



## Performance of grain maize (*Zea mays*) hybrids for dual utility in ideal maize agronomic conditions

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### ABSTRACT

Owing to rising demand, value addition, increased income, superior taste and texture, baby corn is gaining attention as a profitable crop. Superior maize (*Zea mays* L.) cultivars, good for grain yield, can also be exploited for baby corn, fodder, green cob etc. In this work, interest has been taken to evaluate 23 best experimental early single cross hybrids with regard to their baby corn suitability under ideal agronomic conditions of grain maize production. Denser planting and detasseling are the specific operations carried out to identify best hybrid for baby corn along with noting prolificacy and important baby corn quantity and quality based traits. CMLX325 and CMLX338 were found most useful for baby corn purpose. Such superior genotypes can act as genetic resource for baby corn improvement.

**Key words:** Baby corn, Dual utility, Maize

Maize (*Zea mays* L.) is a multi-utility crop, where its unfertilized young cob called as baby corn is consumed worldwide. Its production technology was developed in Thailand in 1970's. The establishment of standard baby corn production technologies helped farmers to produce high yield and excellent quality (Muthukumar *et al.* 2007, Ashoka *et al.* 2008, Dass *et al.* 2009). For the development of baby corn genotypes, early maturing maize hybrids can be used for its yield, uniformity and duration (Dhasarathan *et al.* 2012). The objective of this work was to evaluate the ability of production of quality baby corn in twenty three high yielding and early maturing experimental maize single cross hybrids in ideal agronomic conditions.

### MATERIALS AND METHODS

A set of 23 early maturing single cross maize hybrids excellent for grain yield developed in Indian Institute of Maize Research, were evaluated at experimental farm of New Delhi with HM 4 as check in randomized blocks design with two replications. HM 4, a single cross hybrid is popular as baby corn for its yield and specific traits. Seed rate was 10 kg/acre. Package of practices and nutrient management was the same as for normal maize grain. General nutrition application was 10 tonnes farmyard manure/ha, 10-15 days prior to sowing supplemented with 180 kg N, 80 kg P<sub>2</sub>O<sub>5</sub>, 80 kg K<sub>2</sub>O and 25 kg ZnSO<sub>4</sub>/ha. Full doses of P, K and Zn were applied as basal with nitrogen in three splits of

20% N at 4 leaf stage, 30% N at 8 leaf stage and 25% N before detasseling. The row length was 4 m with spacing of 60 cm between rows and 15 cm between plants for denser planting in four rows. Detasseling or removal of tassel is an important cultural practice in baby corn production. This improves prolificacy that is inherent production of multiple ears. All the baby corns were harvested manually once the silk is 2 to 3 cm out and specific traits were recorded. The counted baby corn ears were categorized into marketable and unmarketable based upon standards (Dass *et al.* 2009, Aekatasanawan 2001). Acceptable export quality requirements of baby corn ear for fresh market or processing industry is the ear size should be of 4 to 9 cm length and 1.0 to 1.5 cm in diameter. Ear diameter and length were taken using a calliper rule. The market standard includes general health, free from pest and diseases, colour varying from pearly white to light yellow and cylindrical shape. Small kernel size, straight kernel row and tapered tips are preferred for high quality baby corn. Data were subjected to analysis of variance and means were compared using least significant difference at 50% level of probability. Comparison of superiority of entries over check was used to determine the best entries.

### RESULTS AND DISCUSSION

Practically any hybrid/composite can be used for cultivation of baby corn but for commercial purpose early maturing, prolific and medium height single cross hybrids are most suitable. Traits like number of ears picked per plant, single husked ear weight, dehusked to husked ear yield ratio and harvest index at genotypic level contributed directly to husked yield and should be given prime

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Table 1 Summary of mean performance of twenty three maize hybrids to baby corn specific quantity and quality traits

	Ear length (cm)		Ear width (cm)		Total weight (kg)		TFW	RHUH	PH	BV	TNE
	WH	WOH	WH	WOH	WH	WOH					
Mean	17.30	9.23	2.26	1.31	6.87	1.30	25.87	5.59	141.77	11.38	177.16
Range	22.24- 11.83	13.45- 5.56	2.93-2.02	1.52-0.91	9.30-4.04	1.84-0.65	36.80- 12.94	7.62-4.76	168.15- 104.45	14.16- 8.65	200.20- 141.56
SEd	0.66	0.45	0.06	0.03	0.36	0.08	1.52	0.15	3.28	0.33	3.44
LSD (P=0.05)	5.35	3.66	0.49	1.72	2.91	0.63	3.03	0.29	6.56	6.56	6.88
Significance level	**	**	**	**	**	**	**	**	**	**	**

