days to 50% flowering	Early (43 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (88 cm)	Very short (84 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (14 cm)	Small (14 cm)
Panicle diameter	Medium (2.2 cm)	Medium (2.3 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	White	White
Seed shape	Globular	Globular
1000-grain weight	Bold (10.6 g)	Very bold (12.7 g)



## SEED PARENTS

**ICMA 07333:** ICMB 07333 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 07333:** [ICMB 97444 × (D2BLN/95-98 × EEBC C1-1)-7-B-B]-34-2-4-B-B

## Key Characteristics

	ICMA 07333	ICMB 07333
Growth habit	Erect	Erect
Days to 50% flowering	Late (52 d)	Late (55 d)
Anther Color	Yellow	Yellow
Node pigmentation	Purple	Purple
Plant height	Short (114 cm)	Short (119 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (18 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.7 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.1 g)	Bold (11.9 g)



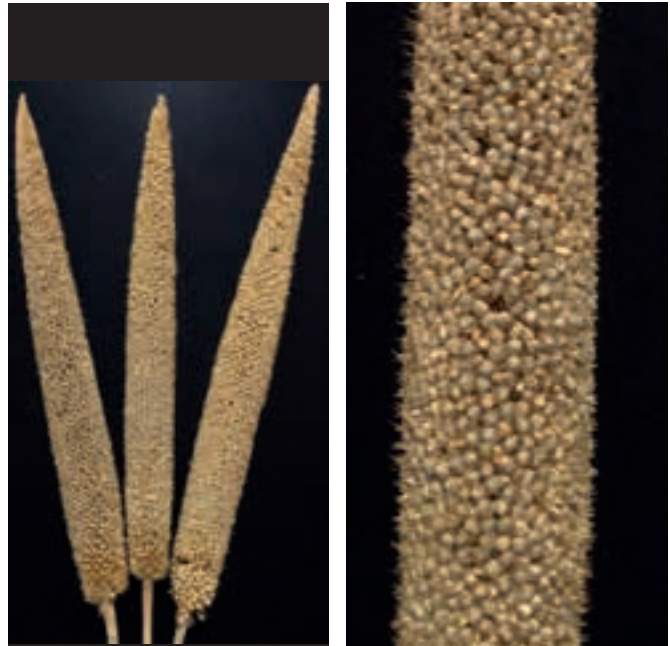
## SEED PARENTS

**ICMA 07444:** ICMB 07444 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 07444:** [(MC 94 S1-81-1-B × HHVBC)-4-4-1 × (MC 94 S1-81-1-B × HHVBC)-4-2-4]-7-1- 1-B

## Key Characteristics

	ICMA 07444	ICMB 07444
Growth habit	Erect	Erect
Days to 50% flowering	Late (54 d)	Very late (57 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (105 cm)	Short (107 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Partial	Partial
Panicle length	Medium (30 cm)	Long (32 cm)
Panicle diameter	Medium (3 cm)	Thick (3.3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular/Ovate	Globular/Ovate
1000-grain weight	Bold (11 g)	Medium (8.4 g)



## SEED PARENTS

**ICMA 07555:** ICMB 07555 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 07555:** [(843B × ICTP 8202-161-5)-20-3-B-B-3 × B-bulk]-2-B-1

## Key Characteristics

	ICMA 07555	ICMB 07555
Growth habit	Erect	Erect
Days to 50% flowering	Early (42 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (89 cm)	Very short (91 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (17 cm)	Small (17 cm)
Panicle diameter	Medium (2.7 cm)	Medium (2.7 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Hexagonal	Hexagonal
1000-grain weight	Very bold (13.8 g)	Bold (12.2 g)





## SEED PARENTS

**ICMA 07666:** ICMB 07666 backcrossed to 89111A (A<sub>4</sub>) cytoplasm source

**ICMB 07666:** [ARD-288-1-10-1-2 (RM)-3 × B-bulk]-14-B-1-1

### Key Characteristics

	ICMA 07666	ICMB 07666
Growth habit	Erect	Erect
Days to 50% flowering	Early (44 d)	Medium (46 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (90 cm)	Very short (90 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (16 cm)	Small (17 cm)
Panicle diameter	Medium (2.8 cm)	Medium (2.8 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Cream	Cream
Seed shape	Globular	Globular
1000-grain weight	Medium (8.9 g)	Medium (8.8 g)






## SEED PARENTS

**ICMA 07777:** ICMB 07777 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 07777:** {ICMB 99555 × [(78-7088/3/SER3 AD//B282/(3/4 EB) × PBLN/S95-359)-19-5-B- B]}-13-2-B-B-B-B

## Key Characteristics

	ICMA 07777	ICMB 07777	
Growth habit	Erect	Erect	
Days to 50% flowering	Early (45 d)	Early (45 d)	
Anther color	Brown	Brown	
Node pigmentation	Green	Green	
Plant height	Very short (83 cm)	Very short (84 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)	
Panicle exertion	Complete	Complete	
Panicle length	Medium (22 cm)	Medium (21 cm)	
Panicle diameter	Thick (3.7 cm)	Thick (3.5 cm)	
Panicle shape	Conical	Conical	
Panicle density	Loose	Loose	
Seed color	Deep grey	Deep grey	
Seed shape	Globular	Globular	
1000-grain weight	Medium (9.1 g)	Bold (10.4 g)	

## SEED PARENTS

**ICMA 07888:** ICMB 07888 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 07888:** [HTBLN/95-98 × (SPF3/S91-544 × SPF3/S91-5)-5-1-2]-3-B-B-1-B-1-B

## Key Characteristics

	ICMA 07888	ICMB 07888
Growth habit	Erect	Erect
Days to 50% flowering	Early (44 d)	Medium (48 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (123 cm)	Short (124 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Partial/Complete	Partial/Complete
Panicle length	Small (15 cm)	Small (16 cm)
Panicle diameter	Medium (3 cm)	Thick (3.1 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.5 g)	Bold (10.3 g)



## SEED PARENTS

**ICMA 07999:** ICMB 07999 backcrossed to 81A (A<sub>5</sub>) cytoplasm source

**ICMB 07999:** (HTBC 48-B-1-1-1-5 × B-bulk)-25-1-B-B

### Key Characteristics

	ICMA 07999	ICMB 07999	
Growth habit	Erect	Erect	
Days to 50% flowering	Medium (46 d)	Medium (46 d)	
Anther color	Brown	Brown	
Node pigmentation	Brown	Brown	
Plant height	Short (103 cm)	Short (103 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)	
Panicle exertion	Complete	Complete	
Panicle length	Small (18 cm)	Small (19 cm)	
Panicle diameter	Medium (2.3 cm)	Medium (2.4 cm)	
Panicle shape	Cylindrical	Cylindrical	
Panicle density	Semi-compact	Semi-compact	
Seed color	Grey	Grey	
Seed shape	Globular	Globular	
1000-grain weight	Bold (11.1 g)	Bold (11.4 g)	

## SEED PARENTS

**ICMA 08111:** ICMB 08111 backcrossed to 88004A (A<sub>1</sub>) cytoplasm source

**ICMB 08111:** (DMR 133 × HTBC 48-B-1-1-1-5)-4

### Key Characteristics

	ICMA 08111	ICMB 08111
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (116 cm)	Short (117 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (23 cm)	Medium (23 cm)
Panicle diameter	Medium (2.9 cm)	Medium (3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Cream	Cream
Seed shape	Globular	Globular
1000-grain weight	Very bold (14.3 g)	Very bold (13.5 g)



## SEED PARENTS

**ICMA 08222:** ICMB 08222 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 08222:** [78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359]-19-2-B-1-B-B-3

## Key Characteristics

	ICMA 08222	ICMB 08222
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	White/Green	White/Green
Plant height	Short (137 cm)	Short (141 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Medium (23 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.4 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.3 g)	Bold (11 g)



## SEED PARENTS

**ICMA 08333:** ICMB 08333 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 08333:** [ICMB 97444 × (843B × 405B)-4]-1-2-B-B-B

## Key Characteristics

	ICMA 08333	ICMB 08333	
Growth habit	Erect	Erect	
Days to 50% flowering	Medium (47 d)	Medium (49 d)	
Anther color	Brown	Brown	
Node pigmentation	Purple	Purple	
Plant height	Very short (98 cm)	Very short (96 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)	
Panicle exertion	Complete	Complete	
Panicle length	Small (17 cm)	Small (17 cm)	
Panicle diameter	Medium (2.7 cm)	Medium (2.8 cm)	
Panicle shape	Cylindrical	Cylindrical	
Panicle density	Semi-compact	Semi-compact	
Seed color	Cream	Cream	
Seed shape	Globular	Globular	
1000-grain weight	Medium (9.4 g)	Medium (8.6 g)	

## SEED PARENTS

**ICMA 08444:** ICMB 08444 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 08444:** HHVBC II D2 HS-410-1-2-4-1-3-B-2-2-3-2

