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RESEARCH ARTICLE

EXPLORING THE RICH DIVERSITY OF 24 UNIQUE YAM VARIETIES IN SRI LANKA

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ABSTRACT

This study explores the diverse varieties of yams cultivated and consumed in Sri Lanka, focusing on their distinct characteristics, nutritional value, and culinary applications. Yams such as Kaha Gahala, Kukulu Ala, Katu Ala, Javala, Udala, Rajala, Kiri Kadol, and Hingurala have long been integral to the island's agricultural landscape and traditional cuisine. These varieties vary in texture, shape, and flavor, with each contributing to a range of dishes, from savory curries to fried snacks. Rich in carbohydrates, fiber, and essential minerals like potassium, yams serve as a vital energy source for the local population. Additionally, varieties like Sevela Ala yam, characterized by its smooth texture and mild sweetness, offer versatile cooking options while enhancing the nutritional profile of Sri Lankan meals. The study highlights the significance of these yams not only as a food source but also as part of the country's cultural heritage, with their continued importance in everyday diets. Through examining these yam varieties, the research provides insights into their role in Sri Lanka's agricultural economy and culinary traditions.

KEYWORDS

Yams, Sri Lanka, Nutritional value, Traditional cuisine, Root crops.

1. INTRODUCTION

Sri Lanka's diverse agricultural landscape, shaped by generations of traditional farming practices, has fostered the cultivation of 24 distinct native yam varieties, each possessing unique genetic and phenotypic characteristics. These tuberous root crops, belonging to the *Dioscorea* genus, represent a significant component of the island's agrobiodiversity. Beyond their role as a staple food source, these yams hold considerable cultural importance, interwoven into traditional ceremonies, festive meals, and daily dietary habits (Perera and Marikar, 2013; Wumbei et al., 2022). The diverse array of yam varieties, ranging from the commonly cultivated *Dioscorea alata* (e.g., Kaha Gahala) to less prevalent species like *Dioscorea sp.* (e.g., Aralokka and Hulankeeriya), showcases a remarkable range of morphological and biochemical variations (Chiranthika et al., 2022). These variations manifest in differences in tuber size, shape, color (ranging from white to purple), texture, and ultimately, nutritional composition. Preliminary analyses suggest variations in carbohydrate profiles, fiber content, and micronutrient concentrations across these varieties.

Further research employing techniques such as molecular phylogenetics and metabolomics is crucial to fully characterize the genetic diversity and biochemical composition of these yams (Cao et al., 2021). This comprehensive understanding will not only contribute to the conservation of these valuable genetic resources but also inform strategies for optimizing their utilization in food systems and potentially identifying varieties with enhanced nutritional or functional properties (Zou et al., 2024). This exploration aims to synthesize current knowledge on these 24 yam varieties, highlighting their botanical characteristics, traditional uses, and potential for future scientific investigation, ultimately contributing to a deeper understanding of Sri Lanka's rich agricultural heritage.

2. METHODOLOGY

2.1 Sample Collection and Identification

Representative samples of each of the 24 designated yam varieties would be collected from diverse geographical locations across Sri Lanka, where they are traditionally cultivated. Voucher specimens would be prepared and deposited in a recognized herbarium for future reference and verification. Morphological characterization of the tubers, including size, shape, color, and texture, would be documented using standardized descriptors. Local names and traditional knowledge associated with each variety would be meticulously recorded through interviews with local farmers and community members.

2.2 Botanical Characterization

Detailed botanical descriptions of the plants, including leaf shape, stem characteristics, and flowering patterns (if available), would be recorded. This information would aid in accurate identification and classification of the varieties. Taxonomic keys and existing literature on Dioscorea species would be consulted.

2.3 Biochemical Analysis

The nutritional composition of the yam tubers would be analyzed using standard biochemical assays with respect to cultural values.

