

ACHIEVING WORLD'S STANDARDS THROUGH QUALITY IN RAW MATERIALS

BY

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*One Needs To Conclusively
Prove The Testing Procedures
To Identify The Specific Species*

A photograph of ginger rhizomes. One rhizome is cut in half, showing its fibrous, yellowish interior. Several thin, rectangular slices of ginger are stacked in the foreground. The background shows more whole ginger rhizomes. The text "RHIZOMA ZINGIBERIS" is overlaid in the center in a red, serif font.

RHIZOMA
ZINGIBERIS

GEOGRAPHICAL DISTRIBUTION

- Native to south-east Asia
- Commonly grown in Africa, China, India, Japan and Jamaica
- India is the world's largest producer



GINGER FINDS PLACE IN

- WHO monographs
- Chinese herbal pharmacopoeia
- United States herbal pharmacopoeia
- British herbal pharmacopoeia
- British herbal compendium
- Japanese standards for herbal medicine
- Ayurvedic Pharmacopoeia of India



DEFINITION

- Dried rhizome of *Zingiber officinale* Roscoe

SYNONYMS

- *Zingiber blanco* Massk
- *Amomum zingiber* L.



CHINESE QA FOR CRUDE DRUGS

- Chinese pharmacopoeia grade ginger rhizome collected in winter containing not less than 0.8mg of volatile oils.
- **Good Agricultural Practice** for Chinese crude drug for 2002
 - Ecological environment of production site
 - Germplasm and propagation material
 - Species, subspecies and varieties
 - Management of rearing
 - Collection and primary processing



SELECTED VERNACULAR NAMES

- Adrak
- Inji
- African ginger
- Cochin ginger
- Common ginger
- Ginger



DESCRIPTION

- A perennial herb with a subterranean, digitately branched rhizome
- Each flower shows reddish to orange corolla



GENERAL APPEARANCE

- Ginger is a large tuberous perennial plant
- Ginger occurs in horizontal, laterally flattened, irregularly branching pieces



- The material of commerce is peeled (Jamaica), partially scraped (India, Nigeria, Australia and Japan) or unpeeled rhizomes (China) .



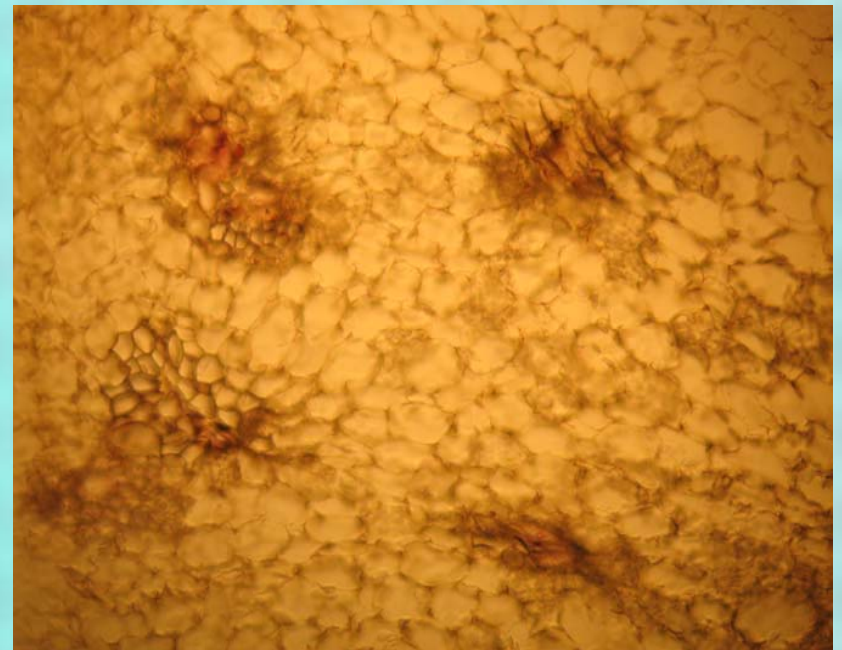
ORGANOLEPTIC PROPERTIES

- Odour-Characteristic aromatic
- Taste-Pungent and Aromatic
- Colour-Internally Pale Yellow To Brown



