Etteriya (*Murraya paniculata*) A Vibrant Beauty in Sri Lanka

University of Colombo Institute for Agro-Technology and Rural Sciences – Sri Lanka
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ETTERIYA (*Murraya paniculata*)
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FOREWORD

Murraya paniculata is a very significant evergreen herbal shrub, commonly called ‘’Orange Jasmine’’ or Etteriya in Sri Lanka. This meticulous herb is having variety of importance as an ornamental, aesthetic medicinal and other values. This monograph is a comprehensive and contemporary overview on botanical aspects, geographical distributions, morphological variations and cultural practices. The book affirms the importance of the Etteriya plant as an essential and integral herb of the natural eco system. The addition of color plates and scientific illustrations makes this book the most comprehensive resource on underutilized herb Etteriya.

This monograph was prepared by Ms. W. G. C. Madushani as a part of her M.Phil. degree programme and as a realization of an endeavor of the World Bank Funded AHEAD / ICE Project of University of Colombo Institute for Agro-Technology and Rural Sciences – Sri Lanka. This monograph would be helpful to the undergraduate and post graduate students, botanists, floriculturists and researchers to understand the taxonomic literature specifically in family Rutaceae for which *Murraya paniculata* belongs.

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1. Introduction

1.1 General Description

Murraya paniculata is an evergreen shrub, commonly called **''Orange Jessamine''** and in Sri Lanka it is known as Etteriya. It belongs to the family Rutaceae and native to South Asia, Southeast Asia, and Australia [1]. The plant is commonly grown as an ornamental tree possessed with hardiness and tolerance to wide range of soil and environments.

This plant mainly grows in Sri Lanka as an ornamental plant in home gardens and it produces highly fragrant, attractive and charming white flowers. This plant is grown commercially for obtaining flowers to use in cosmetic industry. Moreover, various plant parts are being used in Ayurveda medicine owing to their medicinal properties. In Sri Lanka, the shrub blooms mainly from April to August in the year. Also, it is abundantly distributed both in the wet zone and the dry zone. It is frequent at lower elevations and occasionally seen at higher elevations in Sri Lanka. *Murraya paniculata* is a large shrub may grow up to 25m to 30m height however, maintained at a desirable height by manipulating the plant structure by regular pruning.

1.2 Scientific Classification

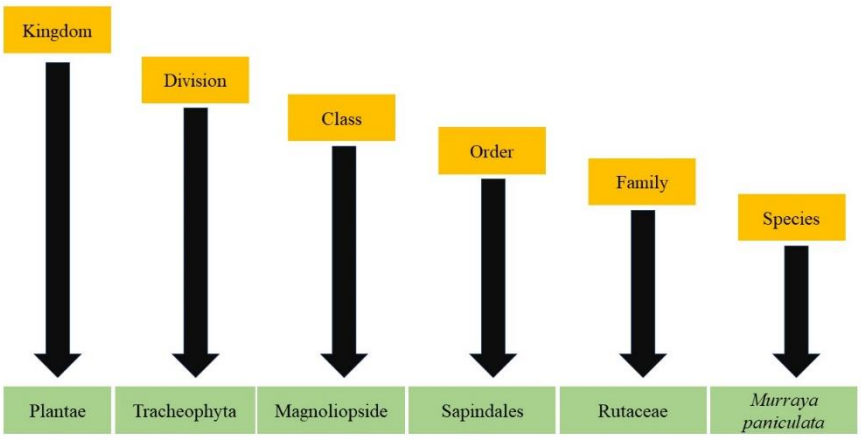

Figure 1.1 : *Scientific Classification of Etteriya*

1.3 Common Names

1. Orange jessamine [2]
2. China box [3]
3. Mock orange [4]
4. Chinese box [5]
5. Common jasmine-orange [2]
6. Cosmetic bark tree [6]
7. Hawaiian mock orange [7]
8. Honey bush [8]
9. Jasmine orange [9]
10. Mock orange
11. Murraya
12. Satinwood [8]
13. Burmess-boxwood
14. Lakeview Jasminum
15. Mock lime [10]