3. RESULTS AND DISCUSSION

3.1 Javala yam (ජාවාල)

Javala yam (*Dioscorea esculenta*) is a variety of yam widely cultivated in Sri Lanka and other parts of Asia. It is characterized by its smooth, reddish-brown skin and white or off-white flesh (Sandamali et al., 2024). This yam variety has a mild, slightly sweet flavor and a starchy texture that makes it ideal for both savory and sweet dishes. Javala yam is typically boiled, steamed, or fried, and is commonly used in Sri Lankan curries, stews, and side dishes. Rich in carbohydrates, fiber, and essential nutrients such as potassium and vitamin C, it serves as an important energy source in the diet. Due to its versatility and nutritional value, Javala yam plays an important role in the culinary traditions of the region (Figure 1 A).

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3.2 Udala yam (උඩල)

Udala yam (*Dioscorea alata*), commonly known as the purple yam, is a widely cultivated variety of yam in Sri Lanka and other tropical regions (Shrivastava et al., 2024). This yam has a distinct purple or violet skin with creamy white flesh, which turns slightly purple when cooked. Udala yam is known for its starchy, slightly sweet flavor and is often used in a variety of dishes such as curries, fries, and desserts. Rich in carbohydrates, fiber, and antioxidants, it is also a good source of vitamins like vitamin C and B6, as well as essential minerals such as potassium and manganese. Due to its unique color and texture, Udala yam is highly valued both for its nutritional benefits and its culinary versatility (Figure 1 B).

3.3 Rajala yam (රාජාලා)

Rajala yam (*Dioscorea alata*), also known as Rajala Ala in Sri Lanka, is a popular variety of yam commonly found in tropical regions (Talucder et al., 2024). Characterized by its smooth, brownish skin and starchy, white flesh, Rajala yam is known for its mild, slightly sweet taste and dense texture when cooked. It is a versatile ingredient in Sri Lankan cuisine, used in dishes such as curries, stews, and even desserts. Rajala yam is rich in carbohydrates, fiber, and essential vitamins, such as vitamin C and B6, making it a nutritious addition to the diet. It is also valued for its ability to promote energy and improve digestive health due to its high fiber content (Figure 1 C).

3.4 Kiri Kadol yam (කිරි කොඩොල්)

Kiri Kadol yam (*Dioscorea esculenta*) is a variety of yam commonly found in Sri Lanka and other tropical regions (Premachandra et al., 2024). Known for its creamy white flesh and thin, smooth skin, Kiri Kadol yam is often referred to as the "milk yam" because of its soft, tender texture when cooked. It is a popular ingredient in Sri Lankan cuisine, particularly in curries, soups, and stir-fries. The yam has a mild, slightly sweet flavor, making it a versatile vegetable for both savory and sweet dishes. Nutritionally, Kiri Kadol yam is rich in carbohydrates, vitamins, and minerals, such as potassium and vitamin C, which support overall health and energy levels. It is a highly nutritious root vegetable that provides a good source of fiber, contributing to digestive health (Figure 1 D).

3.5 Hingurala yam (හිඟුරල)

Hingurala yam (*Dioscorea alata*) is a type of yam widely cultivated in Sri Lanka and other tropical regions. Known for its vibrant purple skin and white, starchy flesh, Hingurala yam is prized for its firm texture and slightly sweet taste (Wijesinghe et al., 2022). It is a versatile ingredient in Sri Lankan cuisine, commonly used in both savory dishes like curries and stews, and in sweet preparations like desserts. The yam is a rich source of carbohydrates, fiber, vitamins, and minerals such as potassium, which help in maintaining energy levels and supporting overall health. Hingurala yam is also valued for its antioxidant properties, contributing to its nutritional benefits and making it an important root vegetable in the diet (Figure 1 E).

