

ESSENTIAL OIL MONOGRAPH:

Agarwood / Oud

By Salvatore Battaglia



BOTANICAL NAME Aquilaria crassna

FAMILY Thymelaeaceae

### SYNONYMS

Agarwood is known as Gaharu in Malaysia, Eaglewood and Krissana in Thailand, Oudh in the Middle East, Chen-xiang in China, Jin-koh in Japan and Agar in India.<sup>3</sup> The incense and perfume produced from oud otherwise known as agarwood have been highly valued for many centuries and used in many cultures for spiritual and perfumery purposes. It is highly revered in Hinduism, Christianity, Buddhism and Islam.<sup>1</sup>

Agarwood is the resin-infused fragrant wood (also known as aloewood, eaglewood, guharu, oud, chén xiāng and jinkoh) derived from the valuable heartwood of the *Aquilaria* spp.<sup>1,2</sup>

### BOTANY AND ORIGINS

Agarwood is the resin impregnated heartwood of the *Aquilari* species. The resin is secreted by the trees as defence reaction and deposited around the wounds over years following the injury, where the volatile compounds eventually form agarwood.<sup>4</sup>

The species most commonly used for their essential oils are Aqularia malaccensis, A. crassna and A. sinensis.<sup>5</sup>

To date, there are a total of 21 *Aquilaria* species which have been documented and 13 of them are recognised as the agarwood-producing species.<sup>4</sup>

Akter et al. state agarwood can be produced from all members of the Aquilaria.<sup>6</sup>

The trees grow in natural forests at an altitude of a few hundred metres above sea level to about 1000 metres. It grows best around 500 metres in locations with average daily temperatures of 20 to 22  $^\circ$ C.<sup>6</sup>

The origin of the Aquilaria tree species is the wider Indo-Malayan region.<sup>3</sup>

The destructive exploitation of agarwood has had a devastating effect on wild population of all *Aquilaria* species. As a consequence, all of the *Aquilaria* species are now on the IUCN Red List as critically endangered species.<sup>78,9</sup>

Laos is the only country where harvesting of wild trees is still permitted.<sup>8</sup>

The trade data indicates that *A. malaccensis* followed by *A. crassna* and *A. filaria* are the agarwood species that have dominated the international trade for the past 10 years.<sup>2</sup>

The age of the tree is a major factor as infected trees produce a resin from the age of 15 years, with trees aged 50 years and more producing the best yields of agarwood.<sup>2</sup>

## FORMATION OF AGARWOOD

Naziz describes the unique scent of agarwood as the scent of stress, referring to the fact that the formation of the fragrant agarwood resin is the outcome of a complex interaction with a fungi and induced physical stress on the *Aquilaria* trees.<sup>2</sup>

As high demand for quality agarwood continues to grow an alternative, mass cultivation and large plantations of *Aquilaria* trees has become a sustainable source of agarwood to resolve the shortage of agarwood supply around the world. Since healthy *Aquilaria* trees do not form agarwood, the lack of naturally occurring agarwood has prompted the development of artificially agarwood-inducing methods.<sup>4</sup>



Plantation Aquilaria trees in Vietnam

Efforts to artificially induce agarwood formation have been traced back to as early as AD 300 in China, where it was recorded that resin formation can happen within a year by injuring the trees. Apart from mechanical wounding approach, the use of chemical, insect and pathogen-inducing techniques is increasingly common in the agarwood industry. All these induction techniques attempt to mimic the natural processes for agarwood formation.<sup>4</sup>



Artificially induced agarwood formation

Natural agarwood formation is often linked to the physical wounding or damage of *Aquilaria* trees caused by thunder strikes, animal grazing, pest and disease infestation. Natural agarwood formation in the natural environment is a long process which can take up to 10 years. Therefore, the development of an effective induction technology has received much attention in order to ensure the stability of agarwood yield from the domesticated *Aquilaria* trees.<sup>4</sup>

Understanding how the fungal interactions with the *Aquilaria* trees leads to the promotion of agarwood formation has led to the development of new induction methods that involve deliberate wounding coupled with the application of biological inoculum. Many pre-culture strains of fungi isolated from natural agarwood have been found to be effective biological agents to induce agarwood formation in healthy *Aquilaria* trees.<sup>4</sup>

The wood of the *Aquilaria* species is characterised as odourless, even-grained and of low density with a yellowishwhitish colour. It is only under specific environmental conditions, and when the tree has been infected or wounded that the agarwood forms. Research suggests that the fungi cause an immune reaction associated with the production of the oleo-resin. The part of the wood infected grows with irregular patches of streaks which become increasingly dark and heavy.<sup>3</sup>

