Ocimum gratissimum

L.

Labiateae

LOCAL NAMES
English (wild basil,tree basil,East Indian basil,clove basil); French (menthe gabonaise); Indonesian (ruku-ruku rimba); Malay (ruku-ruku hitam); Thai (horapha-chang); Vietnamese ([es] l[as] l[ows]n)

BOTANIC DESCRIPTION
Ocimum gratissimum is an aromatic, perennial herb, 1-3 m tall; stem erect, round-quadrangular, much branched, glabrous or pubescent, woody at the base, often with epidermis peeling in strips.

Leaves opposite; petiole 2-4.5 cm long, slender, pubescent; blade elliptical to ovate, 1.5-16 cm x 1-8.5 cm, membranaceous, sometimes glandular punctate, base cuneate, entire, margin elsewhere coarsely crenate-serrate, apex acute, puberulent or pubescent.

Inflorescence a verticillaster, arranged in a terminal, simple or branched raceme 5-30 cm long; rachis lax, softly pubescent; bracts sessile, ovate, 3-12 mm x 1-7 mm, acuminate, caducous; pedicel 1-4 mm long, spreading or ascending, slightly curved; flowers in 6-10-flowered verticillasters, small, hermaphrodite; calyx 2-lipped, 2-3 mm long, in fruit 5-6 mm, pubescent, upper lip rounded and recurved, reflexed in fruit, lower lip with 4, narrow, pointed teeth, central pair of teeth minute and much shorter than the upper lip; corolla campanulate, 3.5-5 mm long, 2-lipped, greenish-white, pubescent outside, upper lip truncate, 4-fid, lower lip longer, declinate, flat, entire; stamens 4, declinate, in 2 pairs, inserted on the corolla tube, filaments distinctly exserted, upper pair with a bearded tooth at the base; ovary superior, consisting of 2 carpels, each 2-celled, style 2-fid.

Fruit consisting of 4, dry, 1-seeded nutlets enclosed in the persistent calyx (the lower lip closing the mouth of the fruiting calyx); nutlet subglobose, 1.5 mm long, rugose, brown; outer pericarp not becoming mucilaginous in water.

O. gratissimum is a variable polymorphic complex species, often subdivided into subspecies, varieties and formas, mainly based on differences in chemical content, the morphology of the fruiting calyx, and on different degrees of hairiness, but the variation forms a continuum. Sometimes O. gratissimum (existing chromosome counts: 2n = 40, 48, 64), O. suave (2n = 32, 48, 64) and O. viride (2n = 38, 40) (here treated as one complex species O. gratissimum) are considered as three different species. Although more research is needed it seems certain that those three taxa are closely related and have 10 homologous chromosomes in common. Crosses between O. gratissimum and O. viride resulted in partially fertile F1 hybrids. Variability is greatest in Africa and India. In Java, 2 chemotypes exist, the eugenol and the thymol type, respectively described as O. gratissimum L. forma caryophyllatum Backer and forma graveolens Backer. Forma caryophyllatum is characterized by: leaves clove-scented when bruised, upper side short-haired, lower side densely gland-dotted, bracts 4-6 mm long, much longer than wide, lower lip of corolla not flushed with violet; and forma graveolens by: leaves strongly odoriferous but not clove-scented when bruised, upper surface covered with minute hairs, bracts 2-4 mm long, about as long as wide, lower lip of corolla flushed violet inside. Most Ocimum species contain essential oil but are primarily used as vegetable (e.g. hoary basil, O. americanum L.), as spice (e.g. sweet basil, O. basilicum L.), or as vegetable and medicine (e.g. sacred or holy basil, O. tenuiflorum L.).

BIOLOGY
Flowering started after 136 days and continued until 195 days. Seed matured after 259 days. Flowering and seed set were much poorer than in O. basilicum L. or O. minimum L. In South-East Asia flowers can be found year-round. In northern India, oil content of young plants was low (2.3%) until the seed setting stage, then remained constant at 2.8% until the seed maturation stage.

Leaves at Wailea 670
Maui, Hawaii (Forest & Kim Starr)

Leaves and fruit at Wailea 670 Maui, Hawaii (Forest & Kim Starr)

Habit at Wailea 670
Maui, Hawaii (Forest & Kim Starr)

ECOLOGY
In its native area O. gratissimum occurs from sea-level up to 1500 m altitude in coastal scrub, along lake shores, in savanna vegetation, in submontane forest, and disturbed land. In South-East Asia it is not frequently found in open locations like roadsides and clearings, but more often cultivated as a hedge plant, up to about 300 m altitude.

