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HORSE GRAM (MACROTYLOMA UNIFLORUM): A REVIEW ON SUSTAINABLE AND NUTRITION APPLICATIONS

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ABSTRACT

Macrotyloma uniflorum (Horse gram) is a pulse that is an excellent source of nutrition. It can be grown in hostile environmental. It has the potential to treat a wide range of health problems, including G.I disorders, kidney stones, respiratory diseases, and anthelmintic requirements, horse gram has other therapeutic benefits which are not widely known. Renal calculus (nephrolith) is accumulation of dietary minerals. supersaturation, nucleation, development, accumulation, and retention inside the kidneys are some of the physicochemical events that lead to the complex formation of lithiasis. Various research reports and traditional applications suggest Macrotyloma uniflorum's importance in treating various illnesses, exhibiting anthelmintic qualities, and exhibiting hypoglycemia, hypolipidemic, and antibacterial actions. Numerous species of Macrotyloma uniflorum is reported with anti-lithiatic properties. The seeds having rich dietary antioxidants properties, are used to treat parasitic worms, bacterial and fungal infections, and hiccups. Additionally, the undigestible carbohydrate in horse gram helps to control diabetes, and seed's extracts have antihypercholesterolemic properties. Beyond its use in medicine, horse gram is known for being a crop that may be used as human food or as animal feed. The current review summarizes the beneficial nutritional content, its variables, pharmacological qualities, and potential applications as a functional or therapeutic meal for health benefits.

KEYWORDS: Horse gram, kidney stones, health benefits, nutraceutical, malnutrition, antioxidant.

INTRODUCTION

Food legumes are the second most remarkable crop category after cereals, which have been used as an essential part of human and veterinary dietary regimes due to their richness in protein for thousands of years (Maphosa et al. 2017). In the globe approx 50,000 plant species are known to be used as edible plants (Cheng et al.2015). Some unexploited native legumes, like horsegram, are pivotal against protein deficiency and are essential for the nutritional security of rural, tribal, and impecunious populations. It is widely used in India and Africa. This pulse is known to be originated in southwest India **(**Arora and Chandel et.al, 1992) Horse gram is a highly nutritious vegetable pulse crop with ethno-medical uses in India. According to its etymology, Gahot means "which destroys stone in initial stage". It has various reginal names (A. Thanga Hemavathy et.al, 2014 & Kaundal et al., 2019).

Table 1: Synonyms of Horse Gram.

S. No	Language	Name
1	Sanskrit	Kulattha
2	Bengali	Kurti-kalai
3	Tamil	Kollu
4	Telgu	Ullavallu
5	Malyalam	Muthira
6	Kumaon and Garhwal	Gahot

In addition to contributing substantially to rural households' diets during drought, famine, and the dry season these underutilized legumes often save the lives of millions of poor people in regions where maintaining food and nutritional security is one of the main concerns (Mayes et al. 2012; Bhartiya et al. 2015). To satisfy the growing demand for vegetable protein, more focus is on underused legumes in search of new alternative protein sources. In the world, various eatable crops are known for fulfilling the requirements of fiber, oil, food, and medicinal importance (Padulosi et al. 2006). Horsegram an underappreciated and neglected crop has enormous unrealized potential to help smallholder rural farming communities by maintaining the genetic resources required to address current and future environmental challenges as well as by supplying food, nutrition, and income. The horsegram, a prospective grain legume with outstanding nutritional and therapeutic qualities and greater climate resilience to withstand extreme environmental circumstances.

Table 2: Botanical Classification of Plant Horsegram (V. Agnihotri et al., 2021).

S. No	Classification	Specification
1	Kingdom	Plantae
2	Phylum	Tracheophytes
3	Class	Dicotyledons
4	Order	Fabales
5	Family	Fabaceae
6	Genus	Macrotyloma
7	Species	Uniflorum

Macroscopic Character

The microscopic characteristics of Horsegram is as follows (R.K. Chahota et., at 2013)

Table-3

S. No	Parameter	Specification
1	Hight	30-60 cm (alone) 60-110cm (as a climber with support)
2	Leaf Type Stipules Petiole	 Trifolate 7-10 cm 3-7 cm
3	Leaflet	Ovate, rounded at base, slightly acuminate
4	Flower	Short, sessile or subsessile 10-12 cm long
5	Seeds	6-7 per pod 6-8 mm long 4-5 mm broad

Fig. 1: Horsegram Crop.

Fig. 2: Horsegram Seeds.

