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Comparative Study on Family *Zingiberaceae* Plants Used In Ayurvedic Drugs

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ABSTRACT
The present article attempts to compare physico-chemical parameters of *Zingiber officinalis* Roxb., *Hedychium spicatum* Ham ex Smith , *Curcuma longa* Linn belonging to common family *Zingiberaceae*. Each of them is considered to have huge medicinal value in Ayurveda, Sidhha and Unani traditional medicines. Since ancient times, these drugs are used according to their medical value. Investigation of such traditionally used medicinal plants is thus valuable on two levels, firstly, as a source of potential chemo therapeutic drugs and secondly, as a measure of safety for the continued use of medicinal plants. The present paper attempts to evaluate the physicochemical parameters like pH, Loss on drying at 105°C, Water soluble extract, Alcohol soluble extract, Total Ash, Acid insoluble ash and Thin layer chromatography. The study revealed specific identities for crude drug taken which will be useful in identification and control to adulterations of the raw drug.

Keywords: *Zingiberaceae,* Physico-chemical, Herbal drugs, Ayurveda.

INTRODUCTION

Zingiber officinalis Roxb. (Roscoe) commonly known as ginger, belonging to the family *Zingiberaceae* is a familiar dietary spice attributed with several medicinal properties. It has been known for its long standing utility as a flavouring agent and also as a digestive aid. It has been widely used as a common household remedy from ancient times. Ancient Ayurvedic texts such as *Charaka Samhita* and *Sushruta Samhita* have listed numerous uses of both fresh and dried rhizomes of Zingiber officinalis. Roxb. Dried rhizome forms an essential ingredient in several Ayurvedic formulations and hence it is called *Mahaoushadha*, the 'great medicament'. [1] Inspired by its health benefits, the Chinese and the Americans have included it in their official pharmacopoeias. [2] It has a long history of use in ailments such as nausea, respiratory disorders, cardiovascular and rheumatic disorders. [3] It also has immuno-modulatory properties and is reported to inhibit various inflammatory mediators such as prostaglandins and pro-inflammatory cytokines. [4-5] Traditionally it is used to treat a number of gastrointestinal disorders including diarrhea. [6] Since the use of *Zingiber officinalis* Roxb. has been associated with only a few insignificant side effects and with no known drug or herb interactions, it has been considered as a safe herbal medicine. [7-8]

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Turmeric is a very important herb in Indian Ayurvedic medicine also known as Curcuma, turmeric, haldi, haridra, gauri. A symbol of prosperity, it is considered as cleansing herb for the whole body. In Ayurvedic practices, turmeric has many medicinal properties and many in South Asia use it as a readily available antiseptic for cuts, burns and bruises. [9-10] It is also used as an antibacterial agent. Traditional Chinese physicians used turmeric to treat liver and gallbladder problems, chest congestion and also used to stop bleeding. The ancient Greeks were well aware of turmeric. It had been used to make yellow-orange dyes. The active constituent is known as curcumin. It has been shown to have a wide range of therapeutic effects. It protects against free radical damage because it is a strong antioxidant. [11] It is used to reduce inflammation. [12] It accomplishes this by reducing histamine levels and possibly by increasing production of natural cortisone by the adrenal glands. It protects the liver from a number of toxic compounds. It has been shown to reduce platelets from clumping together, which in turn, improves circulation and helps protect against atherosclerosis. Numerous studies have also shown cancer-preventing effects of curcumin. This may be due to its powerful antioxidant activity in the body. Medically, it was used as a digestive aid and treatment for fever, infections, dysentery, arthritis, antidepressant, antidiabetic, antithrombiotic, antimutagenic, jaundice and other liver problems. [13-16] The turmeric, with its antibacterial action, will prevent the bacterial wound infections. [17-18] Turmeric helps stimulate the flow of bile, which helps digest fats.Turmeric can also be used to deter

ants. The exact reasons why turmeric repels ants is unknown, but anecdotal evidence suggests it works.

