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COMPARATIVE ANALYSIS OF FODDER COWPEA (*VIGNA UNGUICULATA* L.) VARIETIES FOR SEED YIELD AND NUTRIENT CONTENT

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SUMMARY

The field experiment was to evaluate 14 fodder cowpea varieties for their seed yield, fodder yields, nutrient content in seed and proximate parameters in green fodder & crop residues after seed harvest.Significantly highest seed yield (MT/ha) was recorded in cowpea variety UPC 4200 (0.908) in comparison to many varieties but statistically at par with varieties viz. UPC 9202 (0.869), UPC 621 (0.885), UPC 618 (0.798), UPC 628 (0.743), BL-1 (0.781) and check variety EC 4216 (0.781). Seed yield (MT/ha) in cowpea varieties ranged between 0.607-0.908.In seed, N % was higher in UPC 625 (4.34), whereas, P % was found to be significantly higher (0.59) in seed of two cowpea varieties GFC-4 & GFC-1. Ca % was found to be significantly higher (0.12) in seed of three varieties *viz*. GFC-1, Kohinoor and BL-1. In cowpea varieties seed, macro-nutrients K, Mg and S varied between 1.15-1.27 %, 0.17-0.22 % and 0.19-0.23 %, respectively, whereas,micro-nutrient varied between 1.15-1.27 ppm, 5.00-5.99 ppm, 0.19-0.23 ppm and 0.17-0.22 ppm, respectively for Fe, Cu, Mn and Zinc, respectively. Cowpea varieties non-significantly varied for green fodder, dry fodder and crude protein yields between 12.51-17.22 MT/ha, 2.88-4.33 MT/ha and 0.48-0.73 MT/ha, respectively. Among cowpea varieties, crude protein %, crude fat %, crude fibre %, and silica % ranged between 14.58-18.62, 0.50-2.45, 22.92-36.89 and 0.43-1.36 in green fodder and 8.10-10.30, 0.54-2.94, 35.88-42.56 and 1.01-2.57 in crop residues after seed harvest, respectively.

Key words: fodder cowpea, variety, seed yield, straw yield, nutrient, proximate

Cowpea [*Vigna unguiculata* (L.) Walp] properly known as *lobia*, is one of the important leguminous crop grown in India. Besides having higher crude protein and lower crude fibre content, it fixes atmospheric nitrogen and improves soil heath. Cowpea is multi-purpose crop and it is mainly cultivated for green fodder, hay, green manure, seed/grain and vegetablepurposes. After taking seed production, farmers feed cowpea wet or dry crop residues to their animals due to its good nutritive value and palatability. Over the years, cowpea has become an important fodder crop and due to continuous increase in its cultivated area, demand for improved varieties of cowpea seed is growing.

Cowpea is also cultivated as sole or mixed crop with cereal fodder crops like maize, sorghum and Bajra. In Indian context, it is an important minor pulse cultivated mainly in arid and semi-arid tracts and grown in pockets of Punjab, Haryana, Delhi, and West UP along with considerable area in Rajasthan, Karnataka, Kerala, Tamilnadu, Maharashtra and Gujarat states (Anonymous, 2023). India is the largest producer of cowpea in Asia, accounts for about 0.5 million tons production from an area of 1.5 million hectare (ha) with average seed and fodder yield of 0.3 and 25-45 MT/ha, respectively (Ahmad *et al*., 2017). Indian Council of Agricultural Research (ICAR) has developed & notified several cowpea varieties for fodder cultivation under All-India Coordinated Research Project on Forage Crops and Utilisation coordinated by Indian Grassland and Fodder Research Institute, Jhansi.Timely introduction of improved cowpea varieties in seed rolling plan is very important for the benefit of dairy farmers for fodder purpose. As per the estimate of Indian Grassland and Fodder Research Institute (IGFRI), Jhansi, only 25-30% of required quantity of quality seed of improved fodder varieties/ hybrids is available in cultivated fodders and less than 10% in range grasses and legumes in India (Vijay *et al.,* 2014). Due to scarcity, farmers are forced to use seeds of local genotypes for fodder cultivation resulting in low fodder yields, animal productivity and even crop failure due to susceptibility of local genotypes towards insect, pest and disease infestation.

