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Evaluation of mean performance of cauliflower (*Brassica oleracea* L. var. *botrytis*) genotypes for yield and its attributing traits in Chhattisgarh plain region

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Abstract

The present investigation was performed at Horticultural Research cum Instructional Farm, Department of Vegetable Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh), during Rabi 2019-20. Twelve cauliflower genotypes including three checks were evaluated to study their mean performances for curd yield and its attributing traits. The analysis of variance revealed that mean sum of squares due to genotypes were highly significant for all the traits under study. Among all the other genotypes, 2019/CAUEGENO-8 recorded highest curd yield per plot (15.15 kg) and curd yield (252.27 q/ha). While 2019/CAUEGENO-7 recorded highest marketable curd weight (g), net curd weight (g), stalk length (cm), curd width (cm), curd length (cm) and plant spread (cm), with minimum days for curd initiation.

Keywords: cauliflower, genotypes, mean performance, marketable curd weight, curd yield

Introduction

Cauliflower (*Brassica oleracea* L. var. *botrytis*) is amongst the most popular and well known cole vegetable, which is cultivated across the world under varied range of environmental conditions. The word "Cauliflower" consists of two Latin words *i.e.* 'caulis', which means stem or stalk and 'floris', which means flower. It belongs to family Brassicaceae and varieties belonging to *Brassica oleracea* have equal set of chromosome number *i.e.* $n=9$. It is considered to be a monogenetic species having 'C' genome with chromosome number $2n=2x=18$ (Thamburaj and Singh, 2001) [8].

All the cultivated forms of cole vegetable are believed to be evolved from *Brassica oleracea* var. *sylvestris* L. (wild cabbage), about 2000 years ago in Eastern Mediterranean region (Boriss *et al.*, 2006) [3]. The edible part of cauliflower is botanically known as prefloral fleshy apical meristem or immature inflorescence or flowering primordium (Nath, *et al.*, 1994) [5].

In India it is cultivated in an area of 452.6 thousand hectares, giving the total production of 8668.2 thousand tonnes, with the productivity of 19.2 metric tonne per hectare. To the total production of cauliflower in India, Chhattisgarh contributes for about 5.59% of share. The total cultivated area under cauliflower in Chhattisgarh occupies about 23868 hectares of land with total production of 482648 metric tonnes (Anon, 2018) [1].

Cauliflower being one of the most popular vegetables in India with absolute likable taste and ample amount of nutrients, have immense potential for improvement, yet the progress in cauliflower breeding is still at lower pace considering both India and Chhattisgarh and thereby yield is not improving to a considerable extent. Thus current study for evaluation of mean performances of the genotypes for yield and its attributing traits would help selecting better genotypes with superior qualities, which can be further utilized in cauliflower improvement programmes and to develop high yielding varieties suitable for Chhattisgarh region.

Materials and Methods

The present investigation was performed at Horticultural Research cum Instructional Farm, Department of Vegetable Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) during Rabi 2019-20.

The investigation consists of total twelve cauliflower genotypes viz. 2019/CAUEGENO-1, 2019/CAUEGENO-2, 2019/CAUEGENO-3, 2019/CAUEGENO-4, 2019/CAUEGENO-5, 2019/CAUEGENO-7, 2019/CAUEGENO-8, 2019/CAUEGENO-9, 2019/CAUEGENO-10, with three checks viz. 2019/CAUEGENO-6, 2019/CAUEGENO-11 and 2019/CAUEGENO-12. The experiment was laid out in Randomized block design (RBD) having four replications. Seeds of the genotypes were sown in nursery beds having the size of 18 × 1 × 0.15 m keeping distance of 30 cm between the beds. Plots of 3m × 2m size were prepared for each genotype, keeping 50cm distance between each plots. About one month old seedlings were transplanted in straight lines maintaining 60cm distance between the rows and 50cm between the plants. Following which all the cultural practices were carried out as recommended. Observations were recorded on five randomly selected plants for various

characters viz. plant height (cm), no. of leaves per plant, leaf length (cm), leaf width (cm), plant spread (cm), stalk length (cm), days to curd initiation, days to marketable curd maturity, days taken to first harvest, curd width (cm), curd length (cm), gross plant weight (g), marketable curd weight (g), net curd weight (g), curd yield per plot (kg), duration of crop (days) and curd yield (q/ha). The data recorded were statistically analyzed as per the model by Panse and Sukhatme (1967) [6].

Result and Discussion

The analysis of variance of the observations indicated that the mean sum of squares due to genotypes were highly significant for most of the studied characters except for curd length and are represented in Table-1.

Mean performances of genotypes for various traits under study are represented in Table-2. The genotypes recorded significant variation for all the characters under observations.

