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EVALUATION OF THE PERFORMANCE OF EIGHTY-ONE MAIZE ENTRIES FOR YIELD AND OTHER AGRONOMIC TRAITS

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ABSTRACT
A full-diallel cross comprising eight varieties belonging to four different maturity groups was developed and generate the evaluated entries and studied for fifteen characters to assess their' performance. Eighty-one entries comprising the crosses, reciprocals, selfs, parents and nine checks were evaluated at Kadawa under irrigation in two different sowing dates serving as two environments, they were arranged in 9 x 9 lattice design with three replications in each environment. The results of the study indicated that, SAMMAZ 27 x SAMMAZ 35, SAMMAZ 27 x SAMMAZ 17, SAMMAZ 36 x SAMMAZ 29, SAMMAZ 19 x SAMMAZ 27 and SAMMAZ 29 x SAMMAZ 19 are better and more suitable for early planting in environment one while SAMMAZ 19 x SAMMAZ 17, and SAMMAZ 36 x SAMMAZ 35 are better for late planting in environment two. There is a need to select different parental varieties for hybrid production for specific situations. Specific hybrids should be produced for particular planting dates under irrigation, and also Inter variety hybrid development programme is recommended as an effective breeding approach to exploit the heterotic potential of the varieties. SAMMAZ 35, SAMMAZ 37, SAMMAZ 17, SAMMAZ 36 and SAMMAZ 27 are the best combiners for early days to maturity and high yield. They are recommended for extraction of inbred lines for hybrid and composite variety development.

***Keywords*:** environment, variety, variability, diversity

INTRODUCTION

Maize (*Zea mays L*., 2n=20) is an essential crop belonging to the tribe *Maydeae*, of the grass family, *Poaceae*, Genus *Zea*, Species *mays* (Piperno & Flannery, 2001). It was ranked among the world's most important cereal crops, cultivated in a broader range of environments than wheat and rice because of its adaptability (Koutsika-Sotiriou, 1999).

Allard and Bradshaw (1964) Classified environments into predictable and unpredictable situations. The predictable environment includes the regular and more or less permanent features of the environment such as climate as determined by its longitude and latitude, soil type, rainfall and day length. It also includes what are called controllable variables (Perkins & Jinks, 1971) which include: level of fertilizer application, sowing date, and sowing density, amount of irrigation which can be artificially created. The unpredictable one or uncontrollable environment includes weather fluctuations such as differences between seasons in terms of amount and distribution of rainfall and the prevailing temperature during crop growth.

Maize has become a significant food item in Nigeria, and it is consumed in many forms. It is consumed as green maize when the ear is boiled or roasted. When dry, the grain may be processed into different products such as pap (*ogi*) and starch, and it is also an industrial crop in Nigeria (Oluwaranti, Fakorede, & Badu-Apraku, 2008) providing 50% of the calories in diets in Southern Africa, 30% in Eastern Africa and 15% in West and Central Africa (Vivek, Crossa, & Alvarado, 2009). Maize represents a staple food for a significant proportion of the world's population and supplements the diets of millions of many. Availability of early and extra-early varieties is a strategy for adopting maize to the gradually shortened rainy season so that maize could escape the drought stress that occurs during the grain-filling stage in the late season. The early and extra-early varieties were developed explicitly for cultivation in the northern fringes of the Northern Guinea Savanna (NGS) and the Sudan Savanna (SS) (Badu-Apraku, Fakorede, Ouedraogo, & Carsky, 2001; Fajemisin, 1989; Onyibe, Daudu, Akpoko, & Iwuafor, 1999). The use of extra-early maize results in the production of two or more crops in relays, especially where irrigation facilities are available. The extra-early maize is also very useful to "catch-up" with the season in situations where rainfall started late, or rainfall distribution is so adverse as to require replanting. The use of extra-early varieties is an effective way of escaping havoc caused by drought (Ado et al., 2007).

Genetic improvement in traits of economic importance along with maintaining sufficient amount of variability is always the

desired objective in maize breeding programs (Ali, 1991; Hallauer, Miranda Filho, & Carena, 2010; Hallauer & Sears, 1973). Considerable genotypic variability among various maize genotypes for different traits was observed (Grzesiak, 2001). Bernardo (1996) And Ihsan, et al., (2005) also reported significant genetic differences for the morphological parameter for maize genotypes. This variability is key to crop improvement (Welsh, 1981).

However, one of the significant constraints affecting maize production and productivity is the inadequacy of broadly adapted, high yielding, abiotic/biotic resistant varieties and additionally the weather fluctuations between seasons and locations (Kinfe et al., 2016). The low productivity of maize is as a result of the low yielding ability of the local open – pollinated cultivars and the higher sensitivity of the crop to water stress (Saliem, 1991). Despite the importance of maize, for maize production to remain sustainable, research is necessary, but the immediate task that faces hybrid production programmes in Research Institutes is where to obtain information on the performance of the genotypes and the hybrids. That is why this research is conducted to evaluate the performance of the generated F1s and the parents and to select the best performing F1s for further studies.

MATERIALS AND METHODS

The parent materials comprised of eight varieties consisting of SAMMAZ 19, SAMMAZ 17 and SAMMAZ 36 obtained from IAR-Zaria, SAMMAZ 27, SAMMAZ 37, SAMMAZ 35, SAMMAZ 29 and SAMMAZ 28 from International Institute of Tropical Agriculture (Table 1). They were crossed in a complete diallel pattern to generate crosses, reciprocals and self's (Table 2) at Samaru-Zaria in April 2010. Eighty-one varieties comprising the crosses, reciprocals, self's, parents and nine checks were evaluated at Kadawa in two sowing dates at three months interval in January 2011. The sowing dates were considered as separate environments. The 81 entries were arranged in 9 x 9 lattice design with three replications in each environment. One row of 5m long spaced at 0.75m apart was used as a plot. Three seeds were planted at intra row spacing of 50cm and later thinned to two plants per hill. Three hoe weddings were carried out, first one at two weeks after planting, second at four weeks after planting and earthing up at six weeks after planting. There was split fertilizer application of compound fertilizer (NPK 20:10:10) as basal dressing and urea (46 % N) as a top dressing, giving a total plant nutrient of 120 kg N, 60 kg P_2O_5 and 60 kg K_2O per hectare. Data were collected for: Days to 50% tasselling (Dat), days to 50% silking (Das), plant height (PH) (cm), days to maturity (DM), kernels per row (KPR) and grain yield per hectare (Gy) (kg). A brief description of the varieties is presented in Table 1

Table 1: Origin and descriptions of the varieties

S/N	Variety	Maturity Period	Days to mid-silk	Source, description
1	SAMMAZ 19 (S.14 DKD DT)	Late (100-120 days)	62 days	IAR, White Flint
2	SAMMAZ 37 (Pop 66 SR/Acr91 Suwan-1-SR)	Late (100-120 days)	62 days	IITA, Yellow flint
3	SAMMAZ 17 (Acr Sakatifu)	Medium (91-95 days)	58 days	IAR, White Dent
4	SAMMAZ 36 (Cm 2007 pool QPM-Y)	Medium (91-95 days)	56 days	IAR, Yellow flint
5	Sammaz 27 (EV 99 DT-W-STR)	Early (86-90 days)	52 days	IITA,White Flint,*Striga* resistant
6	SAMMAZ 35 (2000 EV DT-Y STRC4)	Early (86-90 days)	52 days	IITA, Yellow Flint, *Striga* resistant
7	SAMMAZ 29(2000 syn EE-W-STR)	Extra-Early (80-85 days)	50 days	IITA, White Flint
8	SAMMAZ 28 (99 TZEE-Y-STR)	Extra-Early (80-85 days)	50 days	IITA, Yellow flint

Table 2. Crossing Nursery

♀ \ ♂	1	2	3	4	5	6	7	8
1	1x1	1x2	1x3	1x4	1x5	1x6	1x7	1x8
2	2x1	2x2	2x3	2x4	2x5	2x6	2x7	2x8
3	3x1	3x2	3x3	3x4	3x5	3x6	3x7	3x8
4	4x1	4x2	4x3	4x4	4x5	4x6	4x7	4x8
5	5x1	5x2	5x3	5x4	5x5	5x6	5x7	5x8
6	6x1	6x2	6x3	6x4	6x5	6x6	6x7	6x8
7	7x1	7x2	7x3	7x4	7x5	7x6	7x7	7x8
8	8x1	8x2	8x3	8x4	8x5	8x6	8x7	8x8

Key: Where 1 to 8 represents the name of the variety as appeared as a serial number in Table 1.

Table 3: Meteorological data for environments one and two 2011

Days	January		February		March		April		May		June		July	
	Max T(°c)	Min T(°c)	Max T(°c)	Min T(°c)	Max T(°c)	Min T(°c)	Max T(°c)	Min T(°c)	Max T(°c)	Min T(°c)	Max T(°c)	Min T(°c)	Max T(°c)	Min T(°c)
1	35	29	31	35	35	27	30	22	36	29	39	29	36	25
2	32	28	32	27	37	26	29	20	34	28	40	24	40	25
3	32	29	33	28	36	24	32	27	37	26	39	24	38	24
4	33	27	34	29	37	25	32	27	35	25	35	25	39	25
5	33	27	35	30	39	26	32	27	36	26	35	23	40	25
6	34	23	36	29	36	27	32	27	35	27	36	24	36	40
7	34	27	37	28	37	28	32	22	35	25	37	25	42	25
8	35	31	36	29	38	24	32	22	35	25	38	27	38	26
9	35	30	35	28	32	25	32	25	37	27	26	39	37	24
10	30	27	34	27	33	26	32	20	34	28	32	23	36	25
11	31	29	35	28	34	27	32	25	34	25	33	24	36	26
12	30	28	36	29	35	26	35	25	33	25	34	25	40	25
13	31	28	37	29	30	28	38	26	33	26	35	26	40	25
14	30	26	36	29	30	27	38	25	34	27	33	27	40	25
15	30	25	37	32	33	26	38	25	35	28	36	26	35	25
16	32	24	30	27	32	26	37	25	37	27	37	22	35	24
17	33	25	32	26	33	27	32	25	37	28	37	23	38	26
18	33	26	31	26	33	28	32	25	36	27	38	24	35	24
19	35	26	34	27	24	29	32	25	32	28	39	26	35	24
20	35	25	33	22	34	27	32	26	32	29	38	27	35	24
21	34	26	34	23	35	28	37	26	34	25	36	28	35	24
22	34	27	35	24	36	29	32	25	34	26	37	26	36	26
23	32	28	34	25	36	28	35	25	34	27	36	28	37	24
24	33	29	30	25	34	29	38	26	34	27	34	26	36	23
25	34	23	30	26	36	28	38	27	35	28	35	27	35	23
26	33	24	33	27	35	27	38	24	35	28	35	28	34	23
27	33	25	34	27	37	27	38	24	34	28	35	29	35	24
28	34	24	30	26	36	28	38	25	35	28	36	30	38	24
29	35	25			37	27	38	26	34	27	37	26	36	33
30	36	26			37	25	38	27	36	28	36	29	38	33
31	32	27			32	27	34	29						
Total	1023	824	944	768	1069	832	1065	775	1042	808	1074	790	1111	769
Mean	33	27	34	27	35	27	34	25	35	27	36	26	37	25.6

Source: Meteorological data records IRS/IAR/ABU Kadawa, 2011

Data Analysis

Analyses of variance (ANOVA) for the single environment as well as for combined environments were computed using the Statistical Application for the Sciences Software (SAS, 2002). The means were separated using Duncan Multiple Range Test.

RESULTS

Mean Performance

The mean performance of the parents crosses, reciprocals, selfs, and checks for fifteen traits at environment one, environment two and across environments are presented in Supplementary Table 1, 2 and 3 respectively. At environment one, the ranges for days to 50% tasselling, days to 50% silking, number of leaves per plant, plant height, ear height and days to maturity (Supplementary Table 1) were 77-98, 84-105, 11-16, 105-182, 39.67-87, and 113-130, respectively. The hybrid 8x3 was earliest to tassel (77 days), check C5 was earliest to silk (84days), check C7 produced the highest number of leaves (16), hybrid 1x6 was the tallest (182cm), while hybrid 5x6 was the earliest to mature (113days). The records for ear length, kernel row number, kernels per row, ear diameter, cob diameter, cob weight, threshing percentage, and yield ranged from 19-11cm, 15-9, 39-18, 7.3-6cm, 2-1cm, 3-0.2kg, 81-34%, and 5316-2131kg/ha, respectively. The hybrid 4 x 1 had the longest ears (19cm), parent 2 had the highest kernel row number (15), hybrid 4 x 6 had the largest kernels per row (39), hybrid 1 x 5 had the largest ear diameter (7.3cm), reciprocal cross 6 x 4 had the largest cob diameter (2cm), hybrid 3 x 7 had the heaviest cobs (3kg), parent 6 had the largest threshing percentage (81%) and hybrid 3 x 7 had the highest yield (5316kg/ ha).

The mean performance in environment two (Supplementary Table 2) indicated that the ranges for days to 50% tasselling and silking, number of leaves per plant, plant height, ear height and days to maturity were 62-75, 68-81, 14-8, 158-72cm, 90-26cm and 88-103, respectively. The reciprocal cross 5 x 3 (62days) was earliest to tassel and silk (68 days). Check C2 (14) had the highest number of leaves, hybrid 5 x 7 was the tallest (158cm), hybrid 5 x 7 had the most extended ear height (90cm), hybrid 1 x 5 was the earliest to mature (88days). Mean ranges for ear length, kernel row number, kernels per row, ear diameter, cob diameter, threshing percentage, and grain yield were 19.5-7cm, 16-7, 36-8, 8.5-4cm, 2-1cm, 92-53%, and 3049-124kg/ha, respectively. Parent 6 had the highest kernel row number (16), reciprocal 6 x 3 had the most top kernels per row (36), self 4 x 4 had the largest ear diameter (8.5cm), hybrid 5 x 8 had the largest cob diameter (2cm), hybrid 1 x 5 (2kg), hybrid 4 x 7 had the highest threshing percentage (92%) and hybrid 1 x 5 had the highest yield (3049kg/ha).

Across environments (Supplementary Table 3) showed that days to 50 % tasselling and silking, number of leaves per plant, plant height, ear height and days to maturity range between 72-81days, 77-88days, 10-14, 100-155cm, 39-74cm and 100-114days, respectively. The hybrid 1 x 5 was earliest to tassel (72days), hybrid 4 x 7 was earliest to silk (77days), reciprocal 7 x 5 had the highest number of leaves (14), reciprocal 7 x 5 was the tallest (155cm) and hybrid 5 x 7 had tallest ear height (74cm) and reciprocal 7 x 1 was earliest to mature (100 days). The result revealed that check C4 had the most extended ear (18cm), hybrid 1 x 5 had the highest kernel row number (14), reciprocal 6 x 3 had the highest kernels per row (36), self (4 x 4) had the highest ear diameter (8cm), hybrid 5 x 8 had the widest cob diameter (2cm), hybrid 4 x 6 had the highest threshing percentage (86.%) and hybrid 5 x 6 had the highest yield (3524kg/ha).

DISCUSSION

Significant differences among the mean values for most of the traits (PH, DM, and Ear Length) were observed in all environments and combined, the findings are in lines to that of (Abou-Deif, 2003; Grzesiak, 2001; Ihsan et al., 2005; Mustafa, Gaafar, & Haitham, 2016; Shah, Ahmed, Shafi, & Bakht, 2000; Sokolov & Guzhva, 1997). The results also indicated the hybrid performance over that of selfing, similar findings were reported by Mitchell-Olds & Waller, (1985) that reported the increased performance of heterogeneous populations over those that resulted from selfing. For this reason, suitable hybrids could be developed for specific environments. In other words, particular hybrids can be generated for early planting in the dry season at Kadawa while some other hybrids will be suitable for planting late in the season represented as environment two in this study. SAMMAZ 27 x SAMMAZ 35, SAMMAZ 27 x SAMMAZ 17, SAMMAZ 36 x SAMMAZ 29, SAMMAZ 19 x SAMMAZ 27 and SAMMAZ 29 x SAMMAZ 19 is better and more suitable for early planting in environment one while SAMMAZ 19 x SAMMAZ 17 and SAMMAZ 36 x SAMMAZ 35 are better for late planting in environment two.

