



KOLHAPUR

A PROJECT -REPORT

ON

“Study Of Phytochemical Tests For Leafy Vegetables”

SUBMITTED BY

Miss. Manasi Deepak Masal

Miss. Siddhi Prakash Kale

SUBMITTED TO,

VIVEKANAND COLLEGE, KOLHAPUR

(AN EMPOWERED AUTONOMOUS INSTITUTE)

(DEPARTMENT OF BOTANY)

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UNDER THE GUIDANCE OF

Dr. Abhijeet R. Kasarkar Sir

Assistant Professor, Department Botany

“Education for Knowledge Science and Culture”

- Shikshan Maharshi Dr Bapuji Salunkhe

‘Shri Swami Vivekanand Shikshan Sanstha’

Vivekanand College, Kolhapur, (An Empowered Autonomous Institute)

Department of Botany

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We are grateful to all teachers for their valuable suggestions during my project work.

We are also thankful to the non-teaching staff members who helped us to carry out project satisfactorily.

A. R. Kasarkar
14-10-25

Examined
@Mptati
14.10.25

B. T. Dangat
14/10/25
HEAD
DEPARTMENT OF BOTANY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

DECLARATION

I hereby declare that the project work entitled **“Study Of Phytochemical Tests For Leafy Vegetables ”** submitted to the Vivekanand College for the award of the degree of **“Bachelor of Science, Botany”** is the result of Bonafide work carried out by me under the guidance of Dr. Abijeet R. Kasarkar Sir.

I further declared that the results presented here have not been the basis for the award of any other degree.

Place: - Kolhapur

Date: - 13/10/2025

Miss. Manasi Masal

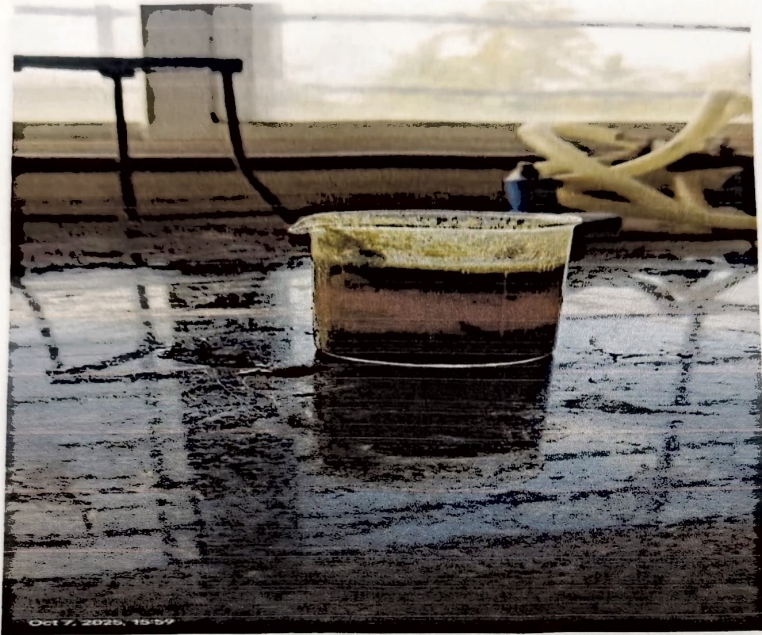
Miss. Siddhi Kale

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Introduction

Fenugreek (*Trigonella foenum-graecum*) is an annual legume plant native to South Asia and the Mediterranean, cultivated for its seeds and leaves. Both the seeds and the greens (fresh or dried) are used in cooking for their unique flavor, and the seeds are also valued as a spice and in traditional medicine for their potential health benefits, including antioxidant, anti-inflammatory, and effects on blood sugar.



Botanical Characteristics

- Plant type: An annual herbaceous plant in the legume (Fabaceae) family.
- Appearance: An erect, smooth plant that grows to about 40-80 cm tall.
- Leaves: Trifoliate (three leaflets) and light green.
- Flowers: Small, white to yellow or purplish-blue.
- Fruits: Thin, pointed pods, typically 2-10 cm long.
- Seeds: Oblong, greenish-brown, and have a distinctive strong odor.

Uses and Culinary Applications

- Seeds: Used as a spice in pickles, curries, and traditional South Indian dishes like idli and dosa to aid in fermentation.
- Fresh Leaves: Eaten as a fresh green vegetable and used in dishes like methi dal and methi paratha.