Many workers in the past have pointed out that quality seed production is an important area that needs to be strengthened for enhancing the availability of green fodder (Vijay *et al.,* 2017). Before introducing

new varieties for cultivation & seed production, information on its growth & quality parameters along with seed yield potential under local agro-climatic conditions is very much needed for selecting the right variety for cultivation. Asaret *et al.* (2021) found the presence of tremendous genetic variation among improved cowpea varieties for all the studied traits, which implies the availability of substantial genetic variation among varieties.Recently some new varieties of oat have been developed, which have the capacity to produce higher seed yield due to variation in genetics and adoption to particular agro-climatic conditions.

However, limited information is available on the performance of notified new fodder cowpea varieties under central Gujarat conditions. Keeping this in view, for the benefit of dairy farmers, seed growers and fodder seed production agencies under dairy cooperatives, the present study was conducted to evaluate various fodder cowpea varieties released in last few decades for their seed production, fodder production, seed & fodder quality and other associated characteristics.

MATERIALS AND METHODS

The experiment was laid out in a randomized block design with three replications containing 14 treatments of cowpea varieties namely UPC 618, UPC 621, UPC 622, UPC 625, UPC 628, UPC 9202, UPC 8705, UPC 4200, GFC 1, GFC 2, GFC 4, Kohinoor, BL 1 and EC 4216. Among the varieties, EC 4216 was the widely adapted variety and considered as check (C) in thistrialsfor comparative analysis. The study was undertaken during two consecutive years during *Kharif* 2017 and *Kharif* 2018 seasons for estimation of seed yield, seed quality & yield parameters and for estimation of fodder yield, quality and growth parameters in Kharif 2018 seasonat fodder demonstration unit (FDU) of National Dairy Development Board, Anand (Gujarat). The soil of the experimental site was loamy in texture with EC (0.18), pH (7.75), total nitrogen (890.73 kg/ha), available P_2O_5 (14.43 kg/ha) and available K_2O (252.42 kg/ha). The soil contained DTPA-extractable Fe (5.61 ppm), Mn (4.53 ppm), Zn (1.93 ppm), available S (3.18 ppm) and Cu (1.67 ppm). The seed crop was sown manually in last week of June, 2017 and harvested during second week of November, 2017 and 2018. The trials were carried out following standard package of practices and seed & technical guidance were obtained from AICRP on Forage Crops and Utilisation, Jhansi. The seed crop was sown with a seed rate of 30 kg/ha at 40 cm row to row distance. Fodder experiment was sown with a seed rate of 40 kg/ha at 40 cm row distance on 27th June, 2018 and harvested on 5th October, 2018.In both the trials, treatments were fertilized with basal dose of fertilizers (30 kg N: P: 80 kg: 60 kg K ha^{-1}) from ammonium sulphate, single super phosphate and murate of potash. After sowing, pendimethalin herbicide was applied as pre-emergence @ 1.0 litre ha^{-1} to control seasonal weeds. In total 2 to 3 irrigations were given during the crop growth period viz. just after sowing for proper germination, flowering and seed formation stages in seed crop. During the growing seasons in both the years, average monthly weather parameters data are mentioned in Fig. 1 & 2.

The matured pods were picked up three times

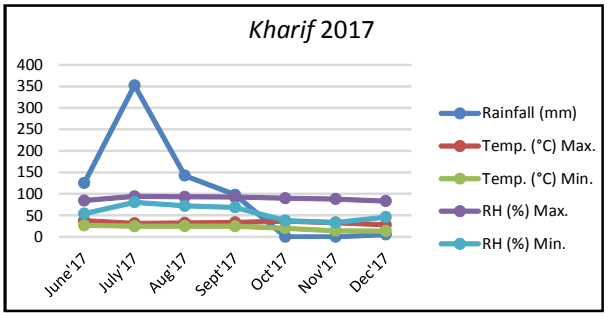

Fig. 1. Monthly weather parameters data recorded at Anand during crop season, *Kharif* 2017.

