Wormwood

**Artemisia absinthium** is commonly known as wormwood because of its ancient use as an anthelmintic. Other common names include absinthium, wermut, absinthe, and green ginger. **Artemisia absinthium** is a member of the Compositae family, which also includes ragweed, chrysanthemums, marigolds, and daisies. It is a perennial shrub that grows 2–3 feet tall and has branched leafy stems and small yellow-green flowers. The leaves and flowering tops are used to make a bitter, aromatic tonic. Although the plant is native to Europe, **Artemisia absinthium** has been naturalized to the United States where it grows in the northeast and northcentral regions. While sweet wormwood (**A. annua**) is used as an antimalarial agent, **Artemisia absinthium** is most commonly used to stimulate appetite and treat parasitic infections. It has been used historically as a flavoring agent for the liqueur absinthe. **Artemisia absinthium** has been banned in many countries; it can still be purchased on the Internet. As a result, an increase in its use has been reported. The purpose of this article is to describe the chemistry, pharmacology, clinical uses, and safety of **Artemisia absinthium**.

**Historical perspective.** The earliest recorded use of wormwood was in 1550 B.C. The Egyptians wrote of the medicinal and religious importance of wormwood in the Ebers Papyrus. Historically, its leaves and flowers were used as a bitter tonic, a sedative, and a flavoring agent; wormwood tea was used as a diaphoretic. It was not until the 16th century when steam distillation was invented that potent extracts of wormwood were made. In the 18th century, both France and Switzerland began formulating absinthe, a liqueur containing ethan-
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acid secretion and bile production. However, as the amount ingested increases, the toxic effects increase. The toxicity of wormwood is a result of its thujone component (α- and β-thujone). Alpha-thujone is a convulsant and has been shown to bind to the γ-amino butyric acid type-A receptor. It is primarily metabolized to 7-hydroxy-α-thujone and secondarily to the diastereomers of 4-hydroxythujone and other hydroxylthujones via the cytochrome P-450 isoenzyme system. These metabolites are then renally excreted. It is the α-thujone and the 7-hydroxy-α-thujone that are most toxic. Thujones, which can cause autonomic excitation leading to convulsions and unconsciousness, are now classified as convulsant poisons. The convulsions produced are often clonic, then tonic, in nature. Permanent damage to the central nervous system can occur with repeated exposure to thujone.

*A. absinthium* has also been shown to have some activity at both nicotinic and muscarinic cholinergic receptors. Structural dimensional analyses have implied that thujone binds to the same receptor as tetrahydrocannabinoid (THC). However, a recent study has shown that thujone does not activate THC receptors. Studies have also shown that *A. absinthium* has some antimicrobial properties against *Staphylococcus aureus* but no activity against *Bacillus subtilis, Streptococcus faecalis, Escherichia coli*, or *Candida albicans*.

Uses. Although wormwood has been used as an antiparasitic, antiflatulent, anthelmintic, aphrodisiac, and antispasmodic agent, there are no published data evaluating its efficacy for these indications in humans. Its main uses today are as a flavoring agent and an anthelmintic. It is included in some naturopathic regimens in combination with other herbal products to rid the intestines of parasites, although no published data exist to support this use. The aboveground parts of the plant have been given orally to treat loss of appetite, indigestion, biliary dyskinesia, and other gastrointestinal problems (e.g., low-acidity gastritis); however, clinical trials supporting these uses are also lacking. While oral use of thujone-free products may be safe for short-term therapy, wormwood is likely unsafe when given for prolonged periods of time or in excessive doses.

Wormwood has been applied topically to promote wound healing and provide relief from pain associated with insect bites, although there are insufficient reliable data to support its topical use. Wormwood has also been applied to the arms and legs to act as an insect repellent; historically the leaves have been hung with clothes to act as a moth repellent. In addition, oil of *A. absinthium* has been shown to effectively repel fleas and mosquitoes and kill houseflies.

Safety and toxicology. The Food and Drug Administration has categorized wormwood as an unsafe compound when it contains thujone because it may lead to neurotoxic symptoms. In the United States, finished wormwood products need to be thujone-free, with a maximum thujone concentration of less than 0.024% to be legally sold. The thujone content of products made outside of the United States, which may be available on the Internet, may not be readily disclosed to consumers.

Adverse effects. Reported adverse effects of wormwood are common and include decreased seizure threshold, bradycardia, abdominal pain, diarrhea, nausea, vomiting, decreased appetite, skin rash, flu-like symptoms, fever, and decreased reticulocyte count. Thujone is also a uterine and menstrual stimulant. Regular consumption of absinthe or thujone-containing wormwood products can result in stomach irritation, neurologic disturbances (insomnia, nightmares, tremors), and possibly absinthism (characterized by digestive disorders, thirst, restlessness, dizziness, renal failure, delirium, paralysis, and death).

Topical use of wormwood can result in dermatitis. Cross-allergenicity has been seen in patients who are allergic to ragweed, chrysanthemums, marigolds, daisies, and other herbs.

The only published data on wormwood use in humans recently appeared as a case report. A 31-year-old man mistakenly purchased oil of wormwood, thinking it was absinthe liqueur, through the Internet. Several hours after consuming 10 mL of the oil, he was agitated, incoherent, and disoriented. He developed tonic and clonic seizures, which led to rhabdomyolysis and acute renal failure. The patient was admitted to the hospital during which time his serum electrolyte, creatinine, and liver enzyme levels were closely monitored. Seventeen days after consuming the oil of wormwood and nine days after discharge from the hospital, his symptoms resolved and his serum electrolyte, creatine kinase, and creatinine concentrations were within normal limits. The manufacturer of the oil of wormwood that the patient consumed verified that the oil contained only wormwood oil (thujone content unknown).

Contraindications. Wormwood is contraindicated in patients with gastrointestinal conditions or ulcers. In addition, thujone is a porphyrinogen terpenoid, so its use could be hazardous to patients with an underlying defect with hepatic heme synthesis. Wormwood is considered unsafe when used in high doses or for prolonged periods of time, and its use should be avoided in pregnant or lactating women. Its use is also contraindicated in patients with a hypersensitivity to the essential oil composition.

Drug interactions. There are important, potentially serious drug interactions associated with wormwood use. Since wormwood increases the production of stomach acid, the efficacy of drugs that inhibit acid secretion (e.g., antacids, sucralfate, histamine-receptor antagonists, proton pump inhibitors) may be reduced when taken concomitantly with wormwood. Also, because of its ability to induce seizures, wormwood has the potential to interfere with antiseizure medications, making them less effective in preventing seizures. When wormwood is taken with other herbs

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with better safety profiles, it is recommended that wormwood be avoided.


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