



Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2026.v26.supplement-2.227>

ASSESSMENT OF GROWTH, YIELD AND QUALITY OF CABBAGE HYBRIDS IN GANGETIC PLAINS OF WEST BENGAL

Sabiha Naz¹, Partha Choudhuri^{1*}, Puspita Das¹, Trisha Baidya¹, Chandan Karak¹,
Pran Krishna Thakur² and Aurolipa Panda¹

¹Department of Vegetable Science, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia,
West Bengal-741252, India.

²Department of Post Harvest Management, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia,
West Bengal-741252, India.

*Corresponding authors E-mail: partha2909@rediffmail.com

(Date of Receiving : 03-04-2026; Date of Revision : 24-05-2026; Date of Acceptance : 08-06-2026)

ABSTRACT

The present investigation was carried out at C-Block Research Farm of Bidhan Chandra Krishi Viswavidyalaya during the Rabi season of 2023-2024 in randomized block design to assess growth, yield and quality of sixteen different cabbage hybrids. The study revealed significant variations in the growth and yield parameters among the cabbage hybrids. Treatment T8 (PAN-3451) exhibited the maximum plant height (22.13 cm, 27.00 cm and 36.00 cm at 30 DAT, 45 DAT and 60 DAT respectively), most non-wrapper leaves, and the greatest yield per hectare (61.66 tonnes), followed closely by treatments T7(MOHAR) and T5(22/CABHYB-6). Quality examination revealed that T5 had the highest ascorbic acid level (26.24 mg/100g), followed by T7 and T8. From the experiment, it may be concluded that hybrids T8 (PAN-3451), T7 (MOHAR), and T5 (22/CABHYB-6) are particularly well-suited for cultivation and may be taken up for commercial cultivation by the farmers of New Alluvial plains of West Bengal as these hybrids out formed others for higher yield and quality in the New Alluvial Zone of West Bengal.

Keywords : Assessment, Cabbage, Hybrid, Growth, Yield.

Introduction

Cabbage (*Brassica oleracea* var. capitata L.), a member of the Cruciferae family, with a diploid chromosome number of $2n = 2x = 18$, is one of the widely cultivated Cole group of vegetables around the globe. India produced 9.04 million tonnes of cabbage from an area of 3.99 million hectares, with West Bengal leading as the top producing state, contributing 2,341.87 thousand tonnes (24.38%) (NHB, 2018). Cabbage is popular for its taste, flavour, and nutritional values. This crop can adapt to wide range of soil and climatic conditions, easy to grow and store packed with several nutrients. The crop is now grown in both tropical and subtropical countries. Cabbage is a popular vegetable worldwide due to its cheaper price and amazing, nutritional benefits (Moreb *et al.*, 2020). The edible portion of cabbage, commonly known as head, is used in preparation of variety of delicious

dishes for its naturally spicy flavour (Hossain *et al.*, 2015) and acts as reservoir of fibre, minerals and vitamins (Nawaz *et al.*, 2018). Among different plant production tools selection of appropriate variety is an important factor for higher yield and quality. There is considerable variability in cabbage genotypes in respect of yield and quality attributes. Higher yield of cabbage can be obtained, as long as selection of varieties which are suitable to the growing environment (Eva *et al.*, 2020). Use of F_1 hybrids for commercial cabbage production can increase yield and also resistance to biotic and abiotic stresses for their uniform growth habit, earliness and better head quality (Singh *et al.*, 2019). In west Bengal cabbage is commercially cultivated in the districts like West Midnapur, South 24 Parganas, North 24 Parganas, Nadia and Murshidabad. Gangetic plains of Nadia district of West Bengal offers suitable soil and climatic

condition for cabbage cultivation. So, identification and cultivation of suitable hybrids of cabbage for this zone is badly needed for better yield and quality as lack of region-specific varieties results lower productivity and poor quality in cabbage (Tabor *et al.*, 2022). Considering the importance of cabbage hybrids, identification of superior cabbage hybrids is essential that offer high yield and quality.

