

Chapter I

Introduction



Takhrai or Takhrai- Khaor.

Scientific name : Cymbopogon citratus (DC) Stapf.

Commonly name : Citronella grass, Fever grass, Geranium grass, Hierba de limon, Paja de limon, Lemongrass, Lapine, Tanglad and Tej-sar.

Family : Gramineae (Graminae, Poaceae.)

In Thailand, Takhrai have differently local names as Ta-khrai (Central), Khaa-hom (Sham-Mae Hong Son), Khrai (Southern), Cha-Khrai (Northern), Soet-Kroei or Loe-Kroei (Khmer-Surin) and Hua-sing-khai (Prachin-Buri) (ชัยโย ชัยชาณุพิพยุทธร และคณะ, 2524).

Takhrai grows annual and more seasons. The stem is distinguished in underground which call rhizome. The rhizome contain starch reserve. Leaves usually consist of a lower part which is amplexicaul over the whole length and an upper part which stands more away from the blade, leaves strongly aromatic when crushed, on account of essential oils (Lemongrass oils, Verbena oils or Indian molissa oils) which are distributed throughout plant in a unique way. The blades lineas, with narrowed base, with acute apex and stout, pale midnerve and more rigid. Leaves in dense tuft from shart annular

rhizome, whereas lower leaf-sheaths loose at base, cinnamon-coloured inside and blades up to 100 cm in length, broad, rough on both sides. The margins sharply inflexed along marginal nerves, at least from middle upwards and back along edges with continuous wings. Internodes usually coated wax and straight, conspicuously arched in stolons of a number of grasses.

Takhrai is rarely flowering plant, carrying true inflorescences at ultimate branchlets, to wit 2 short spike-like racemes with common peduncle enclosed in spathe-like uppermost leaf. The flowers normally bisexual usually consisting of a perianth of 2-3 minute scales, and 3-6 stamens, a superior hollow ovary with on free style with stigmas. The ovule has one, adaxially attached. Fruit a caryopsis in which the thin pericarp is adnate to the seed (seed; has endosperm large, various in consistency, but always rich in starch). The fruit oblong, dorsally compressed, convex at embryo-side, flat at hilum-side. Takhrai is breded by almost separate stem (ช้อยโย ช้อยชาญ ทิปยุทท และคณะ, 2524; พยอม ตันติวัดน์, 2521).

Takhrai has 2 locations, the first location is West Indian Lemongrass, from Cymbopogon citratus (DC) Stapf (Synonymly name : Andropogon citratus (D.C). This kind was grown in Indonesia, Burma, Islets of Madagaska, Sri-Lungka, incude with Thailand. The other location is East Indian Lemongrass (Inchy Lemongrass des Indes, Lemongrass de Cochin), from C. flexnosus (Nees ex Stend.) (Synonymly name : A. flexnosus (Nees), grown in West of India and Veitnam. On this kind may be called Takhrai-yaun (พยอม ตันติวัดน์, 2521).

Six kinds of Takhras have been found in Thailand. They are as follows : Takhras-khor (C. citratus), Takhras-ton or Takhras-bok (Ormasia robusta), Takhras-num (Homonoie riparia), Takhras-khom or Takhras-dang (C. nardus Rendle), Takhras-khang-nak (Rhabdia lyciodes Mars) and Takhras-khang-sing.

The chemical compositions of C. citratus (Takhras), are found in leaves; for example methylheptenol, eugenol, iso-orientin, luteolin, furfural, dipentene, geraniol, cymbopol, linalool, menthol, d- citronellic acid, citral, myrcene, nerol, waxes, essential oil, cymbopogenol, cymbopogone and phenolic substance etc. The chemical compositions of C. citratus in other areas have hexacosyl alcohol, benzyl alcohol, cellulose, gerianol, amino-acids, camphor and humulene etc (ข้อมูลสมุนไพร, ศูนย์, 2528).

Takhras is the medicinal plant which a smaller pharmacological effects studies than the other medicinal plants; example Allium sativum Linn., Zingiber officinale Roscoe, Curcuma longa Linn. and Aloe vera (Linn) Burm. F. etc. However, it may be concluded the reports of the pharmacological effect of crude extract from Cymbopogon citratus that the essential oil which extracted from C. citratus such as citral, citronella and geraniol have effect on killing bacterias (Bose et al, 1949). Subsequently, Nayak and Dutta (1961) found that citronella and geraniol in the essential oil had direct action on bacteriostatic and/or bacteriocidal. Some papers have reported that the essential oil of C. citratus have effect on central nervous system as pain inhibition. On experimental animals the essential oil was

induced middle irritation on skin but no effect on human skin.