MACRO AND MICROSCOPIC EXAMINATION

- Scattered bundles of the leaf-traces accompanied by fibers



POWDERED PLANT MATERIAL

- nonlignified scalariform, reticulate and spiral vessels and starch



CHARACTERIZATION & STANDARDIZATION OF EACH HERBAL INGREDIENT



FOREIGN ORGANIC MATTER

- Not more than 2.0%

TOTAL ASH

- Not more than 6.0%

ACID-INSOLUBLE ASH

- Not more than 2.0%



EXTRACTIVE VALUES

WATER-SOLUBLE EXTRACTIVE

- Not less than 10%

ALCOHOL-SOLUBLE EXTRACTIVE

- Not less than 4.5%



Qualitative & Quantitative Chemical Evaluation

- Volatile oil content – 1 to 4% essential oil
- Oleoresin content – 4 to 7.5% (Non volatile pungent principles, gingerols and shogaols)
- Australian Pharmacopoeia and German Pharmacopoeia require not less than 1.5% volatile oil



**REFERENCE STANDARDS TO
DETERMINE PURITY, SIMPLICITY
AND REPRODUCIBILITY**

CRUDE DRUG GINGER, EXTRACTS



British herbal pharmacopoeia, American herbal pharmacopoeia & German commission E have prescribed certain specifications regarding herbal drugs

These includes

- **"The herbal drug** or herbal preparation in its entirety is regarded as the active substance".
- **Constituents with known activity** "are chemically defined substances or group of substances which are generally accepted to contribute substantially to the therapeutic activity of a herbal drug or of a preparation."



- **Markers** "are chemically defined constituents of a herbal drug, which are of interest for control purposes.
- **Standardization** refers to " adjusting the herbal drug preparation to a defined content of **a constituent or a group of substances** with known therapeutic activity



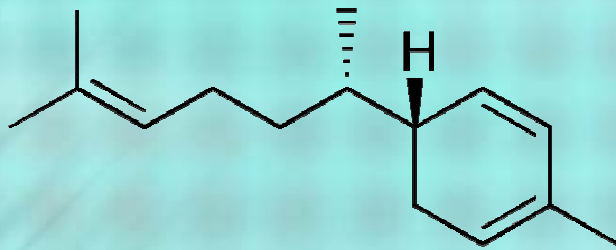
CHEMICAL ASSAYS

- Not less than 2%v/w of volatile oil
- Qualitative analysis by TLC
- Quantitative analysis by GC and HPLC
 - Gingerols
 - Shogaols
 - Zingiberine
 - Bisabolene
 - Curcumene

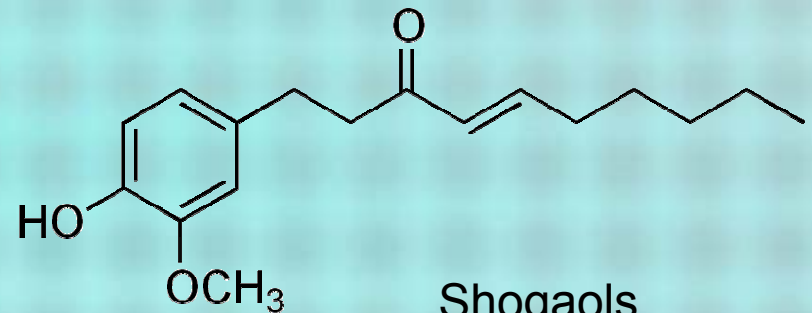


MAJOR CHEMICAL CONSTITUENTS

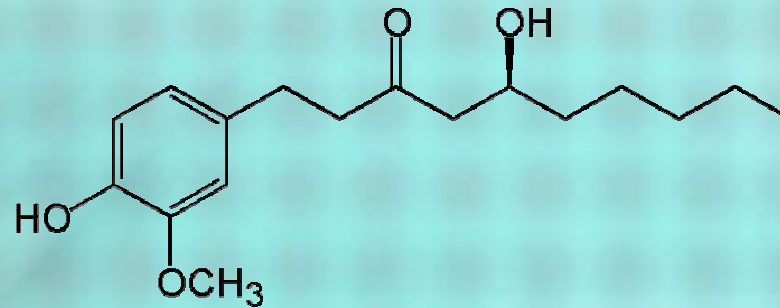
- 1-4% essential oil and an oleoresin



Zingiberene



Shogaols



Gingerols



**CONCERN IS MORE ON THE
IMPURITY LEVELS RATHER THAN
ON THE PURITY LEVELS**

SAFETY MORE THAN EFFICACY



**German Pharmacopoeia and Austrian
Pharmacopoeia specifies purity tests
for absence of bleaching agents
(Calcium carbonate)**



