

Essential Oils in Small Animal Practice

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Aromatherapy - Treatment using scents. Use of essential oils for healing (diffuse, topical, oral)
Essential Oils (Eos) - natural, complex, multi-component systems composed mainly of terpenes/terpenoids

Volatile liquid plant materials play role in biochemistry of plant
Messengers, regulators
Protection from parasites, disease, adaptogens

History

15,000 BCE - Lascaux cave paintings
2700 BCE China – Shennong’s Herbal
1550 BCE Egypt – the Ebers papyrus is the oldest written record of medicinal plants
incense, perfume, medicine, embalming (stop bacterial growth/decay)
1000 BCE India – Ayur Veda
400 BCE Greece – Hippocrates - prescribed perfume fumigations
100 CE Rome - Pedanius Dioscorides (army physician)
1000 CE Persia - Ali-Ibn Sana (physician) discovered distillation method still used today
1000 CE Europe - Crusade knights brought back from Middle East
1300’s frankincense and pine burned to ward off Bubonic Plague
1653 Nicholas Culpeper ”The Complete Herbal”
1920’s French Chemist René-Maurice Gattefossé coined the term “Aromatherapie”
1928 published “Aromatherapie”

Constituents

Most common hydrocarbons in essential oils are terpenes/terpenoids

Isoprene (5 carbons) building block (does not occur in nature) (C₅H₈)_n
Monoterpene (10 carbons) - limonene, pinene, terpinene, and cymene
Diterpene (20 carbons) - camphorene, cafestol, kahweol, cambrene, and taxideme.
Sesquiterpene (15 carbons) - cedrene, zingiberene, himachlene, and caryophyllene
Terpenoids – Terpene w functional group (alcohols, aldehydes, esters, ethers, phenols, etc.)

Each essential oil – hundreds of compounds – mixture determines characteristics

Different parts of same plant may contain different EOs

A Few Active Compounds

d-limonene – monoterpene - orange (Citrus sinensis) essential oil
Hepatoprotective¹
Chemopreventive efficacy in hepatocellular carcinoma models²
Antiangiogenic/proapoptotic effects on human gastric cancer implanted in nude mice,
inhibiting tumor growth/metastasis³
Increased the survival of mice w/lymphoma⁴

Citral – monoterpene - lemongrass (*Cymbopogon citratus*) oil
Induces glutathione-S-transferase (detox)⁵
Inhibitory effect on early phase of hepatocarcinogenesis in rats⁶

Beta-myrcene - monoterpene – sweet fennel (*Foeniculum vulgare*)
Hepatoprotective⁷

thymoquinone – monoterpene - black cumin (*Nigella sativa*)
Hepatoprotective⁸

Eucalyptol (1,8-cineol) - monoterpene -essential oil of eucalyptus (*Eucalyptus globulus*) cardamom (*Elettaria cardamomum*)
Induces apoptosis in human leukemia HL-60 cells⁹

Cancer

“Essential oils and their individual aroma components showed cancer suppressive activity when tested on a number of human cancer cell lines including glioma, colon cancer, gastric cancer, human liver tumor, pulmonary tumors, breast cancer, leukemia and others.”¹⁰

Lemon balm (*Melissa officinalis* L) EO effective against a series of human cancer cell lines¹¹

Garlic (*Allium sativum*) EO - volatile organo-sulfur components - potential cancer chemopreventive agents¹²

Liver

nutmeg, (*Myristica fragrans*), hepatoprotective against certain toxic chemicals¹³
Also induces glutathione-S-transferase (detox)¹⁴

Behavior

Bergamot (*Citrus bergamia*) EO
Systemic administration to rats given stressful tasks - anxiolytic-like/relaxant behavior devoid of sedation - vigilant but relaxed¹⁵

Lavender (*Lavendula angustifolia fragrans*) EO

5 healthy adult male Beagles¹⁶

Lavender EO (0.18 mL) or saline (0.9% NaCl) solution (0.18 mL) was topically applied to the inner pinnae of both ears of all dogs

Mean HR was significantly lower/HRV changes indicated autonomic (vagal) modulation

32 dogs with a history of travel-induced excitement in owners' cars.

