

Teff - Eragrostis Tef

a Drought-Resilient Crop of WaterMellon Project



History and origin

- Teff is an ancient grain that has been grown in Ethiopia and Eritrea for thousands of years.
- It is summer crop, with short growing cycle, widely adapted to different growing conditions, tolerant to drought and salinity, generally used in crop rotations with other cereals and legumes.
- Teff is a highly nutritious grain, gluten free, rich in protein (13 g/100 g), dietary fiber (8 g/100 g), essential minerals (approximately 1.2 g/100 g), and vitamins. It is widely recognized as a health-enhancing superfood, valued for supporting weight management, digestive health, and bone strength.



Morphological Characteristics

- **Teff growth:** Annual, fine-stemmed grass and grows upright (erect).
- **Plant height:** Typically ranges from 30 to 120 cm.
- **Root system:** Fibrous and shallow.
- **Stem:** Thin, slender, round, and hollow between nodes.
- **Leaves:** Long, narrow, flat blades and rough to the touch; Green color and slightly bluish under certain conditions.
- **Inflorescence:** Open, loose, or compact depending on the variety; branches bear very small spikelets.
- **Spikelets:** Very small, containing 2–10 florets each, light, and easily shatter when mature.
- **Seeds:** Extremely small (around 1 mm diameter), oval, and comes in a variety of colors, including white (require the most rigorous growing condition but it is the most expensive), red (has the highest iron content) and brown (has moderate iron content).
- **Seed weight:** One of the smallest cereals, 1000 seeds weigh around 0.3–0.4 g.
- **Life cycle:** about 3-4 months from sowing to harvest, depending on variety, environmental conditions, soil fertility and moisture availability.
- **Photosynthesis:** It is a C4 plant, efficient in high temperatures and low moisture environments.



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Climate and Soil Requirements

Preferred ecosystem: Being from the equatorial highlands, teff benefits from warm temperatures and bright sunlight, as well as cooler nights. Teff doesn't tolerate shade, needing full sun for good growth.

Temperature: The optimal planting time from March to April, as soon as the soil temperature reaches 15° C and the risk of frost has passed. Optimal daytime temperature from 20°C to 30°C.

Rainfall: Requires a moderate amount of rainfall, ideally between 400 mm to 600 mm annually.

Salinity: Can tolerate moderate salinity, perform best in soils with an EC of less than 2 dS/m.

Soil: Adapted to most type of soil, from low-desert sand to waterlogged clay. The soil must be thoroughly tilled and finely textured to ensure proper seed-to-soil contact, promote uniform germination, and prevent seed loss or uneven emergence.

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Agricultural Practices

Seed selection: Teff is available in numerous varieties, each with distinct characteristics and uses. It is essential to select the appropriate variety based on its intended purpose, whether for grain or for fodder.

Sowing seed: Seeds are typically sown on the soil surface and either left uncovered or lightly covered. The planting depth should not exceed 0.5 cm. Light rolling of the field afterward enhances soil contact with seed. When sown using a mechanical seeder, the seed rate is 10–15 kg/ha, while manual sowing requires 15–20 kg/ha to ensure sufficient stand density. Under optimal conditions, teff germinates quickly, typically within 3 to 7 days.

Fertilization: Teff has a low fertility requirement but conducting a soil analysis is essential. Moderate rates of Nitrogen (25-50 kg/h) are recommended. Phosphorus and potassium must be applied if needed.

Planting time: March – April, but not before the soil temperature reach 15° C.

Weed control: Teff is a poor competitor with weeds during the early growth stage. Licensed Herbicide can be used.

Harvesting: Teff is ready for harvest when the leaves turn from green to yellow color before the plants dry out completely, to minimize shattering and grain losses. Harvested plants should be promptly transported to a clean, well-ventilated area and stacked until thoroughly dried. Grain separation is best achieved using mechanical threshers specifically designed for teff's small seed size. In the absence of such equipment, manual threshing—by beating the dried bundles—can be used as an alternative method to extract the grains.

Yield: Average grain yield in standard farming conditions is 1-2 tons/h. Under optimized conditions, the yield can reach 2.5-3 tons/h. Additionally, the dry matter yield of teff hay (used for livestock feed) is typically 3 to 6 times the weight of the harvested grain.

Disease & Pest

When teff is introduced to new regions, its pest and disease profile can change. Some Ethiopia-specific pests/ diseases are less common, but new threats emerge from local pests and pathogens.

World production and Market Value

Total cultivated area: The area under teff cultivation is increasing slightly worldwide, but it remains overwhelmingly the Ethiopian (about 3 million hectares).

Major producers: Ethiopia (over 95%) and Eritrea, it is also cultivated in United States, South Africa (mainly as fodder), Australia, Spain and Netherlands. The total Annual production is about 4.5 to 5.5 million tons of teff grain.

Market value: The global teff market is experiencing significant growth, driven by increasing demand for gluten-free and nutrient-rich grains. In 2024, was valued at approximately USD 0.73 billion and is projected to reach USD 2.57 billion by 2033.

Retail prices: In Ethiopia, range between 0.76 - 3.04 \$/Kg. In international market, typically 2 - 4 \$/Kg for high-quality teff and 5–12 \$/Kg of teff flour.

Use of the Teff

Human food: Teff grain is used for a wide range of food such as porridge, snacks, and meat substitutes. While flour can be used to make gluten free bread, cakes and pancakes.

Livestock feed: Teff hay (forage) has a high nutritional value and is considered premium forage for livestock. its protein content tends to vary between 15 and 25%. Dry hay, a by-product of grain production, is commonly used as livestock feed.

Environment uses: Teff is used as Cover Crop and is excellent for erosion control.