Studies on the cholesterol^{Trusted Source}– and blood sugar-lowering effects of fenugreek suggest that doses between 5 and 25 g may be most effective.

Morphological characters

teristics include its erect, branching stems, aromatic, feathery, and finely divided blue-green leaves, and terminal yellow flower umbels. The fruit is a small, dry, oval-shaped schizocarp that is dorsally compressed with two wing-like lateral ridges, three longitudinal ridges on the convex back, and two flat surfaces. It has a taproot and can grow up to 1.5 meters tall.

Plant and stem

- Growth: Erect and branching.
- Height: Grows up to 0.46–1.52 meters (1.5–5 feet).
- Stems: Slender, hollow, smooth, and cylindrical.
- Root: Long, spindle-shaped taproot.

Leaves

- Arrangement: Alternate along the stem.
- Structure: Finely divided, soft, and feathery.
- Color: Blue-green.
- Petiole: Sheathed at the base.

Flowers and fruits

- Flowers: Small, yellow, and arranged in flat-topped clusters called umbels.
- Fruit: A dry schizocarp, not a true seed.
- Shape: Oval, compressed, and winged.
- Size: Approximately 3.5 mm (0.14 inches) long.
- Color: Light brown.
- Ridges: Three longitudinal ridges on the back and two on the flat surface.

Materials and Methods

Plant collection and identification

Collection of plant material like coriandrum sativum L ,Trigonella fornum graecum,spinacia olerace L, Amaranthus blitum, Anthum graveolens. These samples were free from disease. Plant materials were identified with morphological characters Plant part like stem was used for further studies.

Extraction of plant material Preparation of aqueous extracts

Samples were weighed using an electronic balance and 10 gm of plant material were crushed in 100 ml of distilled water and filter through muscline cloth. These samples are used for phytochemical analysis. (Harbone 1973) [6].

Preliminary Photochemical Analysis

The individual extracts were used for the qualitative photochemical screening for the presence of some chemical constituents. Photochemical test were carried out adopting standard procedure.

Test for Alkaloids

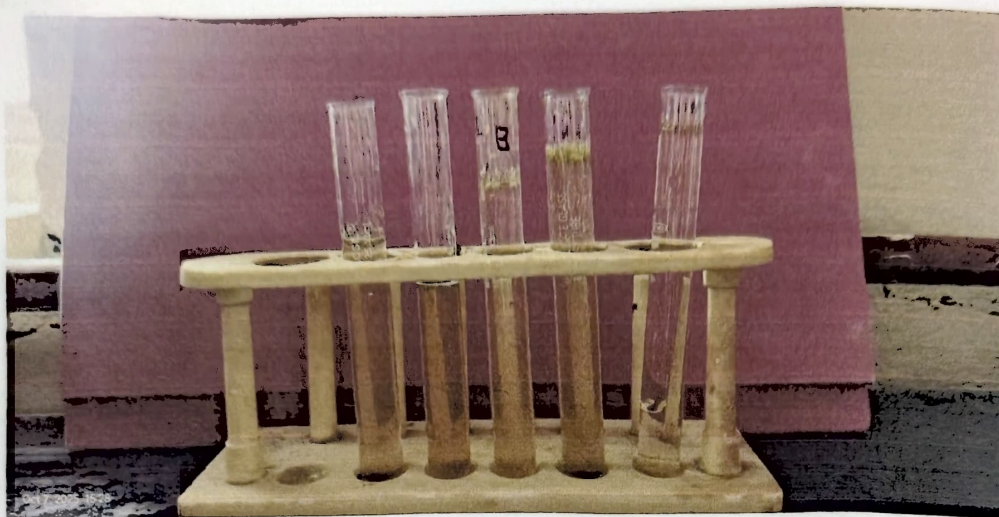
A quantity (3 ml) of concentrated extract was taken into test tube, cooled and filter, the filtrate was used for following test.

Dragendroff's Test: 2 drops of Dragendroff's reagent were added to 1ml of the extract. The development of a creamy ppt was indicates that presence of alkaloids.