Control - dogs were exposed to no odor

Experimental - dogs were exposed to the ambient odor of lavender

“Dogs spent significantly more time resting and sitting and less time moving and vocalizing during the experimental condition.”¹⁷

Antibacterial

In vitro EOs effective against *Listeria monocytogenes*, *L. innocua*, *Salmonella typhimurium*, *Escherichia coli*O157:H7, *Shigella dysenteria*, *Bacillus cereus*, *Staphylococcus aureus*^{18,19,20}

Antiseptics damage skin, increased shedding of the original protective bacterial flora, increased risk of transmission of pathogens²¹

- Repeated use of tea tree (*Melaleuca alternifolia*) EO [TTO] - no dermatological problems, no effect on the original protective bacterial flora of the skin²²
- TTO effective against *Staphylococcus aureus*, *Acinetobacter baumannii*, *Escherichia coli* and *Pseudomonas aeruginosa*²³
- TTO effective against MRSA²⁴

Essential oils show bactericidal activity against oral pathogenic bacteria²⁵

TTO cream (10%) - significant and fast resolution of canine localized acute and chronic dermatitis compared with commercial cream²⁶

Antifungal

Eleven feline isolates of *M. canis* - *in vitro* and *in vivo*²⁷

Breckland thyme (*Thymus serpyllum*), Oregano (*Origanum vulgare*), rosemary (*Rosmarinus officinalis*), star anise (*Illicium verum*) and lemon (*Citrus limon*) Eos

- Effective antifungal activity

14 symptomatic cats - spontaneous *M. canis* dermatophytosis²⁸

- Cats received treatment with oral itraconazole
- Washed twice a week with a neutral shampoo with EOs of *Thymus serpyllum* (2%), *Origanum vulgare* and *Rosmarinus officinalis* (5% each)
- Compared with 2% miconazole/2% chlorhexidine shampoo
- There was no significant difference between recovery of groups

Antiviral

EOs - viricidal properties, low toxicity compared with antiviral drugs²⁹

Inflammation

Pigs (85 each in control and experimental groups) fed a control diet or one supplemented with 25 mg/kg (of feed) of oregano EO for 4 wks.³⁰

- Improved microbiome - lower ($P < 0.05$) population of *E. coli* in the jejunum, ileum, and colon
- Improved GI barrier - increased ($P < 0.05$) villus height and expression of occludin and zonula occludens-1 (ZO-1) in the jejunum, decreased ($P < 0.05$) endotoxin level in serum
- Decreased inflammation - greater inactivation ($P < 0.05$) of inflammation, (inflammatory cytokines)

Canine Allergic Dermatitis

48 privately owned dogs of different breeds, ages and genders diagnosed with atopic dermatitis³¹

- Randomized, double-blinded, placebo-controlled, multicenter clinical trial

- Treated with a spot-on formulation containing PUFAs and essential oils (EOs of neem, lavender, clove, TTO, plus herbal extracts of rosemary, oregano, peppermint, and cedar bark) or placebo on the dorsal neck once weekly for 8 weeks.
- Before and after the study, CAD extent and severity / pruritus scores determined by veterinarians and owners
- There was significantly more improvement in the treatment group than in the placebo group
- No adverse reactions were observed.

Otitis Externa

11 dogs with otitis externa³²

- Control group (5 dogs) was treated with susceptible antibiotics
- Experimental group (6 dogs) was treated with aroma-oil applied topically to the ear canal.
- Aroma-oil = 10 ml sweet almond oil, 0.3 ml bergamot oil, 0.2 ml lavender oil, 0.1 ml TTO and 0.1 ml roman chamomile oil
- Experimental group bacterial cell counts - significantly lower
- “These results suggest that aromatherapy is an effective and practical treatment for otitis externa in dogs.”

External Parasite Prevention

“EOs have repellent, insecticidal, and growth-reducing effects on a variety of insects.... With a few exceptions, their mammalian toxicity is low and environmental persistence is short.”³³

“Recently, a growing number of plant essential oils (EOs) have been tested against a wide range of arthropod pests with promising results.... EOs showed high effectiveness, multiple mechanisms of action, low toxicity on non-target vertebrates.”³⁴

Among the plant families with promising EOs used as arthropod repellents, Cymbopogon spp., Ocimum spp. and Eucalyptus spp. are the most cited.³⁵

Delivery Mode

Inhalation – direct connection to limbic system (affect brain in 4 sec)

Water-based diffusion (never heat)

Be careful of birds/exotics

Transcutaneous – lipophilic/low molecular wt., so easily penetrate skin barrier (Reach blood stream in 5 min)

Neat may cause skin irritation - cinnamon, clove, lemongrass, oregano, and thyme

1% - 5% dilution (1 drop/5 ml carrier oil = 1%)

Oral – most potentially toxic route (Be sure medical grade EOs)

We eat them all the time (the rinds of 50 lemons = 15 ml EO)

Over 160 oils designated as GRAS (FDA)³⁶

Never - arborvitae, birch, cedarwood, cypress, eucalyptus, white fir, and wintergreen

Administer in vegetable capsule/gelatin capsule to prevent irritation of digestive lining

What to Look for in Company/Product

There is no regulatory body that scientifically evaluates and certifies the purity of essential oils.

