Ecofarming (e-Magazine)

Agriculture

Ecofarming
e-Magazine for Agriculture and Allied Sciences
http://www.ecofarming.rdagriculture.in
e-ISSN: 2583-0791

# Baby Corn Breeding
## A Wonderful Vegetable

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***Received: April, 2025; Accepted: May, 2025; Published: July, 2025***

### Introduction

Maize (*Zea mays* L.) is one of the most diverse and versatile grain crops cultivated throughout the world. It is a monoecious, annual, $C_4$ plant with a chromosome number of 2n=2x=20. Maize is considered as the 'Drosophila of crop plants' because of its extensive genetic and cytogenetic breeding investigations and utility. Several diverse types, such as quality protein maize, sweet corn, popcorn, high-oil corn and baby corn have been developed for their unique nutritional profiles and multiple uses.

Baby corn (*Zea mays* L.) holds great relevance among all specialty corn. It is a young finger-like unfertilized cob of maize harvested early within 1-3 days of silk emergence depending upon the growing season. The unfertilized ear of the corn plant is harvested when the silks have either not emerged or just emerged (1-3 cm). It is dual purpose crop because after harvest the still young plants can be used as fodder for cattle. Baby corn is gaining popularity among vegetarian people due to its high nutritive value and it stands out as an excellent source of phosphorous (86 mg/100 g). It is used in two ways, fresh or processed for consumption. For baby corn production, varieties are grown under high plant densities (120,000 to 160,000 plants per ha), irrigation and high nitrogen application. In India, very few maize cultivars have been developed for baby corn production. Prolificacy is an important trait for the baby corn breeding programmes. To enhance baby corn production, cultivars should be developed with multiple ears per plant. Besides, there is a need to develop cytoplasmic male sterile lines for higher baby corn production and specifically to reduce the cost of detasseling which also ensures the quality of the baby corn ears.

### Breeding Methods

(1) Selection (2) Reciprocal recurrent selection (3) Heterosis breeding (4) Male sterility

### Case Studies

**Hemlata *et al.* (2016)** assessed the combining ability and gene action in baby corn genotypes using eight inbred lines HKI 3209, SML 1, EC 595979, CM 128, VQL 1, G 18, HKI 209 and DTPYC. Results revealed that CM 128 and VQL 1 were the best general combiners. The hybrid CM 128 × VQL 1 showed the highest SCA effects for baby corn yield (4.11 q/ha) and quality. Additionally, CM 128 × HKI 209 recorded a high-quality trait mean (7.35%) and significant SCA effects for TSS (2.57 ºBrix). Gene action analysis indicated a predominance of non-additive gene action for yield and related traits.

**Prakash *et al.* (2019)** analyzed the genetics of prolificacy in 'Sikkim Primitive'. A prolific inbred (MGU-SP-101) developed from 'Sikkim Primitive' was crossed with four non-prolific inbreds and evaluated at two different locations. Joint scaling test suggested that dominance × dominance (l) effect was positive and significant across crosses and locations which indicated that prolificacy can be effectively utilized in generating hybrids having multiple ears. Based on the six-parameters model, the interaction was found to be duplicate epistasis type as dominance (h) and dominance × dominance (l) effects possessed opposite signs.

**Kousar *et al.* (2020)** investigated combining ability and gene action of baby corn by crossing nine lines with three testers in line × tester mating design with two commercial checks. BBCP-27-1 emerged as the top general combiner for various baby corn traits, including prolificacy, number of cobs pr plant and yield per plant. The hybrid BBCP-11-2 × BBCH-51-2 exhibited favourable specific combining effects for key traits such as cob weight, ear length and baby corn yield. Study revealed that most baby corn traits are mainly influenced by non-additive gene action, offering valuable opportunities for using these genetic mechanisms in hybrid breeding.

