



Biochemical and Medicinal Importance of Macrotyloma Uniform – A Medicinal Plant

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ABSTRACT

Macrotyloma uniflorum Linn. is a member of the family Fabaceae. It is an annual crop which is cultivated in many parts of India. The amino acids/amides were estimated in the soaked seeds and characteristic variation was observed in the seeds. It indicates a metabolic change that takes place during the process of germination. During the present investigation 13 amino acids/amides are obtained. Considering the medicinal importance of M. uniflorum a proper policy should be formulated by the govt. to improve its cultivation and supply to Ayurvedic medicine industries and the policy framed should be such that it benefits should take the tribals and Weaker sections in sum are the other way.

Keywords- - Macrotyloma uniflorum, Medicinal importance, Aminoacids.

INTRODUCTION

Macrotyloma uniflorum Linn. is a member of family *Fabaceae*. *M. uniflorum* is called horse gram, madras bean, poor man's pulse and kulthi (Sinha 1977). It can be grown in a range of soil. It is drought tolerant but do not tolerate flooding nor frost and require an average annual temperature ranging from 18-27°C. *M. uniflorum* is a short day and day neutral plant maturing 120-180 days after planting. Resources poor farmers in marginal, drought prone areas of India sow horse gram late in the rainy season. Sowing and early crop growth coincides with declining establishment is often poor and yields are low. Horse gram is a neglected crop and farmers. Hence on summarizing the whole situation, it was though worthwhile to make some investigations regarding a few aspects of its Biochemical study and Medicinal Importance. Nitrogen being essential constituent of proteins chlorophyll and many other compound of great physiological importance in plant metabolism. The use of plant hormones has resulted in some outstanding achievements in the seed germination, growth and development of plants. The major class of hormones. Gibberellins, Cytokinin, Auxins and ethylene are associated with seed germination physiology. The medicinal plant have an important role in the production of medicines and cannot be overlooked because of their competitive rate e.g. cortisone and other hormones which are useful for arthritis, rheumatism have been prepared from the

adrenal cortex of the animal meat and because of its high cost it could not reach up to the common man and search have to be carried out for finding a suitable alternative. Similarly a number of plants are being utilized for the preparation of antifertility and anti-cancer drugs and in a country like India, where population control is a must, such types of drugs derived from plant materials will play a significant role in the socio-economic problem of the country. Vigorous researches have therefore, to be carried out on plant sources which can be used as anti-cancer drugs. A survey carried out by Gujarat State in 1968 has revealed the presence of about two thousand efficacious drugs of which about five hundred are newly discovered.

Plants have shown great promise in the treatment of intractable infectious disease (Idu et al., 2007). Even today plant materials continue to play major role in primary health care and higher plant have been shown to lie potential source for the new antimicrobial and chemotherapeutic agents with possible novel mechanism of action (Singh, and Kumar 1984, Kiritkar, and Basu. 1998) Pulse can furnish an eminent source of dietary protein constituent for human consumption as a big benefit in a balanced energy and protein diet for those who lived in developing countries especially when intake from animal are fish source is limited or insufficient.



Fig-1: Field view of crop *M. uniflorum* Plant.

MATERIAL AND METHOD



Fig-2: Seeds



Fig-3: Flowers



Fig-4: Seedlings

BIOCHEMICAL STUDY

Metabolic changes at the time of germination of seeds have fascinated a good number of workers in the past (Hunt 1951, Steward et al. 1954, Miller 1957, Bhardwaj, 1962, Mayber and Poljakoff-Mayber 1962 etc.) at the time of germination of seed. Seed germination initiated by hydration and activation of enzymes, is accompanied by break down of reserve food material, its transportation resynthesize and utilization before new substances are synthesized on account of photosynthesis.

