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## BIOCHEMICAL STUDIES OF SOME PLANT ACANTHACEAE FAMILY PERISTROPHE BICALYCVLATA (Nees) AND ADHATODA VASICA (Nees)

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### ABSTRACT

Protein and soluble nitrogen were estimated in soaked seed and seedling and that show there is higher ratio of protein/soluble nitrogen in both plants *Adhatoda vasica* (Nees).and *Peristrophe bicalyculata* (Nees) i.e. seed and seedling in the separation of amino acid by paper chromatography show on hydration the amino acid and separated in soaked seed but it is immediately utilized in synthesis of protein as soon as seedling so free amino acid are present in seedling than seed.



**KEYWORDS:** Biochemical, Plants, Protein and Nitrogen.

### INTRODUCTION

After germination problem of development and growth can be studied in number of different ways but basically there are two major type of approaches viz. (1) morphological and (2) physiological and biochemical. We find a further dichotomy of approach on one hand a considerable knowledge has been acquired about the role of hormones as internal factor controlling growth development on other hand the profound importance of environmental factor in the regulation of some of the major phases in the plant life cycle, although there is a considerable evidence that a number of environmental influences are mediated through effects on the levels and distribution of hormones within the plants.

Nitrogen being essential constituent of proteins chlorophyll and many other compounds of great physiological importance in plant metabolism. Nitrogen is the basic element of amino acid proteins. Study of metabolism is an important aspect of plant physiology.

### MATERIAL AND METHODS:

#### Biochemical studies:

(1). Nitrogen estimation: protein and soluble nitrogen were estimated by the usual (TCA) Trichloro acetic acid precipitation of proteins and micro-kjeldhal determination (Thimann & Laloraya 1960 perie 1955).

(2). extraction of various soluble fraction, 80% Alcoholic soluble fraction.

(a). extraction of soluble fraction: The extraction procedure was followed as described by Steward, Wetmore, Thomson and Nitsch (1954) soaked seeds and seedlings.

(b). chromatographic separation of Amino-acid and amides: To obtain a complete resolution of the diverse amino acid and amides, two dimensional, ascending chromatographic technique as described by Cousden, Gorden and Martin (1944).

**RESULT AND DISCUSSIONS :**

The estimation of soluble protein nitrogen was done by micro-jeldhol method. Amino-acid as constituent of proteins play the most important role in those changes in the present study. The qualitative estimation of amino-acid was done by the method of paper chromatography.

In present study the protein and soluble nitrogen was estimated in seeds, seedling of *Peristrophe bicalyculata* and *Adhatoda vasica*. The data given Table.- 1,

Alcoholic extract of seed & seedling was prepared and separation of amino- acid was done by two dimensional paper chromatography. The Table-2 and Fig.-1. Show the presence of various amino-acid in seed and seedling of *Peristrophe bicalyculata* and *Adhatoda vasica*.

**Table 1: Estimation of protein and soluble nitrogen**

S.No.	Plant part	Weight in milligram							Protein soluble Nitrogen ratio	
		Fresh weight	Total Nitrogen	Protein Nitrogen	Soluble Nitrogen					
			A.v.	P. b.	A.v.	P.b.	A.v.	P.b.	A.v.	P.b.
1	Soaked seeds	1000	3.92	3.5	2.45	2.187	1.47	1.313	1.6	1.6
2	seedling	1000	6.3	17.5	3.937	10.937	2.363	6.563	1.6	1.6

**Table-2 . showing the presence of various amino acid and amides in soked seed and seedling**

S.No.	Name of amino acids and amides	Soaded seed		seedling	
		<i>Adhatoda vasica</i>	<i>Peristrophe bialyculata</i>	<i>Adhatoda vasica</i>	<i>Peristrophe bicalyculata</i>
1.	Leucines	+	-	-	-
2.	Phenylalanine	-	-	-	-
3.	Valine	+	+	-	-
4.	γ-amino butyric acid	-	+	-	-
5.	tyrosine	-	-	-	-
6.	proline	+	+	-	-
7.	β-Alanine	-	-	-	-
8.	Alanine	-	-	-	-
9.	Gluatamic acid	-	-	-	-
10.	Threonine	-	-	-	-
11.	Arginine	+	+	+	+
12.	Aspertic acid	-	-	-	-
13.	Unidentited	-	-	-	-
14.	Serine	-	-	-	+
15.	Glycine	-	-	-	+
16.	Asparagine	-	-	-	-
17.	Glutamine	-	-	-	-
18.	Histidine + Lysine	-	-	-	-
19.	Cysteic acid	-	-	+	-

A.vasica Seed                      A.vasica Seedling                      P.bicalyculata Seed                      P.bicalyculata Seedling  
 Explanation of Fig. :1

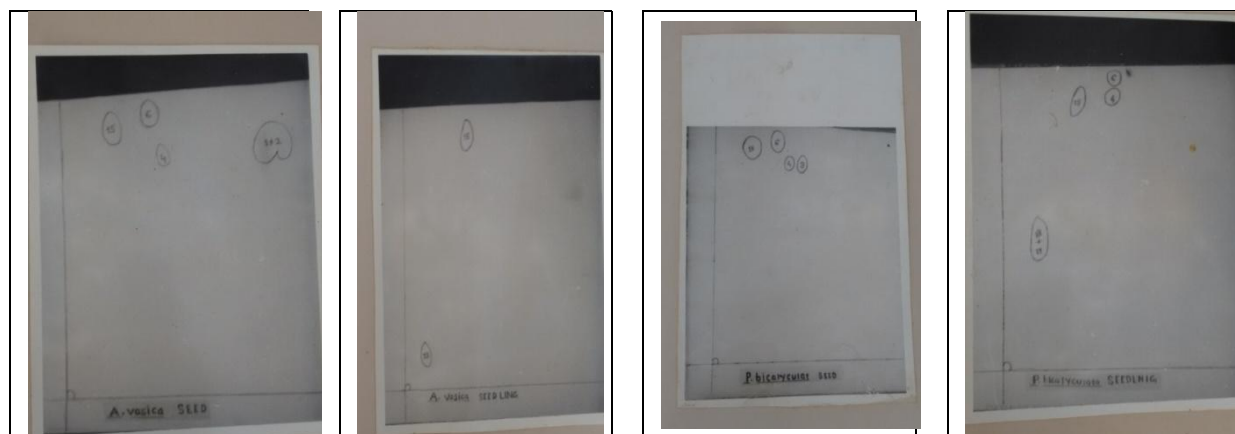
chromatogram depicting amino acids/amides seed and seedlings.