The mean performance of the hybrids at environment one showed that parents from diverse genetic backgrounds can combine effectively to produce good hybrids. Parents with different maturity groups showed similar mean performance, especially SAMMAZ 28 and SAMMAZ 29 for days to 50% tasselling. Among the varieties, SAMMAZ 19 had the longest days to 50% tasselling (99 days) while SAMMAZ 17 had the shortest (79 days). Among the hybrids, SAMMAZ 28 x SAMMAZ 17 had the shortest days to 50% tasselling (77 days). The days to tasselling, silking and maturity were longer in both environments than in the usual wet season because the dry season is characterized by the cold harmattan which reduces maize growth rate (Table 3). SAMMAZ 19 had the highest performance for plant height (165cm), while SAMMAZ 19 x SAMMAZ 35 was the tallest (182cm) suggesting overdominance gene action for the character in the cross similar findings were reported by Kinfe et al., (2016) which additionally, indicated that most of the hybrids have desirable traits for lodging and can be used for further breeding. The same hybrid (SAMMAZ 19 x SAMMAZ 35) was also the tallest for

ear height (87cm), indicating that plant height was associated with ear height. SAMMAZ 19 x SAMMAZ 17 had the longest number of days to maturity (130 days) revealing the importance of the parents in genetic improvement in days to maturity. SAMMAZ 27 x SAMMAZ 35 had the shortest days to maturity (113 days), but the parents were of intermediate maturity group. In general, the maturity periods of the genotypes grown under irrigation were longer than when grown under rainfed condition due to the difference in temperature in the two distinct seasons. The simultaneous emergence of weeds and maize seedlings under irrigation was observed. As such weed competition under irrigation if not checked can affect the yield significantly. SAMMAZ 36 x SAMMAZ 19 and SAMMAZ 36 x SAMMAZ 35 had the highest mean performance for ear length (19cm) and a number of kernels per row (39), respectively. Interestingly, SAMMAZ 17 x SAMMAZ 29 had the highest mean performance for cob weight (2.7kg) and grain yield (5316 kg/ha) suggesting the effect of diversity in origin of the parental lines towards grain yield. The results also revealed that the traits were positively associated (the heavier the cob, the higher the grain yield).

A number of days to maturity is an important trait of a given genotype, which directly or indirectly affects economic yield, it involved several components such as days to 50 percent tasseling and silking. At environment two, SAMMAZ 27 x SAMMAZ 17 had the shortest number of days to 50% tasselling (62 days) and silking (68 days), expressing that the hybrid could be used for early planting under irrigation. The parents were from early and medium maturing groups. SAMMAZ 19 x SAMMAZ 27 had the shortest days to maturity (88days) and also had the highest mean performance for cob weight (2kg) and grain yield (3049 kg/ha), showing that inbred lines extracted from these parents (SAMMAZ 19 and SAMMAZ 27) may likely produce single cross hybrids with early maturity and high grain yields when planted under irrigation in the month of March in Kadawa. Similar findings were reported by Kinfe et al., (2016). According to Lu et al., (2010) reported that earliness in maize used mostly in screening genotypes for tolerance to stresses especially for drought resistance. SAMMAZ 27 x SAMMAZ 29 was the tallest (158cm) and had most extended ear height (90cm) indicating the taller the plant, the taller the height of the ear. The result suggests that plant height and ear height are genetically associated.

The mean performance for the combined data across environments revealed that SAMMAZ 36 x SAMMAZ 29 had the shortest days to 50% silking (78 days). The results also indicated that, the crosses involving SAMMAZ 19 had the highest mean performance for number leaves (14), plant height (155cm), ear height (74cm) and days to maturity (100), indicating that SAMMAZ 19 could be selected for extraction of inbred lines for commercial hybrid development for such traits. SAMMAZ 27 x SAMMAZ 28, SAMMAZ x SAMMAZ 35 and SAMMAZ 27 x SAMMAZ 35 were the best for cob diameter (2cm), cob weight (2kg) and grain yield (3524kg/ha). Similar findings were reported by (Dhakal, Shrestha, Joshi, & Shrestha, 2017), suggesting SAMMAZ 27 to be the best combiner for these traits and could be selected for improvement.

CONCLUSION

The results of the study indicated that suitable hybrids could be produced for specific environments. SAMMAZ 27 x SAMMAZ 35, SAMMAZ 27 x SAMMAZ 17, SAMMAZ 36 x SAMMAZ 29, SAMMAZ 19 x SAMMAZ 27 and SAMMAZ 29 x SAMMAZ 19 are better and more suitable for early planting in environment one while SAMMAZ 19 x SAMMAZ 17, and SAMMAZ 36 x SAMMAZ 35 are better for late planting in environment two.

RECOMMENDATIONS

Based on the results of this study, it is therefore recommended that there is a need to select different parental varieties for hybrid production for specific environments. Specific hybrids should be produced for specific planting dates under irrigation, and also Inter variety hybrid development programme is recommended as an effective breeding approach to exploit the heterotic potential of the varieties. SAMMAZ 35, SAMMAZ 37, SAMMAZ 17, SAMMAZ 36 and SAMMAZ 27 are the best combiners for early days to maturity and high yield. They are recommended for extraction of inbred lines for hybrid and composite variety development.

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Supplementary table 1: Mean performance of parents, crosses, reciprocals, selfs and checks for fifteen agronomic characters in environment one

Genotype	entry	Dat	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 19	1	98.5^{a}	104.5^{a}	14.0^{a-c}	164.5^{a-c}	58.0^{a-h}	117.5^{f-h}	3.0^{k-l}
Sammaz 37	2	82.3^{c-n}	88.0^{d-k}	13.3^{a-d}	140.3^{a-i}	68.0^{a-h}	122.3^{a-f}	13.0^{a-k}
Sammaz 17	3	78.7^{i-n}	85.3^{g-k}	12.7^{b-d}	129.3^{b-i}	57.0^{b-h}	120.7^{c-h}	16.0^{a-g}
Sammaz 36	4	88^{b-d}	96.3^{b-e}	12.7^{b-d}	152.7^{a-h}	53.0^{b-h}	128.7^{a-d}	2.3^{l}
Sammaz 27	5	80.7^{d-n}	87.7^{e-k}	13.3^{a-d}	137.3^{b-i}	58.3^{a-h}	122.0^{a-f}	14.7^{a-h}
Sammaz 35	6	85^{b-l}	90.3^{b-k}	13.3^{a-d}	134.3^{b-i}	56.7^{b-h}	125.3^{a-f}	4.3^{i-l}
Sammaz 29	7	79.0^{h-n}	86.0^{f-k}	12.7^{b-d}	117.0^{f-i}	52.3^{c-h}	122.0^{a-f}	7.0^{g-l}
Sammaz 28	8	81.7^{c-n}	87.3^{f-k}	10.7^{c}	104.7^{i}	41.3^{g-h}	121.0^{c-h}	8.3^{e-l}
Sammaz 19 X Sammaz 19	1x1	85.3^{b-k}	90.7^{b-k}	12.7^{b-d}	131.7^{b-i}	56.3^{b-h}	125.3^{a-f}	14.0^{a-j}
Sammaz 19 X Sammaz 37	1x2	87^{b-f}	92.7^{b-j}	14.7^{a-c}	151.0^{a-h}	64.0^{a-h}	124.3^{a-f}	20.0^{a-c}
Sammaz 19 X Sammaz 17	1x3	86^{b-i}	91.7^{b-k}	13.3^{a-d}	147.7^{a-h}	64.3^{a-h}	130.3^{a}	19.7^{a-c}
Sammaz 19 X Sammaz 36	1x4	85.3^{b-k}	92.7^{b-j}	14.0^{a-c}	156.0^{a-g}	65.3^{a-h}	124.3^{a-f}	15.3^{a-g}
Sammaz 19 X Sammaz 27	1x5	81.3^{c-n}	88.0^{d-k}	14.0^{a-c}	132.0^{b-i}	52.3^{c-h}	122.7^{a-f}	15.0^{a-h}
Sammaz 19 X Sammaz 35	1x6	84^{b-n}	90.0^{c-k}	14.0^{a-c}	182.0^{a}	87.0^{a}	124.0^{a-f}	19.0^{a-d}
Sammaz 19 X Sammaz 29	1x7	85.7^{b-j}	89.3^{d-k}	14.0^{a-c}	148.0^{a-h}	60.3^{a-h}	125.3^{a-f}	15.3^{a-g}
Sammaz 19 X Sammaz 28	1x8	81.7^{c-n}	88.0^{d-k}	12.0^{c-d}	132.0^{b-i}	57.3^{b-h}	120.0^{d-h}	17.7^{a-f}
Sammaz 37 X Sammaz 19	2x1	83^{b-n}	89.3^{d-k}	13.3^{a-d}	161.0^{a-e}	77.3^{a-e}	123.7^{a-f}	19.3^{a-c}
Sammaz 37 X Sammaz 37	2x2	86.7^{b-g}	93.7^{b-h}	13.3^{a-d}	128.3^{b-i}	54.3^{b-h}	122.3^{a-f}	17.3^{a-g}
Sammaz 37 X Sammaz 17	2x3	84.7^{b-m}	93.7^{b-h}	14.7^{a-c}	141.7^{a-i}	62.3^{a-h}	123.3^{a-f}	19.7^{a-c}
Sammaz 37 X Sammaz 36	2x4	83.0^{b-n}	88.3^{d-k}	14.0^{a-c}	132.0^{b-i}	59.0^{a-h}	123.3^{a-f}	19.3^{a-c}
Sammaz 37 X Sammaz 27	2x5	85.3^{b-k}	92.7^{b-j}	13.3^{a-d}	125.7^{c-i}	51.0^{d-h}	127.0^{a-e}	12.7^{b-k}
Sammaz 37 X Sammaz 35	2x6	83.3^{b-n}	89.7^{c-k}	14.7^{a-c}	143.0^{a-i}	67.3^{a-h}	121.7^{a-f}	15.0^{a-h}
Sammaz 37 X Sammaz 29	2x7	84.7^{b-m}	91.7^{b-k}	14.0^{a-c}	134.0^{b-i}	65.7^{a-h}	123.0^{a-f}	18.7^{a-e}

Supplementary table 1 continued

Genotype	entry	Dat	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 37 X Sammaz 28	2x8	82.0^{c-n}	90.3^{b-k}	12.7^{b-d}	138.7^{b-i}	63.0^{a-h}	121.3^{b-g}	19.7^{a-c}
Sammaz 17 X Sammaz 19	3x1	83.3^{b-n}	90.7^{b-k}	13.3^{a-d}	151.7^{a-h}	72.0^{a-f}	124.7^{a-f}	15.3^{a-g}
Sammaz 17 X Sammaz 37	3x2	86.3^{b-h}	92.0^{b-k}	12.0^{c-d}	131.7^{b-i}	53.0^{b-h}	125.0^{a-f}	13.7^{a-j}
Sammaz 17 X Sammaz 17	3x3	85.3^{b-k}	91.3^{b-k}	14.0^{a-c}	120.7^{d-i}	47.3^{f-h}	128.0^{a-e}	23.3^{a}
Sammaz 17 X Sammaz 36	3x4	82.7^{c-n}	89.7^{c-k}	12.7^{b-d}	128.3^{b-i}	54.7^{b-h}	128.7^{a-d}	14.0^{a-j}
Sammaz 17 X Sammaz 27	3x5	84.3^{b-n}	93.0^{b-i}	12.7^{b-d}	138.0^{b-i}	68.3^{a-h}	124.3^{a-f}	20.3^{a-c}
Sammaz 17 X Sammaz 35	3x6	85.0^{b-l}	92.3^{b-k}	14.7^{a-c}	161.0^{a-e}	78.3^{a-d}	123.7^{a-f}	19.0^{a-d}
Sammaz 17 X Sammaz 29	3x7	81.7^{c-n}	87.7^{e-k}	13.3^{a-d}	137.0^{b-i}	53.7^{b-h}	122.7^{a-f}	19.7^{a-c}
Sammaz 17 X Sammaz 28	3x8	85^{b-l}	90.3^{b-k}	14.0^{a-c}	135.3^{b-i}	57.0^{b-h}	124.0^{a-f}	16.0^{a-g}
Sammaz 36 X Sammaz 19	4x1	85^{b-l}	91.7^{b-k}	14.0^{a-c}	169.7^{a}-^{b}	82.0^{a}-^{b}	122.7^{a-f}	19.7^{a-c}
Sammaz 36 X Sammaz 37	4x2	85.3^{b-k}	91.0^{b-k}	13.3^{a-d}	149.3^{a-h}	73.3^{a-f}	125.7^{a-f}	18.3^{a-e}
Sammaz 36 X Sammaz 17	4x3	83.7^{b-n}	90.0^{c-k}	14.7^{a-c}	148.7^{a-h}	55.3^{b-h}	124.0^{a-f}	12.3^{b-k}
Sammaz 36 X Sammaz 36	4x4	87^{b-f}	94.3^{b-f}	14.7^{a-c}	152.3^{a-h}	63.3^{a-h}	126.0^{a-f}	17.0^{a-g}
Sammaz 36 X Sammaz 27	4x5	85.7^{b-j}	94.3^{b-f}	14.7^{a-c}	142.0^{a-i}	54.7^{b-h}	125.0^{a-f}	12.7^{b-k}
Sammaz 36 X Sammaz 35	4x6	84.3^{b-n}	88.0^{d-k}	14.0^{a-c}	138.7^{b-i}	65.0^{a-h}	124.3^{a-f}	14.3^{a-i}
Sammaz 36 X Sammaz 29	4x7	84^{b-n}	86.3^{f-k}	14.3^{a-c}	154.0^{a-h}	71.7^{a-f}	126.0^{a-f}	17.3^{a-g}
Sammaz 36 X Sammaz 28	4x8	84.3^{b-n}	90.3^{b-k}	14.0^{a-c}	143.3^{a-i}	58.0^{a-h}	123.0^{a-f}	14.3^{a-i}
Sammaz 27 X Sammaz 19	5x1	80.0^{e-n}	86.3^{f-k}	12.7^{b-d}	127.0^{c-i}	60.0^{a-h}	122.0^{a-f}	13.0^{a-k}
Sammaz 27 X Sammaz 37	5x2	81.0^{d-n}	87.3^{f-k}	13.3^{a-d}	142.3^{a-i}	64.3^{a-h}	120.7^{c-h}	18.7^{a-e}
Sammaz 27 X Sammaz 17	5x3	88.7^{bc}	98.3^{a-c}	14.0^{a-c}	151.3^{a-h}	67.7^{a-h}	130.0^{a}-^{b}	18.3^{a-e}
Sammaz 27 X Sammaz 36	5x4	87.3^{b-e}	94.3^{b-f}	13.3^{a-d}	127.3^{b-i}	58.0^{a-h}	129.0^{a-c}	21.3^{a-c}
Sammaz 27 X Sammaz 27	5x5	82.0^{c-n}	87.3^{f-k}	12.7^{b-d}	137.7^{b-i}	72.7^{a-f}	123.3^{a-f}	21.3^{a-c}
Sammaz 27 X Sammaz 35	5x6	80.7^{d-n}	88.0^{d-k}	15.3^{a}-^{b}	161.7^{a-d}	81.7^{a-c}	112.7^{h}	19.0^{a-d}
Sammaz 27 X Sammaz 29	5x7	83.0^{b-n}	90.3^{b-k}	14.0^{a-c}	133.0^{b-i}	57.0^{b-h}	123.7^{a-f}	17.7^{a-f}
Sammaz 27 X Sammaz 28	5x8	80.0^{e-n}	87.7^{e-k}	13.3^{a-d}	142.7^{a-i}	59.7^{a-h}	123.7^{a-f}	15.7^{a-g}

