Macrotyloma uniflorum Lam. A TRADITIONAL CROP OF KUMAUN HIMALAYA AND ETHNOBOTANICAL PERSPECTIVES

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Abstract
Horse gram (Macrotyloma uniflorum Lam.) is a popular pulse, locally known as Gaheth belongs to the family Fabaceae that still remain an under exploited legume crop. It is usually grown up to the area at 1800 msl. Horse gram seeds are rich in protein and consumed in majority by poorest section of the society. In Uttarakhand it is grown in large extent both region of Kumaun and Gadhwal. It is cultivated as major pulse crop in villages of Almora, Bageswar, Nainital, Pithoragarh and Chamoli. Macrotyloma is a nutritious food legume it is cultivated for its seed and mostly eaten as a dal. It is rich in protein, iron, calcium and polyphenols. Different part of the plants are used for the treatment of heart disease, asthma, bronchitis, urinary discharges and for treatment of kidney stones.

INTRODUCTION
Horse Gram is scientifically known as M. uniflorus. It also goes by the name Dolichos uniflorus due to a lot of confusion in the Dolichos category the right name for the horse gram scientifically is Macrotyloma uniflorum. According to USDA (United States Department of Agriculture) database both the name's Macrotyloma uniflorum and Dolichos uniflorus mean the same. Horse Gram is native to the old world tropics. It was probably domesticated in India where its cultivation known since prehistoric times. Now a day's horse gram is cultivated as a low grade pulse crop in Southern Asia mainly from India to Myanmar, it is also grown as a forage and green manure in many tropical countries especially Africa horse gram is recorded, to occur wild or neutralized in Central, East and Southern Africa. Horse gram (Macrotyloma uniflorum Lam.) is a popular pulse, locally known as Gaheth belongs to the family Fabaceae that still remain an under exploited legume crop. It is usually grown up to the area at 1800 msl. Horse gram seeds are rich in protein and consumed in majority by poorest section of the society.

BOTANICAL DESCRIPTION
Climbing herb with slam up to 60 cm tall with a perennial fibrous rhizome stem annual densely covered with whitish hairs. The tap root produces a branched root system with smooth, rounded nodules. Nodules containing nitrogen fixing bacteria. Macrotyloma uniflorum is an erect, sub-erect or trailing, densely hairy annual herb. Compound, alternate, Trifoliolate, stipules lanceolate petiole 1-7 cm. long leaflet ovate elliptical apex rounded to acute base rounded lateral leaflets a symmetric hairy to glabrescent on both surfaces. Flower Short only 6-12 mm. long. The flower is cream - yellow with purple spot in auxiliary racemes with 2 appendages at base. Flower zygomorphic, bisexual, Fruit is a linear oblong pod 3-8 cm.x4-8 mm. up curved towards apex acuminate, densely hairy. When young later mar sparsely so margins glabrous smooth or warty dehiscent 5-10 seeds. Seed size ranges 6-8 mm long and 3-4 mm broad smooth of which 100 seed weight is recorded 4gm. Seed trapezoidal oblong or somewhat rounded. pale to dark reddish brown speckled or mottled with black and orange brown or all black. Macrotyloma comprises about 25 species , most of which are restricted to Africa. 4 varieties have been distinguished. Macrotyloma uniflorum, M. stenocarpum, M. verrucosum and M. benadirianum

DISTRIBUTION
In India it is the most extensively grown pulse in south India, the maximum area being in Andhra Parades, Karnataka and Tamil Nadu. It is grown mainly to furnish feed and fodder for cattle and horse. It makes excellent hay and is suitable as green manure. (Seasonal crop Madras 1948, Hyderabad 1949).

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**STRENGTH**
Rapid summer growth
High seed yield
Drought tolerance

**SOIL**
Adapted to a wide range of soils from sand, gravels to clay, loam except highly alkaline type. Prey or near neutral soil but will grow down to 5.5 and up to about 8.0 tolerant of low to moderate salinity. It is draught resistant but cannot withstand water logging.

**CLIMATE**
Tropic and subtropical climate is ideal for its growth. In Uttarakhand it is widely distributed up to 1200m sea level. Annual rainfall 200-1000 mm. It can easily be grown as a dry crop under moderate rainfall not exceeding 87 cm. Best growth is produce dully hot moist weather with temperatures between 25-35°C common in the drier areas the growth rate declining markedly below 20°C it is completely intolerant of frost.