The specific character of the agarwood oil varies according to the region of origin, the botanical species, its age as well as the section of the tree from which the piece of agarwood comes from as well as the amount of time the wood has undergone the biological process.<sup>3</sup>

# EXTRACTION

The extraction of the oil is by distillation where the sun-dried chips with dark resin are soaked in water for 2-3 months and thereafter boiled to recover the oil.<sup>2</sup>



Removing the agarwood from the tree trunk

# CHARACTERISTICS

The aroma is considered one of the most complex olfactory accords known in perfumery today. It is often described as a 'oriental-woody' with a 'soft fruity-floral' note. The smoke from the incense made with high quality agarwood is described by perfumers as having a sweet-balsamic note with a hint of vanilla, musk and ambergris.<sup>3</sup>

Lyengar's description of oud describes the qualities of oud perfectly:

What is most intriguing about this natural substance – which rightfully smells obnoxious to many – is that it is the most sought-after perfumery ingredient in the world and more expensive than gold.<sup>10</sup>

## HISTORY

Ancient Egyptians were believed to be the first users of agarwood in death rituals more than 3,000 years ago. Presently agarwood oil is used in perfumery and cosmetic products and medicinal products throughout the world. It is considered without a doubt the most expensive and precious essential oil in the world.<sup>2</sup>

# TRADITIONAL SACRED USES

Agarwood is highly revered in Hinduism, Christianity, Buddhism, and Islam.<sup>1</sup>

Agarwood is considered one of the most sought after and expensive perfumery raw materials in the world. The incense and perfume produced from agarwood have been highly valued for many centuries and used in many cultures for spiritual and perfumery purposes. It is highly revered in Hinduism, Christianity, Buddhism and Islam.<sup>1</sup>

Agarwood is one of eight important aromatic ingredients in *ashtagandha*, a holy powder used in in deity worshipping and bathing. It was said that when Bhagavan Krishna was on earth the smell of *ashtagandha* was emanating from him. It is not surprising that other aromatic ingredients included sandalwood and spikenard.<sup>10</sup>

In the Holy Bible, agarwood was used with myrrh in the anointing of Christ following his crucifixion. The spiritual importance of agarwood in Buddhism was similarly demonstrated when it was used among other fragrant products in the cremation of Buddha.<sup>1</sup>

It was suggested that the five natural incense products that represented the speech of the five buddhas included sandalwood, agarwood, pine resin or juniper, camphor and vetiver root.<sup>1</sup>

Agarwood is cited three times in the Bible as a fragrant product for intimacy and seduction. In Islamic texts, agarwood was a conspicuous fragrance used in the ritual burning of incense, for spiritual purification, and as one of the rewards in Paradise. Agarwood mixed with camphor was the preferred scent of the Prophet Muhammad. The use of agarwood in many religious texts confirms its reputation as an important scent supporting spirituality.<sup>1</sup>

The Arabs are renowned for their love of oud. Since the beginning of Islam, oud has been a part of Arab daily life. There are 'hadith' or prophetic sayings in Islam that speak of oud and its benefits. Prophet Muhammad not only used oud himself, but recommended its use to his followers for its spiritually elevating aromas and health benefits.<sup>10</sup>

The introduction of Buddhism into China would have most likely promoted the interest in agarwood. The use of agarwood in China as an incense became prominent among the nobility. In 1225AD, a detailed account is provided that distinguishes different types of agarwood by considering their geographic location (e.g. Tonkin, Annam, Cambodia, Malay Peninsula, Sumatra) as well as the varying quality, appearance and fragrance.<sup>3</sup>

# USE AS INCENSE

Arabic incense is called bakhoor, which is agarwood chips burnt over charcoal in traditional incense burners, called mabkharah. Bakhoor is the quintessential symbol of celebration and is considered a sign of Arab hospitality. During social gatherings, the mabkharah is passed among the guests who, on receiving it recite prayers for the Prophet Muhammad.<sup>10</sup>

The first Japanese written record of agarwood was reported in AD 595, when a large piece of agarwood drifted ashore on the island of Awaji. The islanders noticed in wonder that it produced a string fragrance when used as firewood, and later presented an unburnt piece to Empress Suiko. Early aromatics burned in Japanese Buddhist ceremonies included *jinkoh* (the best agarwood), sandalwood, cloves, cinnamon and camphor.<sup>1</sup>