Supplementary table 1 continued

Genotype	entry	Dat	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 35 X Sammaz 19	6x1	83.3^{b-n}	91.3^{b-k}	15.3^{a-b}	142.3^{a-i}	62.3^{a-h}	126.0^{a-f}	15.0^{a-h}
Sammaz 35 X Sammaz 37	6x2	84.3^{b-n}	91.0^{b-k}	14.7^{a-c}	159.0^{a-f}	67.3^{a-h}	124.0^{a-f}	18.3^{a-e}
Sammaz 35 X Sammaz 17	6x3	79.7^{f-n}	85.7^{f-k}	12.0^{c-d}	127.3^{b-i}	58.0^{a-h}	124.3^{a-f}	17.7^{a-f}
Sammaz 35 X Sammaz 36	6x4	86^{b-i}	92.7^{b-j}	13.3^{a-d}	126.7^{c-i}	58.0^{a-h}	123.0^{a-f}	22.0^{a-b}
Sammaz 35 X Sammaz 27	6x5	82.3^{c-n}	90.7^{b-k}	12.7^{b-d}	115.3^{g-i}	51.3^{d-h}	122.3^{a-f}	13.0^{a-k}
Sammaz 35 X Sammaz 35	6x6	80.0^{e-n}	87.0^{f-k}	12.0^{c-d}	126.7^{c-i}	48.0^{e-h}	122.0^{a-f}	12.7^{b-k}
Sammaz 35 X Sammaz 29	6x7	82.7^{c-n}	89.7^{c-k}	13.3^{a-d}	125.7^{c-i}	59.0^{a-h}	123.0^{a-f}	19.3^{a-c}
Sammaz 35 X Sammaz 28	6x8	82.3^{c-n}	86.0^{f-k}	14.7^{a-c}	153.0^{a-h}	63.3^{a-h}	123.3^{a-f}	17.7^{a-f}
Sammaz 29 X Sammaz 19	7x1	79.7^{f-n}	87.7^{e-k}	13.3^{a-d}	135.0^{b-i}	68.3^{a-h}	102.7^{i}	16.3^{a-g}
Sammaz 29 X Sammaz 37	7x2	82.0^{c-n}	88.7^{d-k}	12.0^{c-d}	125.0^{c-i}	50.0^{d-h}	120.0^{d-h}	7.3^{f-l}
Sammaz 29 X Sammaz 17	7x3	81.0^{d-n}	87.7^{e-k}	14.0^{a-c}	144.3^{a-i}	67.7^{a-h}	120.3^{c-h}	22.0^{a-b}
Sammaz 29 X Sammaz 36	7x4	85.7^{b-j}	94.0^{b-g}	13.3^{a-d}	124.0^{c-i}	39.7^{h}	123.0^{a-f}	14.3^{a-i}
Sammaz 29 X Sammaz 27	7x5	82.7^{c-n}	90.0^{c-k}	15.3^{a-b}	160.3^{a-e}	78.7^{a-d}	122.7^{a-f}	15.7^{a-g}
Sammaz 29 X Sammaz 35	7x6	80.0^{e-n}	85.0^{h-k}	12.7^{b-d}	128.0^{b-i}	57.7^{b-h}	121.0^{c-h}	16.0^{a-g}
Sammaz 29 X Sammaz 29	7x7	83.0^{b-n}	89.0^{d-k}	12.0^{c-d}	120.0^{d-i}	48.0^{e-h}	126.3^{a-f}	15.3^{a-g}
Sammaz 29 X Sammaz 28	7x8	81.0^{d-n}	86.7^{f-k}	13.3^{a-d}	118.3^{e-i}	53.0^{b-h}	121.3^{b-g}	15.3^{a-g}
Sammaz 28 X Sammaz 19	8x1	81.7^{c-n}	89.3^{d-k}	12.0^{c-d}	132.7^{b-i}	58.0^{a-h}	121.7^{a-f}	14.0^{a-j}
Sammaz 28 X Sammaz 37	8x2	79.3^{g-n}	85.7^{f-k}	12.7^{b-d}	134.3^{b-i}	62.3^{a-h}	121.0^{c-h}	16.7^{a-g}
Sammaz 28 X Sammaz 17	8x3	77.0^{n}	84.7^{j-k}	12.7^{b-d}	127.3^{b-i}	60.0^{a-h}	119.3^{e-h}	15.7^{a-g}
Sammaz 28 X Sammaz 36	8x4	80.7^{d-n}	86.0^{f-k}	12.7^{b-d}	141.0^{a-i}	59.0^{a-h}	113.0^{g-h}	13.0^{a-k}
Sammaz 28 X Sammaz 27	8x5	78.3^{j-n}	85.3^{g-k}	14.0^{a-c}	141.7^{a-i}	66.7^{a-h}	119.7^{e-h}	16.3^{a-g}
Sammaz 28 X Sammaz 35	8x6	77.3^{l-n}	84.7^{j-k}	13.3^{a-d}	133.0^{b-i}	56.0^{b-h}	119.7^{e-h}	18.3^{a-e}
Sammaz 28 X Sammaz 29	8x7	80.0^{e-n}	85.7^{f-k}	13.3^{a-d}	129.0^{b-i}	60.0^{a-h}	121.0^{c-h}	17.7^{a-f}
Sammaz 28 X Sammaz 28	8x8	77.7^{l-n}	84.0^{j-k}	12.0^{c-d}	126.0^{c-i}	58.3^{a-h}	120.7^{c-h}	12.7^{b-k}
Sammaz 11	C1	84.3^{b-n}	90.0^{c-k}	13.3^{a-d}	148.0^{a-h}	69.0^{a-h}	125.7^{a-f}	19.7^{a-c}

KEY: Dat: Days to tasselling, Das: Days to silk, NL: Number of leaves, PH: Plant height, EH: Ear height, DM: Days to maturity,

Supplementary table 1 continued

Genotype	entry	Dat	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 16	C2	90.3^{b}	99.0^{a-b}	12.7^{b-d}	138.7^{b-i}	56.0^{b-h}	127.0^{a-e}	14.0^{a-j}
Sammaz 14	C3	85^{bl}	90.3^{b-k}	14.0^{a-c}	154.3^{a-h}	70.0^{a-g}	126.3^{a-f}	11.0^{c-l}
Sammaz 15	C4	90.3^{b}	96.7^{b-d}	14.7^{a-c}	151.3^{a-h}	75.3^{a-f}	126.0^{a-f}	20.3^{a-c}
Sammaz 34	C5	78.0^{k-n}	83.7^{k}	13.3^{a-d}	140.7^{a-i}	53.0^{b-h}	120.7^{c-h}	19.3^{a-c}
Sammaz 20	C6	83.7^{b-n}	90.7^{b-k}	13.3^{a-d}	112.3^{h-i}	41.7^{g-h}	127.0^{a-e}	7.3^{f-l}
Sammaz 18	C7	84.7^{b-m}	92.3^{b-k}	16.0^{a}	169.7^{a-b}	76.7^{a-f}	128.0^{a-e}	8.7^{d-l}
Sammaz 13	C8	88^{b-d}	93.3^{b-i}	13.3^{a-d}	129.0^{b-i}	52.3^{c-h}	120.7^{c-h}	4.0^{j-l}
Sammaz 12	C9	79.3^{g-n}	87.7^{e-k}	13.3^{a-d}	121.7^{d-i}	49.7^{d-h}	125.0^{a-f}	5.0^{h-l}
Mean		83.27	89.84	13.47	138.80	60.93	123.13	15.49
CV %		4.30	4.69	9.83	14.67	23.08	3.45	32.32

Ep: Ears per plot.

Supplementary table 1 Continued

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 19	1	19.0^{a-c}	12.0^{b-f}	29.0^{a-l}	6.3^{b}	1.2^{ab}	1.3^{a-m}	52.7^{d-g}	1907^{b-l}
Sammaz 37	2	17.0^{a-i}	15.3^{a}	35.0^{a-f}	6.9^{b}	1.6^{ab}	1.4^{a-m}	69.2^{a-e}	2373^{a-l}
Sammaz 17	3	13.6^{h-m}	13.3^{a-d}	30.3^{a-l}	6.7^{b}	1.4^{ab}	1.5^{a-m}	70.5^{a-e}	2764^{a-l}
Sammaz 36	4	15.3^{a-m}	12.0^{b-f}	23.3^{c-l}	6.1^{b}	1.1^{ab}	0.2^{m}	57.9^{a-f}	213^{l}
Sammaz 27	5	14.5^{e-m}	14.0^{a-c}	29.3^{a-l}	6.9^{b}	1.2^{ab}	1.5^{a-m}	68.9^{a-e}	2587^{a-l}
Sammaz 35	6	13.2^{i-m}	9.3^{f}	22.7^{d-l}	4.8^{b}	1.3^{ab}	0.2^{lm}	80.9^{a}	418^{kl}
Sammaz 29	7	11.7^{l-m}	10.7^{d-f}	19.7^{j-l}	6.4^{b}	1.3^{ab}	0.6^{h-m}	62.0^{a-f}	1129^{g-l}
Sammaz 28	8	13.7^{h-m}	10.0^{e-f}	21.3^{g-l}	5.8^{b}	1.2^{ab}	1.4^{a-m}	77.5^{a-c}	2933^{a-l}
Sammaz 19 X Sammaz 19	1x1	14.1^{f-m}	12.0^{b-f}	21.0^{h-l}	6.8^{b}	1.1^{ab}	0.5^{i-m}	53.3^{c-g}	676^{j-l}
Sammaz 19 X Sammaz 37	1x2	18.4^{a-e}	14.0^{a-c}	27.3^{a-l}	6.2^{b}	1.1^{ab}	1.1^{c-m}	52.9^{d-g}	1573^{d-l}
Sammaz 19 X Sammaz 17	1x3	17.2^{a-i}	13.3^{a-d}	32.3^{a-k}	6.5^{b}	1.2^{ab}	1.0^{d-m}	58.6^{a-f}	1636^{d-l}
Sammaz 19 X Sammaz 36	1x4	16.8^{a-j}	13.3^{a-d}	28.7^{a-l}	7.0^{b}	1.4^{ab}	1.7^{a-m}	65.3^{a-e}	2853^{a-l}
Sammaz 19 X Sammaz 27	1x5	15.4^{a-m}	14.7^{a_b}	27.7^{a-l}	7.3^{a}	1.2^{ab}	1.7^{a-l}	73.0^{a-e}	3342^{a-k}
Sammaz 19 X Sammaz 35	1x6	18.7^{a-d}	12.7^{a-e}	36.3^{a-c}	6.3^{b}	1.2^{ab}	1.8^{a-k}	65.5^{a-e}	3547^{a-j}
Sammaz 19 X Sammaz 29	1x7	16.5^{a-k}	12.7^{a-e}	28.3^{a-l}	6.2^{b}	1.2^{ab}	1.2^{b-m}	61.3^{a-f}	2178^{b-l}
Sammaz 19 X Sammaz 28	1x8	15.1^{c-m}	12.7^{a-e}	25.3^{b-l}	6.1^{b}	1.2^{ab}	0.9^{e-m}	53.3^{c-g}	1200^{f-l}
Sammaz 37 X Sammaz 19	2x1	16.9^{a-i}	14.0^{a-c}	33.3^{a-i}	6.8^{b}	1.3^{ab}	2.3^{a-f}	70.0^{a-e}	4418^{a-e}
Sammaz 37 X Sammaz 37	2x2	15.7^{a-l}	12.7^{a-e}	34.0^{a-i}	6.9^{b}	1.4^{ab}	1.0^{e-m}	59.5^{a-f}	1449^{e-l}
Sammaz 37 X Sammaz 17	2x3	14.3^{f-m}	13.3^{a-d}	33.0^{a-j}	6.3^{b}	1.5^{ab}	1.6^{a-m}	67.9^{a-e}	2809^{a-l}
Sammaz 37 X Sammaz 36	2x4	16.2^{a-k}	11.3^{c-f}	27.3^{a-l}	6.3^{b}	1.2^{ab}	1.0^{d-m}	61.2^{a-f}	1724^{d-l}
Sammaz 37 X Sammaz 27	2x5	14.2^{f-m}	12.0^{b-f}	29.0^{a-l}	6.7^{b}	1.4^{ab}	1.0^{d-m}	67.0^{a-e}	1858^{b-l}
Sammaz 37 X Sammaz 35	2x6	16.5^{a-k}	11.3^{c-f}	30.0^{a-l}	6.2^{b}	1.3^{ab}	1.0^{e-m}	52.9^{d-g}	1324^{e-l}
Sammaz 37 X Sammaz 29	2x7	17.8^{a-g}	12.7^{a-e}	34.3^{a-h}	6.7^{b}	1.4^{ab}	1.7^{a-l}	67.3^{a-e}	3058^{a-l}
Sammaz 37 X Sammaz 28	2x8	16.0^{a-k}	12.7^{a-e}	27.7^{a-l}	6.1^{b}	1.4^{ab}	1.6^{a-m}	49.7^{e-g}	2036^{b-l}
Sammaz 17 X Sammaz 19	3x1	18.2^{a-f}	13.3^{a-d}	28.3^{a-l}	6.9^{b}	1.4^{ab}	1.9^{a-i}	71.2^{a-e}	3760^{a-j}

Supplementary table 1 Continued

Genotype	Entry	EL	NKR	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 17 X Sammaz 37	3x2	17.2^{a-i}	14.0^{a-c}	21.7^{f-l}	6.4^{b}	1.4^{ab}	1.0^{d-m}	53.3^{c-g}	1493^{e-l}
Sammaz 17 X Sammaz 17	3x3	17.7^{a-h}	13.3^{a-d}	33.0^{a-j}	6.9^{b}	1.4^{ab}	1.6^{a-m}	61.0^{a-f}	2631^{a-l}
Sammaz 17 X Sammaz 36	3x4	17.7^{a-h}	11.3^{c-f}	25.3^{b-l}	6.5^{b}	1.2^{ab}	2.0^{c-m}	53.6^{c-g}	1680^{d-l}
Sammaz 17 X Sammaz 27	3x5	16.5^{a-k}	14.0^{a-c}	34.3^{a-h}	7.2^{b}	1.4^{ab}	2.6^{a-c}	70.0^{a-e}	4836^{a-c}
Sammaz 17 X Sammaz 35	3x6	19.3^{a}-^{b}	14.0^{a-c}	33.7^{a-i}	6.9^{b}	1.4^{ab}	2.5^{a-d}	67.4^{a-e}	4658^{a-d}
Sammaz 17 X Sammaz 29	3x7	17.7^{a-h}	14.0^{a-c}	34.0^{a-i}	6.7^{b}	1.5^{ab}	2.8^{a}	72.8^{a-e}	5316^{a}
Sammaz 17 X Sammaz 28	3x8	17.8^{a-g}	14.0^{a-c}	34.7^{a-g}	6.9^{b}	1.2^{ab}	2.1^{a-h}	66.1^{a-e}	3591^{a-j}
Sammaz 36 X Sammaz 19	4x1	19.3^{a}	14.0^{a-c}	35.3^{a-e}	6.7^{b}	1.4^{ab}	2.7^{ab}	71.6^{a-e}	5262^{a}
Sammaz 36 X Sammaz 37	4x2	17.2^{a-i}	13.3^{a-d}	31.0^{a-k}	6.3^{b}	1.5^{ab}	1.5^{a-m}	63.8^{a-f}	2658^{a-l}
Sammaz 36 X Sammaz 17	4x3	15.8^{a-k}	12.7^{a-e}	26.0^{a-l}	6.4^{b}	1.5^{ab}	0.9^{e-m}	67.9^{a-e}	1636^{d-l}
Sammaz 36 X Sammaz 36	4x4	18.1^{a-f}	12.7^{a-e}	30.7^{a-l}	6.1^{b}	1.2^{ab}	0.8^{f-m}	59.2^{a-f}	1227^{f-l}
Sammaz 36 X Sammaz 27	4x5	16.9^{a-i}	13.3^{a-d}	34.7^{a-g}	6.7^{b}	1.3^{ab}	1.5^{a-m}	65.2^{a-e}	2631^{a-l}
Sammaz 36 X Sammaz 35	4x6	18.8^{a-d}	13.3^{a-d}	39.3^{a}	7.0^{b}	1.5^{ab}	1.9^{a-j}	79.6^{ab}	4293^{a-f}
Sammaz 36 X Sammaz 29	4x7	16.8^{a-i}	127^{a-e}	22.0^{e-l}	6.5^{b}	1.3^{ab}	1.1^{c-m}	52.2^{d-g}	1973^{b-l}
Sammaz 36 X Sammaz 28	4x8	14.9^{c-m}	13.3^{a-d}	26.7^{a-l}	7.2^{b}	1.4^{ab}	1.6^{a-m}	66.6^{a-e}	2791^{a-l}
Sammaz 27 X Sammaz 19	5x1	14.8^{d-m}	13.3^{a-d}	19.7^{j-l}	6.7^{b}	1.1^{ab}	1.2^{b-m}	61.6^{a-f}	2409^{a-l}
Sammaz 27 X Sammaz 37	5x2	15.8^{a-k}	13.3^{a-d}	29.7^{a-l}	6.2^{b}	1.3^{ab}	1.5^{a-m}	59.5^{a-f}	2729^{a-l}
Sammaz 27 X Sammaz 17	5x3	14.2^{f-m}	12.0^{b-f}	29.7^{a-l}	6.6^{b}	1.1^{ab}	1.3^{a-m}	67.7^{a-e}	2418^{a-l}
Sammaz 27 X Sammaz 36	5x4	16.6^{a-k}	12.7^{a-e}	35.3^{a-e}	7.1^{b}	1.4^{ab}	1.8^{a-k}	76.3^{a-d}	3476^{a-k}
Sammaz 27 X Sammaz 27	5x5	14.5^{e-m}	14.0^{a-c}	33.0^{a-j}	7.2^{b}	1.1^{ab}	2.0^{a-h}	66.9^{a-e}	3431^{a-k}
Sammaz 27 X Sammaz 35	5x6	17.1^{a-i}	12.7^{a-e}	34.7^{a-g}	7.2^{b}	1.4^{ab}	2.4^{a-e}	76.4^{a-d}	4942^{ab}
Sammaz 27 X Sammaz 29	5x7	15.0^{a-l}	12.7^{a-e}	29.7^{a-l}	6.9^{b}	1.3^{ab}	1.5^{a-m}	65.7^{a-e}	2604^{a-l}
Sammaz 27 X Sammaz 28	5x8	16.5^{a-k}	14.0^{a-c}	34.3^{a-h}	7.1^{b}	1.5^{ab}	2.0^{a-i}	68.3^{a-e}	3609^{a-j}
Sammaz 35 X Sammaz 19	6x1	15.3^{a-m}	12.7^{a-e}	32.0^{a-k}	6.4^{b}	1.1^{ab}	1.0^{d-m}	70.1^{a-e}	1778^{c-l}
Sammaz 35 X Sammaz 37	6x2	16.3^{a-k}	14.0^{a-c}	26.0^{a-l}	6.1^{b}	1.6^{ab}	2.1^{a-h}	63.8^{a-f}	4089^{a-i}