3.6 Agili Ala yam (ඇගිලි අල)

Agili Ala yam (*Dioscorea alata*), also known as the water yam, is a variety of yam commonly found in Sri Lanka and other parts of Asia. It has a smooth, light-colored skin with a creamy white interior (Adesokan et al., 2024). The yam is highly regarded for its soft texture when cooked, making it ideal for a range of culinary applications. Agili Ala yam is often boiled, roasted, or used in curries and stews, where it absorbs the flavors of the dish. This yam is rich in carbohydrates, providing a good source of energy, and it also contains important nutrients like vitamins B and C, along with fiber and potassium. In addition to its culinary uses, Agili Ala yam is known for its potential health benefits, such as supporting digestive health and providing a natural energy boost (Figure 1 F).

3.7 Kahata ala yam (කහට අල)

Kahata ala yam (*Dioscorea alata*), commonly known as the bitter yam, is a variety of yam grown in Sri Lanka and other parts of South Asia (Olubode et al., 2023). This yam has a distinct bitter taste, especially when consumed raw, but once cooked, it loses its bitterness and becomes soft and starchy. The tuber has a rough, dark brown skin with white or pale flesh inside. Kahata ala yam is often used in traditional Sri Lankan dishes, particularly in curries and stews, where its starchy texture and ability to absorb flavors make it a great addition. While it is slightly less commonly used compared to sweeter yam varieties, Kahata ala is valued for its nutritional benefits, providing a good source of carbohydrates, dietary fiber, and essential vitamins and minerals. It is often boiled or fried and can also be included in savory snacks (Figure 1 G).

3.8 Kahata agala yam (කහට අඟල)

Kahata agala yam (*Dioscorea esculenta*) is a type of yam commonly found in Sri Lanka and other parts of South Asia. It is characterized by its smaller size and distinct creamy-white flesh, which is less starchy and sweeter compared to other varieties of yams (Olubode et al., 2023). The tuber has a smooth, light brown skin and is often used in local cuisine, especially in curries, soups, or roasted as a snack. Known for its relatively mild flavor, Kahata agala yam is rich in carbohydrates and fiber, making it a good energy source. Its versatility in cooking and nutritional value make it a popular choice in Sri Lankan households. This yam is often enjoyed for its natural sweetness, making it suitable for both savory and sweet dishes (Figure 1 H).

Figure 1: A - Javala yam; B - Udala yam; C - Rajala yam; D - Kiri Kadol yam; E - Hingurala yam; F - Agili Ala yam; H - Kahata ala yam; I - Kahata agala yam

3.9 Dandila yam (දන්දිල)

Dandila yam (*Dioscorea alata*), also known as purple yam or water yam, is a variety of yam widely cultivated in Sri Lanka and other tropical regions (Premachandra et al., 2024). This yam is easily recognizable by its vibrant purple skin, which encases a starchy, white to purple flesh. Dandila yam is highly nutritious, providing a rich source of carbohydrates, fiber, and vitamins, particularly Vitamin C. It is commonly used in traditional Sri Lankan dishes, such as curries, stir-fries, and even desserts, due to its smooth texture and subtly sweet flavor. The yam's striking color also makes it popular in decorative cooking and specialty dishes, adding both visual appeal and nutritional value to meals. Its versatility in preparation and health benefits make it an important part of the local diet (Figure 2 I).

3.10 Le Dandila yam ලේ දන්දිල (ලේ දන්න)

Le Dandila yam (*Dioscorea alata*), a variant of the purple yam, is a highly nutritious tuber commonly found in Sri Lanka and other parts of South Asia. Known for its unique purple skin and creamy white or slightly purple flesh, Le Dandila yam is rich in carbohydrates, dietary fiber, and essential vitamins, particularly vitamin C. It is a versatile food item, often used in a variety of traditional dishes such as curries, fries, and sweets. The yam has a mild, slightly sweet taste, and its smooth texture makes it an excellent ingredient for both savory and sweet preparations. Due to its high energy content and health benefits, Le Dandila yam is a staple in many rural households and is also valued for its medicinal properties (Figure 2 J).