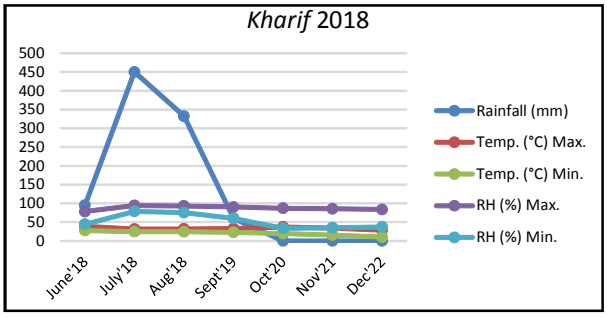

Fig. 2. Monthly weather parameters data recorded at Anand during crop season, *Kharif* 2018.

during first fortnight of November during both the years. Yield of fodder and seed, yield attributes, nutrients and quality components of cowpea varieties were measured and analysed at harvest for both the years. At harvest, number of plants in each rows were counted from net plot area. Pods of different pickings were mixed together, sundried, threshed and cleaned manually for recording the seed yield in Kg/ha. After harvesting of matured pods, remaining biomass was harvested to determine fodder yield. From each plot, 20 matured pods were picked to measure pod length, number of seed/pod and seed weight/pod. Dried samples were fine grinded (1 mm) for chemical

analysis and the amount of N and crude protein content was estimated by using IS/ISO 5983-2 (2005). Proximate analysis of fodder samples for nutritive value was carried out following the standard laboratory procedures recommended by AOAC (2012). Nutrient content was determined according to Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES), Perkin Elmer, OPTIMA-8000. Biological and seed yields were recorded from net plot at maturity and simultaneously seed yield attributes were recorded from twenty randomly selected matured pods with ripened seed. Harvest index, dry matter yield and crude protein yield were calculated as per below formulae.

$$\text{Harvest index} = \frac{\text{Seed Yield}}{\text{Biological Yield}} \times 100$$

Dry matter yield (MT/ha) = [Dry matter % x Green forage yield (MT/ha)]/100

Crude protein yield (MT/ha) = [Crude protein % x Dry matter yield (MT/ha)]/100

Two season's data was pooled and mean values of observations were analysed statistically according to Sheron *et al.* (1998). Overall differences were tested by 'F' test of significance. The critical differences were worked out at 5 per cent level of probability for comparing treatment means in case of significant 'F' test.

RESULTS AND DISCUSSION

Seed yield & yield Attributes

The pooled data analysis showed significant difference among varieties for plant population/ha at harvest (lakh), pod length at maturity (cm), seed weight/pod (g), seed yield (MT/ha) (Table 1). Amongst all varieties, significantly highest plant population (5.73 lakh/ha)was recorded in cowpea variety UPC 621 but at par with UPC 9202. Kumar and Seth (2004) also observed significantly higher initial and final plant stand in variety Bundel Lobia-1 in comparison to UPC 5287. Pod length was found to be highest in variety UPC 8705 (16.48 cm) in comparison to many varieties but statistically at par with few varieties viz. UPC 625 (16.13 cm), UPC 4200 (15.64 cm) and UPC 9202 (15.34 cm). Seed weight/pod was recorded significantly higher in UPC 4200 (2.05g) in comparison to many varieties but at par with UPC 8705 (1.91 g) and UPC 621 (1.81 g) varieties. Significantly highest seed yield (MT/ha) was recorded in cowpea variety UPC 4200 (0.908) in comparison to many varieties but statistically at par with varieties viz. UPC 9202 (0.869), UPC 621 (0.885), UPC 618 (0.798), UPC 628 (0.743), BL-1 (0.781) and check variety EC 4216

TABLE 1
Influence of different cowpea varieties on seed yield and yield parameters (Pooled)