TOXICOLOGICAL STUDIES

MICROBIAL PURITY

- *Aerobic bacteria- not more than 10^7 /g*
- *Fungi- not more than 10^5 /g*



PESTICIDE RESIDUES

- Established in accordance with national requirements
- Maximum residue limit of Aldrin and Dieldrin is not more than 0.05mg/kg



HEAVY METAL CLEARANCE

- Lead – Not more than 10ppm
- Mercury – Not more than 1ppm
- Arsenic – Not more than 3ppm
- Cadmium - Not more than 0.3mg/kg

RADIOACTIVE RESIDUES

- Strontium-90
- Iodine-131
- Caesium-137



DOSAGE FORMS

- Dried root powder, extract, tablets

MEDICINAL USES

Uses supported by clinical data

- Prophylaxis of nausea and vomiting associated with motion sickness
- Treatment of dyspepsia, flatulence, colic, vomiting, diarrhoea, spasms, colds, flu and to stimulate appetite



Uses described in folk medicine, not supported by experimental or clinical data

- Cataracts, toothache, insomnia, baldness, and hemorrhoids



PHARMACOLOGY

- EXPERIMENTAL PHARMACOLOGY
- ANTIEMETIC ACTIVITY
- ANTI-INFLAMMATORY ACTIVITY
- ANTINAUSEA AND ANTIEMETIC ACTIVITIES



CONTRAINDICATIONS

- With gallstones, first consult a physician

SIDE EFFECTS

- None known but European Commission Contraindicates Ginger during pregnancy and lactation



PRECAUTIONS

- Anticoagulant drugs or those with blood coagulation disorders



DRUG INTERACTIONS

- Ginger may affect bleeding times and immunological parameters owing to its ability to inhibit thromboxane synthase and to act as a prostacyclin agonist



ADVERSE REACTIONS

- Contact dermatitis of the finger tips has been reported in sensitive patients.
- Ref: *Indian journal of dermatology*, 1987, 53:328



TRADITIONAL CONCEPTS AND PROCEDURES

- *Conduct the selection of ayurvedic crude drugs as per the scriptures*
- Ginger (Crude drug)
- Fresh Ginger –
- Dry Ginger –
- White Ginger –



- Vettumaran Gulika (**INJINEERU**)
 - (Antipyretic)
- Water Extract (**Kashayam**) of Dry Ginger
 - Amruthotharam Kashayam
 - (Bring in increased blood flow to the surface of the skin, reduce elevated BP, Works as Antipyretic)
- **Total powder**
 - Trikatu (Gingerols are pain relievers close to capsaicin action on specific receptor sites (Vanilloid receptor) normally reacts to heat . Antiinflammatory on COX I and COX II like ibuprofen)



- Injineeru (Ginger juice) act by suppressing the appetite, reducing fat absorption and fat deposition, and increasing the metabolic “burning off” of fat.
- Researchers world wide are trying to understand the mystery of taste buds (2000-10000 Taste Buds convey the signals to the nerve cells)



GINGER

ALAKALOIDS (Berberin)

Amino acids (It decreases the nausea and vomiting)

Flavanoids (Pinostrobin-powerful antioxidant than quercetin and myricetin, contains more than broccoli)

Volatile oils (gingerberine, capsaicin, bisabolene)

Oleoresins (Gingerol and shogaol pungent principles, They are anti-inflammatory, diuretic, anti nausea)



Conduct the finger printing process and characterization process and treat this as an **Active Ayurvedic Ingredient (AAI)** and taken for finished formulations



CHROMATOGRAM

- Juice contains amino acids
- Kashaym contains phenols, saponins, flavonoids, inorganic compounds - Calcium, Iron, Potassium & Phosphorous, Vitamin A and B and Fibers
- Total methanolic extract contains resins, and Volatile oil (DCM extract)



GINGER AMINO ACIDS

FRESH JUICE

Visible light	
Rf	Colour
0.15	Pink
0.29	Pink
0.43	Pink



Solvent: n Butanol: Acetic acid: water (4:0.1:0.1)

GINGER-FLAVANOLS

- FRESH JUICE (Methanol Ext)

LONG UV	
Rf	Colour
0.86	Yellow fluorescent

GINGER KASHAYAM (Methanol Ext)

