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## THE PLANT WITH ESSENTIAL OIL CONTAINING LINALOOL IN VIETNAM

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**ABSTRACT:** Linalool is the first ingredient to synthesize many other substances of higher value for the pharmaceutical and fragrance industry; therefore, finding sources of essential oils containing Linalool is an important and necessary task. The purpose of this study is to investigate Linalool of plants containing essential oil in Vietnam to extract Linalool sources for the pharmaceutical and fragrance industry. By the method of fresh sampling of essential oil plants in Vietnam, essential oils are extracted by steam distillation and then analyze on high-resolution chromatography (HRGC) to search for Linalool sources. We have found that some areas with a lot of plants containing high Linalool content grow concentrated wild in forests as *Coriandrum sativum* Linn., *Homalomena occulta* (Lour.) Schott, *Cinnamomum parthenoxylon* Meissn, and some of them can be planned to cultivate the essential oil source to obtain Linalool for the pharmaceutical and aromatic industry. During the survey, we discovered and made a list of 21 plants with essential oil containing Linalool in Vietnam.

**INTRODUCTION:** Vietnam is a tropical country with a lot of mountains and forests, which is very convenient for essential oil plants to grow year-round. Among the essential oil plants that grow wild in the forest, many of them contain Linalool. Surveying and exploiting essential oil plants containing Linalool that grow wild in the forest and have been grown on farms bring high efficiency for the pharmaceutical and aromatherapy industry. Linalool C<sub>10</sub>H<sub>18</sub>O is a monoterpene that can be found naturally in more than 200 oils, obtained from herbs, leaves, flowers, and wood.

Linalool is found in petitgrain essential oil <sup>1, 2</sup>, lemon <sup>2</sup>, rosewood <sup>3</sup>, bergamot <sup>4, 5, 6</sup>, lavender <sup>7, 8</sup>. *Cinnamomum tamala* <sup>9</sup>, in roots from *Homalomena occulta* (Lour.) Schott <sup>10, 11, 12</sup>, in tangerine, spearmint, rose, cypress, lemon, and ylang-ylang oil. Linalool has many proven activities and is presented in several remedies used in traditional medicine for sedative purposes. Moreover, linalool revealed antimicrobial, anti-inflammatory, anti-hyperalgesic, and analgesic properties <sup>13</sup>.

Linalool and its essential oil can be absorbed by oral absorption or skin, which can cause irritation, pain, and allergic reactions. Linalool is used in some mosquito-repellent products <sup>14</sup>. Linalool is used as a scent in 60% to 80% of perfect hygiene products and cleaning agents, including soaps, detergents, shampoos, and lotions, Linalool is a compound used to concoct perfumes and is a raw material for synthesizing expensive substances like

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linalyl acetate. Some essential oils contain Linalool could be used in the treatment of dementia Alzheimer's type<sup>15</sup>.

Peana and colleagues have demonstrated that linalool is effective against *Escherichia coli* and *Staphylococcus aureus*<sup>16</sup>. Linalool has antioxidant properties, which could be important for the prevention of oxidative damage<sup>17</sup>.

**MATERIALS AND METHODS:** Fresh samples of wild-growing plants containing essential oil are collected in different regions of the Truong Son mountain range in the northern provinces, such as Hoang Lien Son to the provinces of Kontum and Dak Lak in the south of Vietnam. Fresh samples of growing plants containing essential oil are collected in different plantations and family gardens for

growing essential oil plants. The time for sampling is 3 times a year, in the beginning, the end of the dry season, and the middle of the rainy season, January, May, September of the year.

**Methods of taking Essential Oils from Fresh Samples are Collection and Extraction by Enticing Steam Distillation:** The method of determining Linalool content in essential oils is done by high-resolution gas chromatography (HRGC) and the standard sample of Linalool. The results were analyzed on a Japanese Shimadzu GC-9A gas chromatograph with 20M PEG column chromatography. Chromatography runs at a temperature of 110 °C (10 min) then increases by 10 °C/min to 180° C, when carrying a helium 50 ml/min.

