lavender (Lavandula angustifolia Mill; also referred to as Lavandula officinalis Chaix), commonly known as English or “true” lavender in the family Labiatae, is one of at least 25 species in the genus Lavandula. Lavenders are low-growing (~18 inches), bushy evergreen shrubs. They prefer sunny locations and well-drained sandy soils. English lavender has narrow, silvery-green, needle-shaped leaves. Its lavender-blue flowers extend up tall flower stalks, blooming in early summer. There are many hybrids and cultivars of these lavender species. Lavenders are indigenous to the mountain regions of the countries bordering the western Mediterranean area. Lavender is extensively cultivated in France, Italy, Spain, England, and more recently in Australia and the U.S. Several species are used to produce lavender essential oil, but the most fragrant and thus most valuable oils are steam-distilled from the flowers of L. angustifolia. L. latifolia (spike lavender) yields as much as three times the oil as English lavender, but it is less fragrant and of lower quality. Lavender oil mainly has been used as a major fragrance in perfumes and other cosmetics. It has long been used by the pharmaceutical industry to mask unpleasant odors in ointments and creams. A popular essential oil used in aromatherapy, it has well-documented sedative activity. There have also been claims that lavender induces skeletal muscle relaxation, making it useful in massage therapy. Like many other essential oils, lavender also has several constituents that have antimicrobial activity.

**ACTIVE CONSTITUENTS**

Flowers of lavender contain 1.5%-3.0% of a volatile oil composed of over 150 compounds. The oil is pale yellow to yellowish-green and possesses the highest ester content when distilled at the peak of blooming; it later darkens when obtained from older blossoms. The oil has a pungent bitter taste and characteristic fragrant odor. The most abundant constituent is the linalyl esters—predominately linalyl-acetate—with lesser amounts of linalyl-butyrate, linalyl-caproate, linalyl-isobutyrate and linalyl-valerate. Also present are linalool, cineole, geraniol, borneol, camphor, pinene, limonene, b-ocimene and caproic acid. The most fragrant and valuable essential oil preparations have the highest concentration of linalyl-acetate, sometimes up to 70%. The relative concentrations vary between species. Other factors are time of harvesting, soil conditions and climate. Similar constituents occur in the leaves and stems, but in different ratios and lesser amounts. The leaves also contain a high level of tannins (12%). The volatile essential oil produced by oil glands within the flower petals is prepared by steam distillation. (About 60 lbs. of flowers produce 16 fl. oz. of concentrated essential oil.)

**MEDICINAL USES AND PHARMACOLOGY**

**CNS Effects:** Lavender has a long tradition in folk medicine as a mild sedative. It has been used in herbal pillows or massage oils, to “calm the nerves” and relieve stress. Several studies in both humans and animals support this traditional use. Mice orally given the essential oil of lavender showed marked sedative effects. This study also showed lavender to potentiate pentobarbital-induced sleeping time. In another study, lavender essential oil had anxiolytic effects in mice. Further investigations in mice support and extend these findings. Both the essential oil of lavender and linalyl acetate and linalool significantly decreased motility under standardized experimental conditions. Interestingly, hyperactivity induced by caffeine was blocked by inhalation of lavender oil. A Japanese study has shown that inhalation of lavender essential oil prevents convulsions in mice. Although the exact mechanism of this anticonvulsive effect is not known, it is thought to involve alterations in the neurotransmitter gamma-aminobutyric acid (GABA). Linalool, one of the major compounds in lavender essential oil, has been shown to have a dose-dependent CNS sedative effect and to possess hypnotic, anticonvulsant and hypothermic prop-
erties in rats. These studies demonstrated that linalool inhibited the binding of stimulatory neurotransmitter glutamate in the rat cerebral cortex. A study in pigs found that exposure to lavender straw in their cages decreased the incidence and severity of travel sickness on road trips.