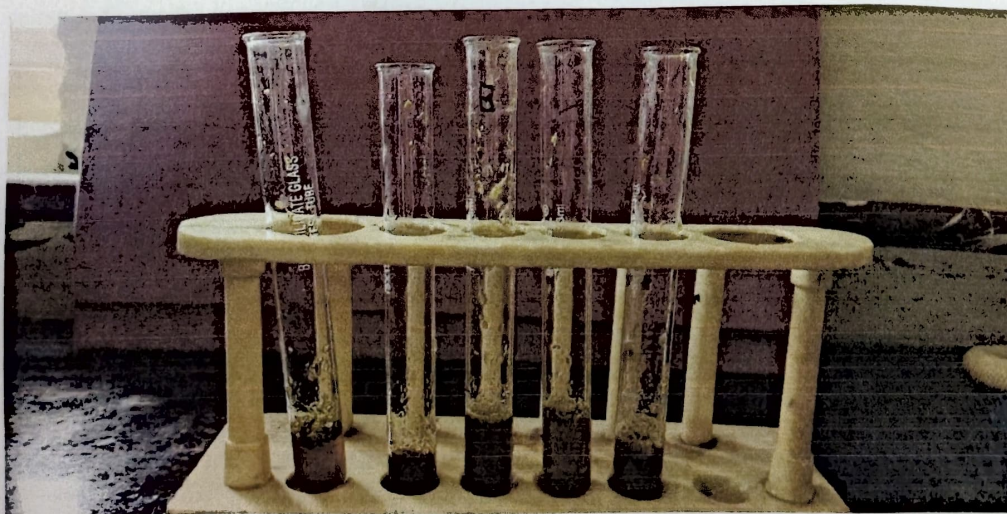
Test for Saponin

5 ml extract was mixed with 20 ml of distilled water then agitated in the graduated cylinder, wait for 15 min formation of foam indicates saponin present.



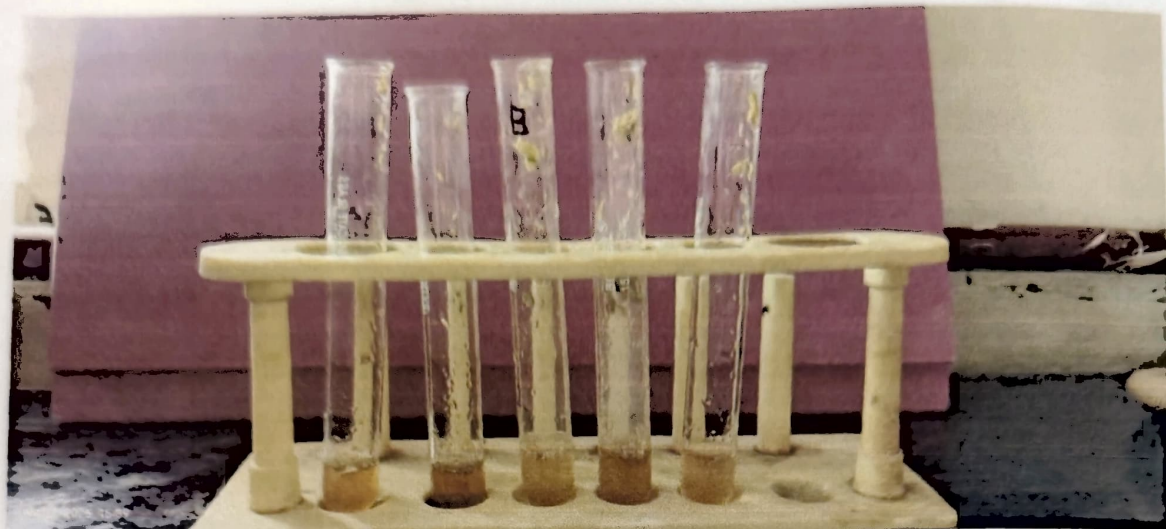
Test for Tannin

4ml of extract was treated with 4 ml FeCl_3 formation of green colour indicates that presence of condensed tannin.



Test for Proteins

Xanthoproteic Test: Extract was treated with few drops of concentrated HNO_3 formation of yellow colour indicates the presence of Proteins.