No band

Solvent: Toluene: Ethyl acetate: Formic acid (5:3:1)



GINGER-DCM Ext-Volatile oils

Fresh Juice (DCM extract) Ginger Kashayam (Dcm Ext)

Visible light	
Rf	Colour
0.10	Violet
0.15	Violet
0.64	Blue

Visible light	
Rf	Colour
0.11	Violet
0.25	Blue



Solvent: Toluene: Ethyl acetate (93:7)

GINGER-RESINS

Fresh juice (alcohol ext)

Ginger kashayam (alc ext)

Visible light	
Rf	Colour
0.19	Violet
0.25	Violet
0.43	Blue
0.60	Blue
0.66	Blue

Visible light	
Rf	Colour
0.14	Blue
0.19	Violet



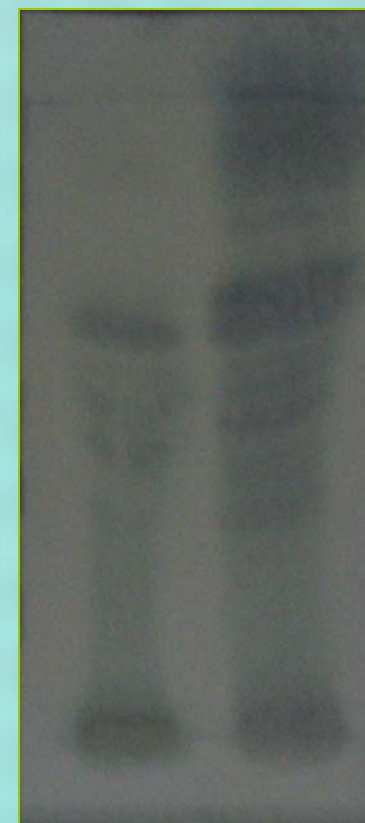
Solvent: Toluene: Ethyl acetate (88:12)

GINGER PHENOLS

GINGER KASHAYAM (Methanol Ext) FRESH JUICE

Visible light	
Rf	Colour
0.44	ALL BLUE
0.52	
0.57	
0.62	

Visible light	
Rf	Colour
0.17	ALL BLUE
0.42	
0.48	
0.52	
0.57	
0.61	
0.67	
0.79	
0.92	



Solvent: Toluene: EA: Formic acid (5:3:1)

- Intellectual Property Rights and assessment of raw materials used in Indian system of medicine, 2002
- TRIPS (Trade related aspects of intellectual property rights) agreement and status of crude drugs in ISM&H



ALCOHOL ABUSE

- The water extracted Ginger has detoxifying and antioxidant effect is recommended even for alcohol toxin (Phenols)
- Antibacterial activity of kashaym
- It inhibits *E.coli*, *Salmonella*, *Staphylococcus* and *Aspergillus*