1.4 Name in Other Languages

1. **English:** Common jasmine-orange, Orange-jasmine, Hawaiian mock-orange, Chinese box, Jasmine-orange, Mock orange, Burmese-boxwood, China-box, Chinese-boxwood, bark tree, cosmetic bark tree, orange jessamine, satinwood, Chinese-myrtle, orange-jessamine, satinwood, Jessamine, Lakeview jasmine, Honey bush, Murraya, cosmetic bar [1,9,10,11,13,14]
2. **Sinhala**-Etteriya
3. **French**: Orange-jessamine, bois buis, bois de Chine, bois jasmin, Rameau, buis de Chine
4. **Afrikaans**: Lemoenjasmyn
5. **Arabic**: Muraya euthkulia
6. **Assamese**: Kamini (কামিনী) Kamini-kanchan
7. **Bengali**: Kamini (কামিনী)
8. **Burmese**: Yujan pain
9. **Chinese**: Jiu li xiang, Qian li xiang, Yue ju, Shi gui shu, Kau lei heung
10. **Finnish**: Tuoksujasmikki
11. **German**: Orangenraute, Jasmin-Orangenraute

2. Botany of the Plant

2.1. Leaf

Figure 2.1 : Leaves of Etteriya

Leaves are alternately arranged along the stem. These leaves are compound (pinnate) with 3–8 leaflets. Stipules are absent in the leaves. Leaf arrangement varied in alternate to sub-opposite. Moreover, leaflet shape is varied from ovate, obovate, elliptical, lanceolate, rambold, and to rounded. Leaflet base shape varied from acute, cunate, obtus and to rounded. Leaflet apex shape varied from acute, cunate, acuminate, obtus, rounded, and to retuse. Leaflet margin is varied in entire to undulate. It's length varied from 3.5cm to 11.5 cm. Leaflet width varied from 2.5cm to 5.5cm, petiole length ranged from 3.5cm to 9.5cm and internode length is varied to 3.5cm to 10cm. Leaf color ranged from light green to dark green colour.

2.2. Flower

Figure 2.2 : Flowers of Etteriya

Flowers are bisexual, aromatic, and have pure white color petals. Petals are varied as oblanceolate, oblong, obovate and lanceolate. Each flowers has five green sepals and five white petals. Moreover, it has backward and curved petals. Their length is varied from 2.5cm to 5. 5 cm. Petal width varied from 0.5cm to 1.5cm. The inflorescence is a terminal or axillary branched cyme. Flowers are displayed as a cluster that consists of 3-15 flowers in a cluster. The pedicel is 0.5 to 1cm long. The calyx is yellowish-green. It has 10 stamens with of 1cm to 2cm long. The pistil is

comprised of a 2 -3 mm long ovary. The buds are pale green. Flowers posses with a strong fragrance that attracts bees, birds, and butterflies.

2.3. Fruit

Murraya paniculata fruit is a berry, shiny, green (when unripe) and turn from orange to red when ripen. The fruit has a bitter and mucilage pulp and contains 1 or 2 seeds. It has tear drop shape seeds. The fruit apex varied acuminate to round. Fruit shape is varied as oval, elliptical, obovate or ovate shapes.

Figure 2.3: Fruits and seeds of Etteriya

2.4. Stem

Murraya paniculata has a pale gray color stem which becomes cracked with age. The bark is a dark grey that can be washed to reveal the sub-bark which is creamish color.

Figure 2.4: Stem of Etteriya

2.5. Root

Murraya paniculata has tap roots that support to the stems. Tap root has lateral roots and numerous fine roots.

Figure 2.5: Roots of Etteriya

3. Properties of the Plant

3.1 Medicinal Properties

The plant comprised of several medicinal properties which are inherent.

1. Antioxidant [11]
2. Antimicrobial [12]
3. Analgesic and Ant nociceptive
4. Anticancer [12]
5. Anti-giardia
6. Antiplatelet aggregation [9]
7. Antifungal [13]
8. Antibacterial [14]
9. Antifertility [15]
10. Anticholinesterase activity [16]
11. Antiprotozoal activity [17]
12. Insecticidal activity [18]

3.2. Major Chemical Composition

There are several chemicals contain in different parts of the plant. As major chemicals, they are [19]

a) 3',4',5,5',7,8-hexamethoxyflavone
b) 3,3', 4',5,5',7,8-heptamethoxyflavone
c) Meranzin hydrate
d) Murpanidin
e) Murragatin
f) T-caryophyllene
g) γ-elemene
h) perolidol, β-elemene
i) spathulenol
j) caryophyllene oxide
k) β-caryophyllene, germacrene D
l) 4-methylene-6-(1-propenylidene)-cyclooctene