Supplementary table 1 Continued

Genotype	Entry	EL	NKR	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 35 X Sammaz 17	6x3	18.4^{a-e}	12.7^{a-e}	35.7^{a-d}	6.8^{b}	1.2^{ab}	2.0^{a-i}	76.1^{a-d}	4089^{a-i}
Sammaz 35 X Sammaz 36	6x4	17.7^{a-h}	12.7^{a-e}	34.7^{a-g}	6.7^{b}	1.6^{a}	2.0^{a-i}	75.3^{a-d}	3920^{a-i}
Sammaz 35 X Sammaz 27	6x5	14.5^{e-m}	14.7^{a-b}	26.3^{a-l}	6.4^{b}	1.4^{ab}	1.1^{c-m}	63.4^{a-f}	1707^{d-l}
Sammaz 35 X Sammaz 35	6x6	15.7^{a-l}	12.7^{a-e}	30.7^{a-l}	6.7^{b}	1.2^{ab}	1.5^{a-m}	62.2^{a-f}	2240^{a-l}
Sammaz 35 X Sammaz 29	6x7	18.4^{a-e}	14.0^{a-c}	33.0^{a-j}	6.2^{b}	1.4^{ab}	1.8^{a-k}	66.0^{a-e}	3351^{a-k}
Sammaz 35 X Sammaz 28	6x8	16.8^{a-j}	13.3^{a-d}	37.7^{a-b}	6.5^{b}	1.2^{ab}	1.7^{a-k}	69.8^{a-e}	3316^{a-k}
Sammaz 29 X Sammaz 19	7x1	14.4^{e-m}	14.0^{a-c}	33.0^{a-j}	6.8^{b}	1.2^{ab}	2.3^{a-f}	74.7^{a-d}	4596^{a-d}
Sammaz 29 X Sammaz 37	7x2	13.8^{g-m}	14.0^{a-c}	19.0^{k-l}	6.5^{b}	1.3^{ab}	0.3^{k-m}	34.0^{g}	1111^{h-l}
Sammaz 29 X Sammaz 17	7x3	16.3^{a-k}	13.3^{a-d}	34.0^{a-i}	7.2^{b}	1.4^{ab}	2.3^{a-g}	69.5^{a-e}	4222^{a-g}
Sammaz 29 X Sammaz 36	7x4	12.5^{k-m}	12.0^{b-f}	22.7^{d-l}	6.2^{b}	1.3^{ab}	1.2^{c-m}	58.4^{a-f}	1822^{c-l}
Sammaz 29 X Sammaz 27	7x5	17.4^{a-h}	12.7^{a-e}	36.0^{a-d}	6.9^{b}	1.3^{ab}	2.0^{a-h}	72.6^{a-e}	3947^{a-i}
Sammaz 29 X Sammaz 35	7x6	15.4^{a-l}	12.7^{a-e}	26.7^{a-l}	6.3^{b}	1.2^{ab}	1.4^{a-m}	70.8^{a-e}	2791^{a-l}
Sammaz 29 X Sammaz 29	7x7	16.3^{a-k}	12.0^{b-f}	29.7^{a-l}	6.6^{b}	1.1^{ab}	0.9^{e-m}	65.1^{a-e}	1582^{d-l}
Sammaz 29 X Sammaz 28	7x8	13.7^{h-m}	12.7^{a-e}	26.3^{a-l}	6.4^{b}	1.4^{ab}	1.4^{a-m}	71.$^{a-e}$	2711^{a-l}
Sammaz 28 X Sammaz 19	8x1	16.2^{a-k}	13.3^{a-d}	28.0^{a-l}	6.6^{b}	1.4^{ab}	1.5^{a-m}	64.5^{a-e}	2622^{a-l}
Sammaz 28 X Sammaz 37	8x2	15.2^{a-m}	11.3^{c-f}	27.7^{a-l}	6.9^{b}	1.5^{ab}	1.6^{a-m}	64.2^{a-e}	2791^{a-l}
Sammaz 28 X Sammaz 17	8x3	17.4^{a-h}	13.3^{a-d}	29.3^{a-l}	6.6^{b}	1.2^{ab}	1.5^{a-m}	64.6^{a-e}	2756^{a-l}
Sammaz 28 X Sammaz 36	8x4	15.2^{b-m}	14.0^{a-c}	28.3^{a-l}	6.8^{b}	1.2^{ab}	0.7^{h-m}	66.6^{a-e}	1671^{d-l}
Sammaz 28 X Sammaz 27	8x5	15.9^{a-k}	13.3^{a-d}	24.0^{c-l}	6.4^{b}	1.3^{ab}	1.3^{a-m}	64.6^{a-e}	2293^{a-l}
Sammaz 28 X Sammaz 35	8x6	16.4^{a-k}	14.0^{a-c}	28.7^{a-l}	5.9^{b}	1.3^{ab}	1.3^{a-m}	69.0^{a-e}	2409^{a-l}
Sammaz 28 X Sammaz 29	8x7	16.7^{a-j}	13.3^{a-d}	31.0^{a-k}	6.4^{b}	1.4^{ab}	1.8^{a-k}	71.9^{a-e}	3333^{a-k}
Sammaz 28 X Sammaz 28	8x8	17.7^{a-h}	13.3^{a-d}	24.7^{b-l}	6.3^{b}	1.3^{ab}	1.2^{b-m}	62.9^{a-f}	1938^{b-l}
Sammaz 11	C1	17.3^{a-h}	14.7^{a-b}	36.7^{a-c}	7.0^{b}	1.4^{ab}	2.0^{a-i}	67.0^{a-e}	3440^{a-k}
Sammaz 16	C2	14.3^{e-m}	14.7^{a-b}	24.7^{b-l}	6.6^{b}	1.1^{ab}	0.7^{g-m}	57.8^{a-f}	1067^{i-l}
Sammaz 14	C3	17.8^{a-g}	12.7^{a-e}	31.3^{a-k}	6.7^{b}	1.2^{ab}	0.9^{e-m}	63.8^{a-f}	1324^{e-l}

Supplementary table 1 Continued

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 15	C4	16.2^{a-k}	14.0^{a-c}	29.3^{a-l}	6.8^{b}	1.2^{ab}	0.9^{e-m}	56.2^{b-g}	1378^{e-l}
Sammaz 34	C5	17.5^{a-h}	14.7^{a-b}	32.3^{a-k}	6.7^{b}	1.3^{ab}	2.1^{a-h}	72.9^{a-e}	4169^{a-h}
Sammaz 20	C6	12.7^{j-m}	12.0^{b-f}	20.7^{i-l}	6.3^{b}	1.2^{ab}	0.6^{h-m}	40.3^{fg}	444^{kl}
Sammaz 18	C7	18.7^{a-d}	13.3^{a-d}	29.7^{a-l}	6.4^{b}	1.2^{ab}	0.8^{f-m}	65.7^{a-e}	1698^{d-l}
Sammaz 13	C8	11.3^{m}	10.7^{d-f}	17.5^{l}	6.4^{b}	1.0^{b}	0.3^{k-m}	12.4^{h}	764^{j-l}
Sammaz 12	C9	14.3^{e-m}	12.7^{a-e}	26.3^{a-l}	6.1^{b}	1.2^{ab}	0.4^{j-m}	61.9^{a-f}	702^{j-l}
Mean		16.12	13.03	29.34	6.73	1.30	1.42	70.90	2572.22
CV %		12.34	12.09	21.91	43.41	21.01	51.66	94.96	57.50

KEY: EL: Ear length, KRN: Kernel row number, KPR: Kernels per row, ED: Ear diameter, CD: Cob diameter, CW: Cob weight, Tp: Threshing percentage, Gy: Grain yield/ha

Supplementary table 2: Mean performance of parents, crosses, reciprocals, selfs and checks for fifteen agronomic characters in environment two

Genotype	entry	Daf	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 19	1	66.0^{a-c}	72.3^{a-c}	12.0^{a-d}	134.7^{a-g}	51.7^{b-h}	92.3^{a-c}	12.0^{a-k}
Sammaz 37	2	69.7^{a-c}	75.3^{a-c}	10.7^{a-d}	135.0^{a-g}	51.7^{b-h}	95.7^{a-c}	7.7^{e-k}
Sammaz 17	3	67.0^{a-c}	74.3^{a-c}	11.3^{a-d}	96.0^{c-h}	33.0^{gh}	94.3^{a-c}	7.3^{e-k}
Sammaz 36	4	72.0^{a-c}	79.0^{a-c}	11.3^{a-d}	119.7^{a-h}	50.0^{b-h}	99.7^{a-c}	13.3^{a-k}
Sammaz 27	5	72.7^{a-c}	78.7^{a-c}	12.0^{a-d}	140.0^{a-d}	53.7^{b-h}	99.7^{a-c}	12.0^{a-k}
Sammaz 35	6	68.7^{a-c}	75.3^{a-c}	12.7^{a-c}	154.3^{ab}	66.3^{a-d}	94.7^{a-c}	19.3^{a-e}
Sammaz 29	7	64.3^{a-c}	71.3^{a-c}	10.0^{a-d}	102.7^{b-h}	42.7^{c-h}	95.3^{a-c}	13.7^{a-k}
Sammaz 28	8	64.3^{a-c}	71.0^{a-c}	10.0^{a-d}	107.0^{a-h}	44.0^{b-h}	95.7^{a-c}	9.3^{b-k}
Sammaz 19 X Sammaz 19	1x1	65.0^{a-c}	72.0^{a-c}	12.7^{a-c}	126.7^{a-g}	61.0^{b-f}	92.0^{a-c}	16.0^{a-i}
Sammaz 19 X Sammaz 37	1x2	66.7^{a-c}	73.7^{a-c}	11.3^{a-d}	123.0^{a-h}	55.0^{b-g}	96.7^{a-c}	15.0^{a-j}
Sammaz 19 X Sammaz 17	1x3	65.7^{a-c}	76.3^{a-c}	13.3^{ab}	129.0^{a-g}	50.7^{b-h}	92.7^{a-c}	8.3^{d-k}
Sammaz 19 X Sammaz 36	1x4	71.0^{a-c}	76.7^{a-c}	11.3^{a-d}	106.3^{a-h}	43.3^{c-h}	95.0^{a-c}	4.0^{i-k}
Sammaz 19 X Sammaz 27	1x5	61.7^{c}	68.3^{bc}	12.7^{a-c}	117.3^{a-h}	46.0^{b-h}	87.7^{c}	17.0^{a-h}
Sammaz 19 X Sammaz 35	1x6	70.3^{a-c}	77.0^{a-c}	12.0^{a-d}	116.7^{a-h}	47.3^{h-h}	98.3^{a-c}	6.7^{f-k}
Sammaz 19 X Sammaz 29	1x7	66.0^{a-c}	72.3^{a-c}	10.7^{a-d}	135.0^{a-g}	50.0^{b-h}	90.7^{a-c}	14.0^{a-k}
Sammaz 19 X Sammaz 28	1x8	70.7^{a-c}	76.7^{a-c}	10.0^{a-d}	109.7^{a-h}	46.0^{b-h}	98.0^{a-c}	6.0^{g-k}
Sammaz 37 X Sammaz 19	2x1	68.0^{a-c}	76.0^{a-c}	9.3^{b-d}	118.7^{a-h}	51.7^{b-h}	96.3^{a-c}	9.7^{a-k}
Sammaz 37 X Sammaz 37	2x2	69.3^{a-c}	75.7^{a-c}	13.3^{ab}	105.0^{a-h}	53.0^{b-h}	93.3^{a-c}	13.7^{a-k}
Sammaz 37 X Sammaz 17	2x3	65.7^{a-c}	73.3^{a-c}	12.7^{a-c}	125.0^{a-h}	48.3^{b-h}	93.7^{a-c}	9.7^{a-k}
Sammaz 37 X Sammaz 36	2x4	71.7^{a-c}	79.0^{a-c}	12.0^{a-d}	121.7^{a-h}	44.0^{b-h}	98.7^{a-c}	8.3^{d-k}
Sammaz 37 X Sammaz 27	2x5	70.3^{a-c}	77.0^{a-c}	10.7^{a-d}	105.0^{a-h}	51.0^{b-h}	98.0^{a-c}	12.0^{a-k}
Sammaz 37 X Sammaz 35	2x6	70.0^{a-c}	76.7^{a-c}	10.7^{a-d}	118.3^{a-h}	45.0^{b-h}	94.3^{a-c}	8.7^{c-k}
Sammaz 37 X Sammaz 29	2x7	67.0^{a-c}	73.7^{a-c}	10.7^{a-d}	102.3^{b-h}	39.3^{d-h}	93.7^{a-c}	11.3^{a-k}
Sammaz 37 X Sammaz 28	2x8	69.3^{a-c}	77.0^{a-c}	11.3^{a-d}	120.7^{a-h}	49.0^{b-h}	96.0^{a-c}	17.3^{a-h}

Supplementary table 2 continued

Genotype	entry	Daf	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 17 X Sammaz 19	3x1	66.0^{a-c}	76.0^{a-c}	11.3^{a-d}	98.0^{c-h}	40.0^{d-h}	93.0^{a-c}	9.7^{a-k}
Sammaz 17 X Sammaz 37	3x2	67.3^{a-c}	74.0^{a-c}	12.0^{a-d}	130.7^{a-g}	49.0^{b-h}	92.3^{a-c}	10.0^{a-k}
Sammaz 17 X Sammaz 17	3x3	69.0^{a-c}	76.3^{a-c}	10.7^{a-d}	93.3^{d-h}	47.0^{b-h}	94.7^{a-c}	7.3^{e-k}
Sammaz 17 X Sammaz 36	3x4	67.3^{a-c}	72.7^{a-c}	10.3^{a-d}	98.0^{c-h}	48.3^{b-h}	95.0^{a-c}	7.7^{e-k}
Sammaz 17 X Sammaz 27	3x5	73.0^{ab}	81.3^{a}	12.7^{a-c}	96.0^{c-h}	55.0^{b-g}	100.7^{a-c}	13.3^{a-k}
Sammaz 17 X Sammaz 35	3x6	67.7^{a-c}	75.7^{a-c}	11.3^{a-d}	118.0^{a-h}	52.0^{b-h}	96.7^{a-c}	11.0^{a-k}
Sammaz 17 X Sammaz 29	3x7	72.0^{a-c}	78.0^{a-c}	10.0^{a-d}	109.7^{a-h}	51.7^{b-h}	97.7^{a-c}	2.667^{k}
Sammaz 17 X Sammaz 28	3x8	68.7^{a-c}	75.3^{a-c}	11.3^{a-d}	135.0^{a-g}	44.0^{b-h}	97.0^{a-c}	12.7^{a-k}
Sammaz 36 X Sammaz 19	4x1	69.3^{a-c}	76.3^{a-c}	10.7^{a-d}	129.7^{a-g}	53.3^{b-h}	96.0^{a-c}	9.3^{b-k}
Sammaz 36 X Sammaz 37	4x2	67.7^{a-c}	72.0^{a-c}	12.7^{a-c}	141.0^{a-d}	55.0^{b-g}	94.3^{a-c}	15.0^{a-j}
Sammaz 36 X Sammaz 17	4x3	63.0^{bc}	69.7^{a-c}	12.7^{a-c}	138.3^{a-e}	52.7^{b-h}	89.3^{a-c}	18.0^{a-g}
Sammaz 36 X Sammaz 36	4x4	67.0^{a-c}	73.3^{a-c}	10.0^{a-d}	110.0^{a-h}	41.7^{c-h}	94.0^{a-c}	9.7^{a-k}
Sammaz 36 X Sammaz 27	4x5	69.3^{a-c}	75.3^{a-c}	11.3^{a-d}	110.0^{a-h}	53.7^{b-h}	92.7^{a-c}	9.0^{b-k}
Sammaz 36 X Sammaz 35	4x6	72.7^{a-c}	78.7^{a-c}	9.7^{b-d}	116.3^{a-h}	45.0^{b-h}	103.0^{a}	4.3^{i-k}
Sammaz 36 X Sammaz 29	4x7	61.7^{c}	68.0^{c}	9.3^{b-d}	117.3^{a-h}	38.3^{e-h}	88.3^{bc}	14.0^{a-k}
Sammaz 36 X Sammaz 28	4x8	72.3^{a-c}	78.7^{a-c}	12.0^{a-d}	113.3^{a-h}	48.0^{b-h}	98.0^{a-c}	10.7^{a-k}
Sammaz 27 X Sammaz 19	5x1	72.0^{a-c}	78.7^{a-c}	13.3^{ab}	133.3^{a-g}	62.0^{b-f}	95.3^{a-c}	20.0^{a-d}
Sammaz 27 X Sammaz 37	5x2	65.3^{a-c}	71.3^{a-c}	12.0^{a-d}	131.7^{a-g}	48.0^{b-h}	91.0^{a-c}	8.7^{c-k}
Sammaz 27 X Sammaz 17	5x3	61.7^{c}	68.0^{c}	10.7^{a-d}	114.7^{a-h}	46.7^{b-h}	90.0^{a-c}	6.0^{g-k}
Sammaz 27 X Sammaz 36	5x4	69.7^{a-c}	77.0^{a-c}	12.7^{a-c}	124.0^{a-h}	53.7^{b-h}	94.3^{a-c}	13.0^{a-k}
Sammaz 27 X Sammaz 27	5x5	67.3^{a-c}	73.7^{a-c}	13.3^{ab}	113.7^{a-h}	51.7^{b-h}	91.0^{a-c}	13.0^{a-k}
Sammaz 27 X Sammaz 35	5x6	69.0^{a-c}	76.0^{a-c}	10.7^{a-d}	133.0^{a-g}	62.0^{b-f}	96.3^{a-c}	15.0^{a-j}
Sammaz 27 X Sammaz 29	5x7	71.7^{a-c}	77.7^{a-c}	13.3^{ab}	158.0^{a}	90.0^{a}	96.7^{a-c}	17.0^{a-h}
Sammaz 27 X Sammaz 28	5x8	68.7^{a-c}	75.3^{a-c}	10.7^{a-d}	130.0^{a-g}	59.0^{b-g}	96.7^{a-c}	21.7^{a}
Sammaz 35 X Sammaz 19	6x1	72.0^{a-c}	78.7^{a-c}	13.3^{ab}	129.3^{a-g}	68.3^{a-c}	92.3^{a-c}	7.3^{e-k}