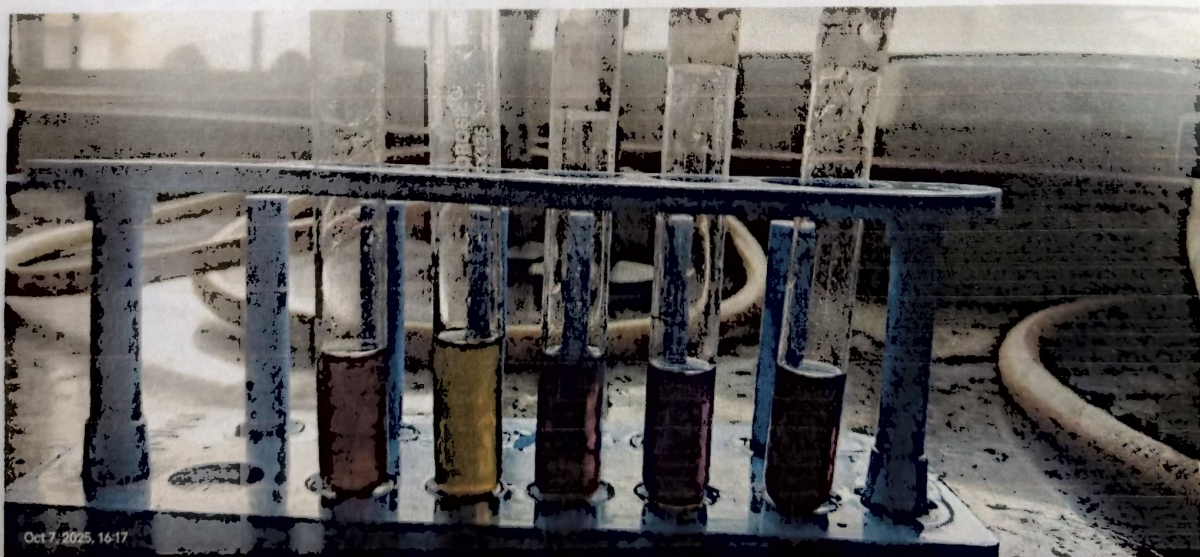


Test for Amino Acid

Ninhydrin Test: Take the 2 ml of extract and 2 ml on the Ninhydrin reagent was added and boil for few minutes, formation of blue colour indicates the presence of the amino acid.

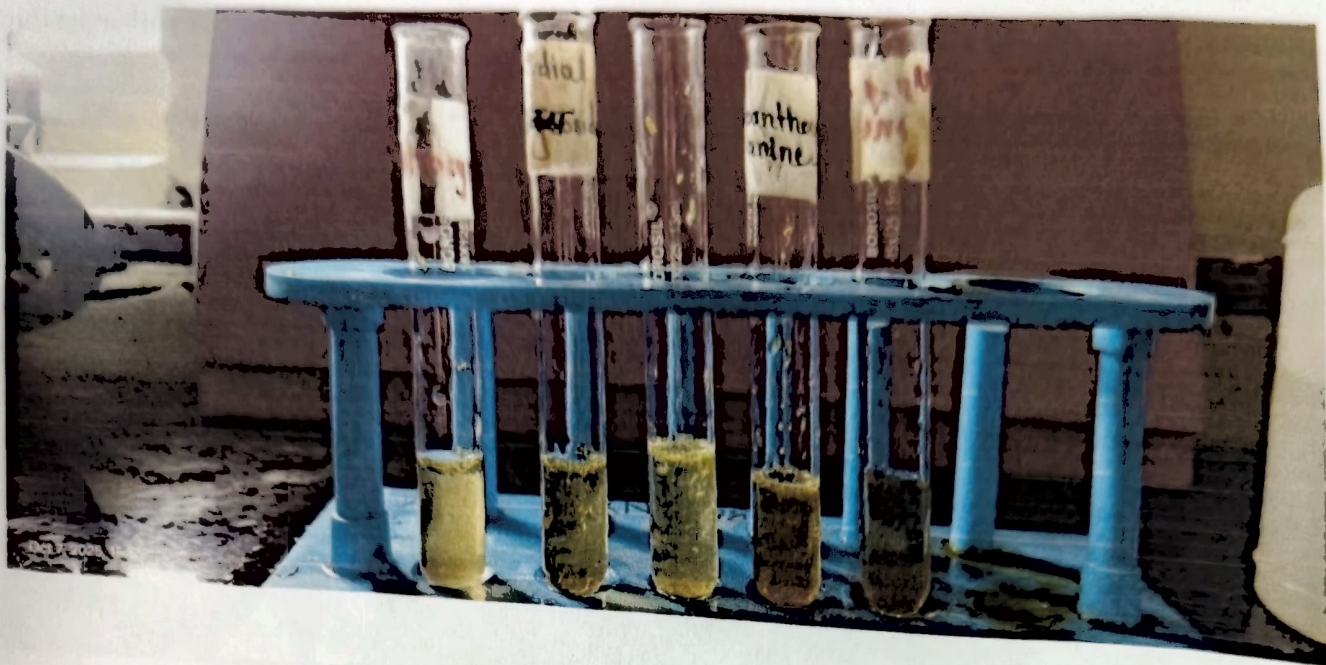
Test for Flavonoids

Alkaline Reagent Test: Extract was treated with 10% of NaOH solution, formation of intense yellow colour indicates the presence of the flavonoids.