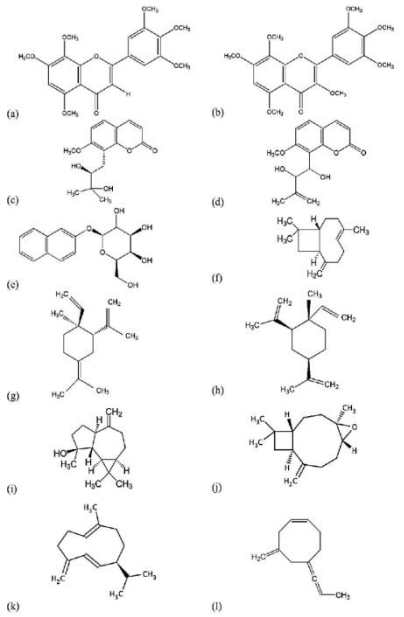

Figure 3.1: Chemical Structure of Etteriya [19]

3.3. Other Chemical Compositions of *Murraya paniculate*

There are some chemicals contain in small amounts compared to the major chemicals,

- Caryophyllene Oxide [20]
- ß-Caryophyllene [21]
- ß-Elemene [22]
- Germacrene D
- Cyclooctene
- Coumarins-Minumicroline Acetonide
- B-Cyclocitral [23]
- Methyl Salicylate [24]
- Trans-Nerolidol [25]
- Cubenol
- B-Cubebene
- α-cubebene [26]

4. Geographical Distribution

5.1. Worldwide Distribution

Murraya paniculata is native to South Asia, Southeast Asia, China, and Australia. The distribution area extends from Pakistan, India [27] and southern China to Taiwan, Philippines, the Ryūkyū Islands, and the Mariana islands, to the south via Malaysia Mexico [27] and Indonesia [22] to New Guinea and parts of Australia [27].

5.2 Distribution in Sri Lanka

In Sri Lanka, *Murraya paniculata* are abundantly distributed in Kalutara, Matara. Galle, Gampaha, Kandy, Anuradhapura, Polonnaruwa, Rathnapura, Kurunegala and Kegalle districts. Also occasionally distributed in Monaragala, Matale, Jaffna, Mulativu, Puttalam, Trincomalee, Vavuniya districts and hardly distributed in Nuwaraeliya and Badulla districts.