Materials and Methods

The field study was undertaken in the C-Block farm of Bidhan Chandra Krishi Viswavidyalaya during rabi months of 2023-24. The site was situated at 23.5°N latitude and 89°E longitude and at an altitude of 9.75m above mean sea level. The site was a high land with assured irrigation facility and adequate drainage facilities and falls under a tropical humid climatic zone. The trial was laid out in Randomized Block Design with sixteen treatments and three replications. The treatments consisted of thirteen different cabbage hybrids like 22/CABHYB-1 AVT-1 (T1), 22/CABHYB-4 (T2), 22/CABHYB-3 (T3), 22/CABHYB-5 (T4), 22/CABHYB-6 (T5), 22/CABHYB-2 (T6), MOHAR (T7), PAN-3451 (T8), 21/CABHYB1 AVT 2 (T9), 21/CABHYB-2 (T10), 21/CABHYB-3 (T11), 21/CABHYB-4 (T12), 21/CABHYB-5 (T13), 21/CABHYB-6 AVT 2 (T14), 21/CABHYB-7 (T15), and 21/CABHYB-6 (T16). The recommended package of practices was followed for Cabbage under this study. Observations were recorded for growth, yield attributes, and quality attributes throughout the study period. Ascorbic acid content of fresh cabbage head was calculated by the procedure given by Ranganna (1986). Statistical analysis of mean values in each replication for all the traits was

calculated by using OPSTAT software. Data were analysed by the methods out lined by Panse and Sukhatme (1978) and Correlation study was done following by using Pearson method.

Results and Discussion

Growth Parameters

The results, presented in table -1, showed that the treatment T₈ i.e. PAN-3451 hybrid of cabbage showed significantly maximum values for the growth parameters under study like plant height (22.13 cm, 27.00 cm and 36.00 cm at 30 DAT, 45 DAT and 60 DAT respectively), leaf length (25.33 cm at 30 DAT, 29.59 cm at 45 DAT, and 31.02 cm at 60 DAT) and leaf breadth (31.02 cm at 30 DAT, 31.42 cm at 45 DAT, and 33.00 cm at 60 DAT) in all stages of crop growth in contrast to the rest of the treatments except Mohar hybrid (T₇) where it was statistically *at par* for those characters. The treatment T₁₃ i.e. the hybrid 21/CABHYB-5 showed significantly highest number of non-wrapper leaves (13.55, 18.49, and 21.06, respectively) than rest of the hybrid except T₃ i.e. 22/CABHYB-3 (12.01, 17.32 and 19.55 respectively) at 30, 45, and 60 DAT and T₉ (16.15 cm) at 45 DAT. The similar result was also observed by Ashik *et al.* (2022). The superior growth of T₈ i.e. PAN-3451 hybrid suggests a robust genetic vigour and potentially better adaptation to the growing conditions. The increased leaf length and leaf breadth in the cabbage hybrids under this study might be due to inherent genetic makeup of the hybrids which produced longest leaves than other types with higher light interception and photosynthetic efficiency traits. This result was in conformity with findings of Eva *et al.* (2020) and Chaurasiya and Pandey (2020).

Table 1: Leaf length, Leaf breadth, Plant height and number of non-wrapper leaves per plant of cabbage hybrids at different growth stages