### Key Characteristics

	ICMA 08444	ICMB 08444
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (48 d)
Anther color	Brown	Brown
Node pigmentation	Green/ Brown	Green/ Brown
Plant height	Short (110 cm)	Short (103 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (24 cm)	Medium (23 cm)
Panicle diameter	Thick (3.1 cm)	Thick (3.1 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (9.8 g)	Bold (10.3 g)





## SEED PARENTS

**ICMA 08555:** ICMB 08555 backcrossed to 88004A (A<sub>1</sub>) cytoplasm source

**ICMB 08555:** (ICMB 96555 × IP 10437)-2-4-2-B-6-1

## Key Characteristics

	ICMA 08555	ICMB 08555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (50 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (104 cm)	Short (104 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (19 cm)	Small (20 cm)
Panicle diameter	Thick (3.1 cm)	Thick (3.1 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Cream	Cream
Seed shape	Globular	Globular
1000-grain weight	Very bold (13.6 g)	Bold (11.4 g)





## SEED PARENTS

**ICMA 08666:** ICMB 08666 backcrossed to 88004A (A<sub>1</sub>) cytoplasm source

**ICMB 08666:** [(D2BLN/95-93 × SPF1/K95-3213-20)-10 × (91777B × HHVBC)]-7-B-1-B-B-4-B-1

## Key Characteristics

	ICMA 08666	ICMB 08666	
Growth habit	Erect	Erect	
Days to 50% flowering	Medium (49 d)	Late (52 d)	
Anther color	Yellow	Yellow	
Node pigmentation	Green	Green	
Plant height	Very short (97 cm)	Very short (97 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)	
Panicle exertion	Complete	Complete	
Panicle length	Small (19 cm)	Small (18 cm)	
Panicle diameter	Thick (3.1 cm)	Thick (3.1 cm)	
Panicle shape	Conical	Conical	
Panicle density	Semi-compact	Semi-compact	
Seed color	Grey	Grey	
Seed shape	Globular	Globular	
1000-grain weight	Medium (10 g)	Bold (10.8 g)	

## SEED PARENTS

**ICMA 08777:** ICMB 08777 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 08777:** (HTBC 48-B-1-1-1-5 × B-bulk)-1-B-B-5-1

## Key Characteristics

	ICMA 08777	ICMB 08777
Growth habit	Intermediate	Intermediate
Days to 50% flowering	Early (45 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (109 cm)	Short (114 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (5)	Medium (5)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (19 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Loose/ Semi-compact	Loose/ Semi-compact
Seed color	Cream	Cream
Seed shape	Globular	Globular
1000-grain weight	Medium (10 g)	Bold (10.3 g)



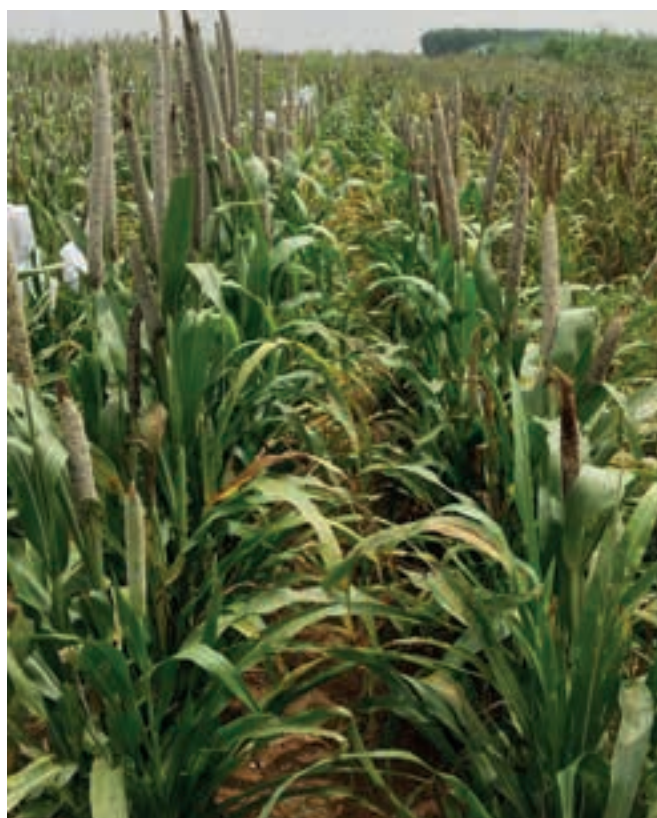
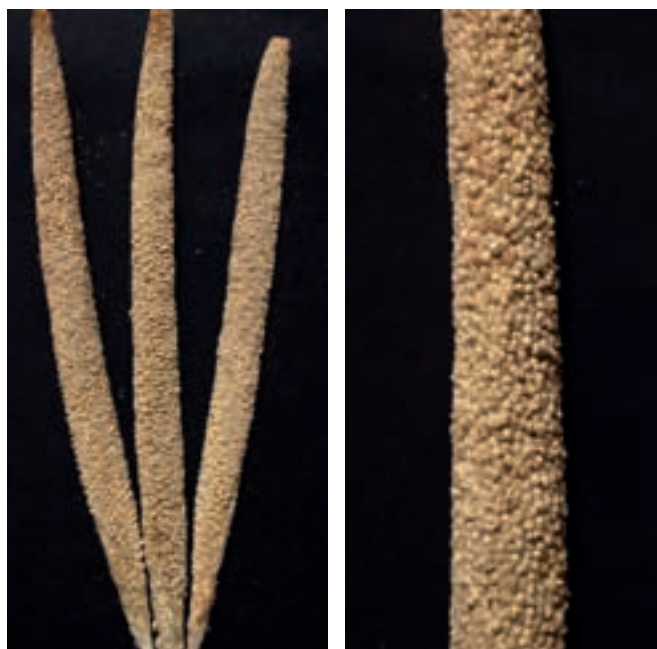
## SEED PARENTS

**ICMA 08888:** ICMB 08888 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 08888:** (SRC II C3 S1-19-3-2 × HHVBC)-27-2-2-1-2-2

### Key Characteristics

	ICMA 08888	ICMB 08888
Growth habit	Erect	Erect
Days to 50% flowering	Late (52 d)	Late (54 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (119 cm)	Short (115 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Partial	Partial
Panicle length	Long (35 cm)	Long (34 cm)
Panicle diameter	Medium (2.7 cm)	Medium (2.8 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.6 g)	Medium (8.5 g)



## SEED PARENTS

**ICMA 08999:** ICMB 08999 backcrossed to 81A (A<sub>5</sub>) cytoplasm source

**ICMB 08999:** [ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-10-2-B-2]- 19-2-B-B-B-B

### Key Characteristics

	ICMA 08999	ICMB 08999
Growth habit	Erect	Erect
Days to 50% flowering	Late (52 d)	Late (52 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (119 cm)	Short (118 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (19 cm)	Small (20 cm)
Panicle diameter	Medium (2.6 cm)	Medium (2.6 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (9.9 g)	Medium (8.2 g)



## SEED PARENTS

**ICMA 09111:** ICMB 09111 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 09111:** [78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359]-7-4-B-B-2-B-B

## Key Characteristics

	ICMA 09111	ICMB 09111
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (48 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (94 cm)	Very short (91 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Partial	Partial
Panicle length	Medium (24 cm)	Medium (23 cm)
Panicle diameter	Thick (3.8 cm)	Thick (3.8 cm)
Panicle shape	Lanceolate	Lanceolate
Panicle density	Compact	Compact
Seed color	Deep grey	Deep grey
Seed shape	Hexagonal	Hexagonal
1000-grain weight	Bold (12.4 g)	Very bold (13.2 g)



## SEED PARENTS

**ICMA 09222:** ICMB 09222 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 09222:** [ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-10-2-B-2]-18-3-B-B-B-B

## Key Characteristics

	ICMA 09222	ICMB 09222
Growth habit	Erect	Erect
Days to 50% flowering	Early (42 d)	Early (43 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (72 cm)	Very short (72 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (19 cm)	Small (20 cm)
Panicle diameter	Medium (2.7 cm)	Medium (2.9 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Loose/ Semi-compact	Loose/ Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.7 g)	Medium (8.2 g)



