

Unlocking the Potential of Arrowroot (*Maranta arundinacea*): A Multifaceted Crop for a Sustainable Future

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Arrowroot (*Maranta arundinacea*) is a tropical plant widely cultivated for its starchy rhizomes. These rhizomes are the primary source of arrowroot starch, which is extracted and used in various industries, including food, pharmaceuticals, cosmetics, and textiles. Arrowroot starch is renowned for its high digestibility, hypoallergenic properties, and versatility as a thickening agent. It is often used as an ingredient in gluten-free, baby foods, and health-conscious diets due to its ease of digestion and ability to blend well in cooking. Arrowroot is also known for its role in sustainable agriculture. It grows well in poor soil conditions and can be cultivated with minimal input, making it a suitable crop for small farmers in tropical and subtropical regions. The plant's fibrous roots help to prevent soil erosion, and its ability to thrive in a range of soil types contributes to its adaptability in various climates.

Taxonomical Classification of Arrow Root

- Kingdom: Plantae
- Division: Angiosperms
- Class: Monocots
- Order: Zingiberales
- Family: Marantaceae
- Genus: Maranta
- Species: Maranta arundinacea



Nutritional Value per 100 g

Nutrition	Content
Water	12.1 %
Calories	346
Protein	0.18 g
Fat	0.05 g
Carbohydrate	85.74 g
Ash	1.89 g
Calcium	58.0 mg
Phosphorus	7.2 mg
Iron	0.55 mg

Economic Importance of Arrowroot

- **Food Industry:** Arrowroot starch is a key ingredient in the food industry, particularly for its use as a thickening agent in soups, sauces, puddings, and gravies. It is also a crucial component of gluten-free baking products, baby foods, and low-fat diets due to its light texture and easy digestibility. The food industry is the largest consumer of arrowroot starch, driven by increasing consumer demand for gluten-free and allergen-free options.
- **Pharmaceuticals:** Arrowroot starch is used as a binder and stabilizer in the pharmaceutical industry, particularly in the production of tablets. It helps to give shape to the tablets and ensures the active ingredients are effectively delivered in the body.
- **Cosmetics and Personal Care:** Arrowroot starch is commonly used in cosmetic formulations, such as powders, lotions, and deodorants. It acts as a thickening agent, providing a smooth texture and helping to absorb moisture, which is beneficial in various skin-care products.

Uses

Maranta arundinacea is cultivated for its starch-storing rhizome. The starch extracted from the rhizomes is easy to digest, and is often used as a thickener in dressings, soups, sauces, candies, cookies and desserts like puddings and ice cream. Processed rhizome pulp is used in the industrial manufacture of paper, cardboard, cushions and wallboards, and the starch is used as the basic ingredient of powders, glues and soap. Rhizomes can also be eaten boiled or roasted. Medicinally, the pulp of fresh rhizomes is used in poultices to heal wounds and ulcers and the starch, mixed with water or milk, is used to relieve stomach aches and diarrhoea. The rhizomes are also a good substitute for maize in broiler rations and the fibrous debris after starch extraction is used as animal fodder and manure.

Botany of Arrow root

Plant description

Roots and Rhizomes: Arrowroot has fleshy, underground rhizomes that are the primary edible part of the plant. These rhizomes store starch and are typically harvested for their starch content. The rhizomes are cylindrical, whitish or creamy in color, and grow horizontally beneath the soil surface.

Leaves: The leaves are large, lance-shaped, and alternately arranged on the stem. They are broad, ovate, and typically have smooth or slightly wavy margins. The leaves are green and may have noticeable veins. The plant can also produce long petioles (leaf stems), contributing to its bushy appearance.

Stem: Arrowroot has an upright, fleshy stem that emerges from the rhizomes. The stem is smooth and non-woody with a simple structure. It does not have a prominent bark and is herbaceous.

Flowers: Arrowroot produces small, spike-like inflorescences that appear at the top of the plant. These flowers are typically white to purple and are relatively inconspicuous. They have a typical structure for a member of the Marantaceae family, with a distinct 3-lobed perianth.

Fruit: The plant produces small, triangular capsules containing small, black seeds.



Temperature Requirements

Arrowroot grows best in temperatures ranging from 25°C to 30°C (77°F to 86°F). It is highly sensitive to frost, and temperatures below 10°C (50°F) can damage the plant. Therefore, it is best suited for tropical and subtropical regions.

Arrowroot prefers high humidity levels, typically 60% to 85%. This is important for the plant's overall health, as it aids in the plant's ability to transpire and grow efficiently. Arrowroot grows well in areas with **full sunlight** but can tolerate some **partial shade**,

particularly during the hottest part of the day. However, the plant does best when it receives ample sunlight for about **4 to 6 hours daily**.

Soil conditions

Arrowroot prefers **loamy soils** that are rich in organic matter. Loam provides a good balance of sand, silt, and clay, which allows for optimal root development and good water retention without waterlogging. Well-drained soils are critical for arrowroot, as waterlogged conditions can lead to root rot and hinder rhizome growth. Sandy loam or light clay soils with good drainage are ideal for arrowroot cultivation.

Soil pH

Arrowroot thrives in **slightly acidic to neutral soils**, with a pH range of **5.5 to 7.0**. The plant can tolerate slightly alkaline conditions but does not grow well in highly acidic soils.

Propagation

Arrowroot (*Maranta arundinacea*) is primarily propagated through **vegetative means** using rhizomes. This method ensures the crop's genetic traits are preserved and allows for faster establishment compared to seed propagation, which is not commonly used.

Planting

Choose healthy, disease-free rhizomes (the underground stem) for propagation. These rhizomes should be mature, firm, and well-developed, with at least one bud or shoot. Rhizomes used for propagation should be about 10-15 cm long (4-6 inches) and have at least one or two growing points or buds. Cut the rhizomes into smaller pieces. Ensure each piece has at least one bud or growing point to ensure successful sprouting. Each piece should be around 5-10 cm in length. Plant the rhizomes 5-10 cm deep into the soil. Ensure they are spaced about 30-45 cm (12-18 inches) apart within rows, with 60 cm (24 inches) between rows. Prior to planting, make sure the field has been properly prepared with well-drained, fertile soil. Arrowroot does best in loamy or sandy-loam soils with good organic content.

Fertilizer requirement

A balanced fertilizer with a ratio of 14-14-14 (N-P-K) is recommended for general fertilization. Apply it every 6-8 weeks, depending on the soil fertility and plant growth. Organic options like compost, well-rotted manure, and bone meal can be applied to boost soil fertility.

Irrigation requirement

Arrowroot requires **moderate to high** levels of moisture throughout its growing period. While it prefers consistently moist soil, it is important that the soil is **well-drained** to avoid waterlogging and root rot. Generally, this means watering **every 2-3 days** during dry periods or whenever the top few inches of soil dry out. Watering might be reduced to **once in every 3-4 days**, depending on the climate and soil conditions.

Weed management

Applying a pre-emergence herbicide such as **glyphosate** (for non-organic practices) can effectively kill weeds before they sprout. These herbicides target young weeds, preventing them from competing with the crops. Apply a thick layer (about 3-4 inches) of organic mulch, such as **straw, leaves, or grass clippings**, around the base of arrowroot plants. Mulch suppresses weed germination by blocking light, retains soil moisture, and provides nutrients as it decomposes.

Harvest and yield

Arrowroot can be harvested 10 months after planting. Yield should be about 25 tons per hectare (t/ha) in open areas.

References

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