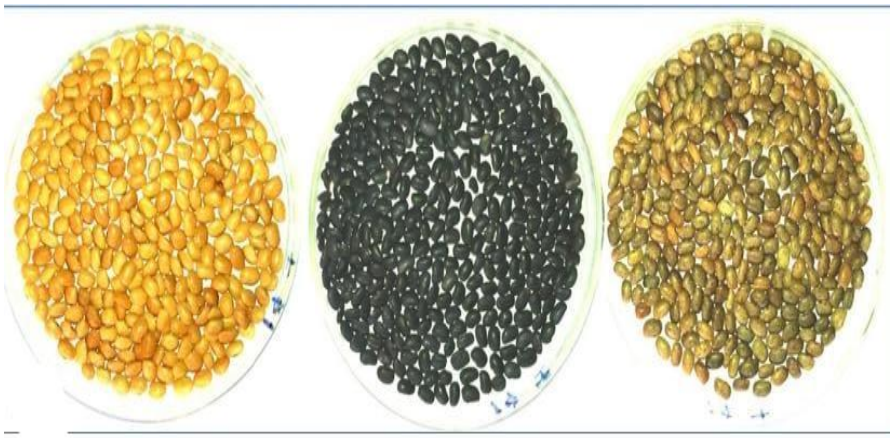

Fig. 3: Horse Gram seeds variety (J. P. Aditya et.,al 2019).

Geographical Source

Almost everywhere in the world, including temperate and sub-tropical zones that include East and Northeast Africa, Asia, especially India, China, the Philippines, Bhutan, Pakistan, Sri Lanka, and Queensland, Australia, it is one of the most significant unexploited food legumes (Blumenthal and Staplesz et.,al 1993 : Durga,et.,al 2012). In southern Asia, mostly from India to Myanmar, horsegram is planted as a low-grade pulse crop. In India it is cultivated in Himachal Pradesh, Karnataka, Orissa, Uttarakhand, Andhra Pradesh.

Nutrition and benefit

Nutrient-dense grain legumes, frequently known as the "poor man's meal," are particularly crucial in developing nations (Padmanabhan et.,L 2023). It is commonly known that horse gram contains a lot of protein along with several other essential components. This horse gram crop has a nutritional value that is similar to other commonly grown pulse crops in every aspect, with the significant addition of calcium, iron, and molybdenum. Horsegram is

cultivated as mixed or intercrop along with many cereals such as finger millet,little millet, sorghum and other (Krishna .,etal,2010). Despite being a good source of phytochemicals, dietary fiber, protein, and other micronutrients, horse gram seeds are often overlooked as a food legume. Consumers of them are mostly farmers in remote places and those with lesser incomes. According to proximate composition tests, germination of horse gram is a good source of protein and crude fiber. Horsegram plant offer benefits like prebiotics, good for intestine, colon and digestive system, astringent, diuretic, antioxidant, menstrual problem, leucorrhea and bleeding during pregnancy **(Ramteke et al., 2016)**

Table 4

Nutritional Information

Horsegram is rich in various nutrients like Amino acid, molybdenum, carotene, thiamine, riboflavin, niacin, vitamin C and below listed nutrients (S.K prasad et.'al 2014)

S. No.	Nutrient	Concentarion	Uses
1	Carbohydrate oligosaccharides, polysaccharides, starches and monosaccharides	51.9-60.9 %	Lower glucose release into blood stream
2	Protein	17.9-25.3%	
3	Lipid	0.58-2.06%	A potential strategy to lower the risk of Parkinson's and Alzheimer's disease is to balance the intake of essential fatty acids like linoleic acid and alpha-linolenic acid.
4	Dietary Fibre	28.8%	This dietary fiber is necessary to keep people's lower intestines functioning normally.health and colon physiology, as well as various therapeutic property.

Study suggested that pyroglutaminylglutamine, Dolichin A & B, and some other flavonoids were isolated form horsegram (Kawsar et al. 2009;Handa et al. 1990).Various phytochemical studies suggested that stigmasterol, β-sitosterol,Kaempferal-3-O-β-Dglucoside, and phenolic compounds that were isolated from horsegram shows antimicrobial & Cytotoxic activity (Kawsar et al. 2008). This plant contains soluble as well as insoluble fibres xylose, fucose, galactose, mannose, arabinose,glucose,uronic acid etc (Bravo et al.1999). The seed coat with low protein and high fibre can be useful in gastrointestinal health (Sreerama et al. 2010a, b).

Pharmacological benefits:

Lentils are well known for their importance in treatment & prevention of various condition cardiovascular disease, cancer, diabetes, obesity ,and GI disorders (Boye et al. 2010;

Kalogeropoulos et al. 2010).Horsegram various species shows medicinal properties like antioxidant, antidiabetic, antiulcer and antimicrobial activity. This can be use for people suffering from jaundice, as a part of diet for weight loss and to regulate boy temperature (Ramesh et al. 2011). The constituents present in the seed namely Linoleic acid is beneficial in Heart related disease as well as in diabetes. Lipid present in horsegram also have anti ulcer activity. Horsegram seed extract can also be use for throat infection,common cough and cold (Thirumaran and Kanchana 2000).

CONCLUSION

Horse gram is a crucial pulse crop having beneficial effects. Herbs in medicine are more prevalent than allopathic pharmaceuticals due to various properties like simple accessibility, low cost, and less adverse effects. The antidiuretic properties of the plants used for the formulation and the study conducted on that foundation were scientifically demonstrated. These investigations have leads to the conclusion that tablets, which have more palatable dose forms, can address the range of kidney stone-related issues. Based on the comprehensive analysis, physical and chemical factors, pre-formulation, and evaluation, we deduced that the dosage form that was created turned out to be a useful medication for treating urolithiasis.

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