Supplementary table 2 continued

Genotype	entry	Daf	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 35 X Sammaz 37	6x2	65.7^{a-c}	72.0^{a-c}	11.3^{a-d}	105.0^{a-h}	46.0^{b-h}	94.3^{a-c}	13.3^{a-k}
Sammaz 35 X Sammaz 17	6x3	65.7^{a-c}	72.0^{a-c}	10.7^{a-d}	140.0^{a-d}	71.7^{ab}	93.0^{a-c}	13.3^{a-k}
Sammaz 35 X Sammaz 36	6x4	72.0^{a-c}	78.7^{a-c}	9.3^{b-d}	115.3^{a-h}	39.3^{d-h}	98.7^{a-c}	7.7^{e-k}
Sammaz 35 X Sammaz 27	6x5	71.0^{a-c}	76.7^{a-c}	10.7^{a-d}	139.7^{a-e}	26.3^{h}	99.0^{a-c}	11.3^{a-k}
Sammaz 35 X Sammaz 35	6x6	71.7^{a-c}	79.0^{a-c}	8.0^{d}	90.0^{d-h}	40.3^{d-h}	98.3^{a-c}	3.3^{jk}
Sammaz 35 X Sammaz 29	6x7	72.0^{a-c}	78.7^{a-c}	12.0^{a-d}	116.0^{a-h}	50.3^{b-h}	100.0^{a-c}	10.0^{a-k}
Sammaz 35 X Sammaz 28	6x8	68.3^{a-c}	75.3^{a-c}	11.3^{a-d}	111.3^{a-h}	48.3^{b-h}	92.3^{a-c}	10.0^{a-k}
Sammaz 29 X Sammaz 19	7x1	70.3^{a-c}	77.7^{a-c}	11.7^{a-d}	81.7^{f-h}	43.0^{c-h}	97.3^{a-c}	10.0^{a-k}
Sammaz 29 X Sammaz 37	7x2	74.7^{a}	81.3^{a}	13.3^{ab}	133.3^{a-g}	62.3^{b-f}	98.3^{a-c}	11.7^{a-k}
Sammaz 29 X Sammaz 17	7x3	69.3^{a-c}	79.7^{a-c}	12.0^{a-d}	121.3^{a-h}	41.7^{c-h}	97.0^{a-c}	13.3^{a-k}
Sammaz 29 X Sammaz 36	7x4	71.3^{a-c}	77.7^{a-c}	12.7^{a-c}	124.3^{a-h}	47.7^{b-h}	90.7^{a-c}	9.3^{b-k}
Sammaz 29 X Sammaz 27	7x5	68.3^{a-c}	74.3^{a-c}	13.3^{ab}	149.7^{a-c}	62.0^{b-f}	94.0^{a-c}	18.0^{a-g}
Sammaz 29 X Sammaz 35	7x6	70.0^{a-c}	76.3^{a-c}	9.3^{b-d}	71.7^{h}	36.7^{e-h}	94.7^{a-c}	4.0^{i-k}
Sammaz 29 X Sammaz 29	7x7	65.0^{a-c}	71.7^{a-c}	12.7^{a-c}	133.3^{a-g}	63.3^{b-e}	100.0^{a-c}	10.3^{a-k}
Sammaz 29 X Sammaz 28	7x8	65.7^{a-c}	72.0^{a-c}	12.0^{a-d}	135.0^{a-g}	49.7^{b-h}	90.3^{a-c}	12.7^{a-k}
Sammaz 28 X Sammaz 19	8x1	66.3^{a-c}	73.3^{a-c}	12.7^{a-c}	110.0^{a-h}	48.3^{b-h}	95.0^{a-c}	12.3^{a-k}
Sammaz 28 X Sammaz 37	8x2	65.0^{a-c}	69.3^{a-c}	12.7^{a-c}	126.3^{a-h}	52.3^{b-h}	91.0^{a-c}	12.7^{a-k}
Sammaz 28 X Sammaz 17	8x3	71.3^{a-c}	79.0^{a-c}	10.7^{a-d}	84.7^{e-h}	43.3^{c-h}	96.7^{a-c}	4.7^{i-k}
Sammaz 28 X Sammaz 36	8x4	70.3^{a-c}	77.0^{a-c}	11.3^{a-d}	98.3^{c-h}	34.7^{f-h}	95.0^{a-c}	6.7^{f-k}
Sammaz 28 X Sammaz 27	8x5	73.0^{ab}	79.0^{a-c}	13.3^{ab}	142.7^{a-d}	50.3^{b-h}	96.7^{a-c}	17.7^{a-g}
Sammaz 28 X Sammaz 35	8x6	66.0^{a-c}	72.7^{a-c}	11.3^{a-d}	110.7^{a-h}	44.7^{b-h}	101.7^{ab}	9.3^{b-k}
Sammaz 28 X Sammaz 29	8x7	66.3^{a-c}	73.0^{a-c}	10.7^{a-d}	120.7^{a-h}	53.0^{b-h}	95.3^{a-c}	13.3^{a-k}
Sammaz 28 X Sammaz 28	8x8	68.7^{a-c}	75.0^{a-c}	9.3^{b-d}	102.7^{b-h}	44.7^{b-h}	92.3^{a-c}	5.3^{h-k}
Sammaz 11	C1	71.7^{a-c}	78.3^{a-c}	11.3^{a-d}	136.7^{a-f}	52.0^{b-h}	92.3^{a-c}	11.0^{a-k}
Sammaz 16	C2	64.7^{a-c}	71.3^{a-c}	14.0^{a}	143.3^{a-c}	53.3^{b-h}	90.7^{a-c}	20.7^{a-c}

Supplementary table 2 continued

Genotype	entry	Daf	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 14	C3	72.3^{a-c}	80.3^{ab}	12.0^{a-d}	140.0^{a-d}	58.3^{b-g}	99.0^{a-c}	18.7^{a-f}
Sammaz 15	C4	72.3^{a-c}	79.7^{a-c}	13.3^{ab}	129.7^{a-g}	68.3^{a-c}	98.3^{a-c}	21.0^{ab}
Sammaz 34	C5	67.7^{a-c}	75.3^{a-c}	8.7^{cd}	80.0^{gh}	35.3^{f-h}	96.7^{a-c}	3.7^{jk}
Sammaz 20	C6	71.0^{a-c}	77.3^{a-c}	12.0^{a-d}	100.0^{b-h}	44.0^{b-h}	97.7^{a-c}	8.0^{d-k}
Sammaz 18	C7	68.0^{a-c}	74.3^{a-c}	10.0^{a-d}	101.7^{b-h}	33.0^{gh}	93.7^{a-c}	7.7^{e-k}
Sammaz 13	C8	71.0^{a-c}	77.3^{a-c}	11.3^{a-d}	113.3^{a-h}	46.0^{b-h}	97.7^{a-c}	13.3^{a-k}
Sammaz 12	C9	70.3^{a-c}	76.3^{a-c}	10.0^{a-d}	105.3^{a-h}	41.3^{c-h}	92.7^{a-c}	8.7^{c-k}
Mean		68.66	75.41	11.45	118.59	49.65	95.17	11.25
CV %		7.80	7.61	17.82	22.26	26.87	6.87	52.23

KEY: Daf: Days to flower, Das: Days to silk, NL: Number of leaves, PH: Plant height, EH: Ear height, DM: Days to maturity, Ep: Ears per plot.

Supplementary table 2 continued

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 19	1	13.7^{b}	12.0^{a-e}	21.0^{b-k}	5.7^{b}	1.3^{b-f}	0.3^{d-g}	69.3^{a-n}	613.3^{e-j}
Sammaz 37	2	5.3^{b}	11.3^{b-f}	9.7^{jk}	5.1^{b}	1.1^{e-f}	0.1^{g}	64.3^{c-n}	240.0^{j}
Sammaz 17	3	9.0^{b}	10.0^{d-g}	17.7^{b-k}	5.4^{b}	1.7^{a-d}	0.3^{e-g}	75.0^{a-n}	497.8^{g-j}
Sammaz 36	4	12.8^{b}	12.7^{a-e}	22.0^{b-k}	8.0^{b}	1.7^{a-c}	0.6^{b-g}	66.2^{b-n}	1102.2^{a-j}
Sammaz 27	5	16.0^{b}	11.3^{b-f}	26.3^{a-g}	6.3^{b}	1.6^{a-d}	0.2^{e-g}	68.9^{a-n}	417.8^{g-j}
Sammaz 35	6	19.0^{b}	16.0^{a}	30.0^{a-e}	7.1^{b}	1.6^{a-d}	1.0^{a-g}	86.6^{a-f}	2248.9^{a-i}
Sammaz 29	7	12.2^{b}	12.0^{a-e}	17.7^{b-k}	6.5^{b}	1.5^{a-d}	0.6^{b-g}	82.5^{a-j}	1333.3^{a-j}
Sammaz 28	8	11.2^{b}	12.0^{a-e}	20.3^{b-k}	6.3^{b}	1.6^{a-d}	0.3^{c-g}	73.4^{a-n}	551.1^{e-j}
Sammaz 19 X Sammaz 19	1x1	14.2^{b}	14.0^{a-d}	26.3^{a-g}	6.3^{b}	1.7^{a-c}	0.6^{b-g}	78.6^{a-m}	1235.6^{a-j}
Sammaz 19 X Sammaz 37	1x2	12.2^{b}	12.7^{a-e}	25.0^{a-i}	5.5^{b}	1.2^{d-f}	0.8^{a-g}	83.1^{a-i}	1600.0^{a-j}
Sammaz 19 X Sammaz 17	1x3	13.7^{b}	10.0^{d-g}	29.3^{a-f}	6.4^{b}	1.5^{a-f}	0.5^{c-g}	88.5^{a-c}	1137.8^{a-j}
Sammaz 19 X Sammaz 36	1x4	14.5^{b}	14.0^{a-d}	17.3^{c-k}	6.3^{b}	1.6^{a-d}	0.3^{d-g}	60.6^{h-n}	426.7^{g-j}
Sammaz 19 X Sammaz 27	1x5	14.6^{b}	11.3^{b-f}	26.0^{a-g}	7.9^{b}	1.6^{a-d}	1.5267^{a}	77.9^{a-m}	3048.9^{a}
Sammaz 19 X Sammaz 35	1x6	9.8^{b}	14.0^{a-d}	16.7^{d-k}	6.1^{b}	1.5^{a-f}	0.2^{g}	61.9^{g-n}	231.1^{j}
Sammaz 19 X Sammaz 29	1x7	12.3^{b}	11.3^{b-f}	22.0^{b-k}	6.6^{b}	1.4^{a-f}	0.4^{c-g}	69.4^{a-n}	728.9^{e-j}
Sammaz 19 X Sammaz 28	1x8	14.7^{b}	13.3^{a-e}	30.7^{a-d}	7.4^{b}	1.3^{b-f}	0.2^{fg}	54.6^{mn}	862.2^{e-j}
Sammaz 37 X Sammaz 19	2x1	12.0^{b}	12.7^{a-e}	19.7^{b-k}	5.9^{b}	1.3^{c-f}	0.2^{fg}	71.5^{a-n}	328.9^{h-j}
Sammaz 37 X Sammaz 37	2x2	12.8^{b}	12.7^{a-e}	24.7^{a-i}	6.7^{b}	1.4^{a-f}	0.4^{c-g}	63.7^{d-n}	693.3^{e-j}
Sammaz 37 X Sammaz 17	2x3	14.2^{b}	12.0^{a-e}	28.3^{a-f}	7.2^{b}	1.5^{a-e}	0.9^{a-g}	76.1^{a-m}	1715.6^{a-j}
Sammaz 37 X Sammaz 36	2x4	11.8^{b}	12.0^{a-e}	21.0^{b-k}	5.2^{b}	1.4^{a-f}	0.5^{c-g}	72.2^{a-n}	675.6^{e-j}
Sammaz 37 X Sammaz 27	2x5	13.0^{b}	10.7^{c-g}	29.7^{a-e}	6.0^{b}	1.4^{b-f}	0.8^{a-g}	84.3^{a-h}	1857.8^{a-j}
Sammaz 37 X Sammaz 35	2x6	11.5^{b}	12.0^{a-e}	22.0^{b-k}	6.1^{b}	1.3^{b-f}	0.9^{a-g}	73.7^{a-n}	1680.0^{a-j}