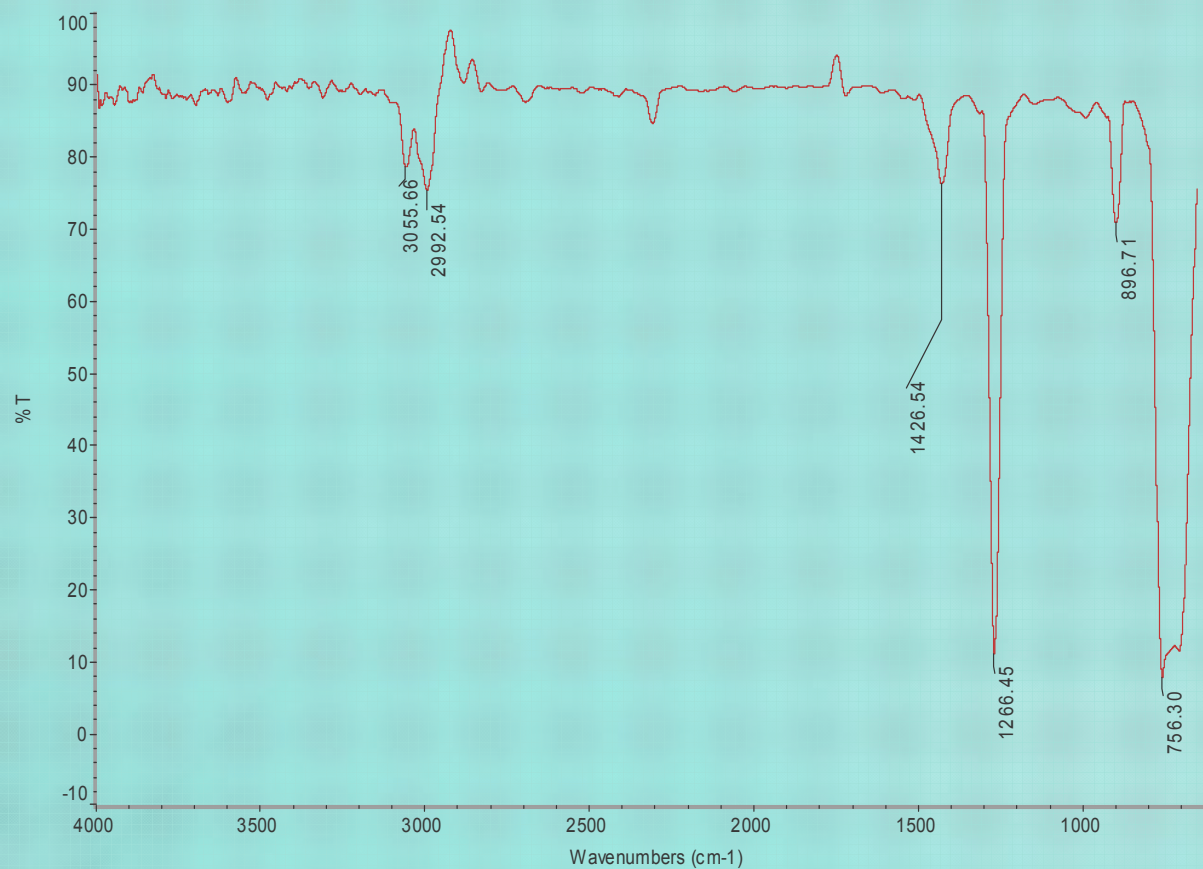


IR SPECTROSCOPY

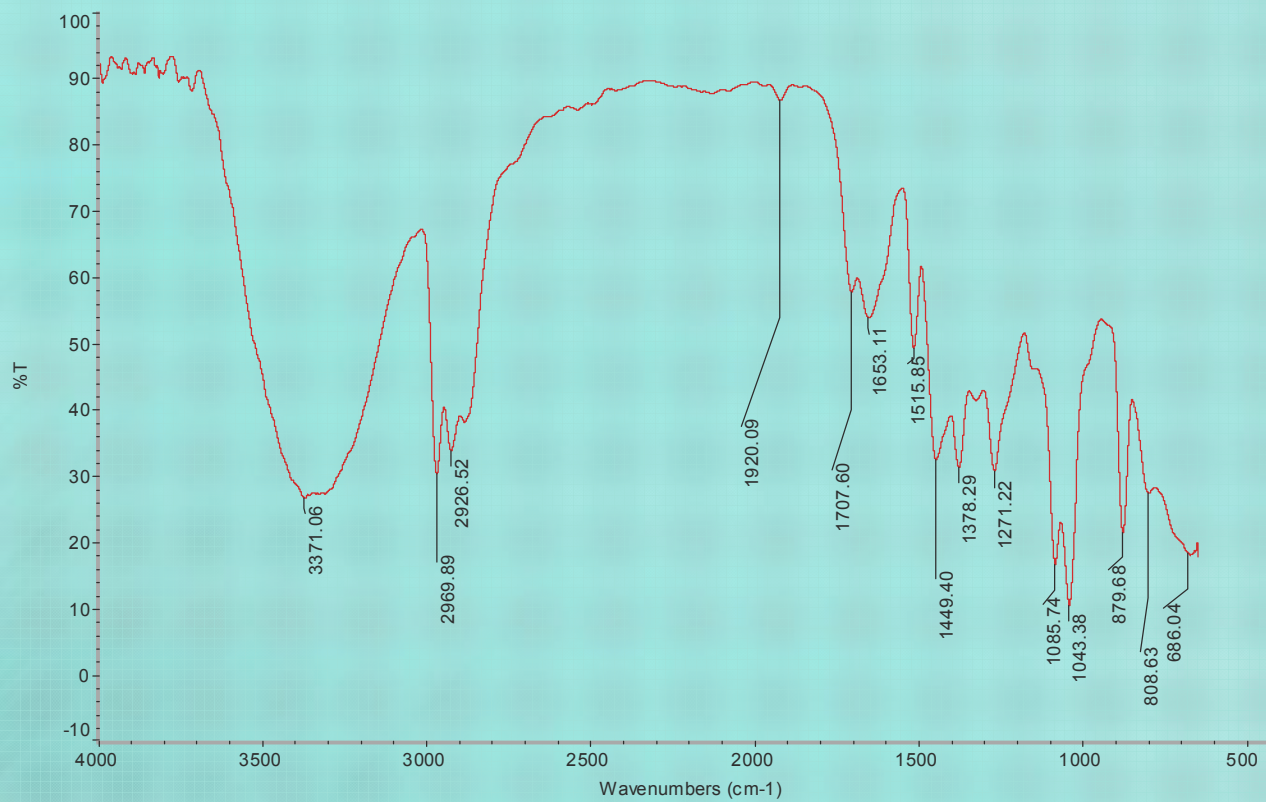
- Oleoresin
- Water extract (Kashayam)
- Alcoholic extract
- DCM extract