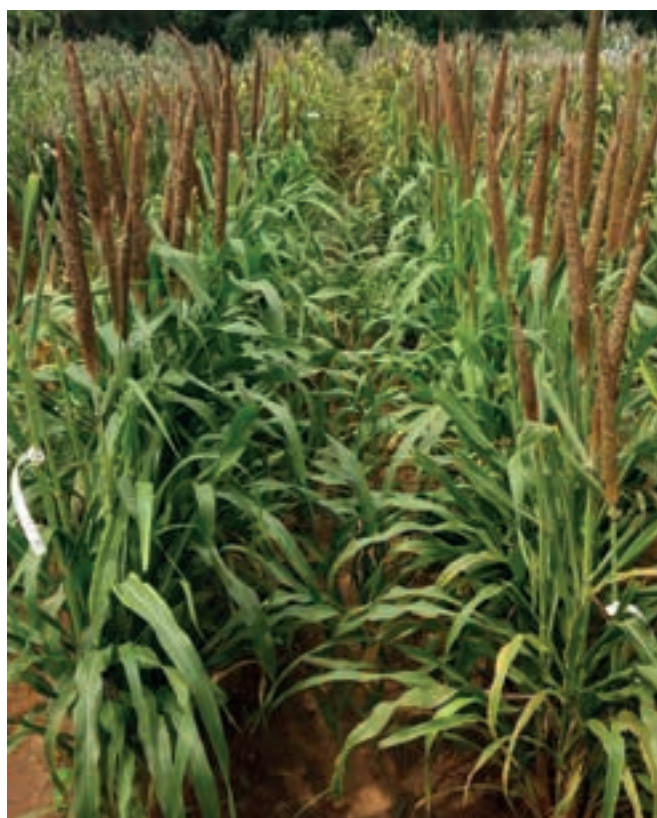
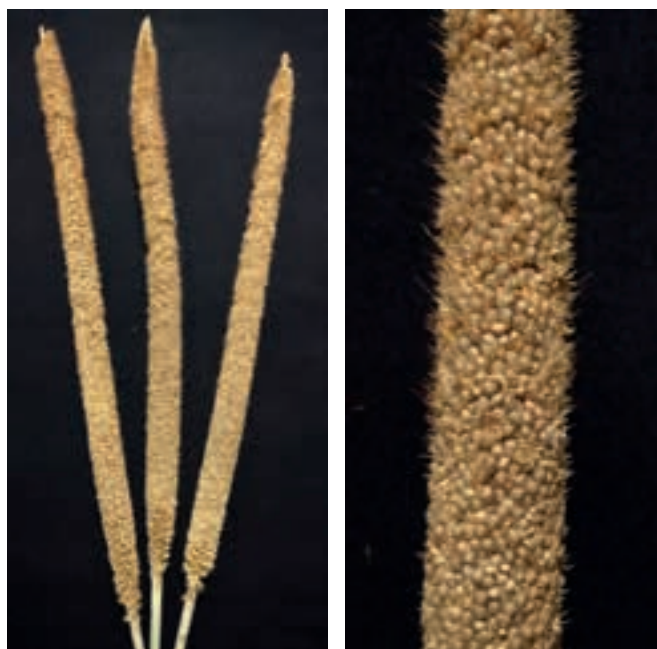
## SEED PARENTS

**ICMA 09333:** ICMB 09333 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 09333:** [(SRC II C3 S1-103-1-1 × HHVBC)-20 × (81B × ICMP 451)-5-4-2-3]-5-2-1-B-B-3-B

## Key Characteristics

	ICMA 09333	ICMB 09333
Growth habit	Intermediate	Intermediate
Days to 50% flowering	Very late (59 d)	Very late (62 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (128 cm)	Short (128 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Long (37 cm)	Long (37 cm)
Panicle diameter	Medium (2.3 cm)	Medium (2.3 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.9 g)	Medium (7.7 g)





## SEED PARENTS

**ICMA 09555:** ICMB 09555 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 09555:** [(ICMB 95111 × 9035/S92-B-3)-17-1-B-B-B-B

### Key Characteristics

	ICMA 09555	ICMB 09555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Early (45 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (107 cm)	Short (113 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Long (31 cm)	Long (32 cm)
Panicle diameter	Medium (2.3 cm)	Medium (2.3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Obovate/ Globular	Obovate/ Globular
1000-grain weight	Medium (8.8 g)	Medium (9 g)



## SEED PARENTS

**ICMA 09666:** ICMB 09666 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 09666:** (ICMB 95444 × ICMB 94555)-18-3-B-4-2

## Key Characteristics

	ICMA 09666	ICMB 09666
Growth habit	Erect	Erect
Days to 50% flowering	Early (45 d)	Early (45 d)
Anther color	Brown	Brown
Node pigmentation	Brown	Brown
Plant height	Very short (97 cm)	Very short (97 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (4)
Panicle exertion	Partial	Partial
Panicle length	Small (17 cm)	Small (17 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.4 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (9.8 g)	Bold (10.1 g)



## SEED PARENTS

**ICMA 09777:** ICMB 09777 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 09777:** (ICMB 94555 × ICMB 92111)-17-2-B-1

## Key Characteristics

	ICMA 09777	ICMB 09777
Growth habit	Erect	Erect
Days to 50% flowering	Early (43 d)	Medium (46 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (101 cm)	Very short (95 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (19 cm)	Small (17 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.2 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.7 g)	Bold (11.7 g)



## SEED PARENTS

**ICMA 09888:** ICMB 09888 backcrossed to 81A (A<sub>5</sub>) cytoplasm source

**ICMB 09888:** NC D2 S1-2-2-2-3-2-B-2

### Key Characteristics

	ICMA 09888	ICMB 09888
Growth habit	Erect	Erect
Days to 50% flowering	Late (53 d)	Late (53 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (132 cm)	Short (130 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Medium (26 cm)	Medium (24 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.4 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.1 g)	Medium (8.8 g)



## SEED PARENTS

**ICMA 09999:** ICMB 09999 backcrossed to 81A (A<sub>3</sub>) cytoplasm source

**ICMB 09999:** (81B × 4025-3-2-B)-8-1-B

## Key Characteristics

	ICMA 09999	ICMB 09999
Growth habit	Erect	Erect
Days to 50% flowering	Very late (56 d)	Very late (58 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (110 cm)	Short (104 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium(29 cm)	Medium(26 cm)
Panicle diameter	Medium (1.8 cm)	Medium (1.8 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.5 g)	Small (7.1 g)



## SEED PARENTS

**ICMA 10111:** ICMB 10111 backcrossed to 88004A (A<sub>1</sub>) cytoplasm source

**ICMB 10111:** [(D2BLN/95-93 × SPF1/K95-3213-20)-10 × (91777B × HHVBC)]-7-B-1-B-B-2-B

## Key Characteristics

	ICMA 10111	ICMB 10111
Growth habit	Erect	Erect
Days to 50% flowering	Early (44 d)	Early (45 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (93 cm)	Very short (90 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (17 cm)	Small (17 cm)
Panicle diameter	Medium (2.9 cm)	Medium (3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.1 g)	Bold (12.2 g)



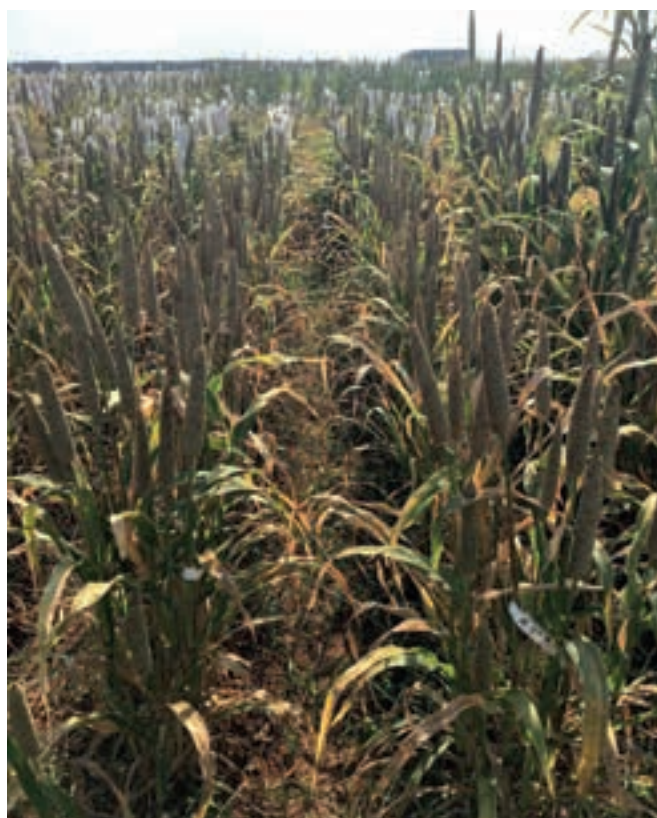
## SEED PARENTS

**ICMA 10222:** ICMB 10222 backcrossed to 88004A (A<sub>1</sub>) cytoplasm source

**ICMB 10222:** (ICMB 01888 × ICMB 01222)-15-2-B-2-3

### Key Characteristics

	ICMA 10222	ICMB 10222
Growth habit	Erect	Erect
Days to 50% flowering	Early (45 d)	Medium (46 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (95 cm)	Very short (93 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (17 cm)	Small (17 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Cream	Cream
Seed shape	Globular	Globular
1000-grain weight	Bold (10.9 g)	Bold (11.7 g)



## SEED PARENTS

**ICMA 10444:** ICMB 10444 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 10444:** [78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359]-7-4-B-B-2-B-B

## Key Characteristics

	ICMA 10444	ICMB 10444
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (49 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (89 cm)	Very short (90 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (24 cm)	Medium (24 cm)
Panicle diameter	Thick (3.6 cm)	Thick (3.7 cm)
Panicle shape	Oblanceolate	Oblanceolate
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (12.6 g)	Very bold (13.7 g)





## SEED PARENTS

**ICMA 10555:** ICMB 10555 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 10555:** (ICMB 95444 × ICMB 94555)-18-3-B-4-2