Bouner and Vauner (1965) concluded that during germination of seeds proteins are hydrolyzed in the endosperm of cotyledons into peptides and amino acids which are translocated to growing axis. The maximum rate of hydrolysis of storage proteins coincided the maximum rate of growth of seedling; Chenoy (1964) has shown that during the germination of peanuts seeds, over 60% of dry weight of cotyledons and 70% of the proteins is depleted. Oota et al (1953) also concluded that the reserve proteins of the seeds are broken down with concomitant rise in amino acid and amides followed by denovo protein synthesis in the growing part of the embryo. Thus the first observable change during germination is change in the protein and soluble nitrogen ratio (Klein 1955) he clearly showed that there is an increase in soluble nitrogen only in those seeds of Lettuce which germinate and not in there which remain dormant.

The ratio of protein/ soluble nitrogen is an important criteria to predict the growth pattern of seedling. (Laloraya 1969) the results obtained in the present study of *P. bicalyculata* and *A. vasica* clearly showed, a higher percentage of protein/ soluble nitrogen ratio exists during germination in the soaked seeds and seedling in both these sp. of family Acantheseae there result confirms the earlier work of Banerji and Loloraya (1967) Chatterji (1975) Patel (1985), Dubey (1987) and Thakur (1992).The result of *P. bicalyculata* and *A. vasica* also reveals that during translocation more nitrogen retained in seedling then in seeds.

Ranjan & Laloraya (1960) analysed the soluble fraction of protein nitrogen in tobacco leaves and identified presence of 21 amino acid. Klein (1955) studied amino acid content of Lettuce. Seed during germination and found the presence of 12 amino acid and amids. He found that quantity of these amino acid varied during germination of Lettuce, seeds, while most of the amino acid increased quantitatively during first three days of germination.

Kashinathan et al. (1965) studies amino acids in *Papaya* and Patel (1985) in studied the amino acids in *Papaya* and obtained 13, Dubey (1987) studies the amino acids in *Hypoxis aurea* and obtained 13 amino acids.



In the present study of *P. bicalyculata* and *A. vasica* there are 6 amino acids in each plant. In *P. bicalyculata* there 4 amino acids in seed and only 2 in seedling that show the protein synthesis start immediately after the formation of seedling so the amino acid are utilized in the synthesis where and *A. vasica* there are 4 free amino acid in seed and only 2 in seedling this indicate that pattern of metabolism is same in both the plants and very little free amino acids are available during soaking period of the seed and that too is utilized immediately after seedling formation.

#### REFERENCE:

- Banerji. D, and M.M. Loloraya (1967) correlative studies in plant growth & metabolism plant Phy. Vol. 42 No. 5 may 1967-623-627.

- Bonner, J. & J.E. Varner. 1965 plant Biochemistry Academic press New-York.
- Chatterji, D. 1975 studies on Physiology and Autecology of certain in plants Ph.D thesis A.P.S. University Rewa (M.P.).
- Chinoy, L.L. 1964 Ascorbic acid nucleic acid protein metabolism concept of flowering plant Bot. Congr. Abst. P. 347.
- Cousden, R.S. A.H. Gorden. AL.P. Martin 1944 Qualitative analysis of proteins A partition chromatographic method using paper Biochem. L. 38: 224.
- Dubey S- 1987 Ecophysiological studies on Hypoxis aurea Lour.Ph.D Thesis A.P.S.University Rewa (M.P.).
- Klein. A. 1955 Seed germination Ann. Rev. Pl. Physiol. 13:431-464.
- Lalorya, M.M. 1969 presidential address in plant physiological society.
- Oafa, Y.R. Pall. & S. Osawa 1953 Lour Biochem. Japan 40:649.
- Oata. Y.R. Fuji & S.Osawa 1953 Jour. Biochem. Japan 40:649.
- Patel, R. 1985 studies on physiology of growth Flowering and fruiting in *Carica papaya* Linn Ph.D Thesis A.P.S.University Rewa (M.P.).
- Perie, N.W. 1955 proteins in modern method of plant analysis 4<sup>th</sup> Ed Peoch. K. and M.V. Tracy supringer Verlag pub. Germany.
- Ranjan, R.& M.M. Laloraya 1960 metabolism of isolate leaves in tobacco pl. Physiol. Vol. 3521 (501).
- Steward F.C., R.H. Wetmore, J.F. Thomson and J.P. Nitsch 1954.Amaer. Jour. Botany 41:223.
- Thakur, D. (1992) Ecophysiological studies on *Hyptis bsuaveotens* family labiatae thesis A.P.S.University Rewa (M.P.).
- Thimann, K.V. & M.M. Laloraya 1960 change in nitrogen in Pea Stem section under the action of kinetin. Physiol. Plant 13:165.



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