Several human studies support these animal results. In one, involving 93 intensive care patients, lavender oil aromatherapy improved mood and lowered perceived levels of anxiety. Lavender oil aromatherapy administered to 28 post-cardiotomy patients in a randomized, double-blind trial reduced emotional and behavioral stress levels. Inhalation of lavender oil has been shown to alter brain waves in humans as monitored by electroencephalography (EEG). Characteristic fluctuations in alpha waves were consistently observed. In another study, mood, alertness and EEG activity were measured in 40 adults following 3 minutes of aromatherapy with lavender oil. Results indicated that inhalation of lavender oil increased drowsiness, promoted relaxation and allowed subjects to perform math computations faster and more accurately. Recent studies have indicated that lavender essential oil has similar efficacy when compared to hypnotics and tranquilizers in treating insomnia. The German Commission E monograph on lavender describes its indications as “states of unrest, difficulty falling asleep, and functional upper abdominal complaints.”

Antimicrobial Effects: Many essential oils have antibacterial and antifungal activity. Linalool had antimicrobial activity against 17 of the 18 bacteria and 10 of the 12 fungi tested. In a similar study, linalool was again found to have antimicrobial activity against all organisms tested, except for P. aeruginosa and Candida albicans. In another study, the sporulation of Aspergillus fumigatus, Fusarium solani, Penicillium expansum and Rhizopus oryzae was suppressed by exposure to the essential oil of lavender. Lavender oil has been used in many countries as an insecticidal agent. Two studies provide supporting evidence for this popular use. One study found that the essential oils of L. angustifolia and L. stoechas, as well as their isolated main constituents linalyl acetate and linalool, were toxic to the mite Tyrophagus longior. A similar study demonstrated the toxicity of linalool in the cat flea Ctenocephalides felis.

Other Effects: Lavender’s reputation in wound healing appears to be due mainly to its antibacterial properties. However, leaf preparations that have high tannin concentrations (12%) may have effects on tissue healing. Lavender oil has historically been used to treat sores, varicose ulcers, burns and scalds. The oil has also been employed to relieve pain and swelling when applied directly to arthritic joints or the site of insect bites or stings. Supportive evidence for some of these uses has been recently reported in a study showing that lavender oil inhibited certain allergic reactions in mice and rats. Topically or intradermally applied lavender oil inhibited a mast cell-mediated ear swelling response in mice in a dose-dependent manner. Lavender oil also inhibited histamine and tumor necrosis factor release from mast cells. If applicable to humans, these results could explain some of the apparent anti-allergic and anti-inflammatory properties of lavender essential oil. In a study to determine if lavender essential oil was absorbed from the skin following a massage, it was shown that the oil’s main constituents could be detected in the blood within 5 minutes and excreted within 90 minutes.

Few studies have been conducted on lavender oil’s purported effects on skeletal and smooth muscle. In one study, lavender applied to isolated rat phrenic nerve diaphragm preparation and a guinea-pig ileum preparation stimulated contraction in the smooth muscle and reduced the twitch response in the skeletal muscle preparation. Human studies are needed.

In Spain, lavender oil is commonly used as an antidiabetic agent. In one study, an infusion of L. stoechas caused hypoglycemia in normoglycemic rats within 30 minutes of administration. Studies utilizing L. dentata and L. latifolia have found active hypoglycemic constituents in partially water-soluble extracts. The extracts were inactive in alloxan-induced diabetic rats, indicating that intact pancreatic cells are necessary for this effect. Whether these hypoglycemic factors are active in humans or even present in essential oil preparations is unknown.

Toxicity and Potential Adverse Reactions: Although generally considered safe and nonirritating when applied to skin, there are reports of allergic contact dermatitis from exposure to lavender essential oil. Because of possible rapid absorption, caution should be used with excessive amounts in massage oils or in a bath, and perhaps during pregnancy because of potential contractile effects on the uterus. Direct exposure to undiluted preparations generally should be avoided.

References available from MSP upon request.