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FODDER COWPEA CO. 5 FOR PROTEIN RICH FODDER

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Mutation breeding undertaken to evolve a high yielding, short duration fodder cowpea variety resulted in the identification of a mutant FCP 2 which was isolated in M5 generation of Co 1 cowpea seeds irriadieted with 30 Kr gamma rays. The mutant has a green fodder, yield potential of 18.16 t/ha in 50 to 55 days which was 32.74% higher than that of Co 1. It is high in crude Protein content and dry matter digestibility. It was released as Co 5 fodder cowpea in 1986

The forages can be classified on several considerations among which nutritional classification is highly relevant for the preparation of a fodder cultivation programme for year round green supply. Nutrient density varies from very low feeding value of straws to very high nutritional value of leguminous fodders. Legumes constitute the only concentrated source of dietary protein (Jain, 1975). Among the legumes, cowpea is the most cosmopolitan being grown in many regions of India as a pulse, vegetable as well as fodder crop. Cowpea is one of the important fodder crops of irrigated land, which can be cultivated throughout the year. As a fodder crop it can cut in 55 to 60 days after sowing. The feeding value of cowpea forage is high and quite comparable to lucerne. That it does not contain any toxic substance and can be cut and fed at any stage of crop growth is another valuable factor. As crude fibre content is low, there is less of wastage by livestock when fed with the cowpea fodder. Besides being grown as a pure crop, it lends itself to be raised as a mixed crop with maize, sorghum, bajra or the short duration deenanath grass. Any grain cowpea variety can be grown for fodder purpose and among the cultivated varieties Co 1 is recommended as a forage legume. To meet a long felt need for a fodder cowpea variety, breeding work was undertaken in the Department of Forage Crops, Tamilnadu Agricultural University, Coimbatore and the results are presented hereunder.

MATERIALS AND METHODS

Co 1 had a determinate plant type with a flowering duration of 65 to 70 days. Mutation breeding has been reported to have special advantages in adding specific characteris-

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tics to agricultural crops (Allard, 1960). Hence, to reduce the duration as well as to alter the plant type of Co 1 mutation breeding was adopted to achieve the objective.

Dry seeds of Co 1 cowpea were treated with gamma rays 0, 5, 10, 15, 20, 25, and 30 Kr and the progenies tested in subsequent generations. In M5 generation, 39 mutants were studied of which six mutants resulting from 30 Kr gamma irradiation were found to be high yielding in green fodder than the parent Co.1. The yield performance of the six mutants was assessed in the fields for three seasons during 1980 and 1981. As the mutant FCP 2 was found to be high yielding than Co 1, it was compared with the entries from All India Co-ordinated trials from 1982-83 to 1984-85. It was tested in MLT-1 for two years 1983 -84 and 1984-85 in 12 centres under irrigated condition and in ten centres under rainfed condition. It was also tested under All India Co -ordinated Researeh project on Forage Crops in nine centres of different states of India besides Coimbatore during 1983-84

RESULTS AND DISCUSSION

The six promising mutants out of 39, were tested for three seasons viz., monsoon season of 1980 and summer and monsoon seasons of 1981 and the mutant FCP 2 recorded a green fodder yield ranging from 14.84 to 20.10 t/ha, the average being 18.16 t/ha, as against 13 68 t/ha recorded by Co. 1. The increase of yield was 32.74 over Co 1. The dry matter as wall as crude protein yield were also 16.8 and 22.0% higher than in Co 1. (Table-1)

Table–1 Yield Performance of Co-5 (FCP 2)

Particulars	Co 5 (FEP 2)	Co. 1	%Over Co 1
i) *Green fodder yield t/ha*			
Monsoon season 1980	14.81	10.73	37.70
Summer Season 1981	20.10	13.02	54.40
Monsoon Season 1981	19.55	17.24	13.40
Mean over three seasons	18.16	13.68	32.74
ii) Dry matter yield kg/ha	26.59	22.76	16.80
iii) Crude protein yield kg/ha	532	436	22.00

The plant height, number of branches per plant, leaf number, leaf length and leaf width were also more in the mutant compared to Co 1. The invitro dry matter digestibility (IVDMD) of the mutant was 58.6% which has appreciably higher than that of Co 1 (50.6%) and this may be presumably due to the higher leaf-stem ratio of 3.3 and lower crude fibre content of 24.25 as against 2.5 and 25.30 of Co 1. FCP 2 contained more NFE (41-32%), Calcium (2.8%) and total ash (16.00%) compared to Co 1 (Table 2).