importance while selecting superior genotypes of baby corn (Chauhan *et al.* 2010). Analysis of variance indicated significant differences among hybrids for all traits. Table 1 summarises variance and average of recorded traits among hybrids. The days to first pick was initiated in 41 to 53 days after sowing in total four harvests. First picking was delayed to 53 days in HM 4, whereas, CML 325 × CML 338 took least number of 41 days to begin harvest. Since baby corn is generally produced under high planting densities, preference is given to shorter cultivars, in order to decrease yield losses due to lodging before flowering. Hybrids CM 139 × Sugary 75, CM 139 × CML 415 and V 346 × V 341 produced shorter plants. Detasseling increases productivity of commercial baby corn ears, regardless of sowing season. Negative correlation exists between tassel size and prolificacy (Souza Junior *et al.* 1985) which is a very important trait proposed for baby corn production. Depending upon the criterion used for yield assessment in baby corn (number and weight of unhusked and husked ears), cultivars can be different (Ashoka *et al.* 2008). To maintain ear freshness, moisture and quality, marketing baby corn with husk is recommended. Hence weight of husked baby corn is an essential trait and varied from 9.30

kg to 4.04 kg. Yield level in terms of weight of husked baby corn ears was highest in DMRN 6 × CM 338, CML 325 × CML 338, V 373 × V 345 and CML 415 × V 373. Promising hybrids (CM 119 × Indimyt 345, V 373 × V 345, CM 119 × CM 120, V 364 × CM 120, CM 139 × CML 415) with >1.40 kg plot weight of baby corn without husk were potential. The ideal profitable husked to dehusked ratio in weight should be 5-6:1 (Dass *et al.* 2009). Fifteen hybrids showed desirable husked to dehusked ratio. First harvest of total harvest was higher than the second and third harvest in 42% of hybrids (Fig 1). Removal of first baby corn harvest induced more ears making it possible for more baby corn ears in the second harvest in remaining 58% hybrids. The number of baby corn ears in the third harvest was lowest in all hybrids. Percentage of marketable baby corn gets reduced with number of harvest. Nearly 99% of harvested baby corn ears of first harvest were marketable which was higher than the subsequent harvests. Shape and size standards are principal factors determining the marketability of baby corn. Ear length without husk ranged from 13.5 cm to 5.56 cm, whereas ear width without husk varied from 1.52 cm to 0.91 cm. Subsequently, nine hybrids confirmed market standards with regard to both ear length

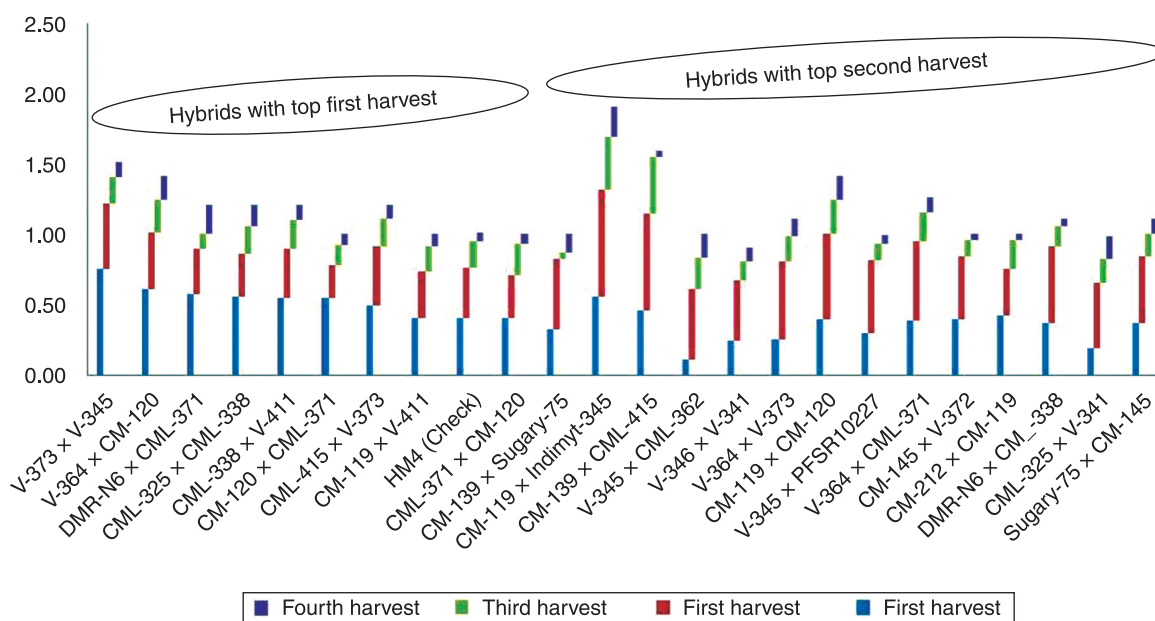


Fig 1 Harvest wise yield of individual picking in each hybrid.

