

## Horse Gram (Kulthi Dal): A Underutilized Nutritious Legume

(Harsha Nayak, Anjali Toppo, Yashwant Kumar Patel and \*Leena Preeti Lakra)

Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur, Chhattisgarh-495009, India

\*Corresponding Author's email: [leenapreeti01@gmail.com](mailto:leenapreeti01@gmail.com)

Horse gram dal (*Macrotyloma uniflorum*) is known as Kulathi, Kulath, Kharthi, Garhat in Hindi, and Kulathika in Sanskrit, it is indeed a fascinating and nutritious legume. It is known by various names across India, such as Kulathi in Hindi, Kulthi in Gujarati, and Hulga in Marathi and Gahhat in the local language of Uttarakhand. This legume is particularly popular in the southern parts of India and is used in dishes like Rasam.



*Kulthi dal* is consumed as a staple food mostly in the southern part of India. The plant has a bushy, slender stem, growing 30 to 45 cm high, with many branches from the root. Its leaves are yellowish-green with triplets, and the seeds are light red, black pied, sticky, and shiny, resembling lentils. It is used to prepare some major dishes of South India like Rasam etc. Apart from Karnataka, Andhra Pradesh, Odisha, and Tamil Nadu, this pulse is also grown in Chhattisgarh, West Bengal, Madhya Pradesh, Bihar, Uttarakhand, and Himachal Pradesh. Horse gram is highly nutritious and can help reduce the risk of serious health problems.

Horse gram (*Macrotyloma uniflorum*) belongs to the family fabaceae. It is an underutilized drought-tolerant crop, especially in areas prone to natural calamities making it a potential food source for the future. The grain can be consumed in various forms, such as ready-to-eat products or snacks, often fortified with other millets, pulses, or vegetables. As a result, consumers can choose the many value-added horse gram products as a healthier alternative to other grains on the market. It is great to see such a versatile and nutritious legume being recognized for its potential in global nutritional management.

### Botanical Description

*Macrotyloma uniflorum* is a legume species belonging to the Kingdom Plantae, Genus *Macrotyloma*, and Species *M. uniflorum*. Commonly known as Horse Gram, this plant is characterized by its distinct morphological features.

#### Leaves

- The leaves are trifoliate, meaning each leaf is divided into three leaflets.
- Each leaf measures between 3.5 and 7.5 cm in length.
- The stipules, which are small leaf-like structures at the base of the leaf stalks (petioles), are 7-20 mm long. They play a role in protecting the young leaf and may have various shapes and sizes depending on the plant's development stage.
- The leaflets have a rounded base and an acute or scarcely acuminate (slightly pointed) tip. This shape helps in optimizing photosynthesis and reducing water loss.

**Petioles:** The petioles, which are the stalks that attach the leaflets to the main stem, measure approximately 2.5 cm in length.

#### Flowers

- The plant produces bisexual flowers, meaning each flower contains both male (stamens) and female (pistil) reproductive organs.

- Each flower has three stamens, which are the male parts responsible for pollen production.
- The pedicels, which are the stalks that hold individual flowers, typically measure between 0.3 and 0.5 cm long.
- The calyx, the outermost whorl of the flower that protects the developing bud, is 10.5 mm long and 7-8 mm wide.

#### Pods

- The fruit of the plant is a pod that contains seeds. Each pod typically bears 5-8 ovoid-shaped seeds.
- The seeds measure between 3-5 mm in width and 4-6 mm in length. They may exhibit occasional black lines on their surface, which can be a distinguishing feature.
- The shape and size of the seeds help in seed dispersal and germination.

Generally, *Macrotyloma uniflorum* is adapted to a variety of environmental conditions and is cultivated for its edible seeds, which are rich in nutrients and used in various culinary applications. The plant's specific features, such as the size of the leaves, the length of the petioles, and the structure of the pods, contribute to its identification and agricultural importance.

**Table 01: Nutritional content as per 100 g of edible portion**

S.NO.	CONSTITUENT	AMOUNT
1	Moisture content(g)	11.8
2	Protein(g)	22.0
3	Fat(g)	0.5
4	Carbohydrates(g)	57.2
5	Minerals(g)	3.2
6	Fibre(g)	5.3
7	Energy(kcal)	321
8	Calcium(mg)	287
9	Phosphorous(mg)	311
10	Iron(mg)	8.4
11	Carotene(hg)	71
12	Thiamine(mg)	0.42
13	Riboflavin(mg)	0.20
14	Niacin(mg)	1.5
15	Vitamin C(mg)	1

**Proteins:** Horse gram legumes are a rich source of protein, providing about 22-24%, which is approximately twice the protein content found in cereal grains. Additionally, they have a higher lysine content compared to pigeon peas and chickpeas, making them a valuable supplement for diets that are primarily based on grains, as lysine is an essential amino acid often limited in grain-based diets.

**Carbohydrates:** Carbohydrates in horse gram include sugars, fibers, and starches. Starches in horse gram are less digestible compared to those in cereal grains, contributing to its lower energy and carbohydrate content (55-65% of dry matter). Horse gram's low glycemic index, due to its complex carbohydrates, helps reduce the risk of lifestyle-related disorders. In legumes like horse gram, carbohydrates constitute 50-70% of the dry weight and are categorized into digestible and indigestible types. Digestible carbohydrates include starches, while indigestible carbohydrates comprise fibers and some oligosaccharides. Starches that are not digested in the small intestine pass into the large intestine, where they are fermented by intestinal bacteria and classified as resistant starch.