Hedychium spicatum is a smallish hardy ginger that grows to around 1 m, with green leaves and large orange and white flowers. It is also known as Spiked Ginger Lily, Sandharlika, Kapur kachri in Hindi and Takhellei in Manipuri. [19] In India, the fragrant rhizomes of *Hedychium spicatum.* Ham ex Smith is a considerable item of trade. The dried rhizomes are burned as incense and a powdered form called "abir" is used for perfuming a tobacco that is chewed in pan rather than smoked. An essential oil derived from the rhizomes is used in perfumery but also has antibiotic properties. The rhizome of *Hedychium spicatum* Ham ex Smith has a special religious significance at marriage ceremonies. Its decoction is applied to body of the bride and grooms to keep them cool. The roots and leaves are used in several Ayurvedic preparations and has great potential for exports. The powder as well as decoction of root is carminative and digestive. A small cup of root decoction twice in a day acts as an expectorant, stimulant, anti spasmodic, tonic, vasodilator. [20] The root is used in Tibetan medicine for various ailments such as indigestion, asthma, foul breath, bronchitis, hiccough, vomiting and poor circulation due to thickening of the blood. The root stock is acrid, bitter, pungent, heating, and astringent. [21-23]

MATERIAL AND METHODS

Samples were washed in running water and air-dried. The rhizomes were studied for physicochemical evaluation. Powder of the samples was used for chemical analysis. Physicochemical studies like total ash, water soluble ash, loss on drying at 105°C TLC and extractive values were carried out as per the WHO/AOAC guidelines. [24-25]

Table 1: Analysis of various Physico-chemical parameters

Parameters	*Zingiber officinalis* Roxb.	*Hedychium spicatum.* Ham ex Smith	*Curcuma longa* Linn
pH (10 % w/v aqueous solution)	4.64	5.95	6.16
Total Ash (% w/w)	5.11	7.68	7.87
Acid insoluble ash (% w/w)	0.54	1.88	0.74
Water soluble extract (% w/w)	14.82	10.82	10.06
Alcohol soluble extract (% w/w)	4.13	2.39	6.23
Loss on drying at 105°C (% w/w)	11.83	11.24	23.29

Table 2: TLC of *Hedychium spicatum.* Ham ex Smith

S. No.	254 nm		366 nm		After Derivatisation in visible light	
	Colour	R_f	Colour	R_f	Colour	R_f
1.	Green	0.20	-	-	Grey	0.20
2.	Green	0.43	-	-	Grey	0.43
3.	Green	0.48	Fluorescent blue	0.48	Pink	0.48
4.	Green	0.54	-	-	Grey	0.54
5.	Green	0.67	-	-	Pink	0.67
6.	Green	0.76	-	-	Red	0.76
7.	Green	0.83	Fluorescent blue	0.83	Grey	0.83

RESULTS AND DISCUSSION

Physico-chemical parameters of the samples are tabulated in Table 1. For *Zingiber officinale* Roxb. Loss on drying at 105°C in roots were found to be 11.83 % w/w. Analytical results showed ash value of 5.11 % w/w. The amount of acid insoluble ash present in the plant sample was 0.54 % w/w. The water soluble extractive value & alcohol soluble extractive value were found to be 14.82 and 4.13%w/w respectively. For *Hedychium spicatium* Ham ex Smith loss on drying at 105°C in roots were found to be 11.24 % w/w. Analytical results showed ash value of 7.68 % w/w. The amount of acid insoluble ash present in the plant sample was 1.88 % w/w. The water soluble extractive value & alcohol soluble extractive value were found to be 10.83 and 2.39% w/w respectively. For *Curcuma longa* Linn. loss on drying at 105°C in roots were found to be 23.29 % w/w. Analytical results showed ash value of 7.87 % w/w. The amount of acid insoluble ash present in the plant sample was 0.74 % w/w. The water soluble extractive value & alcohol soluble extractive value were found to be 10.06 % and 6.23 % w/w respectively.

