CHAPTER I

INTRODUCTION

Lemongrass

Family	:	Graminae (Gramineae)
Scientific name	:	Cymbopogon citratus (DC) Stapf.
Common name	:	Lemongrass,Lapine

Lemongrass has popularly known in Brazil as capim-cidrao or capim-santo. It is widely employed in Brazilian folk medicine (Carlini et al., 1986). In Thailand, it is called "Takhrai" or "Takhrai - Khaor". It has differently local name as Khaa - hom (Mae - Hong - Sorn), Khrai (Southern), Cha - Khrai (Northern), Hua-Sing-Khai (Prachinburi), Choet-Kroei or Loe-Kroei (Surin) (Chaiyo Chaichantipayuth et al., 1981 in Thai; Medicinal Plant Information Center Mahidol University, 1989 in Thai).

Description of Lemongrass

Lemongrass is short - lived plant, grows annual and more seasons. It is approximately one metre height,

grows in a big cluster. The stem is distinguished in underground which called rhizome. The rhizome contains starch reserve. Its leaves usually consist of two parts a lower and an upper parts. The former is ample over the whole length, cylinder - shaped, hard and smooth. The latter stands more away from the blade. Leaves are strongly aromatic when crushed. It contains essential oils called lemongrass oils or Vebana oils or Indian molissa oils, which are distributed throughout plant in a unique way. The blades line with narrowed base with acute apex, pale middle and more rigid. The lower leaf - sheaths loose at base, cinnamon - colored inside and usually coated by wax.

Lemongrass is rarely flowering plant, carrying true inflorescences at ultimate branches. The flowers are normally bisexual (perfect flower) , usually consist of a perianther of 2 - 3 minute scales, and 3 - 6 stamens. Lemongrass is breeded by almost separate stem (Payom Tantiwatana, 1978 in Thai; Chaiyo Chaichantipayuth et al., 1981 in Thai; Athakorn Kutrakul, 1987).

Lemongrass has been grown in tropical and sub - tropical zone of Africa and Asia. In Thailand, six kinds of lemongrass have been found. They are as follows : Takhrai - Khaor (Cymbopogon citratus), Takhrai-ton or Takhrai-bok (Ormosia robusta), Takhrai - num (Homonoie riparia), Takhrai - hom

or Takhrai - dang (Cymbopogon nodus), Takhrai - hang - nak and Takhrai - hang - sing (Udomlak Unchitwatana, 1983 in Thai).

Chemical studies

The chemical compositions from C. citratus leaves are methylheptenol, eugenol, iso - orientin, luteolin, furfural, citral, cymbopol, d - citronellic acid, dipentene, geraniol, linalool, menthol, myrcene, nerol, waxes, essential oil, cymbopogenol, cymbopogone, cymbopogonol and phenolic substance. In other parts have hexacosyl alochol, triacontyl alcohol, benzyl alcohol, phenylethyl alcohol, aminoacids, cellulose, β-sitosterol, citral gerianol, camphor, citronellal, citronellol, geraniol, linalool, d - menthone, myrcene, nerol, oxo-bisabolene, cineole, fenchone, humulene, ocimene, terpinolene, etc. (Medicinal Plant Information Center Mahidol University, 1989 in Thai).

Pharmacological Effects

Cymbopogon citratus Stapf. is a plant with a wide spread folk medicinal use. A herbal tea or decoction prepared from the dried leaves of lemongrass

(C. citratus) is called "abafado" in Brazil. It is frequently used as a sedative and hypnotic, analgesic, anti-emetic, antispasmodic and for treatment of other stomach disorders and intestinal ailments (Paviani, 1964 ; van den Berg, 1980 ; Matos et al., 1982 ; Nogueira, 1983 quoted in Carlini et al., 1986). On Mauritius Island and on the Malay Peninsula, it is recommended against the common cold, pneumonia, fever and gastric problem (Fook, 1980 quoted in Carlini et al., 1986), in Nigeria as an antipyretic and for its stimulant and antispasmodic effects (Olaniyi, Sofowora and Oguntimehin, 1975). In Angola and India, it is considered as an antitussigen, anti - emetic, antiseptic and antirheumatic (Alves et al., 1960 quoted in Carlini et al., 1986). In Indonesia, it is employed to help digestion and as a diuretic and sudorific (Hirschhorn, 1983 quoted in Carlini et al., 1986). In China, its essential oil is prescirbed as an asthmolytic (Peigen, 1983 quoted in Carlini, 1986). In West Africa, the roots of C. citratus are used as chewing sticks or rubbed on the teeth for cleaning (Sawyer, 1982 quoted in Onawunmi, Yisak and Ogunlana, 1984). In Thai ancient medical treatment, lemongrass has been used as carminative, diruetic, anti - hypertensive, anti-anorexia, anti-abdominal pain and analgesic agents include used for treat urinary tract problem, urolithiasis and asthma. Recently, the volatile oil from lemongrass has useful for cosmetic

(Udomlak Unchitwatana, 1983 in Thai; Payow Maunwoagyathi, 1991 in Thai).