Nitrogen and amino acids as constituents of protein play the most important role in these

changes. Total nitrogen, protein and soluble nitrogen of soaked seeds and seedling were estimated in the present investigation. Chromatographic methods are followed to assess such changes. (Partridge and Westwall, 1948, Bidwell et al., 1951, Steward et al., 1954). Recently, a good review of the same have been given by (Patel 1985, Dubey 1988, Thakur 1992, Sharma 1992, Pandey 1992, Rais 1992 and Pandey 1996).

Estimation of Nitrogen:

Total nitrogen, Protein nitrogen and soluble nitrogen of soaked seeds, seedlings were estimated. Data are given below:

Table-1: Nitrogen contents of *M. uniflorum*.per 500 mg. of fresh weight

Seed / Seedling	Fresh weight gms.	Weight in milligram's			Protein soluble/ Nitrogen ratio
		Total Nitrogen	Protein Nitrogen	Soluble Nitrogen	
Seeds	500	38.852	30.82	8.032	3.83
Seedlings	500	45.703	35.08	10.628	3.30

Values of total nitrogen calculated by adding values of protein and soluble nitrogen.

The results reveal that total nitrogen is maximum in seedlings than seeds. The protein soluble nitrogen ratio is also high in seedlings than seeds.

Qualitative Assay of Amino Acids and Amides in *M. uniflorum* seeds and seedlings:

Amino acids as constituents of protein show important role in the growth and development of plants, in present study. The qualitative estimation of amino acids was done by method of paper chromatography as described in chapter material and Methods.

Alcoholic extract of presoaked and soaked seeds and seedlings were prepared. The chromatograms were developed and shown in Fig 5, 6 and Table 2, 3. The table shows the presence of various amino acids in seeds and seedlings.

Table-2: Showing presence of amino acids and amides in soaked seeds and seedlings (untreated) of *M. uniflorum*.

S. No.	Amino acids and amide	Position of amino acids and amides in reference chromatogram	Seeds	Seedlings
1.	D.L. Alanine	1	+	-
2.	D.L. Buteric acid	2	+	-
3.	Arginine	3	+	+
4.	Cysteic acid	5	+	+
5.	L. Glutamic acid	8	+	+
6.	Hydroxy proline	11	+	+
7.	Isoleucine	12	+	-
8.	L. Leucine	14	+	-
9.	Phenyl alanine	18	+	-
10.	Threonine	21	-	+

11.	Tryptophane	22	+	+
12.	Tyrosine	23	+	+
13.	Valine	24	+	-

(+ = Present, - = Absent)

Table-3: Showing presence of various aminoacids and amides in soaked seeds and seedlings (treated) of *M. uniflorum*.

S. No.	Amino acids and amide	Position of amino acids and amides in reference chromatogram	Seeds	Seedlings
1.	Arginine	3	+	-
2.	Aspartic acid	4	+	-
3.	Cysteic acid	5	-	+
4.	Glutamic acid	8	-	+
5.	Glycine	9	+	-
6.	Histidine	10	+	-
7.	Hychoy Proline	11	-	+
8.	L. Leucine	14	+	+
9.	Lysine	15	+	-
10.	B. Phyenyl alanine	18	+	-
11.	Serine	20	+	-
12.	Threonine	21	-	+
13.	Tyrosine	23	-	+
14.	Valine	24	+	-

(+ = Present, - = Absent)

Amino acid constituent of protein shows important role in the growth and development of plants. In the study the quality estimation of amino acids was done by paper chromatography of hormone treated seeds and seedlings.