## RESULTS AND DISCUSSION:

### The Plants with Essential Oils Containing Linalool in Vietnam:

**TABLE 1: THE PLANTS WITH ESSENTIAL OILS CONTAINING LINALOOL IN VIETNAM**

S. no.	Scientific name of plants	Family	%Yield	%Linalol	Part of plants
1	<i>Cananga odorata</i> (Lamb.) Hook. F. & Thom	Annonaceae	0.1-0.3	5-10	Flowers
2	<i>Coriandrum sativum</i> Linn.	Apiaceae	0.5-1.5	50-70	Part on the ground
3	<i>Daucus carota</i> Linn.	Apiaceae	0.5-1.2	12-15	Part on the ground
4	<i>Angelica sinensis</i> (Oliv) Diels	Apiaceae	0.1-0.3	2-4	Root
5	<i>Trachyspermum roxburghianum</i> (DC.) Craib	Apiaceae	0.5-1	5-7	Seed
6	<i>Homalomena occulta</i> (Lour.) Schoot	Araceae	0.9-1.2	50-60	Part on the ground
7	<i>Tagetes erecta</i> Linn.	Asteraceae	0.1-0.2	25-30	Leaves
8	<i>Lonicera japonica</i> Thunb.	Caprifoliaceae	0.1-0.2	7-9	Flowers
9	<i>Illicium verum</i> Hook.f.	Iliciaceae	4-5	2-3	Fruits
10	<i>Ocimum basilicum</i> Linn.	Lamiaceae	0.4-0.6	3-4	Part on the ground
11	<i>Perilla frutescens</i> var. <i>crispa</i> (Thunb) Hand Mazz	Lamiaceae	0.8-1.2	3-4	Part on the ground
12	<i>Cinnamomum camphora</i> (Linn.) J. S. Presl	Lauraceae	0.7-0.9	2-5	Leaves
13	<i>Cinnamomum loureirii</i> Nees	Lauraceae	2-3	2-3	Phloem
14	<i>Cinnamomum parthenoxylon</i> Meissn	Lauraceae	0.6-0.9	80-90	Leaves
15	<i>Cinnamomum verum</i> Presl	Lauraceae	2-3	2-4	Phloem
16	<i>Baeckea frutescens</i> Linn.	Myrtaceae	0.6-0.8	3-5	Part on the ground
17	<i>Jasminum sambac</i> (L.) Ait	Oleacea	0.3-0.4	8-10	Flowers
18	<i>Citrofortunella microcarpa</i> (Bunge) Wijnands	Rutaceae	0.3-0.5	2-4	Pods of fruit
19	<i>Houtuynia cordata</i> Thunb.	Saururaceae	0.1-0.2	3-5	Part on the ground
20	<i>Alpinia katsumadai</i> (Hayata) Linn.	Zingiberaceae	2-4	10-12	Seeds
21	<i>Catibium latilabre</i> (Ridl). Holtt	Zingiberaceae	0.1-0.2	10-14	Root

### The Plants with Essential Oil containing High Linalool Grow Wild in the Forest:

***Homalomena occulta* (Lour.) Schoot:** *Homalomena occulta* (Lour.) Schoot belongs to the Araceae family and has a local name: “Thiên niên kiện”, is grown and grows wild in many mountainous provinces like Lao Cai, Lang Son, Ha Bac, Hoa

Binh, Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, Quang Ngai, Binh Dinh, Quang Nam, Da Nang, Gia Lai, Kon Tum, Dak Lak. Plants are often found in hot, humid climates in mountainous provinces. This plant grows mainly in low-lying areas along canals, water sources, or low mountainsides, hillsides.

It is a perennial herb plant, consist of rhizomes and tubers. The leaves of this plant grow from rhizomes, shiny blades, 30 cm long. Every year, around 4-6 months, this plant will bloom, from August-October will bear fruits. Fruits are full of berries and contain many slitting seeds.