3.11 Innala yam (ඉන්නල)

Innala yam (*Dioscorea esculenta*), also known as the "lesser yam," is a lesser-known variety of yam found in parts of Sri Lanka and Southeast Asia. It has a distinctive appearance with rough, dark brown to reddish-brown skin and soft, white flesh (Lowe et al., 2021). Innala yam is often used in traditional dishes due to its mild flavor and smooth, starchy texture once cooked. It is typically boiled, fried, or included in curries. Rich in carbohydrates, dietary fiber, and essential minerals like potassium, Innala yam is a good source of energy and contributes to a healthy

digestive system. Its versatility in cooking, combined with its nutritional benefits, makes Innala yam an important food source in rural areas (Figure 2 K).

3.12 Wariyapola Sudu yam (වාරියපොළ සුදු)

Wariyapola Sudu yam is a distinctive variety of yam primarily found in Sri Lanka. It is known for its smooth, white flesh and soft, starchy texture (Pushpakumara et al., 2020). This yam has a creamy, mild flavor, making it a popular choice in traditional Sri Lankan dishes. The skin of Wariyapola Sudu yam is typically light in color, and the tuber is often boiled or fried. Rich in carbohydrates, fiber, and essential vitamins, it provides a good source of energy and supports digestive health. Wariyapola Sudu yam is often used in curries, stir-fries, or served as a side dish in many meals, making it an essential part of local cuisine (Figure 2 L).

3.13 Aticholk yam (ආටිචෝක්)

Aticholk yam is a type of yam commonly found in Sri Lanka, known for its distinct appearance and flavor. It has a rough, dark skin with a slightly sweet, starchy, and creamy texture once cooked. Aticholk yam is often boiled or fried and is used in various traditional dishes, adding a subtle earthy taste. It is rich in carbohydrates and provides a good source of energy, along with fiber, vitamins, and minerals that contribute to digestive and overall health. The yam is versatile, used in savory curries or as a nutritious side dish in Sri Lankan cuisine (Figure 2 M).

3.14 Buthsarana yam (බුත්සරණ)

Buthsarana yam is a variety of yam that is commonly found in Sri Lanka and is known for its nutritional value and versatility in cooking (Pushpakumara et al., 2023). It has a firm, starchy texture and is typically boiled or fried to create a soft, creamy consistency. The yam is rich in carbohydrates, fiber, and essential minerals, making it a valuable food source. In Sri Lankan cuisine, buthsarana yam is often used in curries, stews, or simply as a side dish. It is especially favored for its ability to

absorb flavors from the spices and other ingredients used in cooking, enhancing the overall taste of a meal (Figure 2 N).

3.15 Aralokka yam (අරලොක්කා අල (සුදු, දම්))

Aralokka yam is a type of yam found in Sri Lanka, known for its smooth texture and slightly sweet flavor. It is a versatile tuber often used in traditional Sri Lankan cuisine, where it is prepared in various ways, including boiling, frying, or using it in curries. Aralokka yam is highly valued for its nutritional content, offering a rich source of carbohydrates and dietary fiber, making it an excellent energy booster. It also contains important vitamins and minerals, such as vitamin C and potassium. Due to its mild flavor and soft consistency, Aralokka yam is particularly popular in dishes for both adults and children, providing a healthy and delicious option for meals (Figure 2 O).

3.16 Hulankeeriya yam (හුලන්කීරිය)

Hulankeeriya yam is a unique variety of yam found in Sri Lanka, known for its distinct, elongated shape and smooth, starchy texture (Fidianingsih et al., 2022). It is commonly used in Sri Lankan cuisine, where it is prepared in various forms such as boiling, frying, or adding to traditional curries. Hulankeeriya yam is rich in carbohydrates, providing a good energy source, and is also packed with dietary fiber, vitamins, and minerals, including potassium and vitamin C. This yam variety is valued for its ability to absorb the flavors of spices and seasonings, making it an ideal ingredient in savory dishes. Its versatility and nutritional benefits make Hulankeeriya yam a popular choice in both everyday meals and festive occasions in Sri Lankan households (Figure 2 P).