## Key Characteristics

	ICMA 10555	ICMB 10555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (46 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (96 cm)	Very short (98 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (4)
Panicle exertion	Partial	Partial
Panicle length	Small (16 cm)	Small (17 cm)
Panicle diameter	Medium (2.3 cm)	Medium (2.4 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (9.8 g)	Medium (9.8 g)



## SEED PARENTS

**ICMA 10666:** ICMB 10666 backcrossed to 88004A (A<sub>4</sub>) cytoplasm source

**ICMB 10666:** [ICMB 97444 × (843B × EEBC S1-407)-12-4-B-B]-6-1-B-B-B-B

## Key Characteristics

	ICMA 10666	ICMB 10666
Growth habit	Erect	Erect
Days to 50% flowering	Early (44 d)	Medium (46 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (77 cm)	Very short (79 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (5)
Panicle exertion	Partial	Partial
Panicle length	Small (14 cm)	Small (16 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (13.5 g)	Very bold (13 g)



## SEED PARENTS

**ICMA 10777:** ICMB 10777 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 10777:** (ICMB 01666 × ICMB 01222)-27-3-B-3

## Key Characteristics

	ICMA 10777	ICMB 10777
Growth habit	Erect	Erect
Days to 50% flowering	Medium (50 d)	Late (55 d)
Anther color	Purple	Purple
Node pigmentation	Green	Green
Plant height	Short (122 cm)	Short (121 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (23 cm)	Medium (22 cm)
Panicle diameter	Medium (3 cm)	Thick (3.2 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.7 g)	Bold (10.5 g)



## SEED PARENTS

**ICMA 10888:** ICMB 10888 backcrossed to 88004A (A<sub>5</sub>) cytoplasm source

**ICMB 10888:** [ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-10-2-B-2]- 18-3-B-B-B-B

### Key Characteristics

	ICMA 10888	ICMB 10888
Growth habit	Erect	Erect
Days to 50% flowering	Early (44 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (72 cm)	Very short (74 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (20 cm)	Small (20 cm)
Panicle diameter	Medium (2.9 cm)	Medium (3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.2 g)	Medium (9.4 g)



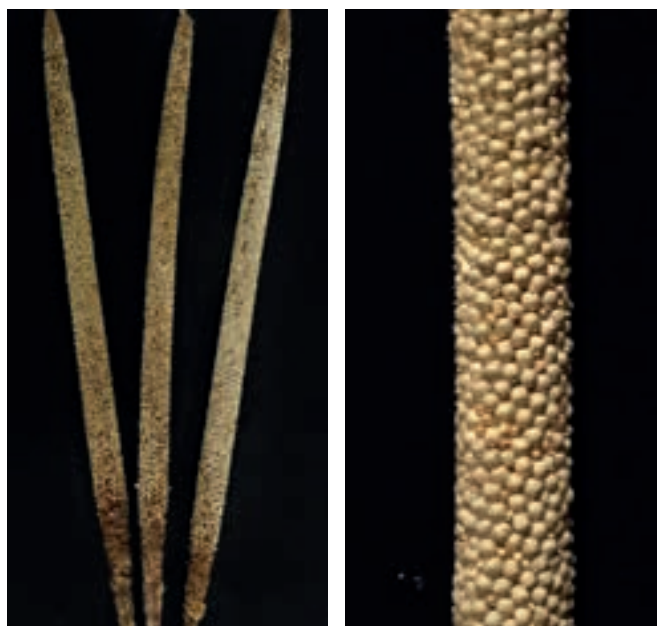
## SEED PARENTS

**ICMA 10999:** ICMB 10999 backcrossed to 81A (A<sub>5</sub>) cytoplasm source

**ICMB 10999:** NC D2 S1-17-2-1-1-2-2-B-4

### Key Characteristics

	ICMA 10999	ICMB 10999
Growth habit	Erect	Erect
Days to 50% flowering	Very late (56 d)	Very late (56 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (114 cm)	Short (114 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Partial	Partial
Panicle length	Long (33 cm)	Long (34 cm)
Panicle diameter	Medium (1.7 cm)	Medium (1.7 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Small (7.3 g)	Medium (7.6 g)



## SEED PARENTS

**ICMA 11111:** ICMB 11111 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 11111:** [EBC-GEN-S1-40-2-2-1 × B-bulk]-19-B-B-2-B-B-3

## Key Characteristics

	ICMA 11111	ICMB 11111
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (48 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (104 cm)	Short (105 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Partial	Partial
Panicle length	Small (19 cm)	Small (19 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (12.9 g)	Very bold (12.6 g)



## SEED PARENTS

**ICMA 11222:** ICMB 11222 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 11222:** (ICMB 95444 × ICMB 93333)-24-2-B-2-B

## Key Characteristics

	ICMA 11222	ICMB 11222
Growth habit	Erect	Erect
Days to 50% flowering	Late (54 d)	Late (55 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (104 cm)	Short (113 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Partial	Partial
Panicle length	Medium (27 cm)	Medium (27 cm)
Panicle diameter	Thick (3.4 cm)	Thick (3.5 cm)
Panicle shape	Lanceolate	Lanceolate
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.7 g)	Medium (9.5 g)



## SEED PARENTS

**ICMA 11333:** ICMB 11333 backcrossed to 81A (A<sub>1</sub>) cytoplasm source

**ICMB 11333:** [ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-10-2-B-2]-8-1-B-2-B-B

### Key Characteristics

	ICMA 11333	ICMB 11333
Growth habit	Erect	Erect
Days to 50% flowering	Early (44 d)	Medium (46 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very Short (89 cm)	Very Short (88 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (28 cm)	Medium (26 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey/ Deep grey	Grey/ Deep grey
Seed shape	Globular	Globular
1000-grain weight	Small (7.3 g)	Small (7.2 g)





## SEED PARENTS

**ICMA 11444:** ICMB 11444 backcrossed to ICMA 04999 (A<sub>1</sub>) and 88004A (A<sub>4</sub>) cytoplasm source

**ICMB 11444:** [ICMB 97444 × (843B × EEBC S1-407)-12-4-B-B]-6-1-B-B-B-B

## Key Characteristics

	ICMA 11444	ICMB 11444
Growth habit	Erect	Erect
Days to 50% flowering	Early (42 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (80 cm)	Very short (82 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (5)
Panicle exertion	Complete	Complete
Panicle length	Small (17 cm)	Small (18 cm)
Panicle diameter	Medium (2.6 cm)	Medium (2.6 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Loose/ Semi-compact	Loose/ Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (13.3 g)	Very bold (14.6 g)



## SEED PARENTS

**ICMA 11555:** ICMB 11555 backcrossed to ICMA 04999 (A<sub>1</sub>) and 81A (A<sub>4</sub>) cytoplasm source

**ICMB 11555:** [(MC 94 S1-81-1-B × HHVBC)-4-4-1 × (MC 94 S1-81-1-B × HHVBC)-4-2-4]-10-3-1-B-1

## Key Characteristics

	ICMA 11555	ICMB 11555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (50 d)	Late (52 d)
Anther color	Purple	Purple
Node pigmentation	Green	Green
Plant height	Short (101 cm)	Short (102 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (29 cm)	Medium (30 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.3 cm)
Panicle shape	Lanceolate	Lanceolate
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular/Obovate	Globular/Obovate
1000-grain weight	Medium (9 g)	Medium (8 g)



## SEED PARENTS

**ICMA 11666:** ICMB 11666 backcrossed to 81A (A<sub>3</sub>) cytoplasm source

**ICMB 11666:** (MC 94 S1-34-1-B × HHVBC)-16-2-1-4-2-B

## Key Characteristics

	ICMA 11666	ICMB 11666
Growth habit	Erect	Erect
Days to 50% flowering	Late (53 d)	Very late (56 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (82 cm)	Very short (73 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (17 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.4 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey brown	Grey brown
Seed shape	Globular	Globular
1000-grain weight	Medium (8.1 g)	Small (5.4 g)



## SEED PARENTS

**ICMA 11777:** ICMB 11777 backcrossed to 88004A (A<sub>1</sub> and A<sub>4</sub>) cytoplasm source

**ICMB 11777:** [ICMB 97444 × (843B × 405B)-4]-1 -2-B-B-B-B

## Key Characteristics

	ICMA 11777	ICMB 11777
Growth habit	Erect	Erect
Days to 50% flowering	Medium (48 d)	Medium (49 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (99 cm)	Very short (95 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (17 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.6 g)	Bold (11.3 g)



## SEED PARENTS

**ICMA 11999:** ICMB 11999 backcrossed to 81A (A<sub>1</sub>, A<sub>4</sub> and A<sub>5</sub>) Cytoplasm source

**ICMB 11999:** (DMR 133 × HTBC 48-B-1-1-1-5)-9-1-B-B-1

## Key Characteristics

	ICMA 11999	ICMB 11999
Growth habit	Erect	Erect
Days to 50% flowering	Early (42 d)	Early (43 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (96 cm)	Short (103 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (5)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Small (16 cm)	Small (16 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.4 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.4 g)	Bold (11.7 g)