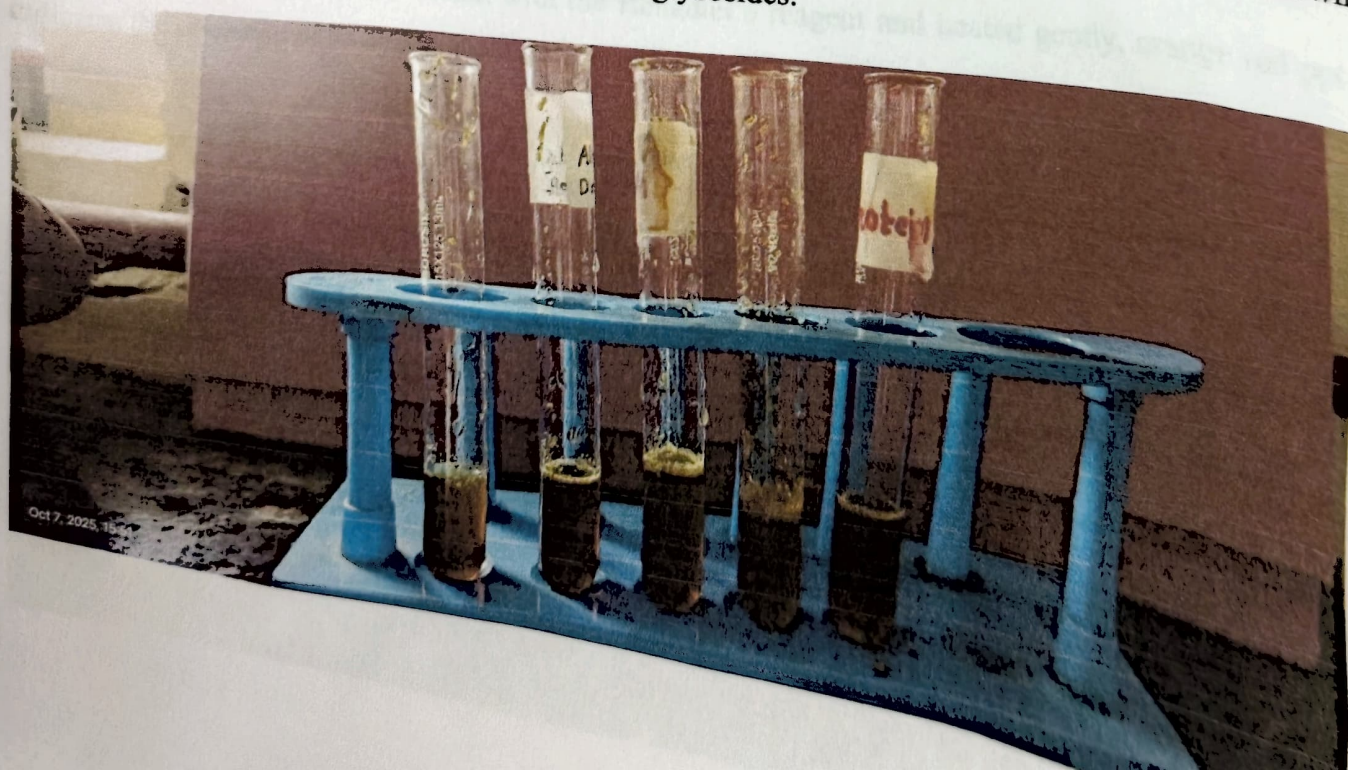
Test for Phlobatannins

Deposition of red ppt when aqueous extract of each plant sample is boiled with 10% aqueous HCl was taken evidence of presence of the phlobatannins.



Test for Cardial Glycosides

Killer-Killani Test: Plant extract treated with glacial acetic acid containing a drop of FeCl_3 . A brown coloured ring indicates the presence of the cardial glycosides.