Treatment	Plant population at harvest (Lakh/ha)	Pod lengths at maturity (cm)	Seed weight/ pod (g)	Test weight (g)	No. of seeds/ pod	Seed yield (MT/ha)	Crop residues yield (MT/ha)	Biological yield (MT/ha)	Harvest index
UPC 618	3.81	14.57	1.70	121.88	13.95	0.798	10.865	11.66	7.29
UPC 621	5.73	14.19	1.81	140.45	12.89	0.885	11.102	11.99	8.19
UPC 622	4.10	14.27	1.61	125.86	12.86	0.691	10.058	10.75	6.83
UPC 625	4.16	16.13	1.59	126.78	12.48	0.616	10.645	11.26	5.59
UPC 628	4.76	13.63	1.58	117.30	13.65	0.743	10.087	10.83	7.11
UPC 9202	5.17	15.34	1.76	141.75	12.58	0.869	10.043	10.91	8.61
UPC 8705	4.37	16.48	1.91	155.66	12.18	0.690	10.917	11.61	6.27
GFC-1	3.11	14.47	1.43	127.63	11.55	0.573	12.062	12.63	5.30
GFC-2	2.33	14.42	1.55	123.88	12.67	0.608	12.022	12.63	6.42
GFC-4	2.67	14.03	1.44	125.17	11.56	0.515	12.463	12.98	5.00
Kohinoor	3.49	13.73	1.48	125.13	11.76	0.607	12.842	13.45	5.86
EC 4216	4.52	14.03	1.59	119.76	13.34	0.781	12.595	13.38	6.83
BL-1	4.57	14.38	1.55	117.25	13.16	0.781	11.038	11.82	7.21
UPC 4200	3.70	15.64	2.05	151.85	13.61	0.908	9.798	10.71	8.71
S Em±	0.41	0.43	0.09	7.15	0.54	0.073	0.84	0.83	0.92
CD at 5 %	1.19	1.17	0.25	NS	NS	0.213	NS	NS	NS

(0.781). Higher seed yield in UPC 4200 variety may be due to combination of higher seed weight/pod, pod length and test weight in comparison to other varieties (Table 1).Seed yield in cowpea varieties ranged between 0.607-0.908 MT/ha. Ahmed *et al*.(2017) also reported significant differences amongst cowpea fodder varieties for seed yield. Similar quantity of seed yield (0.96 MT/ha) in fodder cowpea sown with seed rate of 30 kg/ha was reported by Kurubetta *et al*. (2008). Non-significant differences were observed in cowpeas varieties for test weight (g), number of seed/ pod, crop residue yield (MT/ha) after seed harvest, biological yield (MT/ha) and harvest index that ranged between 117.25-155.66, 11.55-13.95, 9.80-12.84, 10.71-13.45, 5.00-8.71, respectively (Table 1). Similar level of harvest index (5.95) was reported by Ahmed *et al.* (2017). Similarly, differences among varieties for various yield parameters could be attributed to the intrinsic ability of different cultivars to access growth resources and their expression in terms of yield attributes and seed yield (Antwi *et al.,* 2012). Kumar and Sarlach (2015) recorded stover yield in two cowpea varieties between 8.59-9.01 MT/ha after seed harvest.