TLC of an ethanol extract has been developed in various mobile phases and observed under UV 254 nm, 366 nm and after derivatisation in visible light. The results are given in Table 2, 3, 4 and Fig. 1, 2, 3.

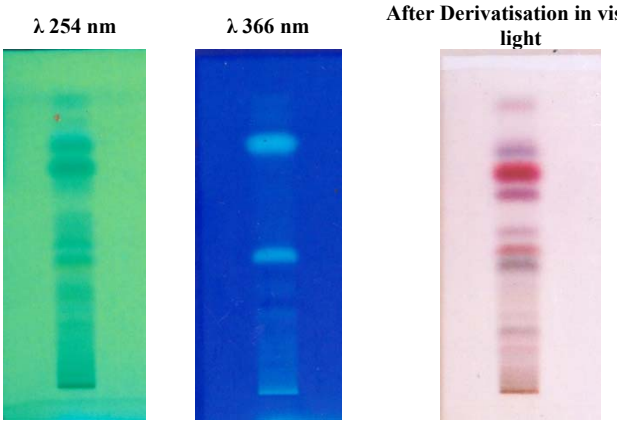

Fig. 1: TLC of *Hedychium spicatum* Ham ex Smith (Toluene: Ethyl acetate:: 9:1v/v)

Table 3: TLC of Haridra (*Curcuma longa* Linn.)

S. No.	λ 254 nm		λ 366 nm		After Derivatisation in visible light	
	Colour	R_f	Colour	R_f	Colour	R_f
1.	Green	0.08	Fluorescent yellow	0.08	Orange	0.08
2.	Green	0.18	Yellowish orange	0.18	Orange	0.18
3.	Green	0.46	Yellowish orange	0.46	Orange	0.46
4.	Green	0.92	Pale blue	0.92	Dark blue	0.92

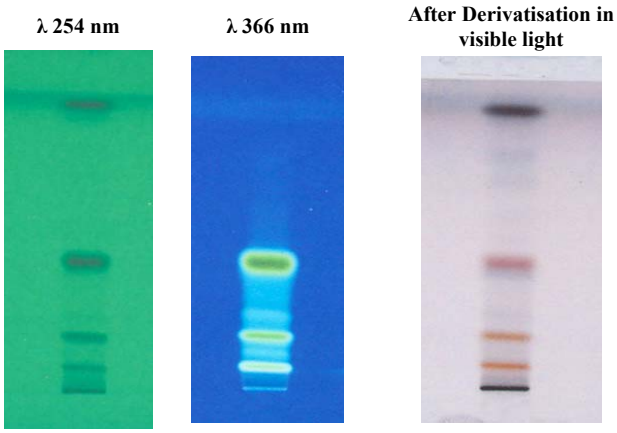

Fig. 2: TLC of *Curcuma longa* Linn. (Chloroform: Methanol :: 9.7 : 0.3 v/v)

Table 4: TLC of Shunti (*Zingiber officinalis.* Roxb.)

S. No.	After Derivatisation in visible light	
	Colour	R_f
1.	Blue	0.14
2.	Greenish blue	0.19
3.	Violet	0.36
4.	Violet	0.44
5.	Violet	0.51
6.	Violet	0.58
7.	Violet	0.64
8.	Violet	0.69
9.	Violet	0.74
10.	Violet	0.77

After Derivatisation in visible light

Fig. 3: TLC of *Zingiber officinalis.* Roxb. (Toluene: Ethyl acetate :: 5: 1.5 v/v)

CONCLUSION

The samples were studied and described physicochemical parameters and TLC studies. These parameters will be useful in authentification and identifying the adulterants and quality control of raw drugs. Sample exhibits a set of diagnostic characters, which will help to identify the drug in dried condition.

It has been concluded from this study that estimation of physicochemical parameters like pH, Loss on drying at 105°C, Water soluble extract, Alcohol soluble extract, Total Ash, Acid insoluble ash and thin layer chromatography profile (TLC) is highly essential for raw drugs or plant parts used for the preparation of compound formulation drugs. The periodic assessment is essential for quality assurance and safer use of herbal drugs.

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