Supplementary table 2 continued

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 37 X Sammaz 29	2x7	10.7^{b}	11.3^{b-f}	16.3^{e-k}	5.9^{b}	1.4^{a-f}	0.9^{a-g}	74.3^{a-n}	2968.9^{a-c}
Sammaz 37 X Sammaz 28	2x8	13.6^{b}	11.3^{b-f}	19.7^{b-k}	6.4^{b}	1.3^{b-f}	0.9^{a-g}	81.5^{a-j}	1991.1^{a-j}
Sammaz 17 X Sammaz 19	3x1	12.7^{b}	12.7^{a-e}	21.3^{b-k}	6.1^{b}	1.4^{a-f}	0.5^{c-g}	81.2^{a-k}	1128.9^{a-j}
Sammaz 17 X Sammaz 37	3x2	13.4^{b}	11.3^{b-f}	15.3^{f-k}	6.4^{b}	1.7^{a-c}	1.1^{a-e}	67.7^{b-n}	1911.1^{a-j}
Sammaz 17 X Sammaz 17	3x3	13.0^{b}	10.7^{c-g}	21.0^{b-k}	6.3^{b}	1.5^{a-e}	0.2^{e-g}	71.5^{a-n}	453.3^{g-j}
Sammaz 17 X Sammaz 36	3x4	12.2^{b}	10.0^{d-g}	21.0^{b-k}	6.1^{b}	1.3^{b-f}	0.5^{c-g}	84.3^{a-h}	1022.2^{b-j}
Sammaz 17 X Sammaz 27	3x5	12.8^{b}	12.7^{a-e}	30.0^{a-e}	7.4^{b}	1.6^{a-d}	0.5^{c-g}	78.0^{a-m}	951.1^{e-j}
Sammaz 17 X Sammaz 35	3x6	12.8^{b}	12.0^{a-e}	21.7^{b-k}	6.0^{b}	1.4^{a-f}	0.4^{c-g}	81.1^{a-k}	782.2^{e-j}
Sammaz 17 X Sammaz 29	3x7	6.3^{b}	10.7^{c-g}	11.7^{h-k}	3.7^{b}	1.1^{f}	0.2^{e-g}	75.4^{a-n}	462.2^{g-j}
Sammaz 17 X Sammaz 28	3x8	13.5^{b}	9.0^{e-g}	25.3^{a-h}	6.9^{b}	1.6^{a-d}	0.4^{c-g}	72.8^{a-n}	844.4^{e-j}
Sammaz 36 X Sammaz 19	4x1	14.7^{b}	12.0^{a-e}	24.3^{a-i}	6.2^{b}	1.5^{a-f}	0.4^{c-g}	85.3^{a-g}	942.2^{e-j}
Sammaz 36 X Sammaz 37	4x2	13.8^{b}	12.0^{a-e}	29.0^{a-f}	6.9^{b}	1.5^{a-e}	0.3^{c-g}	88.2^{a-c}	791.1^{e-j}
Sammaz 36 X Sammaz 17	4x3	15.2^{b}	12.0^{a-e}	26.3^{a-g}	7.3^{b}	1.7^{a-c}	0.6-^{g}	84.4^{a-h}	1200.0^{a-j}
Sammaz 36 X Sammaz 36	4x4	15.0^{b}	13.3^{a-e}	21.7^{b-k}	20.1^{a}	1.6^{a-c}	0.3^{c-g}	59.6^{i-n}	382.2^{h-j}
Sammaz 36 X Sammaz 27	4x5	13.3^{b}	12.0^{a-e}	23.0^{a-j}	5.8^{b}	1.5^{a-f}	0.5^{c-g}	77.8^{a-m}	995.6^{d-j}
Sammaz 36 X Sammaz 35	4x6	11.0^{b}	12.7^{a-e}	15.3^{f-k}	4.7^{b}	1.5^{a-f}	0.1^{g}	92.5^{a}	328.9^{h-j}
Sammaz 36 X Sammaz 29	4x7	14.1^{b}	10.0^{d-g}	22.0^{b-k}	5.6^{b}	1.5^{a-f}	1.2^{a-d}	92.3^{a}	2977.8^{ab}
Sammaz 36 X Sammaz 28	4x8	11.5^{b}	14.0^{a-d}	21.3^{b-k}	5.7^{b}	1.4^{a-f}	0.6^{a-g}	80.1^{a-l}	1297.8^{a-j}
Sammaz 27 X Sammaz 19	5x1	15.0^{b}	11.3^{b-f}	27.0^{a-g}	6.3^{b}	1.4^{a-f}	0.7^{a-g}	74.8^{a-n}	1315.6^{a-j}
Sammaz 27 X Sammaz 37	5x2	13.8^{b}	11.3^{b-f}	27.7^{a-g}	7.1^{b}	1.6^{a-d}	1.4^{ab}	77.4^{a-m}	2933.3^{a-d}
Sammaz 27 X Sammaz 17	5x3	14.1^{b}	12.7^{a-e}	22.7^{a-j}	6.0^{b}	1.5^{a-d}	0.4^{c-g}	79.4^{a-l}	915.6^{e-j}
Sammaz 27 X Sammaz 36	5x4	14.1^{b}	13.3^{a-e}	27.0^{a-g}	6.5^{b}	1.4^{a-f}	1.2^{a-c}	75.8^{a-n}	2515.6^{a-e}
Sammaz 27 X Sammaz 27	5x5	14.3^{b}	12.0^{a-e}	28.3^{a-f}	6.4^{b}	1.4^{a-f}	0.5^{c-g}	51.8^{n}	711.1^{e-j}
Sammaz 27 X Sammaz 35	5x6	16.8^{b}	14.0^{a-d}	28.7^{a-f}	7.1^{b}	1.5^{a-e}	1.1^{a-f}	73.9^{a-n}	2106.7^{a-j}
Sammaz 27 X Sammaz 29	5x7	15.8^{b}	15.3^{ab}	29.7^{a-e}	7.8^{b}	1.8^{a}	1.1^{a-f}	80.7^{a-k}	2400.0^{a-g}

Supplementary table 2 continued

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 27 X Sammaz 28	5x8	14.8^{b}	12.7^{a-e}	29.0^{a-f}	6.7^{b}	1.8^{a}	1.1^{a-e}	84.6^{a-h}	2497.8^{a-f}
Sammaz 35 X Sammaz 19	6x1	7.3^{b}	7.3^{fg}	11.0^{i-k}	5.7^{b}	1.5^{a-f}	0.6^{b-g}	80.5^{a-k}	1173.3^{a-j}
Sammaz 35 X Sammaz 37	6x2	12.3^{b}	12.0^{a-e}	24.3^{a-i}	5.6^{b}	1.3^{c-f}	0.3^{d-g}	74.8^{a-n}	533.3^{e-j}
Sammaz 35 X Sammaz 17	6x3	17.3^{b}	12.7^{a-e}	36.3^{a}	6.7^{b}	1.5^{a-f}	0.7^{a-g}	84.6^{a-h}	1653.3^{a-j}
Sammaz 35 X Sammaz 36	6x4	12.7^{b}	13.3^{a-e}	23.0^{a-j}	7.0^{b}	1.6^{a-d}	0.6^{b-g}	80.2^{a-k}	1235.6^{a-j}
Sammaz 35 X Sammaz 27	6x5	15.3^{b}	14.0^{a-d}	28.3^{a-f}	6.8^{b}	1.5^{a-f}	0.5^{c-g}	87.9^{a-d}	1066.7^{b-j}
Sammaz 35 X Sammaz 35	6x6	10.3^{b}	12.7^{a-e}	19.0^{b-k}	5.6^{b}	1.6^{a-c}	0.1^{g}	64.3^{c-n}	124.4^{j}
Sammaz 35 X Sammaz 29	6x7	14.3^{b}	12.7^{a-e}	22.3^{a-k}	6.7^{b}	1.4^{a-f}	0.7^{a-g}	74.1^{a-n}	1448.9^{a-j}
Sammaz 35 X Sammaz 28	6x8	12.7^{b}	12.7^{a-e}	24.7^{a-i}	6.5^{b}	1.5^{a-f}	0.5^{b-g}	77.2^{a-m}	1111.1^{a-j}
Sammaz 29 X Sammaz 19	7x1	15.7^{b}	12.7^{a-e}	26.3^{a-g}	6.9^{b}	1.5^{a-f}	0.3^{d-g}	82.5^{a-j}	622.2^{e-j}
Sammaz 29 X Sammaz 37	7x2	14.7^{b}	11.3^{b-f}	22.7^{a-j}	6.0^{b}	1.7^{a-c}	0.2^{fg}	73.5^{a-n}	328.9^{h-j}
Sammaz 29 X Sammaz 17	7x3	13.7^{b}	12.0^{a-e}	24.3^{a-i}	6.5^{b}	1.7^{ab}	0.5^{c-g}	89.5^{ab}	1120.0^{a-j}
Sammaz 29 X Sammaz 36	7x4	13.8^{b}	12.0^{a-e}	24.0^{a-i}	6.5^{b}	1.3^{b-f}	0.5^{c-g}	73.8^{a-n}	1013.3^{c-j}
Sammaz 29 X Sammaz 27	7x5	15.8^{b}	14.7^{a-c}	31.0^{a-c}	7.2^{b}	1.6^{a-d}	0.7^{a-g}	78.9^{a-l}	1591.1^{a-j}
Sammaz 29 X Sammaz 35	7x6	10.7^{b}	11.3^{b-f}	14.0^{g-k}	5.2^{b}	1.4^{a-f}	0.2^{g}	63.1^{e-n}	248.9^{j}
Sammaz 29 X Sammaz 29	7x7	12.3^{b}	13.3^{a-e}	24.7^{a-i}	6.8^{b}	1.5^{a-f}	0.7^{a-g}	70.9^{a-n}	1111.1^{a-j}
Sammaz 29 X Sammaz 28	7x8	15.8^{b}	12.7^{a-e}	31.7^{ab}	6.0^{b}	1.7^{a-c}	1.1^{a-f}	85.6^{a-g}	2311.1^{a-h}
Sammaz 28 X Sammaz 19	8x1	12.7^{b}	12.7^{a-e}	18.7^{b-k}	6.0^{b}	1.4^{b-f}	0.4^{c-g}	81.1^{a-k}	817.8^{e-j}
Sammaz 28 X Sammaz 37	8x2	16.1^{b}	14.0^{a-d}	30.0^{a-e}	6.5^{b}	1.5^{a-f}	1.1^{a-e}	78.5^{a-m}	2284.4^{a-h}
Sammaz 28 X Sammaz 17	8x3	12.7^{b}	12.7^{a-e}	21.3^{b-k}	6.0^{b}	1.3^{c-f}	0.8^{a-g}	68.8^{a-n}	1413.3^{a-j}
Sammaz 28 X Sammaz 36	8x4	8.5^{b}	7.0^{g}	8.3^{k}	5.0^{b}	1.3^{b-f}	0.3^{e-g}	61.9^{g-n}	389.3^{h-j}
Sammaz 28 X Sammaz 27	8x5	10.5^{b}	11.3^{b-f}	18.3^{b-k}	6.1^{b}	1.3^{c-f}	0.5^{c-g}	55.9-^{n}	871.1^{e-j}
Sammaz 28 X Sammaz 35	8x6	12.3^{b}	12.0^{a-e}	25.3^{a-h}	5.3^{b}	1.3^{c-f}	0.3^{e-g}	87.0^{a-e}	604.4^{e-j}
Sammaz 28 X Sammaz 29	8x7	12.8^{b}	9.3^{e-g}	23.0^{a-j}	5.7^{b}	1.4^{b-f}	0.9^{a-g}	67.9^{b-n}	1733.3^{a-j}
Sammaz 28 X Sammaz 28	8x8	15.7^{b}	11.3^{b-f}	22.0^{b-k}	6.5^{b}	1.6^{a-c}	0.6^{b-g}	57.1^{k-n}	871.1^{e-j}

Supplementary table 2 continued

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 11	C1	15.8^{b}	11.3^{b-f}	31.7^{ab}	6.8^{b}	1.4^{a-f}	0.6^{b-g}	81.0^{a-k}	1360.0^{a-j}
Sammaz 16	C2	12.8^{b}	13.3^{a-e}	20.0^{b-k}	6.2^{b}	1.6^{a-d}	0.4^{c-g}	69.7^{a-n}	826.7^{e-j}
Sammaz 14	C3	13.7^{b}	12.7^{a-e}	27.7^{a-g}	6.6^{b}	1.3^{c-f}	0.7^{a-g}	62.6^{f-n}	1200.0^{a-j}
Sammaz 15	C4	19.5^{a}	14.0^{a-d}	25.0^{a-i}	7.1^{b}	1.5^{a-d}	0.4^{c-g}	58.7^{j-n}	613.3^{e-j}
Sammaz 34	C5	11.2^{b}	10.0^{d-g}	20.0^{b-k}	5.3^{b}	1.5^{a-e}	0.4^{c-g}	29.5^{o}	204.4^{j}
Sammaz 20	C6	12.5^{b}	14.0^{a-d}	23.7^{a-j}	6.1^{b}	1.5^{a-e}	0.3^{c-g}	75.2^{a-n}	657.8^{e-j}
Sammaz 18	C7	11.8^{b}	12.0^{a-e}	23.7^{a-j}	5.9^{b}	1.4^{a-f}	0.1^{g}	83.4^{a-i}	275.6^{ij}
Sammaz 13	C8	12.5^{b}	12.7^{a-e}	23.3^{a-j}	5.8^{b}	1.5^{a-d}	0.4^{c-g}	92.6^{a}	1120.0^{a-j}
Sammaz 12	C9	13.0^{b}	13.3^{a-e}	24.3^{a-i}	5.7^{b}	1.3^{c-f}	0.2^{e-g}	86.8^{a-f}	515.6^{f-j}
Mean		13.58	12.14	23.26	6.44	1.47	0.55	78.50	1142.04
CV %		55.57	17.18	29.47	43.72	13.99	80.06	57.76	83.26

KEY: EL: Ear length, KRN: Kernel row number, KPR: Kernels per row, ED: Ear diameter, CD: Cob diameter, CW: Cob weight, Tp: Threshing percentage, Gy: Grain yield/ha

Supplementary table 3 Mean performance of parents, crosses, reciprocals, selfs and checks for fifteen agronomic characters combined across environments

Genotype	entry	Daf	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 19	1	79.0^{a-d}	85.2^{a-e}	12.8^{a-f}	146.6^{a-d}	54.2^{a-i}	102.4^{f-g}	8.4^{h-l}
Sammaz 37	2	76.0^{a-g}	81.7^{a-g}	12.0^{a-g}	137.7^{a-h}	59.8^{a-h}	109.0^{a-f}	10.3^{c-l}
Sammaz 17	3	72.8^{c-g}	79.8^{c-g}	12.0^{a-g}	111.3^{e-i}	45.0^{f-i}	107.5^{a-g}	11.7^{b-l}
Sammaz 36	4	80.0^{ab}	87.7^{ab}	12.0^{a-g}	136.2^{a-h}	51.5^{b-i}	114.2^{a}	7.8^{j-l}
Sammaz 27	5	76.7^{a-g}	83.2^{a-g}	12.7^{a-f}	138.7^{a-h}	56.0^{a-i}	110.8^{a-e}	13.3^{a-l}
Sammaz 35	6	76.8^{a-g}	82.8^{a-g}	13.0^{a-e}	144.3^{a-f}	61.5^{a-h}	110.0^{a-f}	11.8^{b-l}
Sammaz 29	7	71.7^{f-g}	78.7^{d-g}	11.3^{c-g}	109.8^{f-i}	47.5^{d-i}	108.7^{a-f}	10.3^{c-l}
Sammaz 28	8	73.0^{c-g}	79.2^{d-g}	10.3^{fg}	105.8^{hi}	42.7^{hi}	108.3^{a-f}	8.5^{h-l}
Sammaz 19 X Sammaz 19	1x1	75.2^{a-g}	81.3^{a-g}	12.7^{a-f}	129.2^{a-i}	58.7^{a-i}	108.7^{a-f}	15.0^{a-k}
Sammaz 19 X Sammaz 37	1x2	76.8^{a-g}	83.2^{a-g}	13.0^{a-e}	137.0^{a-h}	59.5^{a-h}	110.5^{a-f}	17.5^{a-d}
Sammaz 19 X Sammaz 17	1x3	75.8^{a-g}	84.0^{a-g}	13.3^{a-d}	138.3^{a-h}	57.5^{a-i}	111.5^{a-e}	14.0^{a-l}
Sammaz 19 X Sammaz 36	1x4	78.2^{a-g}	84.7^{a-g}	12.7^{a-f}	131.2^{a-i}	54.3^{a-i}	109.7^{a-f}	9.7^{c-l}
Sammaz 19 X Sammaz 27	1x5	71.5^{g}	78.2^{e-g}	13.3^{a-d}	124.7^{a-i}	49.2^{d-i}	105.2^{c-g}	16.0^{a-i}
Sammaz 19 X Sammaz 35	1x6	77.2^{a-g}	83.5^{a-g}	13.0^{a-e}	149.3^{a-c}	67.2^{a-e}	111.2^{a-e}	12.8^{a-l}
Sammaz 19 X Sammaz 29	1x7	75.8^{a-g}	80.8^{a-g}	12.3^{a-g}	141.5^{a-g}	55.2^{a-i}	108.0^{a-f}	14.7^{a-l}
Sammaz 19 X Sammaz 28	1x8	76.2^{a-g}	82.3^{a-g}	11.0^{d-g}	120.8^{a-i}	51.7^{b-i}	109.0^{a-f}	11.8^{b-l}
Sammaz 37 X Sammaz 19	2x1	75.5^{a-g}	82.7^{a-g}	11.3^{c-g}	139.8^{a-h}	64.5^{a-g}	110.0^{a-f}	14.5^{a-l}
Sammaz 37 X Sammaz 37	2x2	78.0^{a-g}	84.7^{a-g}	13.3^{a-d}	116.7^{b-i}	53.7^{a-i}	107.8^{a-f}	15.5^{a-k}
Sammaz 37 X Sammaz 17	2x3	75.2^{a-g}	83.5^{a-g}	13.7^{a-c}	133.3^{a-i}	55.3^{a-i}	108.5^{a-f}	14.7^{a-l}
Sammaz 37 X Sammaz 36	2x4	77.3^{a-g}	83.7^{a-g}	13.0^{a-e}	126.7^{a-i}	51.5^{b-i}	111.0^{a-e}	13.8^{a-l}
Sammaz 37 X Sammaz 27	2x5	77.8^{a-g}	84.8^{a-f}	12.0^{a-g}	115.3^{b-i}	51.0^{c-i}	112.5^{a-d}	12.3^{b-l}
Sammaz 37 X Sammaz 35	2x6	76.7^{a-g}	83.2^{a-g}	12.7^{a-f}	130.7^{a-i}	56.2^{a-i}	108.0^{a-f}	12.0^{b-l}

Supplementary table 3 cont.