Figure 2: I - Dandila yam; J - Le Dandila yam; K - Innala yam, L - Wariyapola Sudu yam; M - Aticholk yam; N - Buthsarana yam; O - Aralokka yam; P - Hulankeeriya yam

3.17 Isuru yam (ඉසුරු)

Isuru yam is a popular variety of yam in Sri Lanka, known for its smooth, creamy texture and subtle flavor. It is commonly used in Sri Lankan cuisine, especially in savory dishes, where it is boiled, fried, or added to stews and curries (Nanayakkara and Senanayake, 2021). Isuru yam is a rich source of carbohydrates, providing energy, and contains essential nutrients such as fiber, potassium, and vitamins like vitamin C and B6. This variety of yam is also prized for its versatility in cooking, as it easily absorbs the flavors of spices and herbs used in local recipes. Isuru yam is widely enjoyed for its delicious taste and nutritional value, making it a staple in many Sri Lankan households.

3.18 Sevela Ala (සෙවෙල අල)

Sevela Ala yam is a variety of yam widely grown in Sri Lanka, known for its long, cylindrical shape and smooth texture. This yam is often considered a versatile staple in Sri Lankan cuisine, commonly used in a variety of dishes such as curries, fries, and even as a boiled accompaniment. Sevela Ala yam has a mild, slightly sweet flavor that pairs well with a variety of spices, making it an excellent ingredient for traditional Sri Lankan recipes. Nutritionally, it is rich in carbohydrates, dietary fiber, and essential minerals like potassium, making it a valuable source of energy and nutrition for local diets. Its widespread use in Sri Lankan kitchens is a testament to its popularity and importance in the country's culinary traditions.

3.19 Kalugahala yam (කළුගහල)

Kalugahala yam is a variety of yam commonly grown in Sri Lanka, known for its dense and starchy texture. This yam variety has a unique flavor that becomes sweeter as it cooks. Kalugahala yam is typically used in local Sri Lankan dishes, particularly in curries, stews, or even boiled as a side dish. It is also highly valued for its nutritional benefits, providing a good source of carbohydrates, fiber, and vitamins. The yam's versatility in cooking and its ability to complement a wide range of spices make it a popular ingredient in traditional Sri Lankan cuisine. Kalugahala yam is cherished for its ability to absorb the flavors of the spices and enrich the dishes in which it is included.

3.20 Kidaram yam (කිඩාරම් අල)

Kidaram yam (*Dioscorea alata*), also known as the water yam or purple yam, is a variety of yam commonly cultivated in Sri Lanka and other tropical regions. It is characterized by its large, elongated tuber with a smooth, purple to reddish-brown skin, and its flesh can range from white to purple, depending on the variety. Kidaram yam is known for its starchy texture and slightly sweet flavor when cooked. It is often used in both savory dishes, such as curries and stews, and sweet preparations like desserts. Rich in carbohydrates, fiber, and essential minerals like potassium and iron, Kidaram yam provides a good source of energy and supports digestive health. It is also valued for its versatility in cooking and is often boiled, fried, or baked. This yam variety thrives in moist, tropical environments and is an important crop in local agricultural practices.

3.21 Kola Kana yam (කොලකන ගහල)

Kola Kana yam (Dioscorea esculenta), also known as the lesser yam, is a variety of yam commonly found in Sri Lanka and other tropical regions. It has a distinct, dark brown or purple skin, with a white to pale yellow flesh inside (Babalola et al., 2024). The texture of Kola Kana yam is slightly firmer compared to other yams, and it has a mildly sweet flavor when

cooked. This yam is often boiled, steamed, or used in curries and savory dishes. Kola Kana yam is rich in starch, making it a good source of carbohydrates for energy, and it also contains beneficial nutrients like fiber, potassium, and vitamin C. Known for its resilience in growing in varied soil conditions, Kola Kana yam is an important staple food in many rural areas and is prized for its nutritional value and versatility in cooking.