Treatments	Leaf length			Leaf breadth			Plant height (cm)			Number of non-wrapper leaves/plant		
	30 DAT	45 DAT	60 DAT	30 DAT	45 DAT	60 DAT	30 DAT	45 DAT	60 DAT	30 DAT	45 DAT	60 DAT
T1(22/CABHYB-1 AVT-1)	11.68	15.47	17.45	17.45	19.36	20.38	10.27	15.66	20.00	10.33	12.00	14.00
T2 (22/CABHYB-4)	19.00	22.00	25.09	25.09	27.00	27.36	16.00	23.33	28.79	6.45	8.37	9.77
T3 (22/CABHYB-3)	9.36	13.00	14.65	14.65	16.00	17.26	9.00	12.24	18.00	12.01	17.32	19.55
T4 (22/CABHYB-5)	18.01	21.33	24.00	24.00	26.09	26.00	15.00	22.33	28.00	7.00	9.00	10.00
T5 (22/CABHYB-6)	22.22	25.09	27.14	27.14	29.15	30.00	18.00	22.00	31.00	6.00	7.02	8.25
T6 (22/CABHYB-2)	10.61	14.08	16.00	16.00	18.00	19.55	10.00	14.00	14.00	14.00	14.00	14.00
T7 (MOHAR)	24.00	27.63	29.00	29.00	30.00	31.23	20.00	24.00	24.00	24.00	24.00	24.00
T8 (PAN-3451)	25.33	29.59	31.02	31.02	31.42	33.00	22.13	27.00	27.00	27.00	27.00	27.00
T9 (21/CABHYB-1 AVT 2)	10.00	14.00	15.24	15.24	17.21	18.00	10.00	13.00	13.00	13.00	13.00	13.00
T10 (21/CABHYB-2)	20.21	23.54	26.18	26.18	28.11	29.15	17.00	21.00	21.00	21.00	21.00	21.00
T11 (21/CABHYB-3)	13.00	17.29	19.07	19.07	22.20	22.49	12.00	15.02	15.02	15.02	15.02	15.02
T12 (21/CABHYB-4)	12.09	16.00	18.11	18.11	20.00	21.00	11.36	14.88	14.88	14.88	14.88	14.88

T13 (21/CABHYB-5)	9.01	12.82	14.00	14.00	15.00	16.25	8.89	11.00	11.00	11.00	11.00	11.00
T14 (21/CABHYB-6 AVT 2)	16.25	20.09	23.36	23.36	25.00	25.08	14.32	18.45	18.45	18.45	18.45	18.45
T15 (21/CABHYB-7)	14.13	18.77	21.00	21.00	23.00	23.00	12.33	16.09	16.09	16.09	16.09	16.09
T16 (21/CABHYB-6)	15.00	19.25	22.00	22.00	24.66	24.01	13.00	17.33	17.33	17.33	17.33	17.33
SEm ($\pm$)	1.23	1.10	1.29	1.286	1.363	1.830	0.98	1.66	1.66	1.66	1.66	1.66
C.D.	3.58	3.21	3.73	3.732	3.957	5.310	2.85	4.83	4.83	4.83	4.83	4.83

Yield Parameters

Regarding yield parameters (table-2), treatment T₈ i.e. PAN-3451 hybrid of cabbage outperformed other hybrids for minimum days to head formation (32.50 days), days taken to 50% head formation (34.25 days), largest polar diameter of head (58.15 cm), largest equatorial diameter (61.10 cm), maximum head weight per plant (2.22 kg), highest head yield per plot (44.50 kg) and highest yield per hectare (61.66 tons). Like growth parameters the PAN-3451 also resulted significantly higher values for also yield parameters except Mohar (T₇) where it was statistically *at par*. In all the cases of growth and yield parameters the treatment T13 recorded lowest values. The early and

large head formation in PAN-3451 suggests its suitability for markets requiring early harvests and larger head sizes, which are economically beneficial traits. The higher values of polar diameter of the said treatments might be a case of hybrid vigour of different hybrids and their interaction to environment. Similar observations were also noted by Sivakumar *et al.* (2022) and Ashik *et al.* (2022). Hybrids that produce heavier heads, higher yield are often more efficient in converting available resources into biomass, leading to higher yields and better profitability. This data was well supported by the field investigation of Tiwari *et al.* (2022) and Samuel (2023).