Pictures of Table

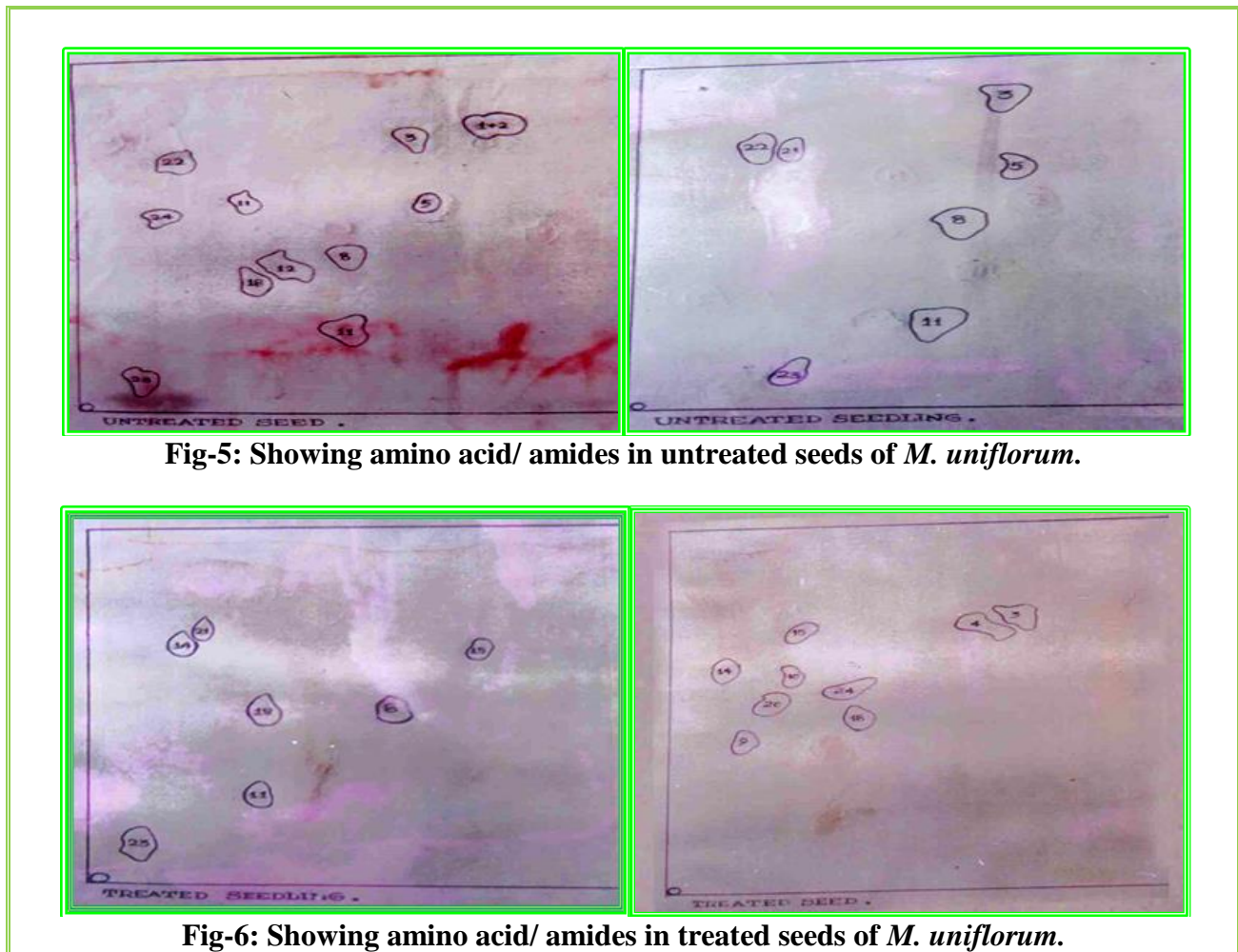


Fig-5: Showing amino acid/ amides in untreated seeds of *M. uniflorum*.

Fig-6: Showing amino acid/ amides in treated seeds of *M. uniflorum*.

Medicinal Importance

Medicinal herbs are the local heritage with global importance. Medicinal herbs have curative properties due to presence of various complex chemical substance of different composition. It has been always been a closed association between plants and human being through ancient time and till date.