The collection of research papers about pharmacological effect studies of crude extract from C. citratus by Chichantippayutta et al, (1961) described that as leaves and roots part of C. citratus had compound which had the same action as insulin. This compound is white-grey powder and no alkaloid, glycoside or tannin. Intake of 1 g of this compound would have the same effect as insulin 440 units, and 880 units if subcutaneous injection, but the effect of crude extract from C. citratus on decrease blood sugar can not conclude surely. The experiment of Mueller-Oerlinghansen et al (1971) studied the effect of crude extract from C. citratus on decreased blood sugar in rabbit by using of "dried root" of C. citratus and hot water extraction. The blood sugar level in diabetes's rabbit induced by alloxan could not be decreased by administration of crude extract.

In addition reports about pharmacological effect of the essential oil from C. citratus, subcutaneous injection of citronella with citronellic acid or rhodinic acid in rat induced localized anesthesia. In the isolated heart of the toad this compound increased the amplitude of ventricular contraction (positive inotropic effect) but high dose of this compound induced heart block. This compound also increased respiratory rate, decreased in blood pressure and vasodilatation on hind limb of the rabbit. A antispasmodic effect on the isolated intestinal muscle and digested erythrocyte have been reported (พยอม ตันติวัฒน์, 2521).

In 1951, Quisumbing found that the extraction of C. citratus from entire plant of Indonesia could use as an emmenagogue when adult women eaten, and this result was conformed by Burkill (1966) which found that the extraction of C. citratus from entire plant of Malaysia could used as an emmenagogue same the result of Quisumbing, E.

Subsequently, Maruzzella and Balter (1959) studied effect of the essential oil from C. citratus on killing of plant pathogenic fungi. They culture fungi on agar plate and the essential oil could growth inhibition of fungi. For Thailand, the studies effect of crude extract from C. citratus on growth of microorganisms has studied many years ago, for example in 1975, Suksringam, B., found that crude extract of C. citratus had effect on growth inhibition of fungi more than bacteria and yeast.. The example of fungi and bacteria which growth inhibited by the essential oil are

Bacteria : Bacillus megaterium.

Lactobacillus sp.

Salmonella anatum. etc

Fungi : Aspergillus sp.

Alternaria sp.

Fusarium sp.

Mucor sp. and Rhizopus sp.

The effective on growth inhibition on microorganism of the essential oil from C. citratus depend on quantitative of citral, linalool and geraniol. Citral is most effective on growth inhibition

of microorganisms. The temperature of the essential oil preparation had no effect on action of citral. However mechanism of growth inhibition on microorganisms by citral is still unknown.

Kaleysa Raj (1975) found that 95% ethanol extraction of entire plant of India of C. citratus has effect on human anthelmintic activity; earthworm, which paralysis in 24 hours but no death.

Gupta et al (1979) studied the pharmacological effect of crude extract from leaves of C. citratus on human systems, it was found that the extract had effect as carminative drugs, indigestive drugs, expectorant and diaphoretic drugs. And in the same studies of Gupta et al found that the major compounds of crude extract from C. citratus which directly effected as carminative agents are terpenes, methylhptanamine, geraniol and farnesol .