Legally there is no such thing as "therapeutic grade" or "certified pure" essential oils.

Chemical analysis - GC/MS (gas chromatography and mass spectrometry)

Grown organically

Where grown

How the oil was extracted (steam / CO₂ distillation, expression [citrus]) never solvent extraction

Cost – don't buy the cheapest

Ask experienced medical practitioner

Product

Tamper-proof packaging

Light-resistant, glass container

Label

Name of plant used - Latin binomial (indicating the plant genus and species)

many species of certain plant families (> 250 species of eucalyptus—8 commonly used)

proper method of use (oral, topical, inhalation)

No adulteration/ not fragrance oils

Lot# / tracking info

Cautions/concerns

TTO toxicosis reported by veterinarians to the National Animal Poison Control Center³⁷

- Applied dermally to dogs and cats. "In most cases, the oil was used to treat dermatologic conditions at inappropriate high doses." - depression, weakness, incoordination and muscle tremors. "Treatment of clinical signs and supportive care has been sufficient to achieve recovery without sequelae within 2-3 d."

Three female Angora cats severely infested with fleas³⁸

- Shaved/numerous flea bites
- The product - 100% TTO
- Product to repel fleas when diluted and used as a dip.
- Instead - The oil was applied directly to the cats' skin, and 2 1-oz (approximately 60 ml) bottles were used on the 3 cats.
- All got sick – hypothermia, incoordination, comatose
- All 3 recovered with supportive care

Retrospective case series —337 dogs and 106 cats with evidence of exposure to 100% TTO³⁹

- Most common signs - increased salivation or drooling, signs of CNS depression or lethargy, paresis, ataxia, and tremors.
- Signs developed within 2 to 12 hours and lasted up to 72 hours
- Younger cats and those with lighter body weight were at greater risk of major illness

Dermal application of a commercial insecticidal dip containing 78.2% d-limonene in cats⁴⁰

- "At the manufacturer's recommended concentration of 1.5 oz/gal of water, no clinical signs or lesions of toxicosis were seen."

- 5 X recommended concentration – mild signs - hypersalivation, ataxia, and muscle tremors resembling shivering
- 15 X the recommended concentration - hypersalivation (15 -30 min), moderate-severe ataxia (1-5 hrs.), muscle tremors resembling shivering (1-4 hrs.), severe hypothermia (5 hrs.), excoriation of the scrotal and perineal areas of the treated male cats
- No deaths or other lasting effects were seen at any dosage.

Acute necrotizing dermatitis and septicemia after application of a d-limonene-based insecticidal shampoo in a cat⁴¹

- Shampoo contained only d-limonene as a 1% cosmetic-grade citrus-peel oil and natural coconut oil as a vegetable-based cleanser
- Authors suspected the d-limonene induced an idiosyncratic cutaneous drug reaction

Nephrotoxicity of d-limonene?⁴²

- d-limonene nephrotoxic in rat
- 10 adult beagles gavaged twice daily over a 6-month period with tap-water (control) or *d*-limonene at 0.12 or 1.2 ml/kg body weight/day (100 or 1000 mg/kg body weight/day)
- “There were no histopathological changes in the kidneys.”

Erythema multiforme major and disseminated intravascular coagulation in a dog following application of a d-limonene-based insecticidal dip⁴³

- “Insecticidal dips containing d-limonene have the potential to induce various toxic effects, including, possibly, erythema multiforme major, and should be used cautiously.”

Retrospective - ASPCA and Animal Poison Control Center database (2006-2008)⁴⁴

- 8 dogs/36 cats symptomatic – Agitation/hypersalivation common in cats, lethargy/vomiting common in dogs
- 28 animals known outcome
50% recovered with bathing alone
Others received intravenous fluids, muscle relaxants, and anticonvulsive medications
Death (1 cat; $n = 1/28$; 4%) or euthanasia (1 cat and 1 dog; $n = 2/28$; 7%)
- “Dogs and cats can experience significant adverse effects when exposed to plant-derived flea preventatives even when used according to label directions.”

EOs to Avoid in Animals

Birch, Wintergreen, Tansy, Spike Lavender, Bitter Almond, Boldo, Calamus, Garlic, Horseradish, Mustard, Sassafras, Wormseed (Chemopodium), and Pennyroyal.

Getting Started

- Take course / read books / work with an EO practitioner
- Use the oils on yourself and your own pets
- Start with diffusion
- Dilute topical

EO Companies to Start With

AnimalEO - <http://www.animaleo.info/learn-more.html>

Young Living - <https://www.youngliving.com>

doTerra - <https://www.doterra.com>

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