Table 1: Analysis of variance for curd yield and its component characters in cauliflower

S. No.	Characters (df)	Mean sum of squares		
		Replication (3)	Treatment (11)	Error (33)
1.	Plant height (cm)	21.068	21.468**	5.395
2.	No. of leaves per plant	0.193	5.767**	0.954
3.	Leaf length (cm)	3.083	4.525**	1.561
4.	Leaf width (cm)	0.388	4.965**	0.787
5.	Plant spread (cm)	4.562	13.092**	1.016
6.	Stalk length (cm)	3.887	6.750**	0.869
7.	Days to curd initiation	16.595	18.269**	6.730
8.	Days to marketable curd maturity	18.366	9.922**	4.563
9.	Days taken to first harvest	15.799	25.981**	6.625
10.	Curd width (cm)	0.764	2.922**	0.298
11.	Curd length (cm)	0.225	0.953	0.118
12.	Gross plant weight (g)	24,588.922	134,869.763**	4,753.361
13.	Marketable curd weight (g)	4,520.063	60,890.753**	4,776.166
14.	Net curd weight (g)	2,600.948	31,072.176**	2,879.169
15.	Curd yield per plot (kg)	5.396	8.544**	2.642
16.	Duration of crop	8.811	14.607**	5.969
17.	Curd yield (q/ha)	1,499.002	2,372.298**	733.503

* Represents significant at 0.05, ** represents significant at 0.01

Table 2: Mean performances for curd yield and its components in cauliflower genotypes

Genotypes	Characters																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2019/CAUEGENO-1	25.56	18.75	20.54	16.34	39.99	9.60	63.15	81.25	80.05	13.71	6.80	944.75	547.50	370.00	10.70	112.05	178.38
2019/CAUEGENO-2	27.88	17.60	18.94	15.42	42.77	11.68	58.00	81.00	76.35	14.58	6.90	847.50	554.00	422.00	11.99	108.35	199.79
2019/CAUEGENO-3	28.43	16.13	18.87	16.58	42.91	10.69	60.93	84.50	81.77	14.33	5.62	1060.50	713.65	451.65	10.75	111.93	179.22
2019/CAUEGENO-4	27.73	17.95	19.07	13.55	41.53	11.82	58.00	82.38	77.00	15.24	7.06	1189.13	768.50	556.75	10.08	109.00	168.02
2019/CAUEGENO-5	31.33	16.90	18.66	14.99	42.77	13.52	60.35	82.00	79.60	16.06	6.78	1210.50	776.50	585.50	12.51	112.80	208.42
2019/CAUEGENO-7	31.59	18.60	19.01	13.99	45.56	14.46	55.05	80.75	75.00	16.46	6.71	1413.00	950.25	663.25	12.68	107.50	211.38
2019/CAUEGENO-8	25.89	16.75	16.74	13.00	38.96	11.34	56.25	81.50	76.65	15.57	6.36	1326.00	825.00	575.00	15.14	108.65	252.27
2019/CAUEGENO-9	27.85	19.75	19.57	14.31	43.06	12.08	58.05	82.75	75.95	16.06	7.01	1256.00	797.75	610.75	12.21	107.95	203.56
2019/CAUEGENO-10	30.10	19.95	20.80	14.65	42.48	13.45	57.40	84.00	81.35	15.69	6.46	1335.25	793.75	561.75	12.08	109.10	201.25
2019/CAUEGENO-6	30.04	18.25	19.88	14.85	44.64	12.28	58.35	78.50	73.80	16.32	7.16	1439.00	943.50	637.25	14.27	107.80	237.83
2019/CAUEGENO-11	32.64	19.00	19.23	13.49	43.35	11.88	57.90	81.50	75.85	14.84	6.54	1054.50	733.00	512.50	13.44	107.15	224.06
2019/CAUEGENO-12	26.59	19.10	20.22	15.37	41.51	12.18	58.35	82.75	77.10	15.70	5.75	1238.00	776.75	560.50	12.62	109.10	210.38
Mean (\bar{X})	28.80	18.23	19.29	14.71	42.46	12.08	58.48	81.91	77.54	15.38	6.59	1192.84	765.01	542.24	12.37	109.28	206.21
SE (m)+	1.16	0.49	0.62	0.44	0.50	0.47	1.30	1.07	1.29	0.27	0.17	34.47	34.55	26.83	0.81	1.22	13.54
CD	3.34	1.40	1.80	1.28	1.45	1.34	3.75	3.07	3.70	0.79	0.49	99.19	99.42	77.19	2.34	3.51	38.96
CV	8.06	5.36	6.48	6.03	2.37	7.72	4.44	2.61	3.32	3.55	5.20	5.78	9.03	9.90	13.13	2.24	13.13