Table 2: Head, Yield and Quality characters of different cabbage hybrids

Treatments	Days to first head formation	Days to 50% head formation	Polar diameter of head (cm)	Equatorial diameter of head (cm)	Head weight /plant	Yield /Plot	Yield /ha	Ascorbic acid	Dehydration ratio	Rehydration ratio
T1 (22/CABHYB-1 AVT 1)	46.21	51.00	37.00	39.00	1.55	30.92	42.94	22.22	9.21	2.53
T2 (22/CABHYB-4)	37.00	40.00	50.17	53.77	1.85	37.00	51.80	22.93	9.82	3.00
T3 (22/CABHYB-3)	49.00	53.00	34.00	36.19	1.46	29.18	40.53	19.93	8.85	2.35
T4 (22/CABHYB-5)	38.13	41.03	48.21	51.00	1.75	35.00	49.41	22.87	9.80	2.95
T5 (22/CABHYB-6)	34.77	36.56	54.10	57.00	2.02	40.22	56.19	26.24	10.15	3.12
T6 (22/CABHYB-2)	47.00	51.85	36.00	38.50	1.53	31.00	42.56	20.68	9.19	2.46
T7 (MOHAR)	33.85	35.66	56.03	59.00	2.10	42.00	58.31	24.10	9.91	3.06
T8 (PAN-3451)	32.05	34.25	58.15	61.10	2.22	44.50	61.66	23.90	11.37	3.48
T9 (21/CABHYB-1 AVT 2)	48.00	52.00	35.00	38.15	1.52	30.39	42.21	20.24	8.95	2.37
T10 (21/CABHYB-2)	35.66	38.00	51.99	55.00	1.92	38.00	53.31	23.05	9.90	3.02
T11 (21/CABHYB-3)	44.00	48.58	39.15	42.54	1.62	32.00	44.97	21.40	9.41	2.61
T12 (21/CABHYB-4)	45.12	50.55	38.00	40.00	1.60	31.68	44.41	21.29	9.23	2.54
T13 (21/CABHYB-5)	48.52	54.27	33.05	35.07	1.35	27.12	37.25	20.10	8.33	2.28
T14 (21/CABHYB-6 AVT 2)	39.69	40.26	47.00	49.85	1.74	34.50	48.13	20.78	9.65	2.92
T15 (21/CABHYB-7)	42.33	46.51	43.00	46.00	1.65	33.00	46.64	21.53	9.42	2.65
T16 (21/CABHYB-6)	41.00	45.89	44.00	48.12	1.71	34.00	47.68	22.19	9.51	2.78
SEm ($\pm$)	1.487	1.965	1.385	1.998	0.04	1.51	4.05	0.39	0.25	0.10
C.D.	4.316	5.704	4.021	5.782	0.12	4.40	11.74	1.12	0.73	0.30

Quality Parameters

Thorough perusal of data pertinent to quality parameters of the cabbage heads of different hybrids also exhibited significant variation. The trial result showed that the cabbage hybrid 22/CABHYB-6 i.e. T₅ recorded significantly highest L-ascorbic acid content (26.24 mg/100g) and was closely followed by the Mohar hybrid i.e. T₇ (24.10 mg/100g) and PAN-3451 (T₈) (23.90 mg/100g). The lowest ascorbic acid content was recorded in T₃ (19.93 mg/100g). The

cabbage hybrid PAN-3451 (T₈) exhibited the highest dehydration and rehydration ratio (11.37 and 3.48 respectively) indicating a significant reduction in moisture content compared to other treatments. The lowest value of dehydration ratio (8.33) and rehydration ratio (2.28) were observed in T13 (21/CABHYB-5), indicating poor rehydration capacity. This variation could be due to genetic factor of different cabbage hybrids. This type of outcome was also noticed by Kaur *et al.* (2018) and Ashik *et al.*

(2022) in cabbage and Prashanthi *et al.* (2022) in broccoli. Jondhale *et al.* (2022) also recorded considerable variation for different quality parameter in cauliflower.

Correlation among different characters

It was also observed that head yield/hectare was considerably and positively correlated with 6 characters namely leaf length ($r = 0.995$), leaf breadth ($r = 0.989$), polar diameter ($r = 0.986$), equatorial

diameter ($r = 0.987$), head weight per plant ($r = 0.973$), output per plot ($r = 0.969$). on the contrary total yield registered markedly negative correlated with other characters like number of non-wrapper leaves per plant ($r = -0.987$), number of days taken to 1st head formation ($r = -0.988$), number of days taken to 50% head formation ($r = -0.975$). Several studies indicated that the characters like had marked positive correlations with fruit yield per plant (Yora *et al.*, 2018; Solankey *et al.*, 2013).