Nutrient content in seed

Macro and micro-nutrients content were analysed in seed of different cowpea varieties and depicted in Table 2. Statistically significant differences were observed amongst cowpea varieties for N, P & Ca nutrients content only. Cowpea variety UPC 625 recorded significantly highest N % (4.34) in comparison to other varieties. Significantly lower N % was found in UPC 4200 (3.71) but at par with UPC 628 (3.77) and UPC 8705 (3.78). P % was found to significantly higher (0.59) in two cowpea varieties GFC-4 & GFC-1 in comparison to many varieties but at par with UPC 625 (0.55), BL-1 (0.55), EC 4216 (0.54) and Kohinoor (0.53). Ca % was found to be significantly higher (0.12) in few varieties viz. GFC-1, Kohinoor and BL-1 in comparison to many varieties but at par with UPC 9202, GFC-4 and EC 4216 varieties that recorded similar level (0.11). Non-significant differences were observed for macro-nutrients (%) K, Mg and S that ranged between 1.15-1.27, 0.17-0.22 and 0.19-0.23, respectively amongst cowpea varieties (Table 2).Similarly statistical differences were found to be non-significant among cowpea varieties for micro-nutrient levels (ppm), however, it was observed to be between 1.15-1.27, 5.00-5.99, 0.19-0.23 and 0.17-0.22, respectively for iron (Fe), copper (Cu), manganese (Mn) and zinc (Zn), respectively (Table 2). The mean nutritional content values in seeds of cowpea germplasm were 24.7% for protein, and 58.9, 41.5, 1107.0, 2132.0, 15282.0 and 5664.0 mg/kg for Fe, Zn, Ca, Mg, K and P, respectively (Boukar*et al*., 2011).Yilmaz *et al.* (1997) reported that in plants without added zinc, concentrations of zinc were about 10 mg/kg both in shoots & seed, and increased to 18 mg/kg dry weight by soil application of zinc.

TABLE 2
Influence of different cowpea varieties on nutrient content in seed (Pooled).

Treatment	N %	P %	K %	Ca %	Mg %	S %	Fe ppm	Cu ppm	Mn ppm	Zn ppm
UPC 618	3.86	0.48	1.19	0.09	0.19	0.19	1.19	5.00	0.19	0.19
UPC 621	3.83	0.51	1.17	0.10	0.19	0.20	1.17	5.00	0.20	0.19
UPC 622	3.82	0.48	1.17	0.09	0.19	0.20	1.17	5.04	0.20	0.19
UPC 625	4.34	0.55	1.15	0.09	0.18	0.22	1.15	5.00	0.22	0.18
UPC 628	3.77	0.48	1.16	0.09	0.19	0.22	1.16	5.00	0.22	0.19
UPC 9202	3.89	0.52	1.19	0.11	0.20	0.20	1.19	5.00	0.20	0.20
UPC 8705	3.78	0.51	1.18	0.10	0.17	0.19	1.18	5.00	0.19	0.17
GFC-1	4.03	0.59	1.24	0.12	0.21	0.23	1.24	5.87	0.23	0.21
GFC-2	3.97	0.56	1.21	0.09	0.19	0.22	1.21	5.28	0.22	0.19
GFC-4	3.95	0.59	1.23	0.11	0.20	0.23	1.23	6.17	0.23	0.20
Kohinoor	4.07	0.53	1.27	0.12	0.20	0.20	1.27	5.09	0.20	0.20
EC 4216	3.95	0.54	1.23	0.11	0.19	0.22	1.23	5.00	0.22	0.19
BL-1	3.90	0.55	1.27	0.12	0.20	0.22	1.27	5.13	0.22	0.20
UPC 4200	3.71	0.50	1.27	0.09	0.22	0.22	1.27	5.99	0.22	0.22
SEm±	0.03	0.02	0.06	0.01	0.10	0.01	0.06	0.34	0.01	0.01
CD at 5 %	0.10	0.06	NS	0.01	NS	NS	NS	NS	NS	NS

Fodder yield and yield attributes

Fodder yield and yield attributes were statistically analysed in cowpea varieties during Kharif 2018 (Table 3). Amongst cowpea varieties, statistical differences were found to be significant only for dry matter %. Cowpea variety UPC 8705 recorded higher dry matter (31.11 %) in green fodder in comparison to many varieties but at par with varieties UPC 9202 (27.78 %), EC-4216 (28.40 %), UPC 628 (29.67 %) and BL-1 (29.90 %). Green fodder yield (17.22 MT/ha) and dry matter yield (4.33 MT) was recorded higher in cowpea varieties GFC-4 and BL-1, respectively, however the differences were found to be non-significant. Cowpea varieties recorded green fodder, dry fodder and crude protein yields variation between 12.51-17.22 MT/ha, 2.88-4.33 MT/ha and 0.48-0.73 MT/ha, respectively. Naveena *et al.* (2021) observed similar variations in green fodder and dry matter yields in fodder cowpea between 10.75-18.87 MT/ha and 1.96-4.02 MT/ha, respectively. Kumar *et al.* (2016) reported variation in green fodder yield in cowpea between 17.76-28.17 MT/ha. Bhavya *et al.* (2014) reported dry matter yield of 5.52 MT/ha in fodder cowpea. Shekara et al. (2020) recorded crude protein yield of 0.30-1.03 MT/ha in fodder cowpea.