Genotype	entry	Daf	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 37 X Sammaz 29	2x7	75.8^{a-g}	82.7^{a-g}	12.3^{a-g}	118.2^{b-i}	52.5^{b-i}	108.3^{a-f}	15.0^{a-k}
Sammaz 37 X Sammaz 28	2x8	75.7^{a-g}	83.7^{a-g}	12.0^{a-g}	129.7^{a-i}	56.0^{a-i}	108.7^{a-f}	18.5^{ab}
Sammaz 17 X Sammaz 19	3x1	74.7^{a-g}	83.3^{a-g}	12.3^{a-g}	124.8^{a-i}	56.0^{a-i}	108.8^{a-f}	12.5^{b-l}
Sammaz 17 X Sammaz 37	3x2	76.8^{a-g}	83.0^{a-g}	12.0^{a-g}	131.2^{a-i}	51.0^{c-i}	108.7^{a-f}	11.8^{b-l}
Sammaz 17 X Sammaz 17	3x3	77.2^{a-g}	83.8^{a-g}	12.3^{a-g}	108.3^{g-i}	47.2^{e-i}	111.3^{a-e}	15.3^{a-k}
Sammaz 17 X Sammaz 36	3x4	75.0^{a-g}	81.2^{a-g}	11.5^{b-g}	113.2^{d-i}	51.5^{b-i}	111.8^{a-e}	10.8^{b-l}
Sammaz 17 X Sammaz 27	3x5	78.7^{a-e}	87.2^{a-c}	12.7^{a-f}	117.0^{b-i}	61.7^{a-h}	112.5^{a-d}	16.8^{a-f}
Sammaz 17 X Sammaz 35	3x6	76.3^{a-g}	84.0 $^{a-g}$	13.0^{a-e}	139.5^{a-h}	65.2^{a-f}	110.2^{a-f}	15.0^{a-k}
Sammaz 17 X Sammaz 29	3x7	76.8^{a-g}	82.8^{a-g}	11.7^{b-g}	123.3^{a-i}	52.7^{b-i}	110.2^{a-f}	11.2^{b-l}
Sammaz 17 X Sammaz 28	3x8	76.8^{a-g}	82.8^{a-g}	12.7^{a-f}	135.2^{a-h}	50.5^{c-i}	110.5^{a-f}	14.3^{a-l}
Sammaz 36 X Sammaz 19	4x1	77.2^{a-g}	84.0^{a-g}	12.3^{a-g}	149.7^{ab}	67.7^{a-d}	109.3^{a-f}	14.5^{a-l}
Sammaz 36 X Sammaz 37	4x2	76.5^{a-g}	81.5^{a-g}	13.0^{a-e}	145.2^{a-e}	64.2^{a-g}	110.0^{a-f}	16.7^{a-g}
Sammaz 36 X Sammaz 17	4x3	73.3^{b-g}	79.8^{c-g}	13.7^{a-c}	143.5^{a-g}	54.0^{a-i}	106.7^{a-g}	15.$^{a-k}$
Sammaz 36 X Sammaz 36	4x4	77.0^{a-g}	83.8^{a-g}	12.3^{a-g}	131.2^{a-i}	52.5^{b-i}	110.0^{a-f}	13.3^{a-l}
Sammaz 36 X Sammaz 27	4x5	77.5^{a-g}	84.8^{a-f}	13.0^{a-e}	126.0^{a-i}	54.2^{a-i}	108.8^{a-f}	11.0^{b-l}
Sammaz 36 X Sammaz 35	4x6	78.5^{a-e}	83.3^{a-g}	11.8^{a-g}	127.5^{a-i}	55.0^{a-i}	113.7^{ab}	9.3^{e-l}
Sammaz 36 X Sammaz 29	4x7	72.8^{c-g}	77.2^{g}	11.8^{a-g}	135.7^{a-h}	55.0^{a-i}	107.2^{a-g}	15.7^{a-k}
Sammaz 36 X Sammaz 28	4x8	78.3^{a-f}	84.5^{a-g}	13.0^{a-e}	128.3^{a-i}	53.0^{b-i}	110.5^{a-f}	12.5^{b-l}
Sammaz 27 X Sammaz 19	5x1	76.0^{a-g}	82.5^{a-g}	13.0^{a-e}	130.2^{a-i}	61.0^{a-h}	108.7^{a-f}	16.5^{a-h}
Sammaz 27 X Sammaz 37	5x2	73.2^{c-g}	79.3^{d-g}	12.7^{a-f}	137.0^{a-h}	56.2^{a-i}	105.8^{b-g}	13.7^{a-l}
Sammaz 27 X Sammaz 17	5x3	75.2^{a-g}	83.2^{a-g}	12.3^{a-g}	133.0^{a-i}	57.2^{a-i}	110.0^{a-f}	12.2^{b-l}
Sammaz 27 X Sammaz 36	5x4	78.5^{a-e}	85.7^{a-e}	13.0^{a-e}	125.7^{a-i}	55.8^{a-i}	111.7^{a-e}	17.2^{a-e}
Sammaz 27 X Sammaz 27	5x5	74.7^{a-g}	80.5^{b-g}	13.0^{a-e}	125.7^{a-i}	62.2^{a-h}	107.2^{a-g}	17.2^{a-e}
Sammaz 27 X Sammaz 35	5x6	74.8^{a-g}	82.0^{a-g}	13.0^{a-e}	147.3^{a-d}	71.8^{ab}	104.5^{d-g}	17.0^{a-f}

Supplementary table 3 cont.

Genotype	entry	Daf	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 27 X Sammaz 29	5x7	77.3^{a-g}	84.0^{a-g}	13.7^{a-c}	145.5^{a-e}	73.5^{a}	110.2^{a-f}	17.3^{a-e}
Sammaz 27 X Sammaz 28	5x8	74.3^{b-g}	81.5^{a-g}	12.0^{a-g}	136.3^{a-h}	59.3^{a-h}	110.2^{a-f}	18.7^{ab}
Sammaz 35 X Sammaz 19	6x1	77.7^{a-g}	85.0^{a-f}	14.3^{a}	135.8^{a-h}	65.3^{a-f}	109.2^{a-f}	11.2^{b-l}
Sammaz 35 X Sammaz 37	6x2	75.0^{a-g}	81.5^{a-g}	13.0^{a-e}	132.0^{a-i}	56.7^{a-i}	109.2^{a-f}	15.8^{a-j}
Sammaz 35 X Sammaz 17	6x3	72.7^{d-g}	78.8^{d-g}	11.3^{c-g}	133.7^{a-i}	64.8^{a-f}	108.7^{a-f}	15.5^{a-k}
Sammaz 35 X Sammaz 36	6x4	79.0^{a-d}	85.7^{a-e}	11.3^{c-g}	121.0^{a-i}	48.7^{d-i}	110.8^{a-e}	14.8^{a-l}
Sammaz 35 X Sammaz 27	6x5	76.7^{a-g}	83.7^{a-g}	11.7^{b-g}	127.5^{a-i}	38.8^{i}	110.7^{a-e}	12.2^{b-l}
Sammaz 35 X Sammaz 35	6x6	75.8^{a-g}	83.0^{a-g}	10.0^{g}	108.3^{g-i}	44.2^{g-i}	110.2^{a-f}	8.0^{i-l}
Sammaz 35 X Sammaz 29	6x7	77.3^{a-g}	84.2^{a-g}	12.7^{a-f}	120.8^{a-i}	54.7^{a-i}	111.5^{a-e}	14.7^{a-l}
Sammaz 35 X Sammaz 28	6x8	75.3^{a-g}	80.7^{a-g}	13.0^{a-e}	132.2^{a-i}	55.8^{a-i}	107.8^{a-f}	13.8^{a-l}
Sammaz 29 X Sammaz 19	7x1	75.0^{a-g}	82.7^{a-g}	12.5^{a-g}	108.3^{g-i}	55.7^{a-i}	100.0^{g}	13.2^{a-l}
Sammaz 29 X Sammaz 37	7x2	78.3^{a-f}	85.0^{a-f}	12.7^{a-f}	129.2^{a-i}	56.2^{a-i}	109.2^{a-f}	9.5^{d-l}
Sammaz 29 X Sammaz 17	7x3	75.2^{a-g}	83.7^{a-g}	13.0^{a-e}	132.8^{a-i}	54.7^{a-i}	108.7^{a-f}	17.7^{a-c}
Sammaz 29 X Sammaz 36	7x4	78.5^{a-e}	85.8^{a-d}	13.0^{a-e}	124.2^{a-i}	43.7^{hi}	106.8^{a-g}	11.8^{b-l}
Sammaz 29 X Sammaz 27	7x5	75.5^{a-g}	82.2^{a-g}	14.3^{a}	155.0^{a}	70.3^{a-c}	108.3^{a-f}	16.8^{a-f}
Sammaz 29 X Sammaz 35	7x6	75.0^{a-g}	80.7^{a-g}	11.0^{d-g}	99.8^{i}	47.2^{e-i}	107.8^{a-f}	10.0^{c-l}
Sammaz 29 X Sammaz 29	7x7	74.0^{b-g}	80.3^{b-g}	12.3^{a-g}	126.8^{a-i}	55.7^{a-i}	113.2^{a-c}	12.8^{a-l}
Sammaz 29 X Sammaz 28	7x8	73.3^{b-g}	79.3^{d-g}	12.7^{a-f}	126.7^{a-i}	51.3^{c-i}	105.8^{b-g}	14.0^{a-l}
Sammaz 28 X Sammaz 19	8x1	74.0^{b-g}	81.3^{a-g}	12.3^{a-g}	121.3^{a-i}	53.2^{b-i}	108.3^{a-f}	13.2^{a-l}
Sammaz 28 X Sammaz 37	8x2	72.2^{e-g}	77.5^{fg}	12.7^{a-f}	130.3^{a-i}	57.3^{a-i}	106.0^{a-g}	14.7^{a-l}
Sammaz 28 X Sammaz 17	8x3	74.2^{b-g}	81.8^{a-g}	11.7^{b-g}	106.0^{hi}	51.7^{b-i}	108.0^{a-f}	10.2^{c-l}
Sammaz 28 X Sammaz 36	8x4	75.5^{a-g}	81.5^{a-g}	12.0^{a-g}	119.7^{b-i}	46.8^{e-i}	104.0^{e-g}	9.8^{c-l}
Sammaz 28 X Sammaz 27	8x5	75.7^{a-g}	82.2^{a-g}	13.7^{a-c}	142.2^{a-g}	58.5^{a-i}	108.2^{a-f}	17.0^{a-f}
Sammaz 28 X Sammaz 35	8x6	71.7^{f-g}	78.7^{d-g}	12.3^{a-g}	121.8^{a-i}	50.3^{c-i}	110.7^{a-e}	13.8^{a-l}

Supplementary table 3 cont.

Genotype	entry	Daf	Das	NL	PHcm	EHcm	DM	Ep
Sammaz 28 X Sammaz 29	8x7	73.2^{c-g}	79.3^{d-g}	12.0^{a-g}	124.8^{a-i}	56.5^{a-i}	108.2^{a-f}	15.5^{a-k}
Sammaz 28 X Sammaz 28	8x8	73.2^{c-g}	79.5^{d-g}	10.7^{e-g}	114.3^{c-i}	51.5^{b-i}	106.5^{a-g}	9.0^{f-l}
Sammaz 11	C1	78.0^{a-g}	84.2^{a-g}	12.3^{a-g}	142.3^{a-g}	60.5^{a-h}	109.0^{a-f}	15.3^{a-k}
Sammaz 16	C2	77.5^{a-g}	85.2^{a-e}	13.3^{a-d}	141.0^{a-h}	54.7^{a-i}	108.8^{a-f}	17.3^{a-e}
Sammaz 14	C3	78.7^{a-e}	85.3^{a-e}	13.0^{a-e}	147.2^{a-d}	64.2^{a-g}	112.7^{a-d}	14.8^{a-l}
Sammaz 15	C4	81.3^{a}	88.2^{a}	14.0^{ab}	140.5^{a-h}	71.8^{ab}	112.2^{a-e}	20.7^{a}
Sammaz 34	C5	72.8^{c-g}	79.5^{d-g}	11.0^{d-g}	110.3^{e-i}	44.2^{g-i}	108.7^{a-f}	11.5^{b-l}
Sammaz 20	C6	77.3^{a-g}	84.0^{a-g}	12.7^{a-f}	106.2^{hi}	42.8^{hi}	112.3^{a-d}	7.7^{k-l}
Sammaz 18	C7	76.3^{a-g}	83.3^{a-g}	13.0^{a-e}	135.7^{a-h}	54.8^{a-i}	110.8^{a-e}	8.2^{i-l}
Sammaz 13	C8	79.5^{a-c}	85.3^{a-e}	12.3^{a-g}	121.2^{a-i}	49.2^{d-i}	109.2^{a-f}	8.7^{g-l}
Sammaz 12	C9	74.8^{a-g}	82.0^{a-g}	11.7^{b-g}	113.5^{d-i}	45.5^{f-i}	108.8^{a-f}	6.8^{l}
Mean		75.95	82.61	12.46	128.67	55.28	109.12	13.37
CV %		6.00	6.09	13.82	18.33	24.79	5.06	40.85

KEY: Daf: Days to flower, Das: Days to silk, NL: Number of leaves, PH: Plant height, EH: Ear height, DM: Days to maturity, Ep: Ears per plot.

Supplementary table 3 cont.

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 19	1	15.8^{b}	12.0^{a-e}	24.2^{c-j}	6.0^{b}	1.3^{b-d}	0.7^{c-m}	62.7^{d-k}	1130.7^{f-n}
Sammaz 37	2	11.2^{b}	13.3^{a-c}	22.3^{d-j}	6.0^{b}	1.3^{a-d}	0.6^{b-m}	66.8^{b-k}	1306.7^{c-n}
Sammaz 17	3	11.3^{b}	11.7^{a-e}	24.0^{c-j}	6.1^{b}	1.5^{a-d}	0.9^{a-m}	72.8^{a-h}	1631.1^{b-n}
Sammaz 36	4	14.1^{b}	12.3^{a-e}	22.7^{d-j}	7.1^{b}	1.4^{a-d}	0.4^{j-m}	62.075^{e-k}	657.8-^{n}
Sammaz 27	5	15.3^{b}	12.7^{a-e}	27.8^{a-j}	6.6^{b}	1.4^{a-d}	0.8^{b-m}	68.9^{a-j}	1502.2^{b-n}
Sammaz 35	6	16.1^{b}	12.7^{a-e}	26.3^{a-j}	6.0^{b}	1.4^{a-d}	0.6^{f-m}	83.8^{ab}	1333.3^{c-n}
Sammaz 29	7	11.9^{b}	11.3^{b-e}	18.7^{j}	6.5^{b}	1.40^{a-d}	0.6^{e-m}	72.2^{a-h}	1231.1^{d-n}
Sammaz 28	8	12.4^{b}	11.0^{c-e}	20.8^{h-j}	6.1^{b}	1.4^{a-d}	0.9^{a-m}	75.5^{a-g}	1742.2^{a-n}
Sammaz 19 X Sammaz 19	1x1	14.1^{b}	12.3^{a-e}	23.7^{c-j}	6.6^{b}	1.4^{a-d}	0.5^{h-m}	65.9^{c-k}	1031.1^{g-n}
Sammaz 19 X Sammaz 37	1x2	15.3^{b}	12.0^{a-e}	25.3^{b-j}	5.9^{b}	1.13^{d}	1.0^{a-m}	68.0^{b-k}	955.6^{i-n}
Sammaz 19 X Sammaz 17	1x3	15.4^{b}	13.7 $^{a-c}$	30.8^{a-g}	6.5^{b}	1.4^{a-d}	0.8^{b-m}	73.5^{a-h}	1586.7^{b-n}
Sammaz 19 X Sammaz 36	1x4	15.6^{b}	12.3^{a-e}	23.0^{d-j}	6.6^{b}	1.5^{a-c}	1.0^{a-m}	63.0^{d-k}	1386.7^{b-n}
Sammaz 19 X Sammaz 27	1x5	15.0^{b}	14.3^{a}	26.8^{a-j}	7.6^{b}	1.4^{a-d}	1.7^{ab}	75.5^{a-g}	1640.0^{b-n}
Sammaz 19 X Sammaz 35	1x6	14.3^{b}	12.0^{a-e}	26.5^{a-j}	6.2^{b}	1.4^{a-d}	1.0^{a-m}	63.7^{c-k}	3195.6^{ab}
Sammaz 19 X Sammaz 29	1x7	14.4^{b}	13.0^{a-d}	25.2^{b-j}	6.4^{b}	1.3^{a-d}	0.8^{b-m}	65.4^{c-k}	1888.9^{a-n}
Sammaz 19 X Sammaz 28	1x8	14.9^{b}	12.7^{a-e}	28.0^{a-j}	6.8^{b}	1.3^{a-d}	0.5^{h-m}	53.9^{i-k}	1453.3^{b-n}
Sammaz 37 X Sammaz 19	2x1	14.5^{b}	13.3^{a-c}	26.5^{a-j}	6.4^{b}	1.3^{a-d}	1.3^{a-k}	70.7^{a-i}	2373.3^{a-n}
Sammaz 37 X Sammaz 37	2x2	14.3^{b}	12.3^{a-e}	29.3^{a-i}	6.8^{b}	1.4^{a-d}	0.7^{c-m}	61.6^{e-k}	1071.1^{f-n}
Sammaz 37 X Sammaz 17	2x3	14.2^{b}	12.7^{a-e}	30.7^{a-h}	6.8^{b}	1.5^{a-d}	1.2^{a-k}	72.0^{a-h}	2262.2^{a-n}
Sammaz 37 X Sammaz 36	2x4	14.0^{b}	11.0^{c-e}	24.2^{c-j}	5.8^{b}	1.3^{a-d}	0.7^{c-m}	66.7^{b-k}	1200.0^{e-n}
Sammaz 37 X Sammaz 27	2x5	13.6^{b}	12.0^{a-e}	29.3^{a-i}	6.3^{b}	1.4^{a-d}	0.9^{a-m}	75.7^{a-g}	1857.8^{a-n}
Sammaz 37 X Sammaz 35	2x6	14.0^{b}	11.3^{b-e}	26.0^{b-j}	6.20^{b}	1.3^{a-d}	0.9^{a-m}	63.3^{c-k}	1502.2^{b-n}

Supplementary table 3 cont.