Table 3: Correlation among different characters of cabbage hybrids

Characters	PH	NNWL	LL	LB	DFHF	D50%HF	PD	ED	HWP	YP	TY
PH	1	-0.987**	0.995**	0.989**	-0.988**	-0.975**	0.986**	0.987**	0.973**	0.969**	0.977**
NNWL		1	0.994**	0.992**	-0.994**	-0.986**	0.996**	0.993**	0.983**	0.982**	0.985**
LL			1	0.995**	-0.996**	-0.987**	0.996**	0.995**	0.978**	0.975**	0.982**
LB				1	-0.993**	-0.982**	0.992**	0.991**	0.985**	0.981**	0.987**
DFHF					1	0.990**	-0.997**	-0.997**	-0.968**	-0.965**	-0.973**
D50%HF						1	-0.994**	-0.992**	-0.960**	-0.956**	-0.963**
PD							1	0.998**	0.976**	0.974**	0.980**
ED								1	0.973**	0.970**	0.977**
HWP									1	0.999**	0.999**
YP										1	0.998**
TY											1

*Significant at 0.05 level, **Significant at 0.01 level

PH= Plant height, NNWL= Number of non-wrapper leaves per plant, LL=Leaf Length, LB=leaf breadth, PD=Polar diameter, ED=Equatorial diameter, HWP= Head weight per plant, YP=Yield per plot, TY=Total yield

Conclusion

This experiment was carried out at the C-Block Research Farm of Bidhan Chandra Krishi Viswavidyalaya located in New Alluvial Zone of West Bengal during the year 2023-2024. The trial consisted of sixteen different hybrids of cabbage as treatment combinations and was laid out in Randomized Block Design (RBD) using three replications. The observations were documented on different growth, yield and quality attributes of the cabbage hybrids. Experimental findings clearly confirmed that almost all the hybrids of cabbage varied significantly for growth, yield and quality parameters. From the experiment, it may be concluded that cultivation of PAN-3451 or Mohar hybrid of cabbage may be taken up for commercial cultivation by the farmers of New Alluvial plains of West Bengal as these two hybrids out formed others for higher yield and quality.

Future Scope of Research

The results of the present field trial clearly indicates that careful selection of high yielding hybrids with better quality may benefit the cabbage growers of this zone for better remuneration. But still some of the areas of this trial needs to be addressed in future for further research. Investigation may be taken up for evaluation of the varieties under trial in different

location. Research works can also be carried out for standardization of these hybrids of cabbage after showing with their interaction with different spacing or nutrient dose. Screening of these hybrids can be done against major pest and disease prevalent in this area. Utilization of these hybrids can be done for further improvement programme may be looked into.

Acknowledgment

The author would like to acknowledge the Department of Vegetable Science, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal for providing the necessary support and requisite financial assistance for conducting the research program smoothly.

References

- Ashik, R. Y., Bahadur, Vijay., Thomas, Tarence. and Prasad, V. M. (2022). Varietal Evaluation of Hybrid Cabbage (*Brassica oleracea* var. *capitata* L.) under Prayagraj Agro-climatic Conditions. *International Journal of Plant & Soil Science*, **34(21)**, 872-881.
- Chaurasiya P.C. and Pandey, S. (2020). Varietal performance of broccoli (*Brassica oleracea* var. *italica*) under northern hill zone of Chhattisgarh. *Journal of Plant Development Sciences*. **12(2)**, 93-97.
- Eva, I. J., Hossain, B. and Mohsin, G.M. (2020). Varietal screening of cabbage (*Brassica oleracea* var. *capitata* L.)