## SEED PARENTS

**ICMA 12111:** ICMB 12111 backcrossed to ICMA 04999 (A<sub>1</sub>) and 81A (A<sub>5</sub>) cytoplasm source

**ICMB 12111:** (ICMB 95444 × ICMB 93333)-24-2-B-B

## Key Characteristics

	ICMA 12111	ICMB 12111
Growth habit	Erect	Erect
Days to 50% flowering	Late (53 d)	Late (54 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (134 cm)	Short (131 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (5)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Medium (30 cm)	Medium (30 cm)
Panicle diameter	Medium (2.3 cm)	Medium (2.3 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (9.2 g)	Medium (9.5 g)



## SEED PARENTS

**ICMA 12222:** ICMB 12222 backcrossed to 81A (A<sub>1</sub>, A<sub>4</sub>, and A<sub>5</sub>) cytoplasm source

**ICMB 12222:** (ICMB 95444 × ICMB 92111)-4-B-4-3-B-B

## Key Characteristics

	ICMA 12222	ICMB 12222
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (48 d)
Anther color	Purple	Purple
Node pigmentation	Brown	Brown
Plant height	Very short (98 cm)	Very short (100 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (5)	Medium (4)
Panicle exertion	Complete	Partial
Panicle length	Small (18 cm)	Small (18 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.4 g)	Bold (12 g)



## SEED PARENTS

**ICMA 12333:** ICMB 12333 backcrossed to ICMA 04999 (A<sub>1</sub>) and 81A (A<sub>4</sub> and A<sub>5</sub>) cytoplasm source

**ICMB 12333:** [HHV-S1-24-3-B-3-2 × (ICMB 91777 × HHVBC)]-5-B-1-1-B-B-B

## Key Characteristics

	ICMA 12333	ICMB 12333
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (50 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (91 cm)	Very short (89 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (24 cm)	Medium (23 cm)
Panicle diameter	Thick (3.5 cm)	Thick (3.5 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Deep grey	Deep grey
Seed shape	Hexagonal	Hexagonal
1000-grain weight	Bold (11.5 g)	Very bold (13 g)





## SEED PARENTS

**ICMA 12444:** ICMB 12444 backcrossed to 81A (A<sub>1</sub> and A<sub>5</sub>) cytoplasm source

**ICMB 12444:** (ICMB 95444 × ICMB 93333)-24-2-B-4-B-B-B

### Key Characteristics

	ICMA 12444	ICMB 12444
Growth habit	Erect	Erect
Days to 50% flowering	Medium (49 d)	Medium (50 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (130 cm)	Short (128 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (18 cm)
Panicle diameter	Medium (2.9 cm)	Medium (2.9 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey brown	Grey brown
Seed shape	Globular/ Hexagonal	Globular/ Hexagonal
1000-grain weight	Medium (9.8 g)	Bold (10.5 g)



## SEED PARENTS

**ICMA 12555:** ICMB 12555 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 12555:** [ICMB 97444 × (D2BLN/95-98 × EEBC C1-1)-7-B-B]-34-2-4-B-B-5-B-B

### Key Characteristics

	ICMA 12555	ICMB 12555
Growth habit	Erect	Erect
Days to 50% flowering	Late (52 d)	Late (54 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (111 cm)	Short (114 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Small (17 cm)	Small (18 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.7 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular/Obovate	Globular/Obovate
1000-grain weight	Medium (9.6 g)	Bold (10.4 g)



## SEED PARENTS

**ICMA 13111:** ICMB 13111 backcrossed to 81A (A<sub>4</sub>) cytoplasm source

**ICMB 13111:** [78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359]-7-4-B-B-6-1-B-1-B-1-B-B- B

## Key Characteristics

	ICMA 13111	ICMB 13111
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Late (51 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Very short (76 cm)	Very short (76 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Medium (21 cm)
Panicle diameter	Thick (3.2 cm)	Thick (3.5 cm)
Panicle shape	Lanceolate	Lanceolate
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.8 g)	Bold (10.4 g)



## SEED PARENTS

**ICMA 13222:** ICMB 13222 backcrossed to ICMA 04999 (A<sub>1</sub>) and 02111A (A<sub>4</sub>) cytoplasm source

**ICMB 13222:** [(ICMB 95111 × 9035/S92-B-3)-17-5-1-B-B-B × ICMB 99111]-3-2-1-3

## Key Characteristics

	ICMA 13222	ICMB 13222
Growth habit	Erect	Erect
Days to 50% flowering	Late (54 d)	Very late (56 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (148 cm)	Short (150 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Medium (21 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.3 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (13 g)	Bold (12.1 g)



## SEED PARENTS

**ICMA 13444:** ICMB 13444 backcrossed to 02111A (A<sub>4</sub>) cytoplasm source

**ICMB 13444:** [(D2BLN/95-93 × SPF1/K95-3213-20)-10 × (91777B × HHVBC)]-7-B-1-B-B-4-B- B-B-B-2

### Key Characteristics

	ICMA 13444	ICMB 13444	
Growth habit	Erect	Erect	
Days to 50% flowering	Early (44 d)	Medium (47 d)	
Anther color	Brown	Brown	
Node pigmentation	Purple	Purple	
Plant height	Very short (93 cm)	Very short (88 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)	
Panicle exertion	Complete	Complete	
Panicle length	Small (16 cm)	Small (17 cm)	
Panicle diameter	Medium (2.3 cm)	Medium (2.7 cm)	
Panicle shape	Conical	Conical	
Panicle density	Semi-compact	Semi-compact	
Seed color	Grey	Grey	
Seed shape	Globular/ Hexagonal	Globular/ Hexagonal	
1000-grain weight	Bold (12.2 g)	Medium (9.1 g)	

## SEED PARENTS

**ICMA 13555:** ICMB 13555 backcrossed to 97333A (A<sub>1</sub> and A<sub>4</sub>) cytoplasm source

**ICMB 13555:** (EEDBC S1-425-2-1-2-3-B-1-B-7-1 × B-bulk (3981-4011/S06 G1))-2-2-3

## Key Characteristics

	ICMA 13555	ICMB 13555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (47 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (104 cm)	Short (103 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (18 cm)
Panicle diameter	Medium (2.3 cm)	Medium (2.4 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (14.5 g)	Very bold (14.6 g)



## SEED PARENTS

**ICMA 13666:** ICMB 13666 backcrossed to 97444A (A<sub>1</sub>) and 03111A (A<sub>4</sub>) cytoplasm source

**ICMB 13666:** IC-CZBC-C0-166-2-1-3-B

## Key Characteristics

	ICMA 13666	ICMB 13666
Growth habit	Erect	Erect
Days to 50% flowering	Early (42 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (92 cm)	Very short (95 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (19 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.6 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular/ Hexagonal	Globular/ Hexagonal
1000-grain weight	Bold (10.6 g)	Medium (8.9 g)





## SEED PARENTS

**ICMA 13777:** ICMB 13777 backcrossed to 81A (A<sub>3</sub>) cytoplasm source

**ICMB 13777:** (ICMB 01888 × ICMB 01222)-16-1-2-2-1-B-B

## Key Characteristics

	ICMA 13777	ICMB 13777	
Growth habit	Erect	Erect	
Days to 50% flowering	Late (53 d)	Late (52 d)	
Anther color	Purple	Purple	
Node pigmentation	Green	Green	
Plant height	Short (106 cm)	Short (104 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)	
Panicle exertion	Complete	Complete	
Panicle length	Medium (21 cm)	Medium (22 cm)	
Panicle diameter	Medium (3 cm)	Medium (3 cm)	
Panicle shape	Conical	Conical	
Panicle density	Compact	Compact	
Seed color	Grey	Grey	
Seed shape	Globular	Globular	
1000-grain weight	Bold (11.2 g)	Bold (10.9 g)	



## SEED PARENTS

**ICMA 14111:** ICMB 14111 backcrossed to 88004A (A<sub>1</sub>) cytoplasm source

**ICMB 14111:** (HTBLN/95-98 × ICMB 89111)-8-B-B-B-B-2-B

## Key Characteristics

	ICMA 14111	ICMB 14111
Growth habit	Intermediate	Intermediate
Days to 50% flowering	Early (43 d)	Early (45 d)
Anther color	Purple	Purple
Node pigmentation	Red	Red
Plant height	Short (106 cm)	Short (109 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (5)	Medium (4)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Small (20 cm)
Panicle diameter	Medium (2.5 cm)	Medium (2.5 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.9 g)	Bold (10.9 g)



## SEED PARENTS

**ICMA 14222:** ICMB 14222 backcrossed to 95444A (A<sub>1</sub>) cytoplasm source

**ICMB 14222:** IC-CZBC-C0-166-2-1-B-B-P3

## Key Characteristics

	ICMA 14222	ICMB 14222
Growth habit	Erect	Erect
Days to 50% flowering	Medium (48 d)	Medium (50 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (104 cm)	Very short (98 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Partial	Partial
Panicle length	Small (20 cm)	Small (18 cm)
Panicle diameter	Thick (3.1 cm)	Thick (3.2 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular/Obovate	Globular/Obovate
1000-grain weight	Bold (11.3 g)	Medium (9.9 g)