Test for Carbohydrates

Iodine Test: Take 2 ml of extract were treated with 5 drops of Iodine solution, gives blue colour, indicates the positive test and presence of carbohydrates.



Test for Reducing Sugar

Benedict's Test: Filtrate were treated with the Benedict's reagent and heated gently, orange red ppt indicates the presence of reducing sugar.



Taxonomy

Kingdom: Plantae

Division: Angiosperm

Order: Apiales

Family: Apiaceae

Genus: *Coriandrum*

See also list of plants in the family Apiaceae and list of herbs and spices.

Physical description coriander flower

coriander flower Coriander (*Coriandrum sativum*) in bloom. The flowers are borne in flat-topped clusters known as umbels.

The plant produces a slender hollow stem 30 to 60 mm (1 to 2.5 inches) high with fragrant bipinnate leaves. The small flowers are pink or whitish and are borne in umbel clusters. The fruit is a small dry schizocarp consisting of two semiglobular fruits joined on the commissural, or inner, sides, giving the appearance of a single, smooth, nearly globular fruit about 5 mm (0.2 inch) in diameter. The yellowish brown fruits have a mild fragrance and taste similar to a combination of lemon peel and sage. The seeds contain from 0.1 to 1 percent essential oil; its principal component is coriandrol.

Morphological characters

Coriander is an annual herb with a branching, cylindrical, hollow, and ribbed stem, and a slender taproot. Its leaves are alternate and variable, with basal leaves being broad and lobed, while upper leaves are feathery and finely dissected with linear segments. The plant produces small, hermaphroditic, white to pink flowers arranged in compound umbels, followed by globular fruits (cremocarpes) that are 3-5 mm in diameter and split into two seed-containing halves.

Morphological Characteristics

- Habit: An erect, annual herb.
- Root: A slender, branched taproot.
- Stem: Herbaceous, cylindrical, fistular (hollow), ribbed, branched, and glaucous with swollen nodes. It can grow to a height of 25-70 cm.

Morphological characters

Spinach has simple, fleshy, and typically triangular-ovate to hastate leaves arranged in a rosette, which can be smooth or crinkled. The plant is an annual herb with an erect, unbranched, or sparsely branched stem, growing up to 30 cm tall, and it has a superficial root system.

Leaf

- Type: Simple (not divided into leaflets).
- Shape: Triangular-hastate to ovate, often with a slightly sunken center and outward-pointing basal lobes.
- Surface: Can be smooth, flat, or crinkled/puckered.
- Edges: Margins can be entire (smooth) or toothed.
- Arrangement: Typically forms a basal rosette, with larger leaves at the base and smaller leaves higher on the stem.
- Color: Green, though varieties like red spinach have different coloring.

Stem

- Growth: Erect and unbranched or sparsely branched.
- Length: Can grow up to 30 cm tall.
- Texture: Fleshy and cylindrical.
- Root
- Type: Superficial.
- Appearance: Can be long and thick.

Flowers and fruit

- Flowers: Small, inconspicuous, and yellow-green, clustered in spikes or axils.
- Fruit: Develops as a small, hard, dry, lumpy fruit cluster containing seeds.
- Seeds: May be smooth or spiny on the surface.

- **Digestive Aid:** Historically and traditionally, dill has been used to help with digestive issues, reduce flatulence, and soothe stomach discomfort in both adults and infants.
- **Other Uses:** Dill is also believed to have sedative properties, promote sleep, help with bad breath, and may support bone and intestinal health.

Growth and Characteristics

- **Appearance:** The dill plant has fine, feathery, blue-green leaves and an upright, branching growth habit.
- **Flowers and Seeds:** It produces small yellow flowers that grow in umbrella-shaped clusters (umbels), which later develop into the aromatic seeds.
- **Origin:** Native to the Mediterranean region and southeastern Europe, it is now cultivated worldwide.

Nutrition facts

One tablespoon, or 11 grams (g), of whole fenugreek seeds contains 35 calories and several nutrients Trusted Source, including:

Fiber: 3 g

Protein: 3 g

Carbs: 6 g

Fat: 1 g

Iron: 3.72 mg – 21% of the Daily Value (DV)

Manganese: 0.137 mg – 6% of the DV

Magnesium: 21.2 mg – 5% of the DV

How to use fenugreek

Fenugreek is an ingredient in many supplements. Since formulations differ, the recommended dose depends on the supplement. There is no single recommended dose. Additionally, the dosage may vary depending on the benefit you seek.