**Pal *et al.* (2020)** analyzed 24 hybrids having fertile (N-) and different sterile (T-, C- and S-) cytoplasms for pollen sterility and various baby corn traits under three dates of sowing. T-based cytoplasm was the most promising for stable male sterility, followed by C-cytoplasm, However, S-cytoplasm exhibited

partial to complete fertility thereby indicating its unsuitability in the baby corn programmes. T-cytoplasm also generated more baby corn ears and baby corn yield over other types. APH27-T, HM4-C and HM4-T were identified as the best baby corn hybrids that can be used for commercial cultivation.

**Carlos *et al.* (2022)** identified popcorn lines with potential for baby corn production and resistance to major foliar diseases, including Southern corn leaf blight, Northern corn leaf blight, and Southern rust. Based on univariate and multivariate analyses conducted over two planting seasons. They found that lines L61, L63, L623, L684, L685 and L691 were the most resistant and are considered promising candidates for use as donor lines in breeding programs targeting multiple disease resistance.

## Conclusion

Baby corn, with its rich nutritional profile, high yield potential, economic benefits for farmers, and consumer appeal, stands as a valuable and versatile crop, contributing to both healthy diets and sustainable agriculture

Non-additive gene action predominantly governs yield and quality traits in baby corn, for that CM 128 and VQL 1 identified as superior parents for hybrid development

Prolificacy is governed by duplicate epistasis. Further, one QTL identified on chromosome 8 was linked with prolificacy from the 'Sikkim primitive' derived population.

Several cross combinations exhibited good SCA in the desirable direction for the majority of the baby corn traits and they could be further utilized for the development of high-yielding hybrid varieties with good-quality traits

T-cytoplasm is the most promising for stable male sterility in baby corn hybrids and baby corn yield, followed by C-cytoplasm. However, S-cytoplasm exhibited unsuitability in the baby corn breeding program

Multiple popcorn lines have strong resistance to major foliar diseases, highlighting their potential as valuable donor sources for baby corn breeding programs aimed at enhancing disease resistance.

## Future Prospects

- Need to promote material uniformity, with a greater emphasis on developing early-maturing prolific hybrids
- Efforts should be directed towards the development of new CMS lines
- for higher baby corn production
- Developing cultivars with a specific focus on maintaining quality attributes, even during the late harvest stage
- Breeding varieties of baby corn that are rich in nutrients and well-suited as fodder for cattle, aiming to feed quality of livestock

## References


1. Carlos, M. C.; Vivas, M.; Costa, A. C.; Vasconcelos, L. C.; Lima, W. L. D.; Almeida, R. N. D., and Valadares, F. V. (2022). Resistance to multiple leaf diseases in popcorn lines with potential for baby corn production. *Acta Scientiarum. Agronomy*, **44**, e55857.
2. Hemlata K.; Nikhil K.; Mukesh K. and Rashmi K. (2016). Studies on combining ability and gene action for yield and quality traits in Baby corn (*Zea mays* L.). *Journal of Applied and Natural Science,* **8** (3): 1349 – 1355.
3. Kousar, H.; Sanjeev, K. D.; and Biradar, B.D. (2020). Estimation of combining ability and gene action for various traits of baby corn in line × tester analysis. *International Journal of Current Microbiology and Applied Sciences*, **9** (11), 2799-2807.
4. Pal, S.; Zunjare, R. U.; Muthusamy, V.; Duo, H.; Gowda, M. M.; Bhowmick, P. K.; and Hossain, F. (2020). Influence of T-, C- and S-cytoplasms on male sterility and their utilization in baby corn hybrid breeding. *Euphytica*, **216** (6), 1-10.
5. Prakash, N. R.; Zunjare, R. U.; Muthusamy, V.; Chand, G.; Kamboj, M. C.; Bhat, J. S.; and Hossain, F. (2019). Genetic analysis of prolificacy in 'Sikkim Primitive'-A prolific maize (*Zea mays* L.) landrace of North-Eastern Himalaya. *Plant Breeding*, **138** (6), 781-789.