Table 2 Mean of best three hybrids for number, weight (with and without husk) of baby corn and fodder

Hybrid	Ear length (cm)		Ear width (cm)		Total weight (kg)		TFW	RHUH	PH	BV	TNE
	WH	WOH	WH	WOH	WH	WOH					
CM-139 × CML-415	15.67	6.47	2.02	0.91	9.00	1.60	32.56	5.78	117.90	12.03	198.00
V-373 × V-345	16.89	11.02	2.02	1.52	8.70	1.52	34.78	5.22	132.05	9.56	200.33
CML-325 × CML-338	16.68	9.00	2.02	1.21	9.30	1.21	32.56	5.71	149.24	13.85	190.33

WH-With husk; WOH-without husk; TFW-total fodder weight (kg); RHUH-ratio of weight of unhusked to husked baby corn; PH-plant height (cm); BV-Brix value (%); TNE-total number of ears.

and width respectively. Regular ovary/row arrangement an important trait for marketability was absent in CML 415 × V 373, V 345 × CML 362, V 373 × V 345, and CM 139 × Sugary75. Baby corn supports the livestock industry as green fodder of left over above ground plant after harvest fetching additional income to growers. CML 415 × V 373, V 373 × V 345 and V 345 × PFSR 10227 gave good fodder yield. Best hybrids with high yield of baby corn without husk and fodder weight were V 373 × V 345 and CM 139 × CML 415. V 373 × V 345 and CM 139 × CML 415 had high baby corn yield (1.52 kg and 1.60 kg) and also fodder weight (34.79 and 32.56 kg). Brix is a measure of soluble solids made up of sugar and minerals. Sugary taste aids in raw salad and culinary. Based on the mean performance over check (HM4), hybrids V 346 × V 341, DMRN6 × CM 338 and CML 325 × CML 338 recorded more than 13.75% brix value, the maximum level found for sweetness.

Specific cultivars for the production of baby corn still do not exist in many countries, but cultivars developed for other purposes indicate baby corn specific traits and their utilization as baby corn (Pereira Filho *et al.* 1998, Carvalho *et al.* 2002). The evaluation of grain type maize for precise baby corn traits can therefore provide more genotypes for baby corn farming. Table 2 illustrates the traits recorded in three hybrids found to best in three important economic traits namely number, weight of baby corn with and without husk as well as fodder. Other than yield superiority baby corn being a market crop is also meant for its quality standards. Hence a suitable hybrid would be the one superior to entire traits recorded to be specific to baby corn both in terms of quantity and quality. Even though hybrid CML 325 × CML 338 yielded less compared to V 373 × V 345 and CM 139 × CML 415 it is found to keep the standard values set for baby corn quality. Denser planting and detasseling and prolificacy are the requirements for screening any cultivar for baby corn suitability. In our experiment, CML 325 × CML 338 was a promising hybrid for baby corn as it produced superiority of all traits recorded over the performance of

check. In addition to superiority over check, hybrid CML 325 × CML 338 confirmed to the marketable size standards of baby corn, yielded high in first picking, took less time to begin harvesting, gave high fodder yield and recorded high sugary taste.

#### REFERENCES

- Aekatasanawan C. 2001. *Baby Corn. Specialty Corn*. Second edition, pp 275-93. CRC Press LLC, Boca Raton, Florida.
- Ashoka P, Mudalagiriappa B T, Pujari P S, Hugar and Desai B K. 2008. Effect of micronutrient with or without organic manures on yield of baby corn (*Zea mays* L.) – Chickpea (*cicer artietinum* L.) sequence. *Karnataka Journal of Agricultural Sciences* 21: 485-7.
- Carvalho G S, Pinho R and Pereira Filho I A. 2002. Efeito do tipo de cultivar, despendoamento das plantas e da época de semeadura na produção de minimilho. *Revista Brasileira de Milho e Sorgo* 1: 47-58.
- Chauhan S K, Jitendra Mohan and Gadag R N. 2010. Genetic analysis of productivity traits in baby corn. *Vegetable Sciences* 37: 132-5.
- Dass S, Yadav V K, Kwatra A, Sekhar J C and Yadav Y. 2009. Baby corn: Production technology and value addition. Technical Bulletin 6, Directorate of Maize Research, Pusa Campus, New Delhi, pp1-45.
- Dhasarathan M, Babu C, Iyanar K and Velayudham K. 2012. Studies on genetic potential of baby corn (*Zea mays* L.) hybrids for yield and quality traits. *Electronic Journal of Plant Breeding* 3: 853-60.
- Muthukumar V B, Velayudham K and Thavaprakash N. 2007. Plant growth regulators and split application of nitrogen improves the quality parameters and green ear yield of baby corn (*Zea mays* L.). *Journal of Agronomy* 6: 208-11.
- Pereira Filho I A, Gama E E G and Cruz J C. 1998. *Minimilho: efeito de densidade de plantio e cultivares na produção e em algumas características da planta de milho*. Sete Lagoas: EMBRAPA-CNPMS (EMBRAPA-CNPMS. Pesquisa em Andamento, 23), 6 p.
- Souza Júnior C L, Geraldi I O and Zinsly J R. 1985. Influence of tassel size on the expression of prolificacy in maize (*Zea mays* L.). *Maydica* 30: 321-8.