## SEED PARENTS

**ICMA 14333:** ICMB 14333 backcrossed to 99666 A (A<sub>4</sub>) cytoplasm source

**ICMB 14333:** {(MC 94 S1-81-1-B × HHVBC)-4-4-1 × (MC 94 S1-81-1-B × HHVBC)-4-2-4-10-3- 1--B-B-B × ICMB 02777}-81-1

## Key Characteristics

	ICMA 14333	ICMB 14333
Growth habit	Erect	Erect
Days to 50% flowering	Late (55 d)	Very late (56 d)
Anther color	Purple	Purple
Node pigmentation	Purple	Purple
Plant height	Short (111 cm)	Short (113 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (23 cm)	Medium (22 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.5 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.4 g)	Bold (11.8 g)



## SEED PARENTS

**ICMA 14444:** ICMB 14444 backcrossed to ICMA 04999 (A<sub>1</sub>) and 88004A (A<sub>4</sub>) cytoplasm source

**ICMB 14444:** (B × B) F2 (G-6)-86-1-1-3

## Key Characteristics

	ICMA 14444	ICMB 14444
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (110 cm)	Short (111 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Small (20 cm)
Panicle diameter	Medium (2.9 cm)	Medium (2.9 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.1 g)	Very bold (13.8 g)



## SEED PARENTS

**ICMA 14555:** ICMB 14555 backcrossed to ICMA 04999 (A<sub>1</sub>) and 81A (A<sub>4</sub> and A<sub>5</sub>) cytoplasm source

**ICMB 14555:** (ICMB 97444 × ICMB 00888)-52-1-1-B-4-2-B

## Key Characteristics

	ICMA 14555	ICMB 14555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (49 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (129 cm)	Short (129 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Partial	Partial
Panicle length	Small (20 cm)	Medium (21 cm)
Panicle diameter	Thick (3.1 cm)	Thick (3.3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (12.7 g)	Very bold (13.4 g)



## SEED PARENTS

**ICMA 14666:** ICMB 14666 backcrossed to 98555A (A<sub>1</sub>), 06999A (A<sub>4</sub>) and 02555A (A<sub>5</sub>) cytoplasm source

**ICMB 14666:** [(ICMB 95111 × 9035/S92-B-3)-17-5-1-B-B-B × ICMB 99111]-3-2-1-2

## Key Characteristics

	ICMA 14666	ICMB 14666
Growth habit	Erect	Erect
Days to 50% flowering	Early (45 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (149 cm)	Short (150 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Medium (21 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.3 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.6 g)	Bold (12.4 g)



## SEED PARENTS

**ICMA 15111:** ICMB 15111 backcrossed to 95444A (A<sub>1</sub>) cytoplasm source

**ICMB 15111:** [(843B × ICMP5 900-9-3-2-2)-41-2-5-5 S2-34-1-2-1-1 × B-bulk]-18-B-B

### Key Characteristics

	ICMA 15111	ICMB 15111
Growth habit	Intermediate	Intermediate
Days to 50% flowering	Late (55 d)	Very late (56 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (98 cm)	Very short (100 cm)
Number of productive tillers plant <sup>-1</sup>	Medium (6)	High (9)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (20 cm)
Panicle diameter	Medium (2.3 cm)	Medium (2.3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Yellow brown	Yellow brown
Seed shape	Globular	Globular
1000-grain weight	Medium (9.2 g)	Medium (9 g)



## SEED PARENTS

**ICMA 15222:** ICMB 15222 backcrossed to 03666A (A<sub>1</sub>) cytoplasm source

**ICMB 15222:** {EEDBC S1-109-1-4-2-1-B-B-B-1-1× 3981-3989 G1}-2-3-2

## Key Characteristics

	ICMA 15222	ICMB 15222
Growth habit	Erect	Erect
Days to 50% flowering	Early (42 d)	Early (43 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (110 cm)	Short (111 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (16 cm)	Small (16 cm)
Panicle diameter	Medium (2.6 cm)	Medium (2.6 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (15.3 g)	Very bold (16 g)





## SEED PARENTS

**ICMA 15333:** ICMB 15333 backcrossed to ICMA 04999 (A<sub>1</sub>) and 02111A (A<sub>4</sub>) cytoplasm source

**ICMB 15333:** {(MC 94 S1-34-1-B × HHVBC)-12-1-2-2-2-B-1-B-B × [ICMB 95111 × (D2BLN/95- 107 × EEBC C1-1)-6-B]-24-4-1-B-B-B-B}-8-2-2-2

### Key Characteristics

	ICMA 15333	ICMB 15333
Growth habit	Erect	Erect
Days to 50% flowering	Early (42 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (107 cm)	Short (114 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (17 cm)	Small (18 cm)
Panicle diameter	Medium (2.4 cm)	Medium (2.4 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (13 g)	Very bold (13.6 g)



## SEED PARENTS

**ICMA 15444:** ICMB 15444 backcrossed to 03999A (A<sub>4</sub>) cytoplasm source

**ICMB 15444:** (ICMB 95111 × EEBC S1-407-1-B-B)-17-3-1-B-B-B-B-4-B× 3981-4011 G2}-1-4-2

### Key Characteristics

	ICMA 15444	ICMB 15444
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (48 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (123 cm)	Short (126 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (16 cm)	Small (17 cm)
Panicle diameter	Medium (2.7 cm)	Medium (2.8 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Medium (10 g)	Bold (11 g)



## SEED PARENTS

**ICMA 15555:** ICMB 15555 backcrossed to ICMA 04999 (A<sub>1</sub>) and 03333A (A<sub>5</sub>) cytoplasm source

**ICMB 15555:** [(ICMB 96555 × IP 10437)-9-B-B-B-B-B × IP 14758-2-2]-19-1-B × (ICMB 96555 × IP 10437)-3-4-1-2-2-1-B-2-B-3]-3-3-2-1-4

### Key Characteristics

	ICMA 15555	ICMB 15555
Growth habit	Erect	Erect
Days to 50% flowering	Medium (50 d)	Late (51 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (124 cm)	Short (127 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Small (20 cm)
Panicle diameter	Thick (3.4 cm)	Thick (3.4 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact	Semi-compact
Seed color	Yellow brown	Yellow brown
Seed shape	Globular	Globular
1000-grain weight	Very bold (13.8 g)	Very bold (14.2 g)



## SEED PARENTS

**ICMA 15666:** ICMB 15666 backcrossed to 97555A (A<sub>4</sub>) cytoplasm source

**ICMB 15666:** (ICMB 01666 × ICMB 01222)-49-1-2-B-2-2-P1

## Key Characteristics

	ICMA 15666	ICMB 15666
Growth habit	Erect	Erect
Days to 50% flowering	Late (55 d)	Very late (57 d)
Anther color	Purple	Purple
Node pigmentation	Green	Green
Plant height	Very short (89 cm)	Very short (89 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Partial	Partial
Panicle length	Medium (23 cm)	Medium (23 cm)
Panicle diameter	Thick (3.4 cm)	Thick (3.5 cm)
Panicle shape	Lanceolate	Lanceolate
Panicle density	Compact	Compact
Seed color	Grey brown	Grey brown
Seed shape	Globular	Globular
1000-grain weight	Medium (8.8 g)	Medium (8.7 g)



## SEED PARENTS

**ICMA 15777:** ICMB 15777 backcrossed to 06999A (A<sub>4</sub>) and 10999A (A<sub>5</sub>) cytoplasm source

**ICMB 15777:** IC-CZBC-C0-26-3-1-1-B-2

## Key Characteristics

	ICMA 15777	ICMB 15777
Growth habit	Erect	Erect
Days to 50% flowering	Medium (48 d)	Medium (49 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (87 cm)	Very short (81 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (19 cm)	Small (18 cm)
Panicle diameter	Thick (3.2 cm)	Thick (3.1 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.2 g)	Bold (11.3 g)



## SEED PARENTS

**ICMA 16111:** ICMB 16111 backcrossed to 98555A (A<sub>1</sub>) cytoplasm source

**ICMB 16111:** (BSECBPT/91-38 × SPF3/S91-529)-10-1-7-1

### Key Characteristics

	ICMA 16111	ICMB 16111
Growth habit	Erect	Erect
Days to 50% flowering	Medium (47 d)	Medium (48 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (93 cm)	Very short (93 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (19 cm)	Small (20 cm)
Panicle diameter	Thick (3.1 cm)	Thick (3.3 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11 g)	Bold (10.7 g)



## SEED PARENTS

**ICMA 16222:** ICMB 16222 backcrossed to 97555A (A<sub>4</sub>) cytoplasm source

**ICMB 16222:** (ICMB 04888 × ICMB 02333)-3-1-3-1

## Key Characteristics

	ICMA 16222	ICMB 16222
Growth habit	Erect	Erect
Days to 50% flowering	Early (45 d)	Medium (46 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (119 cm)	Short (116 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (18 cm)
Panicle diameter	Medium (2.9 cm)	Medium (2.8 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey/ Dark grey	Grey/ Dark grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.4 g)	Bold (11.6 g)