Most testosterone-based research Trusted Source uses around 250–600 mg of fenugreek extract, while research on breast milk Trusted Source production has used around 1–6 g. Research on other areas has used much higher doses.

Studies on the cholesterol^{Trusted Source} and blood sugar-lowering effects of fenugreek suggest that doses between 5 and 25 g may be most effective.

Morphological characters

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- Shape: Oval, compressed, and winged.
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- Color: Light brown.
- Ridges: Three longitudinal ridges on the back and two on the flat surface.

Tests	Coriander	Fenugreek	Spinach	Kohola	Dill
Saponin	-	-	-	-	+
Tannin	-	-	-	-	+
Protein	+	+	+	+	+
Amino acid	+	+	+	+	+
Alkaloids	-	-	-	-	-
Carbohydrate	-	-	-	-	-
Flavanoids	+	+	+	-	-
Cocumarin	+	+	+	-	-
Cardial Glycosis	+	+	-	-	+
Phlobatanis	-	-	-	-	-

Flowers and inflorescence

- Inflorescence: Slender axillary or terminal panicle spikes, or dense axillary clusters.
- Flower color: Green, sometimes tinged with red.
- Sex: Unisexual, with both male and female flowers on the same plant (monoecious). Female flowers are usually more numerous.
- Perianth: 3 green, membranous segments per flower.
- Stigmas: 2–3, short and erect.

Fruit and seed

- Fruit: A capsule that is subglobose or nearly so, 1–1.5 mm long, and indehiscent or irregularly rupturing.
- Surface: Strongly to faintly wrinkled or warty.

Sr.No	Name of the plant	Botanical Name	Family
1	Coriander	<i>Coriandrum sativum L.</i>	Apiaceae
2	Fenugreek	<i>Trigonella foenum-graecum</i>	Leguminosae
3	Spinach	<i>Spinacia oleracea L.</i>	Chenopodiaceae
4	Kohola	<i>Amaranthus blitum</i>	Amaranthaceae
5	Dill	<i>Anthem graveolens</i>	Apiaceae

be popped, cooked into a porridge, or ground into a flour for use in baked goods (typically mixed with grain flours).

Weed species

A number of amaranths are noxious agricultural weeds, and several are considered invasive species in areas outside their native ranges. Often known as pigweeds, these competitive species are tolerant to a variety of growing conditions and readily reseed themselves. At least one species, Palmer's amaranth (*A. palmeri*), has developed resistance to the common herbicide glyphosate and is a troublesome pest in genetically modified cotton and soybean crops in the United States.

Morphological characters

Amaranthus viridis morphology is characterized by an annual, erect herb with slender, often reddish, angular stems. Its leaves are alternate, long-petiolate, and ovate to rhombic-ovate, with a notched and minutely mucronate tip. The flowers are small, green, and unisexual, clustered in slender, panicle spikes at the terminal and axillary positions. The fruit is a nearly globose, wrinkled capsule containing a single, dark, shiny seed.

Plant habit and stem

- Habit: Annual herb, erect or ascending.
- Height: Typically grows to 10–75 cm, sometimes up to 100 cm.
- Stem: Slender, angular, and branched; can be glabrous or have hairs, especially in the inflorescence. Stems are often green but can turn reddish.

Leaves

- Arrangement: Alternate.
- Petiole: Long, sometimes longer than the blade, up to 10 cm.
- Blade: Deltoid-ovate to rhomboid-oblong, 2–7 cm long and 1.5–5 cm wide.
- Tip: Obtuse to clearly emarginate (notched), with a minute mucro (short, sharp point).
- Base: Shortly cuneate (tapered) to subtruncate.
- Surface: Glabrous or shortly pilose on the lower surface of the veins.

Dasar
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- Leaves:
- Arrangement: Alternate and exstipulate.
- Shape: Basal leaves are pinnate or 1-2-pinnate, with broad, lobed segments, while upper leaves are highly dissected into linear, pointed leaflets.
- Texture: Soft and hairless.
- Inflorescence: Terminal and lateral compound umbels, consisting of 5 smaller umbels, with white or pinkish flowers.
- Flowers: Small, hermaphrodite, and zygomorphic (bilaterally symmetrical).
- Fruit: A cremocarp, which is a dry, sub-globular fruit 2-5 mm in diameter. It is pale white to light brown and has a delicate fragrance. The fruit is composed of two semiglobular fruits (mericarps) joined together.