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VARIABILITY IN SOME CHEMICAL CONSTITUENTS OF PUMPKIN *CUCURBITA MOSCHATA* POIR.

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Pumpkin *Cucurbita moschata* Poir, is one of the important cucurbitaceous vegetables grown in India and is gaining importance due to its transportability and and fairly long storage life. Studieson the nutritive value of pumpkin are very limited and hence the present experiment was undertaken to find out the extent of variability with respect to some important qualitative characters and to estimate heritability and expected genetic advance for the qualitative attributes.

Materials and Methods

The eighteen pumpkin genotypes collected from different parts of Kerala State were grown in a Randomised block design with three replications during October—February, 1978-'79, at the Instructional Farm and Research Station College of Horticulture, Kerala Agricultural University, Vellanikkara. There were 3 plants/genotypes per replication. Plants were grown in pits at a spacing of 6 x 1.5 m. The fruits were harvested 60 days after flower opening. Nitrogen in the fruit was estimated by the microkjeldhal method (Anon , 1960) and the protein component expressed as N x 6.25. Phosphorus, potassium and calcium were estimated by the method suggested by Jackson (1973). Total soluble solids (TSS) of the fruit was measured by using Abbe refractometer. Carotene content was also estimated (Anon., 1960). All the above qualitative characters were expressed as percentage of dry matter.

Variability with respect to these characters were estimated by the method suggested by Burton (1952) and heritability in the broad sense worked out following Burton and de Vane (1953). Genetic advance at 5% intensity of selection was calculated as suggested by Lush (1949) and Johnson *ef af.* (1955). Correlation coefficients were calculated according to Searle (1961). Path coefficient analysis was carried out as per Dewey and Lu (1959).

Results and Discussion

The pumpkin genotypes exhibited significant differences with respect to all the six qualitative fruitcharacters (Table 1). Protein content ranged from 5.26% in CM 11 to 9.49% in CM 15, with a mean of 7.4%. Carotene content had a wide range of variation (0.132% in CM 15 and 0.527% in CM 18) with a mean of 0.1 92%. Genotypic coefficient of variation was maximum for caroten content (46.14) followed by potassium (30.67) and minimum for calcium (8.78). Phenotypic coefficient of variation also had the same trend.

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Table 1

Range, mean, genotypic (g c v), phenotypic (p c v) and environmental (e c v) coefficients of variation, heritability and genetic advance of different chemical traits in pumpkin fruit

Characters (percent dry weight basis)	Range	Mean	g.c.v.	p.c.v.	e.c.v.	Heritability	Genetic advance
Protein	[illegible]6—9.49	7.41 ± 0.42	16.66	17.31	4.7[illegible]	[illegible]2.54	5[illegible]
Phosphorus	0.3[illegible]8—0.67[illegible]	0.47 ± 0.00[illegible]	16.[illegible]	16.52	[illegible]1	98.[illegible]1	3[illegible]6
Potassium	1.38—3.75	1.93 ± 0.058	3[illegible]7	3[illegible]	5.18	96.44	62.11
Calcium	0.[illegible]—0.[illegible]0	[illegible] ± 0.[illegible]1	[illegible].78	9.35	3.34	88.1[illegible]	17.[illegible]8
[illegible]	0.132—0.527	0.1[illegible]2 ± 0.003	4[illegible].14	46.[illegible]	1.65	9[illegible].76	93.75
TSS (%)	4.[illegible]—12.7[illegible]	[illegible].67 ± 0.16	[illegible]7.5[illegible]	[illegible]7.[illegible]5	4.2[illegible]	[illegible]7.66	55.[illegible]3

Table 2

Genotypic (r_g) and phenotypic (r_p) correlations involving carotene content and other chemical constituents in pumpkin

Characters	Phosphorus (%)	Potassium (%)	Calcium (%)	TSS (%)	Carotene (%)
Protein (%)	0.28 (0.28)	0.32 (0,32)	-0.28 (-0.25)	0 05 (0.06)	0.15 (0.14)
Phosphorus (%)		0.38 (0,37)	-0.16 (-0.16)	-0.11 (-0.11)	0.23 (0.23)
Potassium (%)			0.47 (0.44)	-0.30 (-0.29)	0.74 (0.72*)
Calcium (%)				-0.47 (-0.43)	0.30 (0.28)
TSS (%)					-0.35 (-0.84)

*p=0.01; Figures within paranthesis indicate phenotypic correlation coefficients

Table 3

Direct and indirect genotypic effects of other chemical constituents on carotene content in pumpkin

Characters	r_g *	Direct effect (Piy)	Indirect effect through character				
			Protein (%)	Phosphorus (%)	Potassium (%)	Calcium (%)	TSS (%)
Protein (%)	. 0.15	-0.21	—	0.04	0.31	0.10	-0.01
Phosphorus (%)	0.23	-0.15	-0.06	—	0.36	0.05	0.03
Potassium (%)	0.74	0.96	0.07	0.06	—	-0.16	0.07
Calcium (%)	0.30	-0.34	0.06	0.02	0.45		0.10
TSS (%)	-0.35	-0.22	-0.01	0.02	-0.30	0.16	—

* Genotypic correlation coefficients between carotene content and other chemical constituents.

Highest heritability was observed for carotene content (99.76%), closely followed by phosphorus content (98.61%). All the characters exhibited high heritability values. Carotene content had very high values of heritability and genetic advance (93.75%) which indicate that this character is governed by additive genes which offer great scope for improvement through selection. Lowest genetic advance was observed for calcium content of fruit.

Correlation study indicated that many of the qualitative characters are independent (Table 2). Potassium content had high positive correlation with carotene content of fruit (r_p –0.72). Path analysis also indicated that potassium was the most important factor contributing to carotene content of fruit (P_{iy} 0.96) (Table 3). All the other characters had negative, direct effects on the carotene content of fruits. The high positive correlation coefficients of carotene with protein, phosphorus and calcium are due to the indirect effects of these characters through potassium content of fruits.

Summary

Significant variability was observed for carotene, protein, phosphorus, calcium and T S S contents of fruits in pumpkin. Maximum variability associated with highest heritability and genetic advance was observed for carotene content of fruit and there is good scope for improvement of this character in pumpkin Carotene content was positively correlated with potassium content of fruit. Path analysis indicated that potassium content had maximum direct effect on carotene content of fruits.

സംഗ്രഹം

മത്തങ്ങയുടെ ഗുണനിലവാരത്തെ ബാധിക്കുന്ന കരോട്ടിൻ, മാംസ്യം, ഭാവഹം, കുഷ്ഠാരം കാൽസിയം, ലയനഖരങ്ങൾ (T S S) എന്നീ ഘടകങ്ങളെ സംബന്ധിച്ച പരീക്ഷണങ്ങളിൽ ഏറ്റവും കൂടുതൽ വിചരണം, പാരമ്പര്യഗുണാംഗം, ജനിതനേട്ടം എന്നിവ കരോട്ടിനു ആണെന്നു കാണുകയുണ്ടായി. കരോട്ടിൻ, കു tins®-, എന്നിവ തമ്മിലുള്ള ഉറച്ച സഹബന്ധം, പഥവിശ്ലേഷണം, സഹബന്ധപഠനം എന്നിവയിൽനിന്നും വ്യക്തമായി. പ്രജനനംമൂലം മത്തങ്ങയിലെ കരോട്ടിൻ ഗണ്യമായി വർദ്ധിപ്പിക്കുവാനുള്ള സാദ്ധ്യത ഈ പഠനങ്ങൾ പൂണ്ടിക്കാട്ടുന്നു.

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