BIOPHYSICAL LIMITS
Altitude: 0-1500 m.

DOCUMENTED SPECIES DISTRIBUTION

Native:
Exotic: India, Thailand, Vietnam

The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS
Essential oils: O. gratissimum is grown for the essential oil in its leaves and stems. Eugenol and to a lesser extent thymol extracted from the oil are substitutes for clove oil and thyme oil.

Poison: The essential oil is also an important insect repellent.

Medicine: The whole plant and the essential oil have many applications in traditional medicine, especially in Africa and India. Preparations from the whole plant are used as stomachic and in treating sunstroke, headache and influenza. The seeds have laxative properties and are prescribed against gonorrhoea. The essential oil is applied against fever, inflammations of the throat, ears or eyes, stomach pain, diarrhoea and skin diseases. It is being tested as an antibiotic.

Other products: In Indonesia (Sumatra) a tea is made from the leaves, while in Thailand the leaves are applied as a flavouring. In Indonesia the eugenol-type of O. gratissimum is used in the ceremonial washing of corpses and is planted in graveyards. In India O. gratissimum, named 'ram tulsi', is widely used in religious ceremonies and rituals.

The fresh aboveground parts of O. gratissimum contain 0.8-1.2% essential oil. The chemical composition of the oil is variable and at least 6 chemotypes have been reported, characterized by the main component of the essential oil: eugenol, thymol, citral, ethyl cinnamate, geraniol and linalool. An overview of the occurrence of the various types and possible implications for the taxonomy is lacking. The eugenol type is the most important economically; the thymol type was formerly important, but most thymol is now produced synthetically, while natural thymol is mostly obtained from Thymus vulgaris L. or Trachyspermum ammi (L.) Sprague ex Turrill. The other types are of little economic importance. The eugenol-type oil is a brownish-yellow to pale yellow liquid with a powerful, warm-spicy and aromatic odour, reminiscent of clove oil, but with a sweet-woody, almost floral top note. The dry-out is more bitter than that of clove oil. Analysis of a sample of an essential oil of the eugenol type from Vietnam indicated that the main component was eugenol (71%) with small amounts of D-germacrene and (Z)-beta-ocimene. In a sample from southern China the eugenol content was as much as 95%. Samples from Madagascar had eugenol contents of 40-90%, with very variable other components.

The thymol-type oil is a dark yellow to orange-yellow or brownish liquid with a medicinal-spicy, warm and somewhat herb-like odour. Its flavour is warm, slightly astringent and burning, and has a sweet medicinal aftertaste. Analysis of several samples of essential oils from O. gratissimum from Central and West Africa rich in thymol indicated that their main constituents were thymol, gamma-terpinene, p-cymene and eugenol. The concrete obtained by solvent extraction is much richer in thymol than the distilled oil. A geraniol-rich type, found in the United States, contained mainly geraniol (84-88%) with small amounts of gamma-muurolene, neral, beta-caryophyllene and limonene. The citral type, reported from Iran, Pakistan and India is rich in citral (67%) and geraniol (26%).

SERVICES
Boundary or barrier or support: O. gratissimum is also cultivated as a hedge plant.

TREE MANAGEMENT
The time for transplanting seedlings into the field in the delta of the Hong River in northern Vietnam is February-March, in southern Vietnam from May-August. Plants are spaced at about 40 cm x 50 cm. The optimum harvesting time for distillation of the essential oil is when 3 branches per plant or 75% of the branches are flowering. In northern Vietnam 2-3 cuts can be obtained in an average year, 4-5 cuts per year in the south. In Vietnam, O. gratissimum remains productive for 5-10 years.

In India, yields of 70-75 t/ha green herbage of O. gratissimum producing 400 l essential oil in 2 years have been obtained experimentally. In Thailand harvesting every 10-12 days resulted in an annual green herbage yield of only 13 t/ha and an oil yield of nearly 200 l.

GERMPLASM MANAGEMENT

PESTS AND DISEASES

FURTHER READNG

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SUGGESTED CITATION

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