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VARIATION FOR YIELD AND QUALITY IN COLEUS MUTANTS

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ABSTRACT

Chinese potato (**Coleus parviflorus** Benth) mutants numbering twelve obtained from a mutation breeding program and its control were evaluated for the extent of variation in yield and quality attributes. In general there was significant variation among the mutants as well as between mutants and control. Canopy spread and top yield (biomas) was less in mutants as compared to the control resulting in an improved harvest index. In mutants with less number of tubers the yield per plant achieved was greater than in control due to uniformity of tubers. Besides, in some of the mutants the tuber production was restricted at the base only which made the harvest easy. There was variation in the quality traits both towards positive and negative directions. Based on the overall performance few mutants showed superior performance in terms of yield and quality than the control.

Coleus is a widely cultivated tuber crop of tropics. Coleus is reported to be a natural tetraploid (Ramchandran, 1967) and is propagated vegetatively. Germplasm collection maintained at the Institute show lack of variability for yield and morphology. The alternative is to induce variability through induced mutations. In potato similar to coleus it is reported that the useful mutants could be induced following mutagenic treatments (Upadhya and Purohit, 1973). Recently Vasudevan and Jos (1988) and Vasudevan et. al., (1988 a & b) have reported the induction and recovery of few useful mutants in coleus following gamma ray treatment. In the present study, an attempt was made to evaluate a dozen of Coleus mutants along with the control for their yield and quality attributes.

MATERIALS AND METHODS

In the mutation breeding studies on Coleus (**Coleus parviflorus** Benth) following treatment of CP-11 with 1 kR, 2 kR, 3 kR and 4 kR gamma rays resulted in the production and isolation of more than 50 solid mutants (CPM) which are distinct from each other morphologically. Of them, 12 mutants were used in the present study along with its control CP-11. Tender three node-cuttings of these 12 mutants and control were planted in 4 rows maintaining 5 plants/row at a spacing of 40 x 30 cm in two replications in an RBD design. All cultural practices were adopted uniformly. Data on vine length and number of main branches were recorded on 100th day after planting. During harvest, data were obtained on number, weight of tubers per plant and

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tuber length. The tubers were analysed for dry matter, cooking quality, starch, grain size (microscopic evaluation), starch and proteins.

RESULTS AND DISCUSSION

(i) Morphological characteristics: The data presented on vine length, number of branches and top yield (biomas) in Table 1, indicated that there is significant difference between the mutants and control. Vine length is the measure of spread of plant, where mutants recorded lesser vine length occupying less area as compared to the control (39.2 cm), the least vine length being in CPM 23 (15.1 cm). The top yield was more in control while it was least in CPM 25 (42.5) g. Moreover the mutants CPM 25, 27 & 46 matured earlier i.e., within 100-120 days after planting as compared to 160-165 days in control. It is also seen from the Table 1 that the canopy of mutants were less compared to control. Though the canopy spread was very high in CPI-11, the yield obtained was less in terms of tuber yield, in other words, the mutants possessing less canopy produced economical yield with lesser crop duration. An improved source sink relationship and higher harvest index was obtained in mutants CPM 25, 27 and 46. It was also interesting to note that the mutant CPM-46 was possessing erect plant type combined with tuber produc-

TABLE 1. : Yield And Traits Of Gamma Ray Induced Mutants In Coleus

Variety mutant	Vine length (cm)	No. of branches per plant	Top yield (g)	Tuber length (cm)	Number of tubers/plant	Tuber yield (g)
CPM. 20	16.9	7.4	80.5	3.35	39.4	230.5
CPM. 23	15.1	7.1	63.5	2.65	20.6	102.0
CPM. 25	16.9	6.2	42.5	2.60	15.9	89.0
CPM. 27	18.8	9.1	68.0	2.90	12.9	65.9
CPM. 28	30.9	9.1	318.0	3.10	10.5	113.0
CPM. 33	28.7	8.1	366.5	4.15	53.1	423.0
CPM. 35	16.2	7.0	66.5	3.35	25.0	179.5
CPM. 46	19.4	10.4	110.0	6.20	21.8	240.5
CPM. 49	28.2	13.0	235.5	3.55	70.4	372.5
CPM. 61	19.9	11.1	109.0	2.50	36.4	187.9
CPM. 62	22.9	11.6	168.0	2.75	57.7	282.4
CP-11 (Control)	39.2	18.4	579.5	3.25	98.2	300.4
CD	0.70	0.94	63.41	7.29	0.29	25.52