The consumption of agarwood became increasingly sophisticated. In line with the rising aesthetic sensitivity and appreciation of the scent, agarwood was increasingly consumed on its own, without any other aromatic. In order to appreciate its fragrance, a small silver plate was used to protect the wood from the fire during incensation. *Wen xiang* or 'listening to fragrance' became a special pastime to fully appreciate the incensation, and pay attention to the agarwood's diverse olfactory notes.<sup>3</sup>

The Japanese drew from the Chinese perfumery culture and adapted similar practices for the exclusive use of agarwood. The Japanese term *monko*, literally meaning 'listening to fragrance' developed these notions further. In Japan, the aristocratic practice of appreciating incense in the Heian period was known as *koh-do* among the affluent, educated society during the course of the thirteenth to seventeenth centuries. The incense appreciation games were determined by the Zen ideals of simplicity and purity.<sup>3</sup>

## TRADITIONAL MEDICINE

Agarwood has been used for its medicinal properties in Ayurveda, Chinese, Tibetan and traditional East-Asian medicinal practices for thousands of years.<sup>11</sup>

In Ayurveda, agarwood was used for healing wounds, skin diseases, coughs and colds and long considered an aphrodisiac.<sup>10</sup>

Traditionally, the leaves, bark and root of *Aquilaria agallocha* have been used for their aphrodisiac, aromatic, astringent, bitter, cardiotonic, carminative and stimulant properties.<sup>11</sup>

In Malaysian traditional medicine, agarwood is mixed with coconut oil to make an ointment to treat body pain.<sup>12</sup>

Agarwood powder is used for the loss of appetite and digestive ailments. It improves blood circulation, reduces coughing and helps sooth bronchitis and asthma. Because of its cooling effect, agarwood is used to reduce fevers.<sup>11</sup>

Aquilaria crassna is the major source plant for agarwood in Vietnam. In Vietnam the wood of *A. crassna* is used in traditional medicine to assist digestion and as a sedative. It is prescribed in a Vietnamese medicine as a powder, aqueous preparation or tincture to treat gastralgia (pain in the stomach or epigastrium especially of a neuralgic type), nausea, vomiting and anxiety.

### Contemporary uses

Agarwood is in high demand throughout the world as a raw material for incense, perfume and medicinal purposes. The Middle East and East Asia are the two major regions of consumption. The cost of the agarwood can be as high as \$10,000 per kg and the value of agarwood essential oil can be as high as US\$30,000 or more per kg.<sup>4</sup>

The oil is in high demand due to its use as an incense for religious ceremonies, in perfumes and traditional medicine preparations. In the Middle East it is considered a symbol of wealth and commonly used during wedding ceremonies.<sup>5</sup>

Agarwood oil is traded globally, however the main importers are the United Arab Emirates, Saudi Arabia, China and Japan.<sup>5</sup>

## CHEMICAL COMPOSITION

More than 150 compounds have been identified so far. Most of them are sesquiterpenoids and chromones.  $^{\rm 2}$ 

The chemical composition agarwood essential oil from Australian plantation-grown *Aquilaria* trees was reported as follows: 4-phenyl-2-butonone (0.3%), (-)selina-3,11-dien-9-one (2.01%),  $\alpha$ -guaiene (2.41%), guaia-1(10),11-diene-15-ol (1.41%), agarospirol (1.1%), eremorphila-9,11(13) dien-12-ol (6.10%), *epi*-10-Y-eudesmol (3.42%), vetispirane-2(11)6(14)diene-7-ol (n/d), valance-1(10)8-diene-11-ol (6.44%), vetispirane type sesquiterpene (5.71%), 2,14-epoxy-vetispir-6-ene (1.87%), aragofuran (1.59%), guaiene type sesquiterpene (1.74%), guaia1(10), 11-diene-9-one (1.12%), selinene type sesquiterpene (1.85%), selina-3, 11-dien-9-ol (4.89%), 2-2-phenyl ethyl chromone derivative (1.27%).<sup>13</sup> The chemical composition agarwood essential oil from Vietnam plantation-grown *Aquilaria crassna* trees was reported as follows:

Benzyl acetone (1.05%), (-)selina-4,11-dien-14-al (3.88%),  $\beta$ -agarofuran (6.71%),  $\alpha$ -agarofuran (0.35%), norketoagarofuran (2.15%), Y-eudesmol (1.02%), agarospirol (8.51%), hinesol (3.56%), jinkoh eremol (1.78%), valerianol (3.81%),  $\alpha$ -eudesmol (4.47%),  $\beta$ -eudesmol (5.16%), 9,11-eremophiladien-8-one (2.28%), oxoagarospirol (2.38%).<sup>14</sup>



