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Correlation in between physical characteristics, nutrient composition and quality parameters of chilli (*Capsicum annuum* L.) germplasm under Konkan condition

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Abstract
The correlation between physical characteristics, nutrient composition and quality parameters in hundred chilli germplasm. The experiment was laid out in randomized block design with three replication was studied at Vegetative Improvement Scheme, Central Research Station, Wakawali, Dapoli during kharif season, 2018-2019. The results revealed that fruit diameter and fruit length had significant positive correlation with fruit weight. Moisture had positive and significant correlation with iron, zinc and manganese. Iron had positive and significant correlation with manganese. Manganese showed significant positive correlation with zinc and copper content. Chlorophyll 'a' content had highly significant positive association with chlorophyll 'b' and total chlorophyll content. Chlorophyll 'b' had also highly significant positive correlation with total chlorophyll content. Iron content had highly significant and positive correlation with chlorophyll 'a', chlorophyll 'b' and total chlorophyll content.

Keywords: Chilli germplasm, correlation

1. Introduction
Chilli (*Capsicum annuum* L) is an important crop both as a vegetable and as a spice and it is extensively cultivated in India and is marketed as a whole fruit, green and dry, powder, paste and oleoresin. Chilli are a good source of vitamin 'A', 'B', 'C' (Ascorbic acid) and E (tocopheral), oleoresin, carbohydrates and minerals such as calcium, phosphorus, ferrous, sodium and copper in trace amounts. It is predominantly popular for its green pungent fruits, which is used for culinary purpose. It is used in salads, chutney, sauces, pickles and it is a main ingredient of Indian diet in every home. The nutritive value of chilli is important for human diet. Particularly chilli needs heavy manuring for sound plant growth and high yield. Correlation provide information on the nature and extent of relationship among the character. Therefore, the experiment was undertaken to study the Correlation in between physical characteristics, nutrient composition and quality parameter of chilli (*Capsicum annuum* L.) germplasm under konkan condition

2. Materials and methods
The present investigation was carried out at Vegetative Improvement Scheme, Central Research Station, Wakawali, Dapoli. Hundred different chilli germplasm were evaluated in a Randomized Complete Block Design with three replications during Kharif 2018-19. Observation were recorded on physical characteristics *viz*.,fruit length (cm), fruit diameter (cm), fruit weight (g), nutrient compositions *viz*., Moisture (%), Ascorbic acid (mg 100 g^{-1}), Total N (%), P (%), K (%), Micronutrients *viz*., Fe, Mn, Zn and Cu (mg kg^{-1}) and quality parameter *viz*., pungency and natural pigment *viz*., anthocyanin and chlorophyll. Statistical analysis for calculation of correlation was worked out as per the procedure described by Gomez and Gomez (1983) [2].

3. Results and Discussion
3.1 Relationship of physical characteristics and nutrient composition of chilli germplasm with each other
The fruit weight had significant positive correlation with fruit diameter (r= 0.321**) and fruit length (r= 0.331**). Similar are the findings of Shweta *et al*. (2018) [7]. Fruit length had

negative and significant correlation with copper content (r= -0.266**). Moisture had positive and significant correlation with zinc (r= 0.218*) at 1% level. Ascorbic acid had negative and significant correlation with moisture percentage (r= -0.267**). Moisture had significant positive correlation with iron (r= 0.343**) and manganese (r= 0.276**). Manganese had significant positive correlation with iron content (r= 0.363**). Zinc (r= 0.384**) and copper (r= 0.244*) showed significant positive correlation with manganese content.

3.2 Relationship of physical characteristics and quality parameters of chilli germplasm with each other

Fruit diameter of chilli showed significant and negative correlation with chlorophyll 'b' (r= -296**) and total chlorophyll content (r= -0.216*). Fruit weight had significant and positive correlation with anthocyanin content (r= 0.223*). Chlorophyll 'a' content had significant positive correlation with chlorophyll 'b' (r= 0.702**) and total chlorophyll content (r= 0.886**). Chlorophyll 'b' also showed significant positive correlation with total chlorophyll content (r= 0.893**). However, Manju and Shreelathkumari (2002) revealed that capsaicin was negatively associated with fruit weight. Capsaicin value showed non-significant and negative association with fruit length (Gokulakrishnan *et al*., 2020) [1].