Table—2 Details of yield at attributes and quality parameters of CO 5 (FCP 2)

Details		CO 5 (FCP 2)	Co 1
Plant height (cm)		93.0	90.0
Number of branches		2.4	2.3
Number of leaves		12.1	11.5
Leaf length (cm)		12.1	11.9
Leaf width (cm)		8.2	7.6
Leaf—stem ratio		3.3	2.5
Dry matter content	%	14.64	16.64
Crude protein content	%	20.00	19.17
Crude fibre content	%	24.25	25.30
Ether Extract	%	2.18	2.51
Total ash	%	16.00	15.00
Nitrogen free extracts	%	41.32	31.82
Calcium	%	2.80	1.84
Phosphorus		0.14	0.16
VDMD	%	58.60	50.60

In MLT 1 the mutant on an average recorded 14.2 and 10.8% more green fodder than Co 1 under irrigated and rainfed conditions respectively in two years 1983-84 and 1984-85 with an average increase of 13.1% (Table - 3). when tested along with the entries from All India Co-ordinated Trials for three years from 1982-83 to 1984-85 at Coimbatore, it recorded on an averge 15.83 t/ha' 2410 kg/ha and 441 kg/ha of green fodder, dry matter and crude protein yields respectively which were 16.e 13.6 and 19.5% higher than thos0 of Co 1. (Table - 4). Genotype-environment interaction was studied through stability parameter analysis on the dry matter production in these entries for these three years and the mutant FCP 2 has been found to be high yielding and most stable under the environments tested (Sukanya Subramanian *et al* 1986). In the trials conducted in other states of India under the AICRP on

Table—3 Green fodder yield of Co 5 (FCP 2 in MLT 1 (t/ha)

District	(Co 5 FCP 2)	Co 1	% Over Co 1
A. *Irrigated*			
1. Coimbatore	15.98	14.03	13.9
2 Periyar	27.50	24.65	11.6
3 Madurai	10.25	10.50	2.5
4 South Arcot	25.65	19.93	28.7
5 Dharmapuri	16.06	14.11	13.9
6 Pondicherry	18.64	16.64	12.0
Mean	19.01	16.64	14.2
B. *Rainfed*			
1 Ramanathapuram	21.00	20.71	1.4
2 North Arcot	30.65	24.58	24.7
3 Chengalputtu	12.74	12.78	0.3
Mean	21.46	19.36	10.8
Over all mean	19.83	17.54	13.1

Table—4 Performance of Co 5 (FCP 2) in Co-orinated Trial at Coimbatore

Details	Year	CO 5 (FCP)	Co 1	% Over Co 1
Green fodder yield t/ha	1982—83	10 85	8.74	24 14
	1983—84	13.33	1400	-4.80
	1984—85	23 30	18.21	27.95
	Mean	15.83	13.65	16.00
Dry matter yield Kg/ha	1982—83	2332	1888	23.51
	1983—84	1909	2092	-8.75
	1984—85	2988	2386	25.23
	Mean	2410	2112	13.86
Crude protein yield t /ha	1982—83	409	352	16.19
	1983—84	334	353	-5.40
	1984—85	581	403	44.17
	Mean	441	369	19.50

Forage crops. it recorded 24.09 t/ha of green fodder and 3691 kg/ha of dry matter which worked out to 12.5% and 11.3% mo e than that in C 152 (Table 5).

On the basis of the above trials it was conclusively proved that in Tamil Nadu the mutant FCP 2 is suitable for growing in Coimbatore, Periyar, Madurai, South Arcot and Dharmapuri districts besides Pondicherry under irrigated condition and in Remanathapuram, North Arcot and Chingleput district under rainfed condition. Ragarding its performance in other States, the mutant did well in Kerala, Maharashtra Gujarath, Madhya pradesh, Uttar Pradesh, Bihar and Assam States.

Table — 5 Performance of Co 5 (FCP 2) in All India Co-ordinated Trials Kharif 1983

Sl. No.	Centres	State	Co 5 (FC 2		C—152	
			Green Fodder yield t/ha	Dry matter yield kg/ha	Green Fodder yield t/ha	Dry matter yield Kg/ha
1	Dantiwada	Gujarat	18.75	3030	17.36	3030
2	Kanpur	Uttar Pradesh	17.33	—	19.99	—
3	Faizobad	Uttar Pradesh	21.20	—	17,02	—
4	Vellayani	Kerala	23.72	4370	19 99	2660
5	Coimbatore	Tamil Nadu	13.33	1809	12.20	1933
6	Urulikanchan	Maharashtra	37.78	3755	35.11	3333
7	Akola	Maharashtra	23.55	3660	17,50	2780
8	Jobalpur	Madhya Pradesh	15.96	1668	18.22	1902
9	Kanke	Bihar	29.72	4995	27.43	4949
10	Jorhat	Assam	39.52	6373	29,97	5451
	Mean		24 09	3691	21.48	3255
	% On C— 152		2.50	11.30		

Based on the above desirable features, the mutant FCP-2 has been released as Co.5 fodder cowpea by the Department of Forage Crops, School of Genetics in the Tamil Nadu Agricultural University, Coim batore in January 1986 for large scale cultivation.

REFERENCES

ALLARD- R. W. 1960. Principles of plant Breeding, New York London, John Wiley and Sons, Inc.

JAIN, N. K. 1975. Breeding for yield and other attributes in green legumes. Indian J. Genet. 35 (2) : 169—187.

SUKANYA SUBRAMANIAN, A GOPALAN, R. RAGU RAJ, M. GOVINDASWAMY and P. CHANDRA SEKARAN 1985, Genotype-Environment Interactions and stability analysis for dry matter production in fodder Cowpea (*Vigna unguiculata*). National symposium on Genetics and Physiology of drymatter production in crop plants 29—31 Oct. 1985, Abstracts pp. 77.