4. Morphological variations in Sri Lanka

5.1 Floral Variations

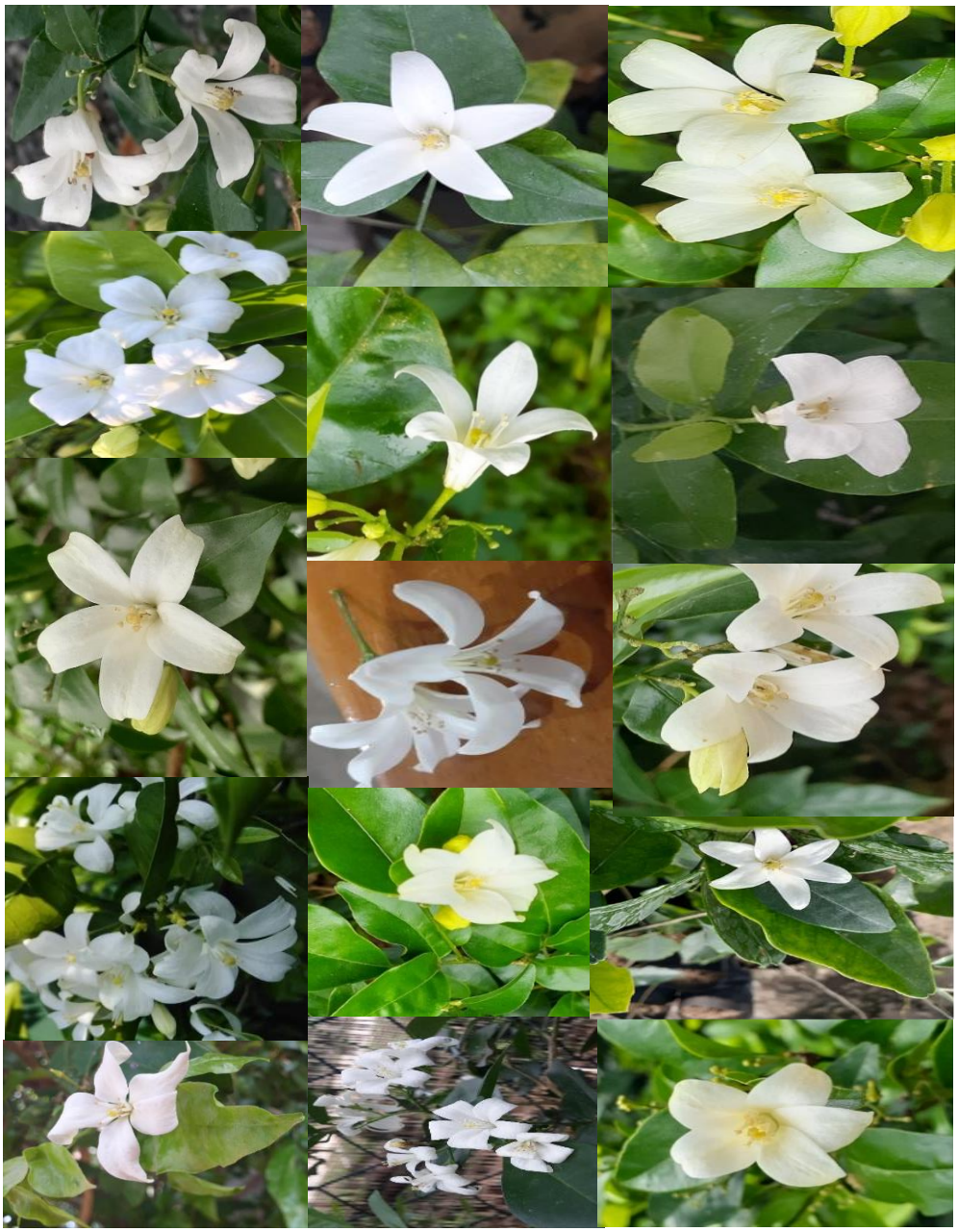

***Figure 5.1**: Flower variations of Etteriya,*

Petal shapes varied as Obovate, Oblanceolate, and Oblong

5.2 Leaf Variations

***Figure 5.2**: Leaf variations of Etteriya,*

5.3 Fruit Variations

***Figure 5.3**: Fruit variations of Etteriya,*

6. Reproduction and Dispersal

6.1 Sex distribution

Flowers are bisexual, each flower has both male and female structures.

6.2 Pollination

Murraya paniculata is pollinated by bees. strong fragrance and color selectively attracting the pollinators.

6.3 Seed dispersal

These seeds are most spread by birds and other animals. They eat the brightly colored fruit and seeds can be spread via dumped garbage waste.

Figure 6.1: .Pollination by Bees

6.4 Propagation

6.4.1 By seeds

Seed propagation is an easy method for *Murraya paniculata.* Fruits peel off to disclose yellowish-white seeds and then rinse with clean water, drain the seeds and place on a flat surface for 15 to 20 minutes before sowing. Seeds should not store longer they reduce the viability. It takes about 1 week for germination.

The pots in 25 cm height are filled with potting mixture can be used for planting seeds. Seedlings should be acclimatized for 1 week before transplanting in the field.

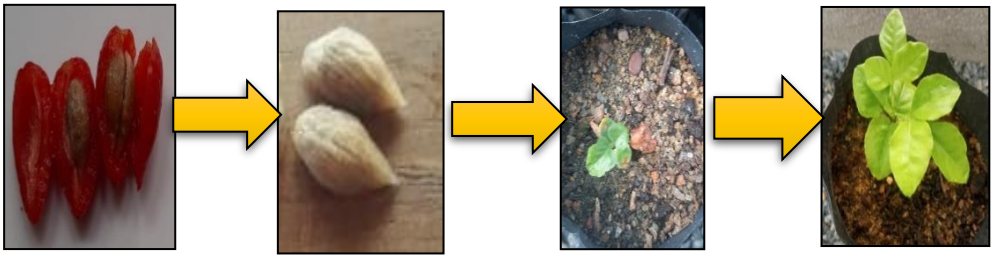

Figure 6.2: .Propagation by seeds

6.4.2 Vegetative Propagation-By cuttings

Both soft wood cuttings with tips but no flowers and semi hardwood cuttings are more appropriate than hard wood cuttings as planting material for successful development of roots. These cuttings should be maintained under either single or multiple propagators for minimum of 21 days before transplanting in pots or containers.

Figure 6.3 Propagation by cuttings

6.4.3 Air Layering

The air layer is generally formed at least 12 to 15 inches (30 to 38 cm) below the tip of the branch. The first step is to remove leaves and twigs for 3 to 4 inches (8 to 10 cm) above and below the point where the air layer is to be made. On larger or brittle stems, two small cuts are made on opposite sides. One cut should be slightly higher on the branch than the other and the cuts should not be too deep. The incisions should

be kept open by inserting a small chip of wood or toothpick to prevent the cut from healing over.