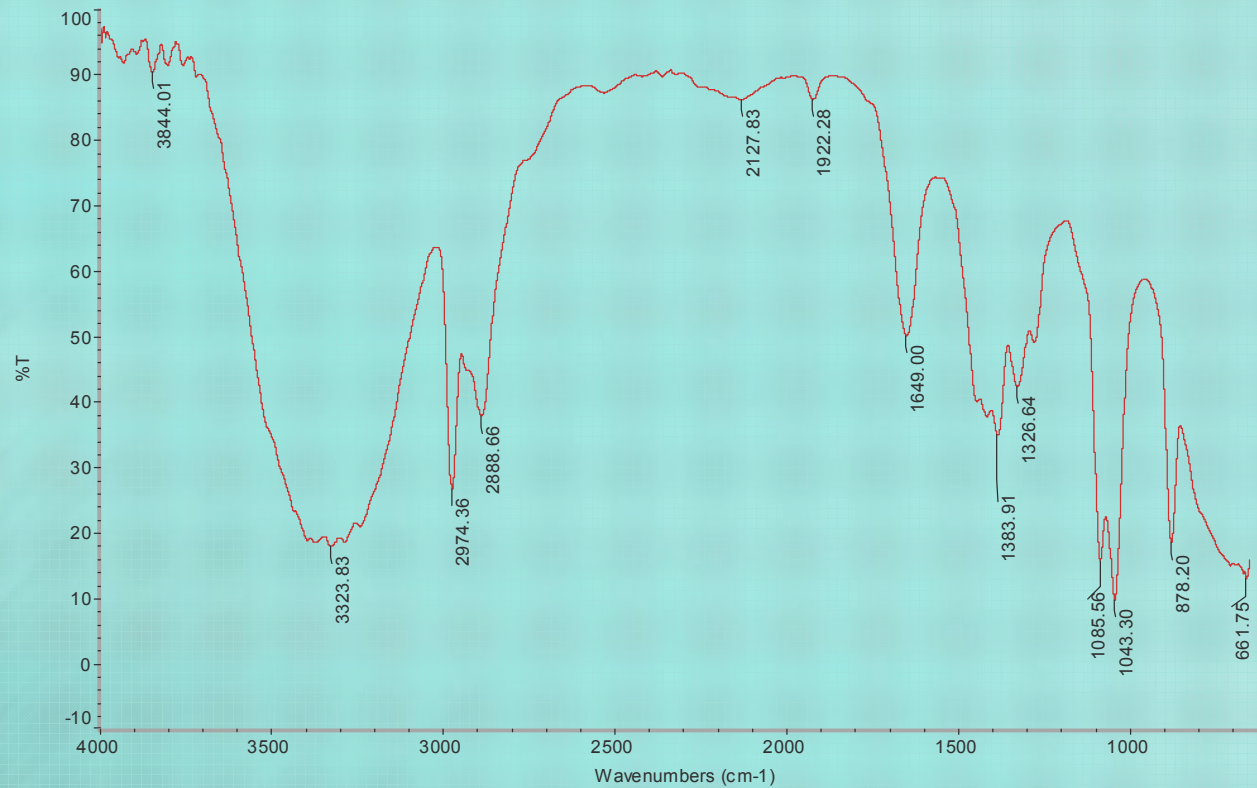
GINGER-DCM extract IR



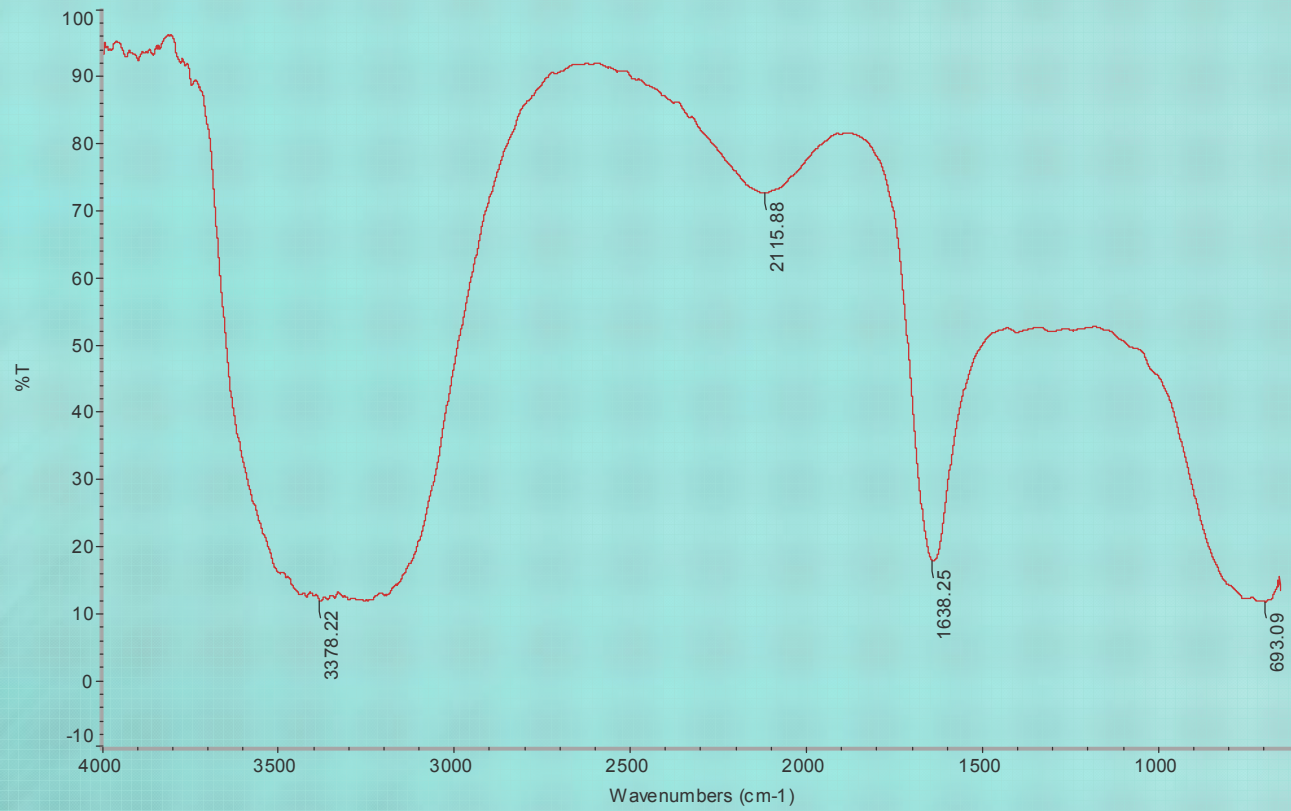
GINGER-OLEORESIN IR



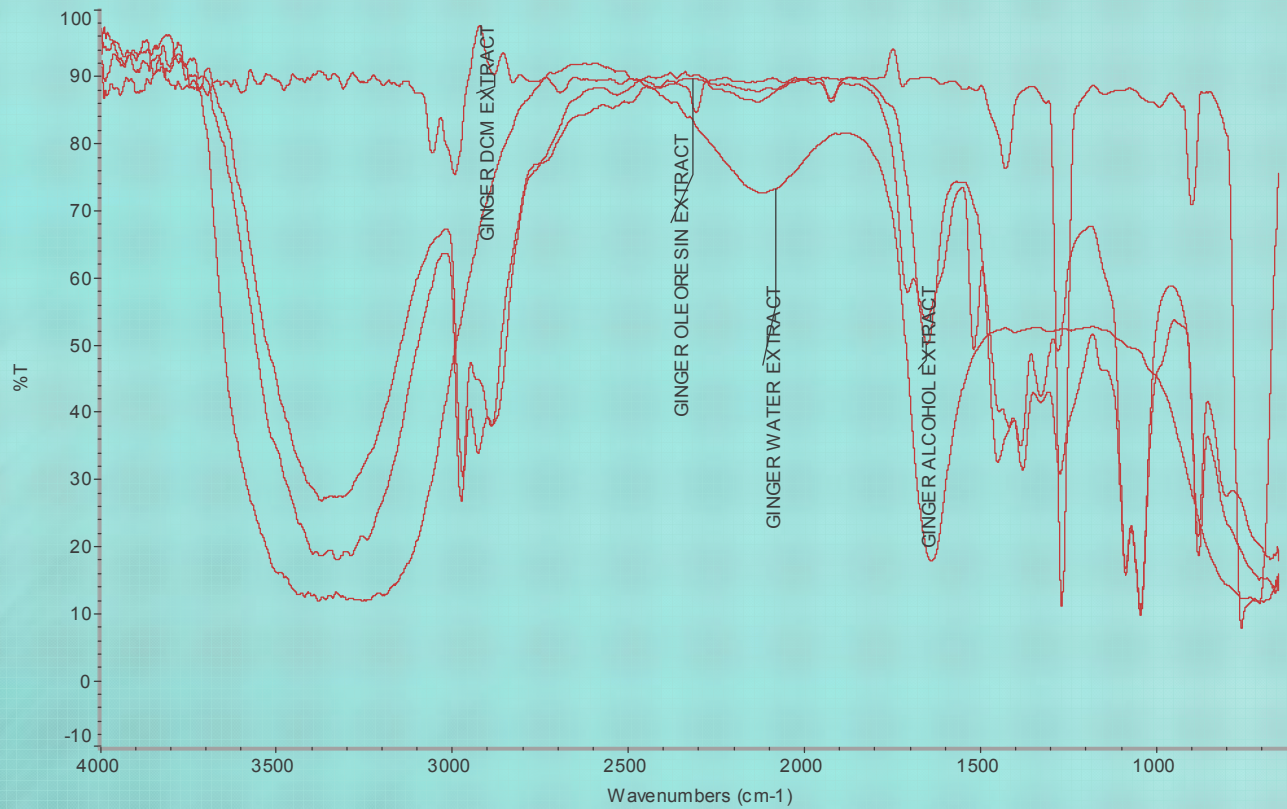
GINGER- ALCOHOLIC EXTRACT IR



GINGER- WATER EXTRACT IR



GINGER-OVERLAPING IR



IR SPECTRUM COMPARISON

Sl.No.	Ginger DCM extract	Ginger oleoresin - Alcohol ext.	Ginger - Alcohol ext.	Ginger - Water extract
1			3844.01	
2		3371.06	3323.83	3378.22 (Phenol)
3	3055.66			
4	2992.54	2969.89	2974.36 (Resins)	
5		2926.52	2888.66 (Resins)	
6			2127.83	2115.88 (Alkynes)
7		1920.09	1922.28	
8		1707.6		
9	1426.54	1653.11	1649	1638.25 (Alkenes)
10		1515.85		
11		1449.4		
12		1378.29	1383.91 (Volatile oil)	
13	1266.45	1271.22	1326.64 (Volatile oil)	
14		1085.74	1085.56	
15		1043.38	1043.3	
16	896.7	879.68	878.2	
17	756.3	808.63		
18		686.04	661.75	693.09

STABILITY OF CRUDE DRUGS

- 4 to 8 months storage
- Resulted changes from the conversion of geranyl acetate to geraniol, geranial and neral successively.
- Components of fresh ginger oil are Zingiberene and β -sesquiphellandrene.
- On storage deposits of **Ar-curcumene** are seen in the oil.
- Its presents indicates of its long storage.



SHELF LIFE OF CRUDE DRUG

- Ginger is ideal to store maximum of 3 to 4 months.
- Changes of chemical constituents are observed
- Fresh ginger, powder or its extracts are used for treating gastric ulcer and enhances secretion of bile and decreases gastric secretion.



*“Stones are only thrown that bear fruits. Take
constructive criticism on our side”*

*“We want Ayurveda to be a medium to talk about
issues of health care”*



Thank You!