The lemongrass oil has been described that citral, citronella and geraniol which extracted from C. citratus had demonstrated to kill bacteria (Bose et al., 1949). Subsequently Nayak and Dutta (1961) also found that citronella and geraniol in the essential oil had direct action on bacteriostatic and /or bacteriocidal (quoted in Athakorn Kutrakul, 1987). Ramadan et al.(1972) reported that lemongrass oil could decrease the cell number of Streptococcus faecalis, Bacillus cereus, and Salmonella enteritidis. In 1984, Onawunmi, Yisak and Ogunlana indicate α - citral (geranial) and β - citral (neral) which produced from lemongrass oil on steam extraction of its leaves elicited antibacterial action on gram - negative and gram - positive organisms such as Staphylococcus aureus, Bacillus subtilis, Escherichia coli and Pseudomanas aeruginosa. In addition, the lemongrass oil had damaging effect on the cells and spheroplasts of Escherichia coli. Membrane damage had been indicated by leakage of essential intracellular materials at lower concentration of the oil. In addition, studies with the spheroplast of E. coli had indicated that at higher concentration of the oil, cytoplasmic coagulation also been manifested (Onawunmi and Ogunlana, 1985). Not only antibacterial effect,

lemongrass oil had also demonstrated antifungal effect such as against Aspergillus niger and Rhizopus stolonifer (Moleyar and Narasimham, 1988). Citral and citronellal constituents of lemongrass oil had shown fungicidal activities on Candida spp., Aspergillus fumigatus , Microsporum gypseum , Trichophyton mentagrophytes (Onawunmi, 1989) and some dermatophytic fungi , for example Epidermophyton floccosum , Microsporum gypseum , Trichophyton mentagophytes and Trichophyton rubrum (Achara Hemtanont, Sumalee Leungsakul and Tararatana Supasiri, 1989 in Thai). Seth, Kokate and Verma (1976) revealed that the essential oil of C. citratus had a depressant effect on the central nervous system and also indicated analgesis and anti-pyretic properties.

Oral administration of decoction prepared from the lemongrass had been unable to decrease body temperature of normal rats and /or hyperthermic rat by previous administration of pyrogen (Carlini et al., 1986) It neither changed the intestinal transit of a charcoal meal in mice nor decreased the defecation scores of rats. However, these effects had obtained when the intraperitoneal route was employed (Carlini et al., 1986). On toxic effect studies, Formingoni et al. (1986) reported that oral administration of decoction of lemongrass (abafado) to adult rats for 2 months did not have on evidence of toxicity, in spite of

administration prior to mating or during pregnanacy of rats. In the same year, Leite et al. investigated the abafado effect on human. They described that a single dose or 2 weeks of daily oral administration of abafado produced no changes in serum glucose, urea, creatinine, cholesterol, triglycerides, lipids, total bilirubin, indirect bilirubin, glutamic oxalacetic transminase (GOT), glutamic pyruvic transminase (GPT), alkaline phosphatase, total protein, albumin, lactate dehydrogenase (LDH) and creatine phosphokinase (CPK), including urine analysis of protein, glucose, ketones, bilirubin, occult blood and urobilinogen as well as electroencephalogram (EEG) and electrocardiogram (ECG). They also indicated that the abafado lacks hypnotic or anxiolytic properties. The decoction showed some dose - related hypotensive effects when given intravenously and some weak diuretic and anti - inflammatory effects when given orally (Carbajal et al., 1989).

Kaleysa Raj (1975) found that 95% ethanol extraction of C. citratus had paralytic effect on human roundworm in 24 hours. Gupta et al. (1979) studied the pharmacological effect of crude extract from leaves of C. citratus found that it had effect as carminative , indigestive , expectorant and diaphorotic drugs. They indicated that the major compounds of crude extract from leaves of C. citratus

which directly effected as carminative agents are terpenes, methylhiptanamine, geraniol and farnesol. In 1982, Keiwa found that the essential oil of C. citratus had been used for dispel dogs and cats, because the dogs and cats do not like the oil odor. So in Japan, the people have coated the wrapping paper plate with the essential oil in order to prevent the stealth of dogs and cats which this effect could continue for seven days (quoted in Medicinal Plant Information Center Mahidol University, 1989 in Thai).

Locksley et al. (1982) described that in Egypt, hot water extract of dried leaves and stem of C. citratus has been used as an effective renal antispasmodic and diuretic agents.

Besides those mentions, crude extract of C. citratus significantly increased tone of contraction of the isolated stomach of rat and small intestine of rat and guinea - pig (Athakorn Kutrakul, 1987).

All collected reports in pharmacological effect of C. citratus on body's systems are very little when compared with some other medicinal plants. In the data of Thai drugs' useful and in many countries of Asia and Africa, the crude water extract of C. citratus was mainly used as diuretic agents. The mechanisms of action on renal function have never been

studied, then this research has aim to study effect of crude water extract from C. citratus on renal function in dogs in order to confirm the diuretic effect of C. citratus which reported in Thai drugs' useful. It may be a criteria to use this plant as a medicine in the future. It is interesting because lemongrass (C. citratus) is easy to find in Thailand and very cheap.