Leaves grow from rhizomes, leaf blades are shiny, up to 30cm long, with 3 pairs of base veins, 7-9 pairs of extra veins, blue flowers.

Fresh rhizomes of *Homalomena occulta* (Lour.) Schoot has 0.9-1.2 essential oil containing linalool 50-60%.

In medicine, it is widely used in the treatment of osteoarthritis pain, herniated disc, spinal degeneration or digestive, intestinal, stomach, etc.

It is a bitter herb, spicy, aromatic, slightly sweet, works very well in the treatment of leprosy, rheumatism, tonic reinforcement, convulsions, limb aches, and pains.

In traditional medicine, it has the effects of tonic, eliminating rheumatism, sutures, and specialized emphysema is used to treat rheumatism, bone tendon fatigue, stomach pain, dysmenorrhea, effective insecticide.

***Cinnamomum parthenoxylon* Meissn.:** The scientific name of the plant is *Cinnamomum parthenoxylon* Meissn. belongs to the Lauraceae family, which has a local name: "Cây xá xỉ", grows wild in the forest that lives for many years. It is a large plant, with a height of up to 30 m and smooth branches. The leaves are long, and spaced, ovoid and pointed. The flowers grow in leaf axils, covered with hairy, spherical fruits are attached on cup-shaped flower tubes, when ripe is gray-yellow or dark purple, fragrant.

**TABLE 2: THE CONTENT OF ESSENTIAL OILS AND LINALOOL OF CINNAMOMUM PARTHENOXYLON MEISSN.**

S. no.	Parts of the plant	%Yield	%Linalool
1	Roots	1.5-2.0	5-7
2	Bark	0.2-0.4	60-65
3	Wood	2.5-3.5	2-3
4	Branches	0.4-0.6	30-35
5	Leaves	1.5-2.0	80-90

Plants grow wild in the highland areas of the North and the North Central of the provinces of Bac Thai,

Quang Ninh, Thanh Hoa, Nghe Tinh, and Lam Dong.

The roots, bark, wood, branches, and leaves give essential oils.

In medicine, roots and stems have a slightly bitter, spicy, and warm taste, which should be used to treat colds, indigestion, stomach pain, rheumatoid arthritis, pertussis, and dysentery. In addition, the bark is also used to treat enlarged liver. On the other hand, research results on lab rats show that bark extract is also resistant to oxidation and hypoglycemia.

### **The Plants with Essential Oil Containing High Linalool can be Cultivated:**

***Coriandrum sativum* Linn.:** The scientific name of the plant is *Coriandrum sativum* Linn. belongs to the Apiaceae family, which has a local name: "Cây ngò".

It is a herbaceous vegetable, which can grow to about 0.5 m tall. The leaves grow from the base, have long stems with three leaflets with lobes, leaf edges have serrated edges. Flowers are small, growing at the tip of branches, and are white. The sphere is spherical, straw-yellow, consists of two halves of the fruit, which contain small seeds inside.

The whole plant has essential oils and has a pleasant aroma, so it can also be used as a fragrance. In cuisine, it is an indispensable ingredient in meat loaves, in curries as well as soups, stir-fries, and other storages.

According to traditional medicine, *Coriandrum sativum* Linn. has a spicy, moderate, dispersing effect, wind, expectorant, cough, fever, headache, help digestion, benefit milk, strong stomach.

**CONCLUSION:** We have established a list of the plant with essential oils containing Linalool in Vietnam, which can be cultivated, exploited as Linalool sources for the pharmaceutical and aromatic industries.

*Homalomena occulta* (Lour.) Schoot and *Cinnamomum parthenoxylon* Meissn. is wild plant with essential oils containing high Linalool content in the Truong Son mountain range that can be extracted for essential oils. These wild-growing

plants with essential oils can be grown in areas suitable for Linalool extraction. *Coriandrum sativum* Linn. is plant with essential oil containing high Linalool that has been grown in Vietnam, so be careful not to degenerate.

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