Prior to world war second, a series of natural products isolated from higher plant became clinical agents and a number are still in use

today. The use of plant as medicinal goes back too early man. Certainly the great civilization of the ancient Chinese, Indians and North Africans provided written evidence of man ingenuity in utilizing plant for the treatment of wide variety of disease. The important of medicinal plant and traditional health systems in solving the health care problems is gaining increasing attention and because of this resurgence of intrust, the research on plant of medicinal importance is rapidly increasing at the international level. Medicinal plants have long been the subjects of human curiosity

and need. It is estimated that there are about 2500000 species of higher plants and the majority of these have not been examined in detail for their pharmacological activities (Kawsar et al., 2003, Kawsar et al., 2008). Plants are the natural reservoir of many antioxidants (Reddy 2005, Idu 2007, George 1974,).

M. uniflorum is famous for its medicinal uses because different parts of the plant are used for the treatment, of heart condition, asthma, bronchitis, leucoderma, urinary discharge and for treatment of kidney stones (Ghani 2003). Literature survey showed that Dolichin Aohd B, Pyroglutaminyl/ glutamine along with some flavonoids were isolated from this plant (Saksena 1961, Salgar et al. 1990, Singh 1984). Indeed, *M. uniflorum* could play a role of antioxidation (Reddy et al., 2005). *M. uniflorum* has the greatest potential for further utilization as nutraceuticals, forage and food for malnourished and drought prone areas of the world (Morris 2008) Herbal medicine is part and parcel of the much needed health care in most of the developing countries including India.

The seeds of *M. uniflorum* are utilized as cattle feed. However it is consumed as whole seeds by a large population in rural area of southern India the seeds of *M. uniflorum* are used in traditional medicine as bitter, thermogenic, astringent, anthelmintic, diaphoretic, diuretic, expectorant, ophthalmic and tonic. The seeds are also useful for hemorrhoids, tumors, bronchitis, splenomegaly and in asthma.

M. uniflorum is usually grown for livestock and human food as a pulse (Sinha 1977). The phytochemical, D-pinitol is found in *Macrotyloma* seed (ILDIS 1994) and identified to reduce post prandial (after a meal) blood glucose in patients with type two diabetes (Kang et al. 2006). Insoluble

dietary fibers are required for normal intestinal function in humans. Extracts from *M. uniflorum* seeds had significant activity against *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa* (Gupta et al. 1970). *M. uniflorum* could play a role of antioxidation as well (Reddy et al. 2005) discovered that when *M. uniflorum* plants were exposed to toxic level of lead, several enzymes showed a pivotal role against oxidation injury. *M. uniflorum* also an excellent source of iron. Seeds have higher trypsin inhibitor and hemagglutinin activities and polyphenols. Educing cooking and roasting have been shown to produce beneficial effects on nutritional quality. These are much better for any unhealthy person suffering from jaundice or swelling of body by water. Obese persons can also use horse gram strengthens food for people with iron deficiencies. It is tastier also. It keeps body warm in winter season as well. Apart from this one of the major importance of *M. uniflorum* seeds in curing the disease urolithiasis. Urolithiasis is a major health problem with its high morbidity, high cost of management and potential for endstage renal disease. The aim of our study is to cure and prevent the recurrent stone formation. Herbal drugs claim many promising remedies in urolithiasis. It was found that the extract of *M. uniflorum* dissolved the performed stones. It is found that the alcoholic extract of *M. uniflorum* shows a comparable anthelmintic activity as that of reference control, piperazine citrate. The anthelmintic activity of the seeds of *M. uniflorum* was found to have comparable effect with that of standard piperazine citrate. Being a freely available legume it is one of the best herbs that can be used as nutraceuticals. It can be used as dietary food for in faults to eradicate worms, used as forage; its leaves also contain additional health enhancing traits.

CONCLUSION

The plant is highly useful for various diseases. Considering the medicinal importance of *M. uniflorum* proper policy should be formulated by the govt. to improve its cultivation and supply to Ayurvedic medicine industries and the policy framed should be such that it benefits should take the tribals and weaker sections in sum are the other way. Nitrogen being essential constituent of proteins chlorophyll and many other compound of great physiological importance in plant metabolism.

To conclude finally *M. uniflorum* has a great ecological as well as economic significance. The species should be paid specific attention for in farming and management to have better ecological as well as economic in returns.

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