- in coastal area of Bangladesh. *International Letters of Natural Sciences*, **7(2)**, 70-76.
- Hossain, M.F., Farhana, T., Raihan, M.Z., Hasan, M.S., Mia, M.M. and Rahman, M.M. (2015). Effect of different fertilization practices on the growth and yield of cabbage. *Asian Journal of Medical Research*, **1(2)**, 182-186.
- Jondhale, A., Immaneuil, D.G. and Latpate, R. (2022). Rehydration properties of tray dried cauliflower (*Brassica oleracea*). *International Journal of Pharmaceutical Innovation*, **11(8)**, 813-816.
- Kaur, M., Chadha, S., Kumar, N., Sehgal, N. and Kanwar, S. (2018). Genetic evaluation of cabbage hybrids under mid hill conditions of Himachal Pradesh. *Journal of Hill Agriculture*, **9(1)**, 35-38.
- Moreb, N., Murphy, A., Jaiswal, S. and Jaiswal, A.K. (2020). Cabbage. In: *Nutritional Composition and Antioxidant Properties of Fruits and Vegetables*, pp. 33-54.
- National Horticulture Board (NHB). (2018). Indian Horticulture Database 2018. Ministry of Agriculture and Farmers Welfare, Government of India.
- Nawaz, H., Shad, M.A. and Muzaffar, S. (2018). Phytochemical composition and antioxidant potential of *Brassica*. In: *Brassica Germplasm Characterization, Breeding and Utilization*, **1**, 7-26.
- Panse, V.G. and Sukhatme, P. V. 1978. Statistical methods for agricultural workers. ICAR Publications, New Delhi-12.
- Prashanthi, C., Prasad, V.M., Topno, S.E., Vani, L. and Singh, Y.K. (2022). Performance of different varieties of broccoli (*Brassica oleracea* var. *italica*) under Prayagraj agro climatic condition. *International Journal of Environment and Climate Change*, **12(11)**, 3003-3009.
- Ranganna, S. (1986). Handbook of analysis and quality control for fruits and vegetables (2nd edition). Tata Mc. Graw Hill Publishing Company, New Delhi, P. 1152.
- Samuel, H. (2023). Evaluation of hybrid cabbage (*Brassica oleracea* L.) varieties on yield and quality in Gamo Zone, Southern Ethiopia. *Journal of Horticulture*, **10**, 005.
- Singh, S., Khemariya, P., Alam, T. and Singh, B. (2019). Combined effect of pretreatments and packaging materials on quality retention in dried cabbage (*Brassica oleracea* var. *capitata* L.). *Journal of Packaging Technology and Research*, **3**, 205-214.
- Sivakumar, V., Srinivasulu, A., Rao, K.M. and Reddy, R.V.S.K. (2022). Performance of broccoli (*Brassica oleracea* var. *italica* L.) genotypes under high altitude tribal zone of Andhra Pradesh. *Emerging Life Sciences Research*, **8**, 84-88.
- Solankey, S.S., Singh, A.K. and Singh, R.K. (2013). Genetic expression of heterosis for yield and quality traits during different growing seasons in okra (*Abelmoschus esculentus*). *Indian Journal of Agricultural Sciences*, **83(8)**, 17-21.
- Tabor, G., Gebretensay, F., Fikre, D., Dagne, Z., Taddese, F. and Atnafu, G. (2022). Influence of plant population on yield and yield components of head cabbage (*Brassica oleracea* var. *capitata* L.) in two agro-ecologies of Ethiopia. *Results of Crop Improvement and Management Research*, **15(3)**, 112-124.
- Tiwari, A., Singh, S.K., Bora, A., Gogoi, B.J. and Dwivedi, S.K. (2022). Performance evaluation of cabbage cultivars under open field cultivation in high altitude of Tawang, Arunachal Pradesh. *Defence Life Science Journal*, **7(1)**, 40-43.
- Ashik, Y., Bahadur, R., Thomas, V., and Prasad, V.M. (2022). Varietal evaluation of hybrid cabbage (*Brassica oleracea* var. *capitata* L.) under Prayagraj agro-climatic conditions. *International Journal of Plant and Soil Science*, **34(21)**, 872-881.
- Yora, M., Syukur, M. and Sobir, S. (2018). Characterization of phytochemicals and yield components in various okra (*Abelmoschus esculentus*) genotypes. *Biodiversitas*, **19(6)**, 2323-2328.