Amongst cowpea varieties at green fodder harvest stage, differences were found to be non-significant for plant height (cm), no. of leaves/plant, no. of branches/plant, no. of plants/metre row length, L:S, dry matter accumulation/plant (g), green fodder yield (MT/ha) and dry matter yield (MT/ha) that ranged between 185.33-252.00, 52.20-71.47, 17.47-23.93, 4.72-9.95, 0.39-1.03, 23.80-34.60, 12.51-17.22 and 2.88-4.33, respectively (Table 3). Similar level of dry matter accumulation (21.48 g/plant) was reported in fodder cowpea variety UPC 626 by Ahmed *et al.* (2017). Dutta *et al.* (2020) found variation in plant height and no. of branches/plant ranging between 162.0-204.6 cm and 3.5-5.7, respectively in fodder cowpea.

Although, cowpea varieties were found to be at par for yields, but many varieties recorded slightly better green fodder, dry fodder and crude protein yields in comparison to check variety EC 4216.

Proximate parameters

To evaluate fodder quality, proximate parameters were analysed in green fodder and crop residues of different cowpea varieties and are depicted in Table 4. Crude protein % was found to be higher in green fodder (18.62) as well as crop residues (10.30) of cowpea variety GFC-2 (Table 4). Crude fat % was found to greater in green fodder of variety UPC 621 (2.45) and crop residues of variety (2.94). Crude fibre % was recorded higher in UPC 618 (36.89) green fodder and UPC 622 (42.56) crop residue. Silica % was observed greater in green fodder of UPC 621 (1.36) and crop residue of EC 4216 (2.57). On average

TABLE 3
Influence of different cowpea varieties on green fodder yield and yield attributes during 2018.

Treatment	Plant height (cm)	No. of leaves/ plant	No. of branches/ plant	No. of plant/metre row length	L:S	Dry accumulation plant (g)	Dry matter (%)	Green fodder yield (MT/ha)	Dry matter yield (MT/ha)	Crude protein yield (MT/ha)
UPC 618	252.00	71.47	23.60	7.37	0.40	27.27	24.67	14.44	3.57	0.59
UPC 621	232.00	61.73	22.00	4.72	0.63	28.47	22.89	12.51	2.88	0.48
UPC 622	238.87	66.00	22.00	6.72	0.43	31.60	25.45	15.56	3.96	0.62
UPC 625	233.00	52.20	17.47	7.72	0.50	26.97	26.78	13.35	3.57	0.62
UPC 628	185.53	65.00	21.60	9.50	0.48	25.53	29.67	13.89	4.10	0.63
UPC 9202	222.93	54.53	17.93	6.55	0.40	28.67	27.78	13.33	3.73	0.61
UPC 8705	210.00	61.40	20.47	7.33	0.40	34.60	31.11	12.78	3.99	0.59
GFC-1	211.33	59.60	19.87	9.95	0.50	23.93	26.33	15.56	4.08	0.65
GFC-2	213.33	55.60	18.53	7.17	0.45	27.60	27.56	14.45	3.90	0.73
GFC-4	231.60	62.67	21.33	6.78	0.51	23.80	24.11	17.22	4.15	0.73
Kohinoor	237.80	55.27	19.47	5.83	0.48	32.87	23.78	15.01	3.56	0.61
EC 4216	192.33	59.80	19.93	5.72	0.40	33.53	28.40	14.44	4.11	0.67
BL-1	225.00	65.80	23.93	6.33	1.03	28.60	29.90	14.44	4.33	0.66
UPC 4200	185.33	62.73	20.47	6.72	0.39	32.60	24.89	16.67	4.14	0.73
S Em±	19.34	6.01	2.16	1.22	0.17	3.99	1.31	1.08	0.32	0.02
CD at 5 %	NS	NS	NS	NS	NS	NS	3.84	NS	NS	NS