**Fatty acids:** Horse gram seeds are notably low in oxidized fatty acids, which is beneficial for maintaining their nutritional quality. They contain linoleic acid, an essential fatty acid, at

levels of 45.58% in raw seeds and 40.33% in toasted seeds. The slight reduction in linoleic acid content after toasting may be due to heat-induced changes.

**Dietary fiber:** Dietary fiber, primarily sourced from whole grains and legumes, is crucial for a balanced diet and gut health. It comprises components like pectin, cellulose, and hemicelluloses, and is found only in plant-based foods. Fiber, including oligosaccharides like inulin and resistant starch, can be either soluble or insoluble. Horse grams, for example, have higher insoluble fiber compared to kidney beans. The high-fiber seed coat of legumes supports gastrointestinal health, aids in satiety, and contributes to lowering cholesterol and blood sugar levels. Generally, dietary fiber helps prevent various health issues, including diabetes, cardiovascular disease, and certain cancers, while also enhancing bowel function and nutrient absorption.

**Micronutrients:** Horse gram is notable for its high calcium content, surpassing other legumes in this regard. It is relatively low in tryptophan and methionine but rich in iron and molybdenum, making it a valuable component of a diet for its mineral contributions.

### Nutraceutical Benefits of Horse Gram

- **Benefits for stones:** Horse gram, known for its antioxidant and detoxifying properties, may help in managing kidney stones by aiding in their dissolution and removal. Similar to fennel, which has a long history of use in stone treatment, horse gram's benefits are attributed to its ability to support kidney function and reduce the risk of stone formation. This makes it a valuable option in both traditional and alternative medicine for addressing kidney stones.
- **Diabetes:** Horse gram is beneficial for managing diabetes due to its antioxidant properties, which can help reduce the risk of the disease. Additionally, it may lower postprandial hyperglycemia by slowing carbohydrate digestion and reducing insulin resistance. Its high resistance to digestive enzymes further supports its role in blood sugar regulation.
- **For Weight Loss:** Horse gram can aid in weight loss due to its high fiber content, which promotes satiety and reduces overall calorie intake. The fiber helps control appetite and enhances digestion, making horse gram soup a useful addition to a weight loss regimen. Studies have highlighted its effectiveness in supporting weight management.
- **Cholesterol Control:** Horse gram can help control cholesterol levels due to its high dietary fiber content, which lowers LDL (bad cholesterol) and raises HDL (good cholesterol). Its cholesterol-lowering effect supports overall heart health and helps manage elevated cholesterol levels.
- **For Diarrhea:** Horse gram can be beneficial for managing diarrhea due to its high flavonoid content, which has antidiarrheal properties. Additionally, the dietary fiber in horse gram aids in resolving gastrointestinal issues and helps in controlling diarrhea by improving bowel function.
- **Ulcers:** Horse gram, rich in flavonoids, can be effective in managing ulcers due to these compounds' anti-ulcer properties, which aid in healing. Additionally, the dietary fiber in horse gram is beneficial for stomach ulcers, as recommended by the World Health Organization. Fiber helps alleviate bloating and pain in the gastrointestinal tract, contributing to overall ulcer management.
- **Colds and Fever:** Horse gram has been used in traditional Unani medicine to address irregular menstruation. While it is believed to help with menstrual irregularities, further research is needed to fully establish its efficacy and mechanisms in this regard.
- **Irregular Menstruation:** Horse gram has been used in traditional Unani medicine to address irregular menstruation. While it is believed to help with menstrual irregularities, further research is needed to fully establish its efficacy and mechanisms in this regard.
- **Constipation:** Horse gram helps relieve constipation due to its high dietary fiber content, which softens stools and facilitates easier bowel movements. The fiber in horse gram is essential for smooth digestion and can effectively address constipation issues, contributing to overall healthy digestion.

- **To the Heart:** Horse gram supports heart health by lowering cholesterol levels, which reduces the risk of heart attack. Research indicates that the fiber in horse gram is effective in this regard. Additionally, it contains phenolic acids, flavonoids, and tannins, which have protective effects against cardiovascular issues.
- **For piles:** Horse gram is traditionally used in Ayurveda to help manage piles. Its high fiber content may contribute to this benefit by promoting regular bowel movements and reducing strain during defecation. However, further research is needed to identify the specific qualities of horse gram that make it effective for treating piles.
- **For the skin:** Horse gram offers several skin benefits. Grinding and applying it can help alleviate rashes and boils. Additionally, its flavonoid content may protect the skin from harmful ultraviolet rays, contributing to overall skin health.

### Side Effects of Horse Gram

- **Digestive Issues:** Due to the presence of raffinose, horse gram can cause gas and bloating, especially if consumed in large quantities or by those not used to high-fiber diets.
- **Allergic Reactions:** Although rare, some individuals may experience allergic reactions, such as itching or respiratory issues.
- **Nutrient Absorption:** Antinutrients like phytic acid in horse gram can hinder the absorption of minerals unless the grain is properly prepared.
- **Gout and Medication Interactions:** People with gout or those on certain medications should consult a healthcare professional before including horse gram in their diet.