tion restricted to base of the plant unlike CP-11 where the tuber production was found to be almost every node as such the uniformity of the tuber for the size and maturity was missing.

(ii) Tuber Yield : Data on tuber yield and yield contributing traits presented in Table 1., show that there was significant variation in these traits. In general, the yield per plant was lower in mutants except in CPM 34 (423 g) and CPM 49 (372 g) as compared to the control (300 g). The number of tubers was less in these mutants but almost all tubers were well matured and uniform in size with better average tuber weight. The longest (6.2 cm) tuber was observed in CPM. 46 and it peeled off easily. Though the yield per plant was lower in mutants, it could be increased per unit area with closer spacing taking advantage of less canopy spread and shorter vine length. In traditional cultivar like CPI-11, an operation of earthing up is required for effective tuber production from individual nodes after 100 days of planting. Such operation can be avoided in some of the mutuant (CPM. 25) where the tuber production is restricted only to the base and will help in easy harvest also.

(iii) Tuber Quality : Results on quality of tubers presented in Table 2., clearly indicated the presence of variability induced through mutagenesis. Mutants viz. CPM 25 (31.58), CPM. 27 (31.46), CPM. 33 (31.65) and CPM. 46(29.99) registered greater dry matter

TABLE 2. : Tuber Quality of gamma ray induced mutants in Coleus

Variety mutant	Dry matter (%)	Cooking quality	Starch Grain Size μ	Protein (%)	Starch (%)	Sugar (%)
CPM. 20	27.06	Fair	11.7	2.26	14.3	0.38
CPM. 23	26.85	Fair	12.4	1.71	12.3	0.40
CPM. 25	31.58	Good	11.5	2.23	18.7	0.75
CPM. 27	31.46	Good	13.6	1.98	19.3	0.56
CPM. 28	25.70	Good	11.0.	1.71	13.5	0.56
CPM. 33	31.65	Good	14.0	1.50	18.9	0.45
CPM. 35	26.43	Good	11.7	1.71	15.6	0.54
CPM. 46	29.99	Fair	15.0	2.13	17.3	0.93
CPM. 49	26.74	Poor	11.2	2.28	18.1	0.54
CPM. 61	25.68	Poor	11.9	2.18	13.1	0.75
CPM. 62	27.02	Good	12.3	2.39	18.8	0.67
CP-11 (Control)	27.83	Fair	10.8	2.04	15.4	0.48

percentage as compared to control (27.83) and these mutants also showed higher starch percentage. An improved cooking quality was observed in many of the mutants except in CPM 49 and 61, as against the control. Microscopic observation on starch grain size presented in Table 2., also showed variability and the maximum starch grain size observed was 15.0 u in CPM. 46 and against 10.8 u in control. Data presented on reducing sugar showed both increasing and decreasing trends in mutuant as compared to their control.

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BIOCONVERSION OF RICE STRAW INTO PROTEIN RICH FEED

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ABSTRACT

Three cellulolytic fungi were inoculated on alkali hydrolysed rice straw and untreated rice straw. **Asperquillus** sp. (AS.3) exhibited maximum straw conversion (80.0%) followed by **Fusarium** sp. (Fs.4) and **Trichodermu** sp. (T.3) Fungal biomass yield ranged from .82 to 1.06 g/50 ml depending upon the fungi. Crude protein content of rice straw after

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