SHORT COMMUNICATION

Curcumin Content in Relation to Date of Harvesting in Turmeric (*Curcuma longa* L.)

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Curcuma longa L. (Zingiberaceae), commonly known as turmeric, is an important crop used in Indian traditional system of medicine and also as a spices. It grows well under partially shaded condition. India is the largest producer and exporter of turmeric in world market (Kumar and Shankar, 1998). Andhra Pradesh, Tamilnadu, Orissa, Maharashtra and Assam are major states for turmeric production. Its rhizomes are used as condiments, spices, natural dye and in pharmaceutical, confectionery and food industries, As medicine, it is commonly being used for several aliments (Raghunath and Mitra, 1982, Chauhan *et al,* 1999). Yellow colour in turmeric is due to the presence of crystalline matter called curcumin, a bis-diferuloyl methane, which makes it suitable for food, confectionery and cosmetics. The curcumin content is dependent on developmental stages and selection of suitable turmeric of genotypes. Very little work has been done to breed high yielding, high curcumin varieties. The present study is an attempt to determine the curcumin content in relation to different developmental stages (harvesting) in a crop grown on sodic soil.

The experiment was conducted on sodic soil of Banthra Research Station of the Institute (longitude 80°45'–80°54'E and latitude 26°45'-26°45'N at 129 m above sea level) in 2^2 factorial randomized block design with 4 replications in 1998-99 and 1999-2000. The experimental site is representative of alkali soil and represented by high pH (8.5) with electric conductivity (EC) upto 2.0 dsm^{-1} and poor aeration due to high exchangeable sodium percentage (ESP 20%). Fertilizers at the rate of 90 kg nitrogen, 60 kg phosphorus and 60 kg potash per hectare were applied. Spacing was kept 0.5 x 0.2 cm^2 as inter crop in popular planted during 1988-1989. Normal cultural practices were done through out the crop season. Harvesting of rhizomes was started on October and further diggings were done at the interval of 15 days to estimate curcumin and mositure contents.

Moisture content was estimated following official and standardized methods of analysis (Anonymous, 1994) while the curcumin content was estimated following the method of Chauhan *et al.* (1999).

To study the effect of different harvesting on curcumin content, the mean data was analysed following 2^2 factorial experiment (Panse and Sukhatme, 1961).

Table 1. Analysis of variance of moisture and curcumin content in *C. Longa* L.

Source	df	Moisture content	Curcumin content (%)
Replications	3	0.16	0.05
Treatment	15	2.03	1.45**
(i) Varieties (V)	1	1.65 NS	0.08 NS
(ii) Date of digging (D)	7	1.78 NS	1.69**
(iii) V x D	7	1.99 NS	0.02 NS
Error	45	0.76	0.106

** = significant at 1% probability level, NS = non-significant

Analysis of variance in 2^2 factorial design and mean of two genotypes (BRS-1 and BRS-2) at different harvesting stages are presented in Table 1 and 2 respectively. Variance in curcumin due to different dates of digging(D) was significant indicating much variation in curcumin content in different development stages. However, for moisture content no significant difference was noticed. Interaction effects VxD was also not significant for both the characters.

Curcumin content ranged from 3.65 to 6.01 per cent in BRS-1 and 3.70 to 6.08 percent in BRS-2 with arithmetic mean of 4.92±0.34 and 5.07±0.33 per cent respectively. In general curcumin content was found increasing in each subsequent harvesting. Comparing with general mean, it was significantly higher in rhizomes harvested during January and February. This indicates that synthesis of curcumin was maximum at maturity and thus January and February may be recommended

Table 2. Moisture and curcumin content in *C. Longa* L.

Date of Harvesting	Moisture content (%)			Curcumin content		
	BRS-1	BRS-2	X±SE	BRS-1	BRS-2	X±SE
28.10.98	78.95	80.02	79.49±0.54	3.65	3.70	3.67±0.02
13.11.98	76.57	79.89	78.23±1.66	4.13	4.15	4.14±0.01
28.11.98	79.68	79.91	79.80±0.10	4.25	4.58	4.42±0.15
12.12.98	77.15	77.70	77.43±0.28	4.64	4.72	4.68±0.04
27.12.98	77.64	77.70	77.67±0.02	4.91	5.37	5.14±0.23
11.01.99	79.69	78.54	79.12±0.58	5.82	5.90	5.86±0.04
11.02.99	75.68	79.10	77.39±171	5.98	6.05	6.01±0.03
26.02.99	79.90	77.53	78.72±1.18	6.01	6.08	6.05±0.03
±SE	78.16±0.57	78.80±0.38	78.48±0.33	4.92±0.34	5.07±0.33	4.99±0.32

		Selection Parameters	
1.	Heritability (%)	63.46	81.25
2.	Genetic advance	1.25	1.33
3.	Genetic advance in per cent of mean (%)	1.60	26.82

as an ideal period of harvesting in the Indo-gangetic plains of India. Among the two selections curcumin was higher in BRS-2 and BRS-1. However, the difference was not very significant. Earlier, Lynrah *et al,* (1998) noticed a wide range in curcumin content (0.08-8.64 per cent) among 25 genotypes with average of 3.96 per cent while Chauhan *et al,* (1999) reported total curcuminoid upto 2.38 per cent and 2.37 per cent estimated through spectrophotometric and HPLC methods respectively.

For mositure content no regular trend was found in different dates of harvesting in both the genotypes. It ranged from 75.68 to 79.90 per cent in BRS-1 and 77.53 to 80.02 per cent in BRS-2 with average mean of 78.16±0.57 and 78.80±0.38 per cent respectively. The moisture content was less variable and almost similar in all the diggings which also confirms the non-significant 2^2 analysis (Table 1) for moisture content.

Heritability for curcumin content was 81.25 per cent while for moisture content it was 63.46 per cent. Though the heritability was high for both the characters under study but high heritability coupled with high genetic advance (26.82 per cent) was noticed for curcumin content. This suggests that curcumin content may be increased through clonal selections. High heritability and genetic advance were also reported (Lynrah *et al,* 1998, Pathania *et al,* 1988).

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