TABLE 4
Influence of differentcowpea varieties on proximate parameters in green fodder& crop residues during 2018.

Treatments	Crude Protein %	Crude Fat %	Crude Fibre %	Silica %	Crude Protein %	Crude Fat %	Crude Fibre %	Silica %
		Green Fodder				**Crop Residues**		
UPC 618	15.34	1.76	36.89	0.47	8.52	0.83	37.41	1.01
UPC 621	16.79	2.45	32.75	1.36	9.33	0.54	41.64	1.41
UPC 622	15.38	1.50	34.55	0.52	8.55	0.60	42.56	1.44
UPC 625	17.42	1.39	35.29	0.61	9.68	1.06	40.43	1.25
UPC 628	15.38	1.09	22.92	0.81	8.55	1.48	38.78	1.08
UPC 9202	16.27	1.56	46.75	0.35	9.04	0.82	40.24	2.19
UPC 8705	14.58	1.60	29.67	0.45	8.10	2.94	35.95	1.39
GFC-1	15.89	0.50	30.71	1.18	8.83	2.26	39.69	1.05
GFC-2	18.62	0.87	32.10	0.77	10.30	1.10	36.45	1.76
GFC-4	18.42	1.44	32.38	0.70	10.20	0.84	41.25	2.32
Kohinoor	17.48	0.91	33.44	0.43	9.71	2.09	35.88	2.16
EC 4216	16.27	0.67	28.63	1.18	9.04	0.89	38.25	2.57
BL-1	15.15	0.87	33.59	1.14	8.42	2.55	41.35	1.90
UPC 4200	17.66	0.54	31.49	0.47	9.81	0.75	42.50	1.05
Average	16.48	1.23	32.94	0.83	9.15	1.34	39.46	1.61

cowpea varieties recorded higher crude protein % in green fodder (16.48) in comparison to crop residues (9.15). This may be due to movement of nutrients towards sink in plants at maturity stage. Whereas, on an average level of crude fat (1.34), crude fibre (39.46) and silica (1.61) in crop residues were found higher than green fodder due to maturity effect on plants. Among cowpea varieties, crude protein %, crude fat %, crude fibre %, and silica ranged between 14.58-18.62, 0.50-2.45, 22.92-36.89 and 0.43-1.36 in green fodder and 8.10-10.30, 0.54-2.94, 35.88-42.56 and 1.01-2.57 in crop residues, respectively (Table 4). Babu *et al.* (2016) reported crude protein %, crude fat % and crude fibre % ranging between 19.54-21.56, 1.40-1.57 and 19.9-21.0, respectively in green fodder of two cowpea varieties. Shekara *et al.* (2020) have recorded crude protein %, crude fibre % and crude fat % ranging between 16.5-18.9, 26.5-30.5 and 2.2-3.2, respectively in fodder cowpea.

CONCLUSION

Based on the findings of the present investigation, it may be concluded that the cowpea variety UPC 4200 proved to be superior variety with respect to getting higher seed yield under central Gujarat conditions. However, other cowpea varieties viz. UPC 9202, UPC 621, UPC 618, UPC 628 and BL-1 may also be cultivated as a replacement of check variety EC-4216. To get high quality seed, cowpeavarieties UPC 625, GFC-1 and GFC-4 may be cultivated due to rich N, P & Ca contents over check EC-4216. For green fodder purpose, GFC-4 and UPC 4200 varieties may be given priority for cultivation over check variety EC-4216 due to better productivity under central Gujarat conditions.

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