## SEED PARENTS

**ICMA 16333:** ICMB 16333 backcrossed to 01222A (A<sub>4</sub>) cytoplasm source

**ICMB 16333:** (ICMB 96555 × IP 10437)-3-4-1-2-8 × {(96555B × LaGrap C2 S1-32-1)-10} × IP 14758-2-1]-8-3-2-1-2-2

## Key Characteristics

	ICMA 16333	ICMB 16333
Growth habit	Erect	Erect
Days to 50% flowering	Late (53 d)	Very late (57 d)
Anther color	Yellow	Yellow
Node pigmentation	Green	Green
Plant height	Short (128 cm)	Short (131 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Monoculm (1)
Panicle exertion	Complete	Complete
Panicle length	Medium (24 cm)	Medium (24 cm)
Panicle diameter	Thick (3.5 cm)	Thick (3.4 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular/ Hexagonal	Globular/ Hexagonal
1000-grain weight	Very bold (13.3 g)	Very bold (14.3 g)





## SEED PARENTS

**ICMA 16444:** ICMB 16444 backcrossed to 95444A (A<sub>1</sub>) and 03111A (A<sub>4</sub>) cytoplasm source

**ICMB 16444:** (ICMB 04888 × ICMB 00444)-7-1-3-2

## Key Characteristics

	ICMA 16444	ICMB 16444
Growth habit	Erect	Erect
Days to 50% flowering	Early (43 d)	Early (44 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Short (103 cm)	Short (101 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (18 cm)	Small (17 cm)
Panicle diameter	Thick (3.2 cm)	Thick (3.3 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.5 g)	Bold (12.5 g)



## SEED PARENTS

ICMA 16555: ICMB 16555 backcrossed to 00222A (A<sub>1</sub>) and 06999A (A<sub>4</sub>)cytoplasm source

ICMB 16555: [(ICMB 95111 × 9035/S92-B-3)-17-5-1-B-B-B × ICMB 99111]-3-2-3-B

## Key Characteristics

	ICMA 16555	ICMB 16555
Growth habit	Erect	Erect
Days to 50% flowering	Late (52 d)	Late (54 d)
Anther color	Yellow	Yellow
Node pigmentation	White/ Green	White/ Green
Plant height	Short (135 cm)	Short (135 cm)
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (3)
Panicle exertion	Complete	Complete
Panicle length	Small (20 cm)	Small (20 cm)
Panicle diameter	Medium (3 cm)	Thick (3.2 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (12.4 g)	Bold (12.1 g)






## SEED PARENTS

ICMA 16666: ICMB 16666 backcrossed to 97444A (A<sub>1</sub>) and 07999 A (A<sub>5</sub>) cytoplasm source

ICMB 16666: (ICMB 04888 × ICMB 99222)-10-3-1-3

## Key Characteristics

	ICMA 16666	ICMB 16666	
Growth habit	Erect	Erect	
Days to 50% flowering	Medium (46 d)	Medium (48 d)	
Anther color	Brown	Brown	
Node pigmentation	Purple	Purple	
Plant height	Short (110 cm)	Short (119 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (3)	Low (2)	
Panicle exertion	Complete	Complete	
Panicle length	Small (17 cm)	Small (17 cm)	
Panicle diameter	Medium (2.8 cm)	Medium (2.9 cm)	
Panicle shape	Conical	Conical	
Panicle density	Semi-compact	Semi-compact	
Seed color	Deep grey	Deep grey	
Seed shape	Globular	Globular	
1000-grain weight	Bold (10.6 g)	Medium (9.4 g)	

## SEED PARENTS

**ICMA 17222:** ICMB 17222 backcrossed to 97555A (A<sub>4</sub>) cytoplasm source

**ICMB 17222:** (HHVDBC HS-246-1-2-1-2 × ICMB 99555)-1-3-1-1

### Key Characteristics

	ICMA 17222	ICMB 17222
Growth habit	Erect	Erect
Days to 50% flowering	Medium (50 d)	Late (51 d)
Anther color	Purple	Purple
Node pigmentation	Green	Green
Plant height	Very short (99 cm)	Short (108 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Monoculm (1)
Panicle exertion	Complete	Complete
Panicle length	Medium (24 cm)	Medium (25 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.4 cm)
Panicle shape	Lanceolate	Lanceolate
Panicle density	Semi-compact/ Compact	Semi-compact/ Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (9.5 g)	Bold (11.2 g)





## SEED PARENTS

ICMA 17333: ICMB 17333 backcrossed to 96333A (A<sub>1</sub>) cytoplasm source

ICMB 17333: [[{ICMV 88908-11-12-3-2-B × B-bulk)-8-B-3 × {(843B × ICMP5 900-9-3-2-2)-41-2-5-5 S2-34-1-2-1-1 × B-bulk}-5-B-B]-11-1-1-B-B × ICMB 04111]-127-1-3-4

## Key Characteristics

	ICMA 17333	ICMB 17333	
Growth habit	Erect	Erect	
Days to 50% flowering	Late (53 d)	Very late (56 d)	
Anther color	Brown	Brown	
Node pigmentation	Purple	Purple	
Plant height	Short (106 cm)	Short (108 cm)	
Number of productive tillers plant <sup>-1</sup>	Medium (4)	Low (3)	
Panicle exertion	Complete	Complete	
Panicle length	Medium (22 cm)	Medium (22 cm)	
Panicle diameter	Medium (2.3 cm)	Medium (2.4 cm)	
Panicle shape	Conical	Conical	
Panicle density	Semi-compact	Semi-compact	
Seed color	Grey	Grey	
Seed shape	Globular	Globular	
1000-grain weight	Bold (11.3 g)	Bold (11.2 g)	

## SEED PARENTS

**ICMA 17444:** ICMB 17444 backcrossed to 97555A (A<sub>4</sub>) cytoplasm source

**ICMB 17444:** EBC-Gen-S1-40-2-2-1 × B-line bulk]-28-B-B-3-B-B-3

### Key Characteristics



	ICMA 17444	ICMB 17444	
Growth habit	Erect	Erect	
Days to 50% flowering	Medium (47 d)	Medium (50 d)	
Anther color	Brown	Brown	
Node pigmentation	Purple	Purple	
Plant height	Very short (96 cm)	Very short (97 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)	
Panicle exertion	Complete	Complete	
Panicle length	Small (18 cm)	Small (18 cm)	
Panicle diameter	Medium (2.8 cm)	Medium (2.9 cm)	
Panicle shape	Conical	Conical	
Panicle density	Semi-compact	Semi-compact	
Seed color	Grey/ Deep grey	Grey/ Deep grey	
Seed shape	Globular/ Hexagonal	Globular/ Hexagonal	
1000-grain weight	Medium (9.7 g)	Medium (9.8 g)	

## SEED PARENTS

**ICMA 17555:** ICMB 17555 backcrossed to 01555A (A<sub>4</sub>) cytoplasm source

**ICMB 17555:** {(EEDBC S1-425-2-1-2-3-B-2-2-1 × NC D2 BC7F4-22-2-4-1-3-3-1-B) × (HHVDBC Dwarf HS-155-1-1-1-2-2-3 × HHVDBC Medium HS-15-1-1-1-2-2-4)}-3-1-4-1-1

### Key Characteristics



	ICMA 17555	ICMB 17555	
Growth habit	Erect	Erect	
Days to 50% flowering	Late (52 d)	Late (53 d)	
Anther color	Brown	Brown	
Node pigmentation	Green	Green	
Plant height	Short (120 cm)	Short (120 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)	
Panicle exertion	Complete	Complete	
Panicle length	Medium (27 cm)	Medium (27 cm)	
Panicle diameter	Thick (3.7 cm)	Thick (3.6 cm)	
Panicle shape	Conical	Conical	
Panicle density	Compact	Compact	
Seed color	Grey	Grey	
Seed shape	Globular/Obovate	Globular/Obovate	
1000-grain weight	Bold (11.9 g)	Bold (11 g)	

## SEED PARENTS

ICMA 17666: ICMB 17666 backcrossed to 03111A (A<sub>4</sub>) and 02444A (A<sub>5</sub>) cytoplasm source

ICMB 17666: {(MC 94 S1-81-1-B × HHVBC)-4-4-1 × (MC 94 S1-81-1-B × HHVBC)-4-2-4-10-3-1--B-B-B × ICMB 02777}-3-3-B-2

## Key Characteristics

	ICMA 17666	ICMB 17666	
Growth habit	Erect	Erect	
Days to 50% flowering	Late (54 d)	Very late (56 d)	
Anther color	Brown	Brown	
Node pigmentation	Green	Green	
Plant height	Short (102 cm)	Short (105 cm)	
Number of productive tillers plant <sup>-1</sup>	Low (2)	Monoculm (1)	
Panicle exertion	Complete	Complete	
Panicle length	Medium (27 cm)	Medium (27 cm)	
Panicle diameter	Thick (3.2 cm)	Thick (3.2 cm)	
Panicle shape	Conical	Conical	
Panicle density	Semi-compact	Semi-compact	
Seed color	Deep grey	Deep grey	
Seed shape	Globular	Globular	
1000-grain weight	Medium (9.5 g)	Medium (9.8 g)	