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 37 X Sammaz 29	2x7	14.3^{b}	12.0^{a-e}	26.0^{b-j}	6.3^{b}	1.4^{a-d}	1.3^{a-i}	70.8^{a-i}	3013.3^{a-e}
Sammaz 37 X Sammaz 28	2x8	14.8^{b}	12.7^{a-e}	23.7^{c-j}	6.3^{b}	1.4^{a-d}	1.3^{a-j}	65.6^{c-k}	2013.3^{a-n}
Sammaz 17 X Sammaz 19	3x1	15.4^{b}	12.3^{a-e}	24.8^{b-j}	6.5^{b}	1.4^{a-d}	1.2^{a-l}	76.2^{a-g}	2444.4^{a-m}
Sammaz 17 X Sammaz 37	3x2	15.3^{b}	12.3^{a-e}	18.5^{j}	6.4^{b}	1.5^{a-c}	1.1^{a-m}	60.5^{f-k}	1702.2^{a-n}
Sammaz 17 X Sammaz 17	3x3	15.3^{b}	11.7^{a-e}	27.0^{a-j}	6.6^{b}	1.5^{a-d}	0.9^{a-m}	66.3^{c-k}	1542.2^{b-n}
Sammaz 17 X Sammaz 36	3x4	15.0^{b}	12.0^{a-e}	23.2^{d-j}	6.3^{b}	1.3^{b-d}	0.8^{b-m}	69.0^{a-j}	1351.1^{b-n}
Sammaz 17 X Sammaz 27	3x5	14.7^{b}	13.0^{a-d}	32.2^{a-d}	7.3^{b}	1.5^{a-c}	1.5^{a-d}	74.0^{a-h}	2893.3^{a-f}
Sammaz 17 X Sammaz 35	3x6	16.0^{b}	12.3^{a-e}	27.7^{a-j}	6.4^{b}	1.4^{a-d}	1.4^{a-g}	74.3^{a-h}	2720.0^{a-i}
Sammaz 17 X Sammaz 29	3x7	12.0^{b}	11.5^{b-e}	22.8^{d-j}	5.2^{b}	1.3^{a-d}	1.5^{a-e}	74.1^{a-h}	2888.9^{a-f}
Sammaz 17 X Sammaz 28	3x8	15.7^{b}	13.0^{a-d}	30.0^{a-i}	6.9^{b}	1.4^{a-d}	1.2^{a-k}	69.5^{a-j}	2217.8^{a-n}
Sammaz 36 X Sammaz 19	4x1	17.0^{b}	13.0^{a-d}	29.8^{a-i}	6.5^{b}	1.5^{a-d}	1.6^{a-c}	78.5^{a-e}	3102.2^{a-c}
Sammaz 36 X Sammaz 37	4x2	15.5^{b}	12.7^{a-e}	30.0^{a-i}	6.7^{b}	1.5^{a-c}	0.9^{a-m}	76.0^{a-g}	1724.4^{a-n}
Sammaz 36 X Sammaz 17	4x3	15.5^{b}	13.0^{a-d}	26.2^{b-j}	6.8^{b}	1.6^{a-c}	0.8^{b-m}	76.2^{a-g}	1417.8^{b-n}
Sammaz 36 X Sammaz 36	4x4	16.6^{b}	12.3^{a-e}	26.2^{b-j}	8.0^{a}	1.4^{a-d}	0.6^{g-m}	59.4^{g-k}	804.4^{j-n}
Sammaz 36 X Sammaz 27	4x5	15.1^{b}	13.0^{a-d}	28.8^{a-i}	6.^{b}	1.4^{a-d}	1.0^{a-m}	71.5^{a-h}	1813.3^{a-n}
Sammaz 36 X Sammaz 35	4x6	14.9^{b}	11.7^{a-e}	27.3^{a-j}	5.9^{b}	1.5^{a-d}	1.0^{a-m}	86.1^{a}	2311.1^{a-n}
Sammaz 36 X Sammaz 29	4x7	15.5^{b}	13.3^{a-c}	22.0^{e-j}	6.1^{b}	1.4^{a-d}	1.2^{a-l}	72.3^{a-h}	2475.6^{a-l}
Sammaz 36 X Sammaz 28	4x8	13.2^{b}	12.3^{a-e}	24.0^{c-j}	6.4^{b}	1.4^{a-d}	1.1^{a-m}	73.4^{a-h}	2044.4^{a-n}
Sammaz 27 X Sammaz 19	5x1	14.9^{b}	12.3^{a-e}	23.3^{d-j}	6.5^{b}	1.3^{b-d}	1.0^{a-m}	68.2^{b-j}	1862.2^{a-n}
Sammaz 27 X Sammaz 37	5x2	14.8^{b}	13.7^{a-c}	28.7^{a-i}	6.7^{b}	1.5^{a-d}	1.5^{a-f}	68.5^{b-j}	2831.1^{a-h}
Sammaz 27 X Sammaz 17	5x3	14.1^{b}	12.3^{a-e}	26.2^{b-j}	6.3^{b}	1.3^{a-d}	0.9^{a-m}	73.5^{a-h}	1666.7^{b-n}
Sammaz 27 X Sammaz 36	5x4	15.3^{b}	13.0^{a-d}	31.2^{a-f}	6.8^{b}	1.4^{a-d}	1.5^{a-f}	76.1^{a-g}	2995.6^{a-e}
Sammaz 27 X Sammaz 27	5x5	14.4^{b}	13.0^{a-d}	30.7^{a-h}	6.8^{b}	1.3^{a-d}	1.3^{a-j}	59.4^{g-k}	2071.1^{a-n}

Supplementary table 3 cont.

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 27 X Sammaz 35	5x6	17.0^{b}	13.3^{a-c}	31.7^{a-e}	7.1^{b}	1.4^{a-d}	1.7^{a}	75.2^{a-g}	3524.4^{a}
Sammaz 27 X Sammaz 29	5x7	15.7^{b}	14.0^{ab}	29.7^{a-i}	7.4^{b}	1.5^{a-c}	1.3^{a-j}	73.2^{a-h}	2502.2^{a-l}
Sammaz 27 X Sammaz 28	5x8	15.7^{b}	13.3^{a-c}	31.7^{a-e}	6.93^{b}	1.63^{a}	1.5^{a-d}	76.5^{a-g}	3053.3^{a-d}
Sammaz 35 X Sammaz 19	6x1	11.3^{b}	10.0^{e}	21.5^{f-j}	6.1^{b}	1.3^{a-d}	0.8^{b-m}	75.3^{a-g}	1475.6^{b-n}
Sammaz 35 X Sammaz 37	6x2	14.3^{b}	13.0^{a-d}	25.2^{b-j}	5.9^{b}	1.4^{a-d}	1.2^{a-l}	69.3^{a-j}	2311.1^{a-n}
Sammaz 35 X Sammaz 17	6x3	17.9^{b}	12.7^{a-e}	36.0^{a}	6.8^{b}	1.3^{a-d}	1.4^{a-i}	80.4^{a-c}	2871.1^{a-g}
Sammaz 35 X Sammaz 36	6x4	15.2^{b}	13.0^{a-d}	28.8^{a-i}	6.9^{b}	1.6^{ab}	1.3^{a-j}	77.7^{a-f}	2577.8^{a-j}
Sammaz 35 X Sammaz 27	6x5	14.9^{b}	14.3^{a}	27.3^{a-j}	6.6^{b}	1.5^{a-d}	0.8^{b-m}	75.7^{a-g}	1386.7^{b-n}
Sammaz 35 X Sammaz 35	6x6	13.0^{b}	12.7^{a-e}	24.8^{b-j}	6.1^{b}	1.4^{a-d}	0.8^{b-m}	63.2^{c-k}	1182.2^{e-n}
Sammaz 35 X Sammaz 29	6x7	16.4^{b}	13.3^{a-c}	27.7^{a-j}	6.5^{b}	1.4^{a-d}	1.3^{a-j}	70.1^{a-i}	2400.0^{a-m}
Sammaz 35 X Sammaz 28	6x8	14.7^{b}	13.0^{a-d}	31.2^{a-f}	6.5^{b}	1.4^{a-d}	1.1^{a-l}	73.5^{a-h}	2213.3^{a-n}
Sammaz 29 X Sammaz 19	7x1	15.1^{b}	13.3^{a-c}	29.7^{a-i}	6.9^{b}	1.4^{a-d}	1.3^{a-i}	78.6^{a-e}	2608.9^{a-j}
Sammaz 29 X Sammaz 37	7x2	14.3^{b}	12.7^{a-e}	20.8^{h-j}	6.2^{b}	1.5^{a-c}	0.2^{m}	53.8^{i-k}	720.0^{k-n}
Sammaz 29 X Sammaz 17	7x3	15.0^{b}	12.7^{a-e}	29.2^{a-i}	6.8^{b}	1.63^{ab}	1.4^{a-i}	79.5^{a-d}	2671.1^{a-i}
Sammaz 29 X Sammaz 36	7x4	13.2^{b}	12.0^{a-e}	23.3^{d-j}	6.3^{b}	1.3^{a-d}	0.8^{b-m}	66.1^{c-k}	1417.8^{b-n}
Sammaz 29 X Sammaz 27	7x5	16.6^{b}	13.7^{a-c}	33.5^{a-c}	7.1^{b}	1.5^{a-d}	1.4^{a-h}	75.8^{a-g}	2768.9^{a-i}
Sammaz 29 X Sammaz 35	7x6	13.1^{b}	12.0^{a-e}	20.3^{ij}	5.8^{b}	1.3^{a-d}	0.8^{b-m}	67.0^{b-k}	1520.0^{b-n}
Sammaz 29 X Sammaz 29	7x7	14.3^{b}	12.7^{a-e}	27.3^{a-j}	6.7^{b}	1.3^{a-d}	0.8^{b-m}	68.0^{b-k}	1346.7^{c-n}
Sammaz 29 X Sammaz 28	7x8	14.8^{b}	12.7^{a-e}	29.0^{a-i}	6.2^{b}	1.5^{a-c}	1.2^{a-k}	78.6^{a-e}	2511.1^{a-k}
Sammaz 28 X Sammaz 19	8x1	14.4^{b}	13.0^{a-d}	23.3^{d-j}	6.3^{b}	1.4^{a-d}	0.9^{a-m}	72.8^{a-h}	1720.0^{a-n}
Sammaz 28 X Sammaz 37	8x2	15.7^{b}	12.7^{a-e}	28.8^{a-i}	6.7^{b}	1.5^{a-d}	1.3^{a-i}	71.3^{a-h}	2537.8^{a-k}
Sammaz 28 X Sammaz 17	8x3	15.1^{b}	13.0^{a-d}	25.3^{b-j}	6.3^{b}	1.3^{b-d}	1.2^{a-l}	66.7^{b-k}	2084.4^{a-n}

Supplementary table 3 cont.

Genotype	Entry	EL	KRN	KPR	EDcm	CDcm	Cwkg	Tp%	Gykg/ha
Sammaz 28 X Sammaz 36	8x4	11.8^{b}	10.5^{d-e}	18.3^{j}	5.9^{b}	1.3^{b-d}	0.5^{i-m}	64.2^{c-k}	1030.2^{g-n}
Sammaz 28 X Sammaz 27	8x5	13.2^{b}	12.3^{a-e}	21.2^{g-j}	6.2^{b}	1.3^{a-d}	0.9^{a-m}	60.3^{g-k}	1582.2^{b-n}
Sammaz 28 X Sammaz 35	8x6	14.4^{b}	13.0^{a-d}	27.0^{a-j}	5.6^{b}	1.3^{a-d}	0.8^{b-m}	78.0^{a-e}	1506.7^{b-n}
Sammaz 28 X Sammaz 29	8x7	14.8^{b}	11.3^{b-e}	27.0^{a-j}	6.1^{b}	1.4^{a-d}	1.4^{a-i}	70.0^{a-i}	2533.3^{a-k}
Sammaz 28 X Sammaz 28	8x8	16.7^{b}	12.3^{a-e}	23.3^{d-j}	6.4^{b}	1.5^{a-d}	0.9^{a-m}	60.0^{g-k}	1404.4^{b-n}
Sammaz 11	C1	16.6^{b}	13.0^{a-d}	34.2^{ab}	6.9^{b}	1.4^{a-d}	1.3^{a-i}	74.0^{a-h}	2400.0^{a-m}
Sammaz 16	C2	13.6^{b}	14.0^{ab}	22.3^{d-j}	6.4^{b}	1.3^{a-d}	0.6^{f-m}	63.7^{c-k}	946.7^{i-n}
Sammaz 14	C3	15.8^{b}	12.7^{a-e}	29.5^{a-i}	6.7^{b}	1.2^{c-d}	0.8^{b-m}	63.2^{c-k}	1262.2^{c-n}
Sammaz 15	C4	18^{a}	14.0^{ab}	27.2^{a-j}	7.0^{b}	1.4^{a-d}	0.6^{d-m}	57.5^{h-k}	995.6^{h-n}
Sammaz 34	C5	14.3^{b}	12.3^{a-e}	26.2^{b-j}	6.0^{b}	1.4^{a-d}	1.3^{a-k}	51.2^{k}	2186.7^{a-n}
Sammaz 20	C6	12.6^{b}	13.0^{a-d}	22.2^{e-j}	6.2^{b}	1.4^{a-d}	0.5^{i-m}	57.7^{h-k}	551.1^{n}
Sammaz 18	C7	15.3^{b}	12.7^{a-e}	26.7^{a-j}	6.2^{b}	1.3^{a-d}	0.5^{i-m}	74.6^{a-h}	986.7^{h-n}
Sammaz 13	C8	11.9^{b}	11.7^{a-e}	20.4^{ij}	12.3^{a}	1.3^{b-d}	0.4^{k-m}	52.5^{jk}	941.8^{i-n}
Sammaz 12	C9	13.7^{b}	13.0^{a-d}	25.3^{b-j}	5.9^{b}	1.3^{b-d}	0.3^{ml}	74.4^{a-h}	608.9^{mn}
Mean		14.85	12.59	26.29	6.59	1.38	0.98	69.54	1855.65
CV %		37.23	14.69	25.28	43.56	17.44	61.42	16.74	66.95

KEY: EL: Ear length, KRN: Kernel row number, KPR: Kernels per row, ED: Ear diameter, CD: Cob diameter, CW: Cob weight, Tp: Threshing percentage, Gy: Grain eld/ha.