Guaia-1(10),11-dien-15-al



#### Agarospirol

The highest quality agarwood oil is rich in oxygenated sesquiterpenes and chromone derivatives. Three sesquiterpene compounds that are commonly detected in the high-quality agarwood oils include (-)-guaia-1(10),11-dien-15-al, (-)-selina-3,11-dien,9-one and (+)-selina-3,11-dien,9-ol.<sup>5</sup>

# PHARMACOLOGY AND CLINICAL STUDIES

Pharmacological studies using agarwood oil have reported anti-cancer, analgesic, anti-inflammatory and antidepressant properties.<sup>2</sup>

One study reported sedative activity of vapour administration of agarwood oil on mice.  $^{\rm 15}$ 

A recent study reported that both the ethanol extract and essential oil of agarwood, had a sedative-hypnotic effect, where its potential mechanism is relating to regulating gene expression of GABAA receptors and potentiating the GABAA receptor function.<sup>16</sup>

Agarofuran, a constituent found in agarwood essential oil was reported to have anxiolytic and anti-depressant activity in mice. It was reported that the potential mechanism might be through modulating central neurotransmitters such as dopamine.<sup>16</sup>

Agarwood oil was also reported to have anti-inflammatory activity in a study involving mice.  $^{\rm 16}$ 

In vitro and in vivo studies reported that agarwood oil possesses anticancer activity towards breast cancer cells and colorectal carcinoma cells.<sup>12,16</sup>

### PROPERTIES

Oud oil is not mentioned in many aromatherapy books. However, the chemical composition and aroma of oud indicate that it has similar properties to spikenard or valerian essential oil. Based on the pharmacological studies, I would suggest that the properties of oud oil are anxiolytic, sedative and nervine.

### AROMATHERAPY

The rather prohibitive price and the difficulty sourcing agarwood means that it is not commonly used in aromatherapy.

#### Aromatherapy uses

The anxiolytic and sedative properties of oud indicate that it would be beneficial for alleviating, anxiety, nervous tension and restlessness.

#### Energetics

The cooling nature of the oil suggests that the oil calms the Heart and soothes an agitated Shen. It would be ideal whenever one experiences nervous tension, anxiety and insomnia.

#### Subtle

I recommend using oud oil in subtle aromatherapy. Covington recommends using oud oil to amplify communication, effective listening skills and expression. She also recommends using the oil to purify emotional disharmony and to gain access to timeless wisdom and for the support in artistic expression.<sup>17</sup>

Unlike spikenard and vetiver which I find spirituality grounding, the scent of oud is spiritually elevating. I believe that the fragrance of oud carries with it a deep connection with all of humanity that has existed since it was first used. It reminds us that we are not alone on our journey and whenever we feel despondent, oud gives us the courage and strength to be devoted to our chosen path.

### BLENDING

I love working with oud. It is a magical oil to blend with; however, one has to be very discerning as any mistakes will be costly.

Oud oil blends with essential oils such as benzoin, atlas cedarwood, cinnamon bark, cistus, clove bud, frankincense, galbanum, ginger, lavender, myrrh, oakmoss absolute, patchouli, rose absolute, saffron, spikenard, sandalwood, vetiver and yakusugi.

Some ideas for blending with oud include:

- *Soothing and relaxing blend* consider blending oud with lavender, patchouli, spikenard, sandalwood or vetiver.
- *Connecting with the divine blend* consider blending oud with frankincense, myrrh, spikenard or sandalwood
- *Promoting spiritual sensuality blend* consider blending oud with benzoin, cistus, patchouli, rose absolute or sandalwood.
- Connecting with nature blend consider blending oud with galbanum, lavender, oakmoss absolute, patchouli or vetiver.
- *Promoting courage and resilience blend* consider blending oud with atlas cedarwood, ginger, sandalwood or yakusugi.
- *Grounding and nurturing blend* consider blending oud with atlas cedarwood, myrrh, patchouli, spikenard or vetiver.

Perfumer, Krishnaraj Iyenar explains that Arab attars are generally known to be audacious, woody, spicy and warm with a distinct oud note. He states using other aromatic ingredients such as rose, saffron and amber compliment the outstanding longevity of oud.<sup>10</sup>

### SAFETY

No known hazards or contraindications.

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