1.	Plant height (cm)	2.	No. of leaves per plant	3.	Leaf length (cm)
4.	Leaf width (cm)	5.	Plant spread (cm)	6.	Stalk length (cm)
7.	Days to curd initiation	8.	Days to marketable curd maturity	9.	Days taken to first harvest
10.	Curd width (cm)	11.	Curd length (cm)	12.	Gross plant weight (g)
13.	Marketable curd weight (g)	14.	Net curd weight (g)	15.	Curd yield per plot (kg)
16.	Duration of crop	17.	Curd yield (q/ha)		

The genotype which recorded maximum plant height was 2019/CAUEGENO-11 (32.64 cm), minimum plant height was recorded for 2019/CAUEGENO-1 (25.56 cm), with the general mean of 28.80 cm. Maximum number of leaves per plant was observed in the case of 2019/CAUEGENO-10 (19.95), whereas lowest number of leaves was obtained in case of 2019/CAUEGENO-3 (16.13), with overall mean of 18.23 for all genotypes. Highest value of leaf length was recorded for genotype 2019/CAUEGENO-10 (20.80 cm), genotype 2019/CAUEGENO-8 (16.74 cm) recorded shortest average leaf length, the overall mean recorded for all the genotypes was 19.29 cm. Maximum value for leaf width was recorded for genotype 2019/CAUEGENO-3 (16.58 cm), lowest value for average leaf width was observed for 2019/CAUEGENO-8 (13.00 cm), with general mean of 14.71 cm. Maximum plant spread was recorded for genotype 2019/CAUEGENO-7 (45.56 cm), while minimum plant spread was observed in case of 2019/CAUEGENO-8 (38.96 cm), with general mean of 42.46 cm.

The genotype 2019/CAUEGENO-7 (55.05 days) taken shortest time to initiate curding, while genotype which taken maximum days to curd initiation was 2019/CAUEGENO-1 (63.15 days), the overall mean was 58.48 days for all the genotypes. The genotype 2019/CAUEGENO-6 (78.50 days) taken minimum days to attain marketable curd maturity, while the genotype which required maximum days was 2019/CAUEGENO-3 (84.50 days), general mean recorded for all genotypes was 81.91 days. The genotype 2019/CAUEGENO-6 (73.80 days) taken minimum days to first harvest, while genotype 2019/CAUEGENO-3 (81.77 days) taken maximum days, with overall mean recorded 77.54 days. The genotype which recorded shortest crop duration was 2019/CAUEGENO-11 (107.15 days), genotype 2019/CAUEGENO-5 (112.80 days) exhibited longest of crop duration among all the other genotypes, with general mean of 109.28 days.

Maximum value of stalk length was observed for genotype 2019/CAUEGENO-7 (14.46 cm), while minimum value was recorded for genotype 2019/CAUEGENO-1 (9.60 cm), with general mean of 12.08 cm for all the genotypes. Highest curd width was recorded for genotype 2019/CAUEGENO-7 (16.46 cm), lowest average curd width was recorded for 2019/CAUEGENO-1 (13.71 cm), with general mean of 15.38 cm. Highest curd length was recorded for genotype 2019/CAUEGENO-6 (7.16 cm), while 2019/CAUEGENO-3 (5.62 cm) recorded shortest curd length, with overall mean of 6.59 cm.

Maximum gross plant weight was observed for genotype 2019/CAUEGENO-6 (1439.00 g), genotype 2019/CAUEGENO-2 (847.50 g) recorded lowest gross plant weight, with general mean recorded 1192.84 g. Maximum marketable curd weight was recorded for 2019/CAUEGENO-7 (950.25 g), while lowest marketable curd weight was observed in case of 2019/CAUEGENO-1 (547.50 g), with general mean of 765.01 g. Highest net curd weight was recorded for 2019/CAUEGENO-7 (663.25 g), while lowest net curd weight was recorded for genotype 2019/CAUEGENO-1 (370.00 g), with general mean of 542.24 g.

Genotype 2019/CAUEGENO-8 recorded highest curd yield per plot (15.15 kg) along with highest curd yield (252.27 q/ha) followed by 2019/CAUEGENO-6, 2019/CAUEGENO-11, 2019/CAUEGENO-7, 2019/CAUEGENO-12. While, genotypes 2019/CAUEGENO-4 recorded both low curd yield per plot (10.08 kg) and curd yield per hectare (168.02 q/ha).

Above findings are in accordance with the findings of Ansari *et al.* (2017)^[2], Kindo and Singh (2018)^[4] and Sharma *et al.* (2018)^[9].

Conclusion

As per the results obtained through present investigation, it can be concluded that estimates of mean sum of squares were significant for all the traits under study. The analysis of mean performances of genotypes for various traits revealed that genotypes 2019/CAUEGENO-8 recorded highest curd yield (q/ha), whereas 2019/CAUEGENO-7 recorded highest marketable curd weight, net curd weight, curd width and curd length, which makes these two genotypes more promising for Chhattisgarh plain regions.

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