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DORMANCY RELATED CHANGES IN INDIVIDUAL PROTEIN AND AMINO ACID CONTENTS IN *DIOSCOREA ALATA* AND *CURCUMA LONGA*

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Protein bound amino acids were extracted, identified and estimated using paper and thin layer chromatographic techniques in *Dioscorea alata* and *Curcuma longa* at weekly intervals from the day of harvest until sprouting commenced. Eleven amino acids were identified from the protein hydrolysate of both *D. alata* tubers and *C.longa* rhizomes during the dormant period while the latter had the amino acid serine additionally. The pattern of increase in individual amino acids content exhibited two distinct stages viz., the initial stage of dormancy marked by a slow and gradual increase, and the final stage before dormancy break marked by a rapid increase in amino acid contents.

Keywords : Amino acids; *Curcuma longa; Dioscorea alata*; Dormancy.

Dormancy inducing proteins are reported to be synthesised continuously until dormancy break[1]. Sprouting requires protein synthesis and it is promoted when synthesis of dormancy inducing proteins decreased.

The involvement of two counteracting systems - one dormancy inducing and another dormancy breaking - in protein synthesis and in regulation of dormancy was discussed by Tanno and Okagami[2]. The present work reports the changes in the content of individual amino acids during dormancy in the tubers of *Dioscorea alata* and in the rhizomes of *Curcuma longa.*

Healthy *Dioscorea alata* L. tubers and *Curcuma longa* L. rhizomes were selected as seed materials and were planted in the Botanical garden of VHNSN College. Undamaged tubers / rhizomes were selected after harvest and they were stored in special storage chamber kept at 28 ± 2°C (humidity 50-60%) and sprouting time was recorded.

During the dormant period of *D. alata* tubers (56 ± 4 days) and *C.longa* rhizomes (70 ± 5 days), protein amino acids contents were studied at an interval of 7 days from the day of harvest till the day of sprouting.

Protein bound amino acids were extracted and were identified using paper and thin layer chromatographic technique following the method of Smith and Steakins[3]. The quantitative estimation of individual amino acids was followed by the method of Esser[4] with slight modifications.

The developed silica gel plates were sprayed with 0.5% ninhydrin in acetone and then maintained for 105 min. at 70°C. The spots were immediately scrapped off and mixed separately with 4 ml of 0.5% Cadmium acetate in Methanol and brought into suspension by a current of air. After 2hr the suspension was again formed and centrifuged at 600 rhm. The clear solution was measured at 494 nm in a Spectronic-20. The amino acid content (mg/g protein Dr.wt) was quantified.

In both *D. alata* and *C.longa* the

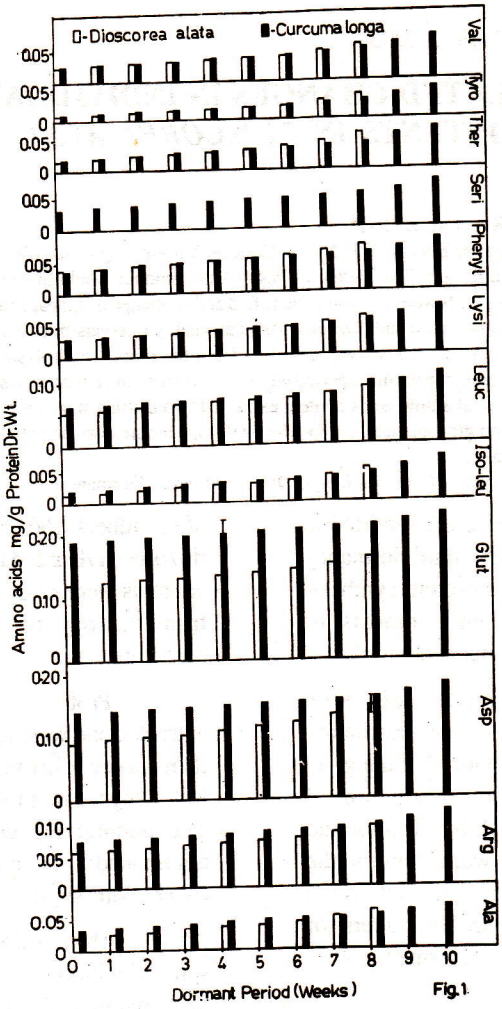

Fig.1

content of essential amino acids like leucine, phenlyalanine was high as reported earlier[5], but the content of aspartic acid and glutamic acid was still higher and the content of another essential amino acid threonine was distinctly lower. While tyrosine, isoleucine and threonine exhibited more than 200 per cent increase in content during the entire dormant period. Alanine, lysine and valine showed 100% increase in content. In *C.longa* additionally serine was also present and it along with phenylalanine showed more than or nearly 100 per cent increase in content (Table 1 & Figure 1).

The content of tyrosine, alanine, threonine and valine started increasing from the fourth week itself, whereas lysine and phenylalanine showed an increase in content

Table 1. Percentage increase of protein amino acids during different dormant periods in tubers of *Dioscorea alata* L. and rhizomes of *Curcuma longa* L.

Amino acids	*D. alata*						*C. longa*					
	Dormant period (weeks)											
	0*	4	5	6	7	8	0*	6	7	8	9	10
Alanine	0.022	73	82	105	141	182	0.035	46	49	60	77	98
Arginine	0.060	20	25	30	43	58	0.077	20	23	30	40	55
Aspartic acid	0.090	21	28	34	47	62	0.140	10	11	14	21	29
Glutamic acid	0.122	11	13	17	23	31	0.190	9	11	12	16	21
Isoleucine	0.015	87	100	127	173	247	0.021	81	90	119	171	229
Leucine	0.053	28	32	38	51	68	0.063	24	27	41	57	74
Lysine	0.029	38	45	55	79	107	0.029	62	72	93	124	159
Phenylalanine	0.038	32	39	50	68	89	0.036	56	61	69	92	125
Serine	-	-	-	-	-	-	0.031	52	58	71	94	132
Thereonine	0.018	66	89	117	156	217	0.020	80	95	110	165	225
Tyrosine	0.008	113	150	175	263	375	0.010	130	160	200	280	380
Valine	0.023	52	65	74	104	143	0.025	64	80	100	136	184

* amino acid content expressed in mg/g protein Dr. wt.

towards dormancy break. Significantly glutamic acid content did not change appreciably. This pattern of change in content of individual amino acids indicated the stable dormant period for *D.alata* tubers and *C.longa* rhizomes which is 4 weeks and 6 weeks respectively. This is corroborated by our earlier work on protein profiles during dormancy of *D.alata*[6]. Further work involving amino acid analyser would help to characterize proteins based on aminoacids and would bring to light the specific proteins involved in the induction and breaking of dormancy.

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