7. Management Practices

7.1 Requirements for Planting

Light: Partial shade

Water: well-drained soil, drought tolerant

Soil: adaptable to different soil types, no other special requirements

Murray's should be planted in a sunny area with well-draining soil

7.2 Pruning of *Murraya paniculata*

A slight pruning can be done once a month to keep the hedge tidy. Most *Murraya* hedges should be trimmed to 1.5 to 2 meters rather than being allowed to grow the full 3 meters in height, for an attractive and dense hedge. Many hedges are shaped, such as spherically, but it depends on the plant type. Regular pruning will not only keep the shrub's shape, but also keep it healthy, and will allow checking for pests and to cut off any damaged areas. After pruning, the hedges should be watered and fertilized to stimulate the plant to grow.

7.3 Pest and Disease Management

7.3.1 Common Pests

Table 7.1: Common pests of Etteriya

Pest	Description	Treatments
Aphids [28]	Very small, but visible, green, black, brown, and orange insect which feeds by sucking sap from the plant. They multiply in warm, dry weather and secrete a substance called	**Minor infection** Washed the infected area by immersing it in a solution of insecticidal soap and water or Neem oil, or horticultural oils are effective against for **aphids**. Aphids may also

	honeydew that attracts ant's honeydew on the leaves also cause sooty mold.	be removed by hand or wiped off with a damp cotton swab **Serious Infection** Use general insecticide
Scale Insects	Leaves frequently appear to be covered in an oval-shaped brown or tan shell (scale). Mobile when young the adults rest on the underside of eaves or beneath the leaf sheath, single or in colonies. These sap-sucking insects leave yellow patches on leaves. They also secrete honeydew which causes sooty mold and attracts ants.	Use a soft brush and insecticidal soap and water to remove, being careful not to damage the leaves.
Whiteflies [28]	Whiteflies can damage plants directly by their feeding. Both nymphal and adult whiteflies feed by inserting their needle-like mouthparts into the vascular tissue or phloem of the leaves and suck out the plant sap. If the numbers of whiteflies per leaf are great enough, the plant will suffer from lack of water and nutrients, resulting in a weakened plant and loss of leaves but rarely in plant death.	Washed the infected area with water. Use a yellow sticky trap because whiteflies get attracted to the yellow color.

7.3.2 Common Diseases

Murraya paniculata plant is susceptible to soil nematodes, scales, aphids, sooty mold, and whiteflies. It is the preferable host to insect pest Citrus psyllid. Because it produces new leaves continuously. This psyllid is the vector for the citrus greening diseases. [29]

Brown spots on leaves, eaten away patches on leaves, and soft, small sacks around the plant are all indicators that pests may be present and will need to be treated.

Fungi are responsible for many diseases that cause leaves to turn yellow. Wet, humid conditions often encourage the growth of fungus spores on leaves and woody parts of the hedge, causing dieback or overall decline. Root rots, leafspot, and molds may also cause leaves to yellow and in some cases can kill plants [29].

Citrus Greening Disease

Citrus greening is caused by a bacterium that is spread by a psyllid insect. As the psyllid feeds on the sap of a citrus tree, it passes the bacterium into the tree, infecting the tree [28,29]. Once a plant has become infected, the bacterium can move throughout the plant.

Treatments

- Use a yellow sticky card to trap psyllid insets.
- Use systematic insecticides

8. Benefits and uses of the plant

8.1 Health Benefits

Overcome pain due to ulcers	Smooth skin
Treat boils	Abdominal pain
Treat arthritis joints	Diarrhea
Treat toothache and oral care	Stomach ache
Can slim body	Headache
Cure inflammation of the testicles	Swelling,
Treat urinary tract infections	Thrombosis
Smooth menstruation	

8.2. As a Bonsai Plant

The *Murraya* has a three to four-inch-long compound leaf but the leaves are often cut back to only one pair of leaflets for bonsai display.

Figure 8.1: Bonsai plant of Etteriya

8.3 Landscaping

Murraya paniculata is a great hardy plant for landscaping

Figure 8.2: Etteriya plants in Hedges

8.4 Cosmetic production

Essential oil is extracted from the flowers and it is used mainly in perfumery as a cosmetic product. The wood and the roots are ground into a sweet-scented powder that is used as a cosmetic on the cheeks of women.

8.5 Wood & Crafts

Most useful part of the tree is the yellow wood, in demand for making canes. Top branches, with the leaves, used for making wreaths and in giving body to bouquets.

8.6 Culinary uses

Use as a food flavor additive for cuisine, in preparing meat, fish, and Soup. Flowers are used for scenting tea. Leaves are used to flavor curries

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