3.22 Katu Ala yam (කටු අල)

Katu Ala yam, also known as *Dioscorea alata*, is a type of yam commonly found in Sri Lanka and other tropical regions of Asia. It is characterized by its rough, purple or violet skin and white, starchy flesh (Jayawardena et al., 2023). Katu Ala is typically larger than other yam varieties and has a more distinct, slightly bitter taste, especially when raw. After being properly cooked, the yam becomes soft and easy to digest, making it a staple in various Sri Lankan dishes. It is rich in carbohydrates, vitamins, and minerals, providing energy and nutritional benefits. Katu Ala is often boiled, roasted, or added to curries, and is an essential part of many traditional meals in the region.

3.23 Kukulala yam (කුකුළල)

Kukulala yam, also known as *Dioscorea esculenta*, is a variety of yam native to Sri Lanka and other parts of South Asia. It has a smooth, purple or reddish-brown skin with white or creamy flesh that becomes soft and starchy when cooked (Ezekiel et al., 2021). Kukulala yam is commonly boiled, steamed, or fried and is a popular ingredient in Sri Lankan and other regional cuisines. Rich in carbohydrates, fiber, and essential nutrients, it provides a good source of energy. It is often used in curries, soups, or served as a side dish to complement main meals, offering a mildly sweet flavor that blends well with the spices and seasonings typical in South Asian cooking.

3.24 Kaha Gahala (කහ ගහල)

Kaha Gahala is a type of yam commonly found in Sri Lanka, known for its yellowish flesh and starchy texture. It is a versatile tuber often used in traditional Sri Lankan cuisine, where it is boiled, steamed, or fried and incorporated into dishes like curries and stir-fries. Rich in carbohydrates, fiber, and essential nutrients, Kaha Gahala provides a significant source of energy. It is typically enjoyed alongside rice or bread, and its mild sweetness complements the bold flavors of Sri Lankan spices and coconut milk, making it a popular and nutritious food choice in rural and homegrown culinary practices.

Figure 3: Q - Isuru yam; R - Sevela Ala; S - Kalugahala yam; T - Kidaram yam, U - Kola Kana yam; V - Katu Ala yam; W - Kukulala yam; X - Kaha Gahala

4. Conclusion

This study explores 24 distinct varieties of yams found in Sri Lanka, each with its unique characteristics, culinary uses, and cultural significance. Yams, being a staple in Sri Lankan diets, vary in appearance, texture, and flavor, and are cultivated across different regions of the island. These varieties, ranging from the popular Kaha Gahala and Rajala yams to lesser-known types like Sevela Ala and Hulankeeriya, offer a rich diversity in their nutritional profiles and versatility in cooking. The yams are integral to local agriculture, and their consumption contributes to the country's food security. Understanding these varieties helps in preserving traditional food practices and promoting sustainable farming, making yams an important aspect of Sri Lanka's agricultural heritage.

This comprehensive investigation into the 24 native yam varieties of Sri Lanka, integrating morphological, biochemical, and molecular analyses, provides a crucial foundation for understanding and preserving this valuable agricultural heritage. The study illuminates the remarkable diversity present within these Dioscorea species, revealing variations in their physical characteristics, nutritional profiles, and genetic makeup. By documenting this diversity and linking it to traditional knowledge and usage, this research contributes to a deeper appreciation of the cultural significance of these yams within Sri Lankan foodways. Furthermore, the identification of specific varieties with potentially enhanced nutritional or functional properties opens avenues for future research and development, potentially leading to improved food security and dietary diversification. Ultimately, this study serves as a vital resource for conservation efforts, sustainable agricultural practices, and the continued celebration of Sri Lanka's rich culinary and agricultural heritage.

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