## SEED PARENTS

**ICMA 17777:** ICMB 17777 backcrossed to 05444A (A<sub>1</sub>), 05111A (A<sub>4</sub>) and 02444A (A<sub>5</sub>) cytoplasm source

**ICMB 17777:** [(ICMB 95111 × 9035/S92-B-3)-17-5-1-B-B-B × ICMB 99111]-3-2-4-B

### Key Characteristics

	ICMA 17777	ICMB 17777
Growth habit	Erect	Erect
Days to 50% flowering	Very late (56 d)	Very late (58 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Medium (159 cm)	Medium (156 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (21 cm)	Medium (23 cm)
Panicle diameter	Thick (3.2 cm)	Thick (3.3 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (11.9 g)	Bold (12.5 g)



## SEED PARENTS

**ICMA 18111:** ICMB 18111 backcrossed to 05444A (A<sub>1</sub>) cytoplasm source

**ICMB 18111:** [(ICMB 96555 × IP 10437)-9-B-B-B-B-B × IP 14758-2-2]-19-1-B × (ICMB 96555 × IP 10437)-3-4-1-2-2-1-B-2-B-3]-3-3-2-1-5

### Key Characteristics

	ICMA 18111	ICMB 18111
Growth habit	Erect	Erect
Days to 50% flowering	Late (51 d)	Late (54 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (119 cm)	Short (123 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Medium (22 cm)	Medium (22 cm)
Panicle diameter	Thick (3.4 cm)	Thick (3.5 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (13.5 g)	Very bold (14.4 g)



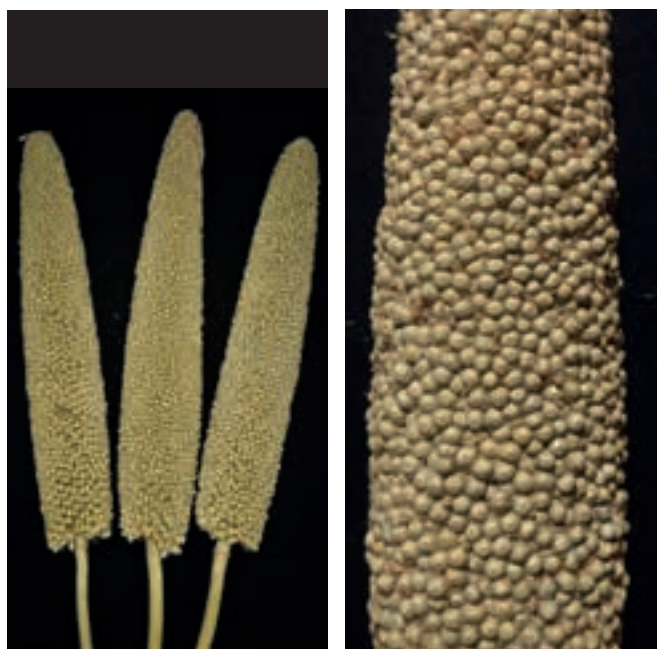
## SEED PARENTS

**ICMA 18222:** ICMB 18222 backcrossed to 97555A (A<sub>4</sub>) cytoplasm source

**ICMB 18222:** [(843B × (843B × 700651)-11-1-2-B) × 1163B] × (ICMB 89111 × ICMB 88005)]- 5-2-2-B-18

## Key Characteristics

	ICMA 18222	ICMB 18222
Growth habit	Erect	Erect
Days to 50% flowering	Medium (50 d)	Late (53 d)
Anther color	Purple	Purple
Node pigmentation	Green	Green
Plant height	Very short (78 cm)	Very short (80 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Partial	Partial
Panicle length	Small (19 cm)	Small (19 cm)
Panicle diameter	Medium (3 cm)	Thick (3.1 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.6 g)	Bold (10.8 g)



## SEED PARENTS

**ICMA 18333:** ICMB 18333 backcrossed to 97555A (A<sub>4</sub>) cytoplasm source

**ICMB 18333:** [ICMB 97444 × (D2BLN/95-98 × EEBC C1-1)-7-B-B]-34-2-4-B-B-B-5

### Key Characteristics

	ICMA 18333	ICMB 18333
Growth habit	Erect	Erect
Days to 50% flowering	Late (53 d)	Very late (56 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (95 cm)	Very short (94 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Monoculm (1)
Panicle exertion	Complete	Complete
Panicle length	Medium (23 cm)	Medium (24 cm)
Panicle diameter	Thick (3.6 cm)	Thick (3.6 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (8.8 g)	Medium (7.8 g)



## SEED PARENTS

**ICMA 18444:** ICMB 18444 backcrossed to 98555A (A<sub>1</sub>) cytoplasm source

**ICMB 18444:** (BSECBPT/91-38 × SPF3/S91-529)-10-1-7-18

### Key Characteristics

	ICMA 18444	ICMB 18444
Growth habit	Erect	Erect
Days to 50% flowering	Medium (46 d)	Medium (47 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Very short (91 cm)	Very short (94 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (19 cm)	Small (19 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.4 cm)
Panicle shape	Cylindrical	Cylindrical
Panicle density	Loose/ Semi-compact	Loose/ Semi-compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Medium (9.8 g)	Bold (10.9 g)



## SEED PARENTS

**ICMA 18555:** ICMB 18555 backcrossed to 02111A (A<sub>4</sub>) cytoplasm source

**ICMB 18555:** {HHVDBC HS-10-1-2-1-1-4 × [ICMB 99555 × {78-7088/3/SER3 AD//B282/(3/4)EB × PBLN/S95-359}-19-5-B-B]-13-2-B-B-B}-22-3-2-2-1-B-18

### Key Characteristics

	ICMA 18555	ICMB 18555
Growth habit	Erect	Erect
Days to 50% flowering	Very late (59 d)	Very late (64 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (121 cm)	Short (113 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Monoculum (1)
Panicle exertion	Complete	Complete
Panicle length	Medium (22 cm)	Medium (21 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.3 cm)
Panicle shape	Conical	Conical
Panicle density	Semi-compact	Semi-compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Small (6.9 g)	Small (6.8 g)



## SEED PARENTS

**ICMA 18777:** ICMB 18777 backcrossed to 96333A (A<sub>1</sub>) and 01555A (A<sub>4</sub>) cytoplasm source

**ICMB 18777:** [HHVDBC HS-120-1-2-1-1-3-B × (SRC II C3 S1-19-3-2 × HHVBC)-3-5-1-1-1-B]- 20-1-2-2

## Key Characteristics

	ICMA 18777	ICMB 18777
Growth habit	Erect	Erect
Days to 50% flowering	Late (55 d)	Very late (59 d)
Anther color	Brown	Brown
Node pigmentation	Green	Green
Plant height	Short (115 cm)	Short (113 cm)
Number of productive tillers plant <sup>-1</sup>	Monoculm (1)	Monoculm (1)
Panicle exertion	Complete	Complete
Panicle length	Medium (27 cm)	Medium (27 cm)
Panicle diameter	Thick (3.4 cm)	Thick (3.5 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Deep grey	Deep grey
Seed shape	Globular	Globular
1000-grain weight	Bold (10.7 g)	Bold (11.8 g)



## SEED PARENTS

**ICMA 18888:** ICMB 18888 backcrossed to 94555A (A<sub>1</sub>) and 06999A (A<sub>4</sub>) cytoplasm source

**ICMB 18888:** (ICMB 04888 × HHVDBC HS-10-1-2-1-1-1-2-B)-1-2-3-2

## Key Characteristics

	ICMA 18888	ICMB 18888
Growth habit	Erect	Erect
Days to 50% flowering	Medium (48 d)	Medium (49 d)
Anther color	Brown	Brown
Node pigmentation	Purple	Purple
Plant height	Very short (99 cm)	Short (101 cm)
Number of productive tillers plant <sup>-1</sup>	Low (2)	Low (2)
Panicle exertion	Complete	Complete
Panicle length	Small (20 cm)	Small (19 cm)
Panicle diameter	Thick (3.3 cm)	Thick (3.2 cm)
Panicle shape	Conical	Conical
Panicle density	Compact	Compact
Seed color	Grey	Grey
Seed shape	Globular	Globular
1000-grain weight	Very bold (14.1 g)	Very bold (15.1 g)











## About

The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a pioneering, international non-profit scientific research for development organization, specializing in improving dryland farming and agri-food systems. The Institute was established in 1972, by a consortium led by the Ford Foundation and the Rockefeller Foundation and with the support from the Government of India. ICRISAT works with global partners to develop innovative science-backed solutions to overcoming hunger, malnutrition, poverty and environmental degradation on behalf of the 2.1 billion people who reside in the drylands of Asia, Sub-Saharan Africa and beyond.

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