**SOWING AND HARVESTING**
Horse gram is propagated by seed. The sowing time of the seed is last week of June to first week of July. The plant attains flowers and fruits between Aug to Oct. The 1000 seed weight is 15-50 gm. The seed crop is sown broadcast or in rows 20-90 cm. Apart at a seed rate of 20-25 kg. /hec. The sowing depth is 1-2.5 cm. (Blumethal, M.J. Hilder and William R.J. 1989). In India horse gram is usually sown as a sole crop, but sometime it is intercropped with maize ground nut or castor. In Kumaun it is grown as a kharif Crop mixed with maize or finger millet.

It is also a valuable green fodder crop light grazing by sheep is permitted in the yield and green trimming are fed to cattle and sheep in some area's, Horse gram is grown with fodder and mixed crop and used as green feed. The crop comes into bearing in 4-6 months after sowing the leaves begin to dry and drop out the plant are uprooted dried and the seed thresher out by treading of bullocks and with the help of a stone roller. The seed are cleaned by winnowing and sifting. The average yield is 150-300 lb per acre a yield as high as 600 lb per acre has been obtained under favorable condition when grown for fodder as in north India it is harvested about 6 week after sowing.

**FOOD VALUE, USE AND MEDICINAL IMPOTANCE**
*Macrotyloma* is a nutritious food legume it is cultivated for its seed and mostly eaten as a dal. It is rich in protein iron, calcium and polyphenols. Green plant of horse gram valuable green manure horse gram that fail to meet food grade standard can be used as livestock feed, because of there high protein content and lack of digestive inhibitors. Husk dried leaves stems and residues can be fed to livestock. The fodder being rich in protein; it is widely used as a feed to animals and horses (B. G. Prakash et al. 2008).

**Traditional Medicinal Used**
- Help in eliminating kidney stones.
- Horse gram also helps in lowering cholesterol levels.
- Horse gram famous for its medicinal uses because different parts of the plant are used for the treatment of Asthma, Urinary Disorder and kidney stones.
- *M. uniflorum* could play a role in antioxidation (Reddy et.al. 2005).
- *Macrotyloma* has the greatest potential for further utilization as nutraceuticals forage and food for malnourished and drought prone areas of the world. (morris 2008).
- As a part of investigation on the medicinal plant of Bangladesh *M uniflorum* and isolated kaempferol -3-O-B-D-glucosid, B-sitosterol and stigmasteral was investigated (Kawsar et. al 2003) and recently reported the cytotoxicity assessment of this plant (Kawsar et. al. 2008).
- Horse gram water is prescribed for treating jaundice in Andhra Pradesh.
- It is famous for its medicinal use because different part of the plants are used for the treatment of heart disease , asthma, bronchitis urinary discharges and for treatment of kidney stones.(Ghani 2003)

**Chemical composition :**
Horse gram is a valuable protein supplement analysis of seed gave the following value.

**Table 1- Nutritional value (per 100 gm.) of different nutrient in horse gram.**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>57.3</td>
<td>gm.</td>
</tr>
<tr>
<td>Moisture</td>
<td>11.8</td>
<td>gm.</td>
</tr>
<tr>
<td>Fat</td>
<td>0.5</td>
<td>gm.</td>
</tr>
<tr>
<td>crude protein</td>
<td>22.0</td>
<td>gm.</td>
</tr>
<tr>
<td>Calories</td>
<td>321</td>
<td>calorie</td>
</tr>
<tr>
<td>Fiber</td>
<td>5.3</td>
<td>gm.</td>
</tr>
<tr>
<td>Mineral matter</td>
<td>3.1</td>
<td>mg</td>
</tr>
<tr>
<td>Iron</td>
<td>7.6</td>
<td>mg</td>
</tr>
<tr>
<td>Calcium-</td>
<td>0.28</td>
<td>mg</td>
</tr>
<tr>
<td>Nicotinic acid</td>
<td>1.5</td>
<td>mg</td>
</tr>
<tr>
<td>Carotene</td>
<td>11.9</td>
<td>IU.</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>0.39</td>
<td>mg</td>
</tr>
<tr>
<td>Vitamin B</td>
<td>0.42</td>
<td>IU.</td>
</tr>
</tbody>
</table>

The globulins of Horse gram account for nearly 80% of Nitrogen. They contain arginine (6.7% 1.7%) tryosian (6.68% 6.68%) Lysine (7.64%) but are deficient in cystine and Tryptophan. at 10% level of protein intake the biological value and digestibility coefficient are 66 and 73 respectively (Hith Bull, 1930, Niyogi at al 1931, Swaminathan 1937 Menon and Rao 1931).

**REFERENCES**
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