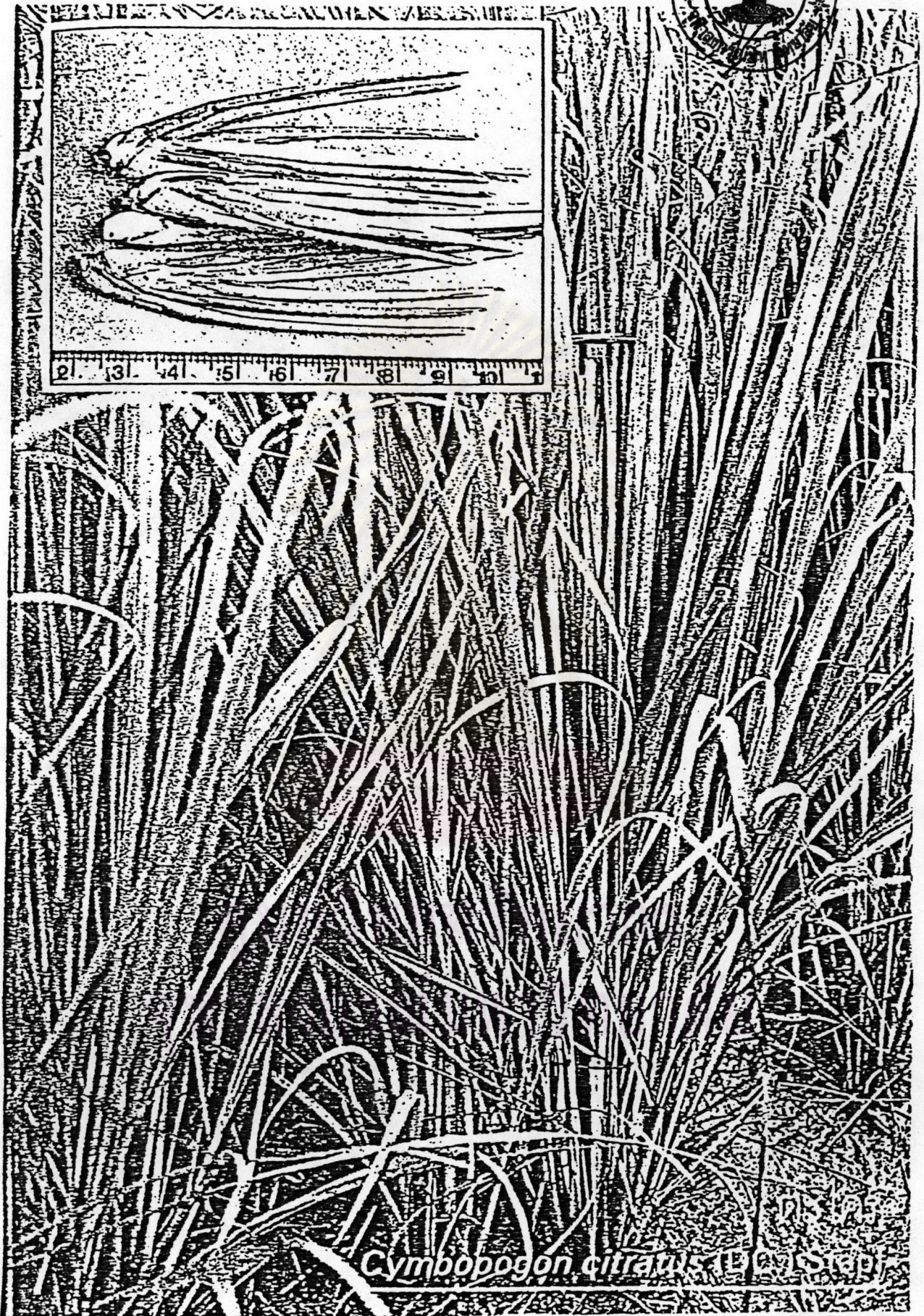
Arnason et al., (1966) found that the hot water extract of dried entire plant of C. citratus used for relieving fever. In 1982, Locksley and co-worker described that the hot water extract of dried leaves and stems of C. citratus had effects on human renal antispasmodic and diuretic, and this extract also had effect on antispasmodic of the isolated rabbit's ileum.

Recently Keiwa (1982) found that the essential oil of C. citratus had effect as same as carminative drugs and also used for dispel dogs and cats, because the dogs and cats do not like the oil odor. So in Japan have coated the wrapping papers plated with the

essential oil in order to prevent stealation of dogs and cats which this effect could continue for one week.

All collections reports of pharmacological effect research of C. citratus on body' systems are very little when compared with some the other midicinal plants. In the present, crude extract of C. citratus was mainly used as carminative and/or laxative agents, which described by Thai' drug useful. The mechanisms of action on carminative and/or laxative have never been studied then this research has aim to study effect of crude extract from C. citratus on contraction of stomach and small intestine and the mechanisms of action. in order to confirm data in Thai' drug useful of C. citratus using as a carminative and/or laxative agents which a criteria to use this plant as a medicine.

In this research studies on pharmacological effects of crude extract from C. citratus, using the rat's stomach and duodenum, and guinea-pig's ileum as model studies for describe the mechanisms of crude extract from C. citratus on the carminative and/or laxative effected.



Cymbopogon citratus (L.) Stapf

Fig 1 Cymbopogon citratus (DC) Stapf : Takhrail.