3.3 Relationship of nutrient composition and quality parameters of chilli germplasm with each other

Moisture had significant and negative correlation with anthocyanin content (r= -0.241**). Total potassium had significant and positive association with anthocyanin content (r= 0.206*). Manganese content had significant and negative correlation with anthocyanin content (r= -0.206*). Iron content had significant and positive correlation with chlorophyll 'a' (r= 0.254**), chlorophyll 'b' (r= 0.301**) and total chlorophyll content (r= 0.259**). No correlation of capsaicin was found with any of the physical characteristics and the other quality parameters. However, Rekha *et al* (2019) [6] have reported that pungency had significant and negative association with vitamin C at both phenotypic and genotypic levels.

Table 1: Correlation in between physical characteristics and nutrient composition of chilli germplasm with each other

Nutrient Composition	Physical Characteristics											
	1	2	3	4	5	6	7	8	9	10	11	12
1	1.000											
2	-0.081	1.000										
3	0.321**	0.331**	1.000									
4	-0.030	0.029	-0.095	1.000								
5	0.067	-0.094	-0.108	-0.267*	1.000							
6	-0.118	-0.060	-0.048	-0.048	0.142	1.000						
7	0.035	0.065	0.097	0.081	-0.016	-0.088	1.000					
8	-0.079	0.022	-0.044	-0.065	0.108	-0.001	0.132	1.000				
9	-0.060	-0.070	-0.057	0.343**	0.062	-0.024	-0.082	0.020	1.000			
10	0.128	-0.147	-0.039	0.276**	0.099	0.003	0.022	0.037	0.363**	1.000		
11	-0.018	-0.089	0.053	0.218*	0.075	0.090	0.150	0.107	0.194	0.384**	1.000	
12	-0.073	-0.266**	-0.188	0.140	0.105	0.100	0.005	-0.064	0.010	0.244*	0.117	1.000

1. Fruit Diameter
2. Fruit Length
3. Fruit weight
4. Moisture
5. Ascorbic acid
6. Total N
7. Total P
8. Total K
9. Fe
10. Mn
11. Zn
12. Cu

Table 2: Correlation of physical characteristics and quality parameters of chilli germplasm with each other

Quality parameters	Physical characteristics							
	Fruit Diameter	Fruit Length	Fruit Weight	Capsaicin	Anthocyanin	Chlorophyll 'a'	Chlorophyll 'b'	Total Chlorophyll
Capsaicin	-0.021	0.150	-0.135	1.000				
Anthocyanin	-0.049	0.066	0.223*	0.117	1.000			
Chlorophyll 'a'	-0.114	-0.019	-0.020	-0.018	-0.155	1.000		
Chlorophyll 'b'	-0.296**	0.046	-0.045	0.096	-0.080	0.702**	1.000	
Total Chlorophyll	-0.216*	0.005	-0.046	0.030	-0.105	0.886**	0.893**	1.000

Table 3: Correlation of nutrient composition and quality parameters of chilli germplasm with each other

Quality Parameters	Nutrient Composition								
	Moisture	Ascorbic acid	Total N	Total P	Total K	Fe	Mn	Zn	Cu
Capsaicin	0.023	-0.035	-0.085	-0.105	0.069	-0.113	0.015	-0.099	0.060
Anthocyanin	-0.241*	0.022	-0.028	-0.096	0.206*	-0.100	-0.206*	-0.096	-0.060
Chlorophyll 'a'	0.143	-0.059	0.155	0.036	-0.046	0.254**	0.026	-0.027	0.034
Chlorophyll 'b'	0.116	-0.004	0.105	0.010	0.050	0.301**	0.121	0.097	0.036
Total Chlorophyll	0.143	0.052	0.135	0.012	-0.020	0.259**	0.059	0.052	0.102

Critical r Value=0.195 at 5 percent and 0.254 at 1 percent

* and ** indicate significant at 5 and 1 percent probability level, respectively.

4. Conclusion

From above study it can be indicated that fruit diameter and fruit length had significant positive correlation with fruit weight. Moisture had positive and significant correlation with iron, zinc and manganese. Iron had positive and significant correlation with manganese. Manganese showed significant positive correlation with zinc and copper content. Fruit weight and total potassium had significant and positive correlation with anthocyanin content. Chlorophyll 'a' content had significant positive correlation with chlorophyll 'b' and total chlorophyll content. Chlorophyll 'b' also had significant positive correlation with total chlorophyll content. Iron had significant and positive correlation with chlorophyll 'a', chlorophyll 'b' and total chlorophyll content. No correlation of capsaicin was found with any of the physical characteristics and the other quality parameters.

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