PHARMACOGNOSTIC STUDY ON THE LEAF OF *PIPER BETEL* L.

ကွမ်းရွက်၏ဆေးဘက်ဝင်ကဏ္ဍကိုသိပ္ပံနည်းကျလေ့လာခြင်း။

Swe Mar Tin

ABSTRACT

- သတ်မှတ်ချက်များအရအပင်အမျိုးအစားအမည်ဖော်ပြထားပါသည်။
- ခန္ဓာဗေဒနှင့်ဆေးဝင်ပင်လက္ခဏာများကိုလေ့လာတင်ပြထားပါသည်။
- Elemental analysis များကို Energy Dispersive X-Ray Fluorescence (EDXRF) နှင့် Atomic Absorption Spectrophotometery (AAS) နည်းစနစ်များကို အသုံးပြု၍ လေ့လာဖော်ပြထားရာ ကွမ်းရွက်တွင် Mg ပါဝင်မှု 8.412 ± 0.007 ppm ပါဝင်ကြောင်း တွေ့ရပါသည်။
- Solvents အမျိုးမျိုးကိုသုံးပြီးကွမ်းရွက်ကို extract ပြုလုပ်၍ *Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus pumalis, Candida albicans, Escherichia coli* စသည့် microbes များနှင့် antimicrobial activity စမ်းသပ်ကြည့်ရာ Water extract မှလွဲ၍ microbes အားလုံးတွင် activity ပြကြောင်းတွေ့ရပါသည်။
- Water extract တွင် *Bacillus subtilis* တစ်မျိုးတည်းသာ activity ပြကြောင်း တွေ့ရပါသည်။

INTRODUCTION

- The study of traditional medicinal plants and their therapeutic properties play a very important role in the health care system of the country.
- Myanmar traditional practitioners use a variety of effective medicines mostly based on plant materials available.

AIMS

- to explore the potent and qualitative medicine for promote the health of people
- to facilitate easy identification the herbs before their use
- to use the outcome results in upgrading the future traditional medicine to level up with the modern medicines.

OBJECTIVES

- to identify and standardized the characters of medicinal plants used in traditional medicine
- to determine the leaves of *Piper betle* L.
- to determine the antimicrobial activities

MATERIAL AND METHODS

For morphology and taxonomical studies

- made from the fresh specimens of both the vegetative and reproductive parts
- identified in the Department of Botany, University of Lashio with the help of literatures (Hooker 1879, Kirtikar and Basu 1933, Backer 1963, Hutchinson 1967, Brandis 1971, and Dassanayake 1980 – 1998).

For anatomical studies

- **leaves as lamina, midrib and petiole were undertaken free hand sections**
- **by using razor blades and chloral hydrate solution was used as clearing agents,**
- **stained with standard saffranin and studied.**

MATERIAL AND METHODS

For phytochemical investigations

- determine the presence or absence of chemical constituents by the methods of Central council for Research in Unani Medicine, 1987; Trease and Evans 1980; Santra 1999.

For elemental analysis

- the energy dispersive X-ray fluorescence spectrometer (EDX 700, Shimadzu) and atomic absorption spectrophotometer (AAS instrument in Perkin Elma Analyst 800 spectrophotometer) were used to analyze the sample.

For antimicrobial activities

- extracted by using n-hexane, benzene, acetone, ethyl acetate, ethanol and water
- tested against 6 pathogenic microorganisms by using agar-well diffusion method.

***Piper betle L.*, Sp. Pl. 28. 1753.**

Myanmar name – Kun

English name – Betel vine

Family – Piperaceae

Flowering period – November to January

Part Used – Leaves

MORPHOLOGICAL CHARACTERS

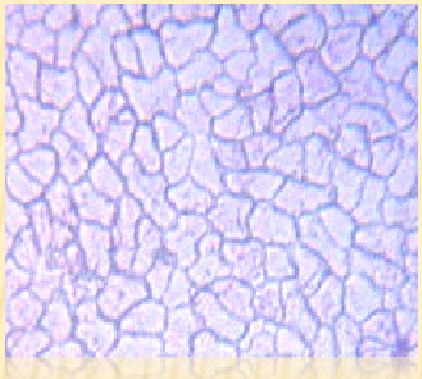
- Evergreen, root climbing herb
- Leaves simple, caudate at the base, entire, acuminate.
- Inflorescence spike.
- Flowers minute.
- Fruit a small drupe.

MACROSCOPICAL CHARACTERS

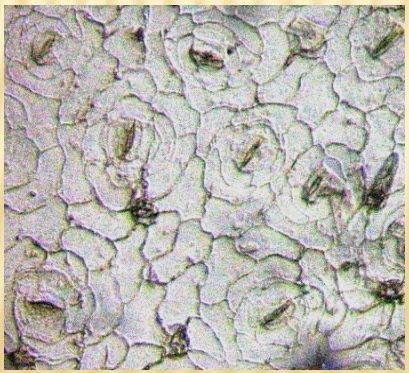
- dorsiventral, simple, evergreen, glabrous.
- cordate in shape
- caudate at the base, entire, acuminate at the apex, reticulated venation
- Colour - green or light green
- Texture - slightly coriaceous and glabrous.

HISTOLOGICAL CHARACTERS

Lamina



Adaxial surface

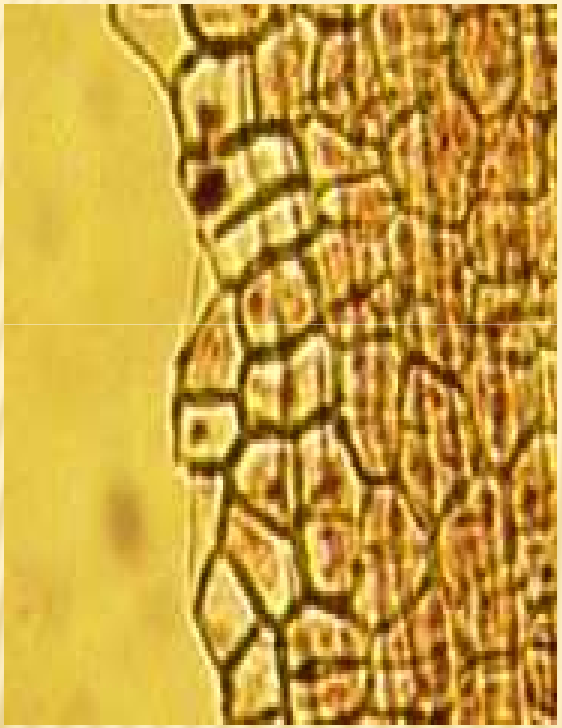


Abaxial surface

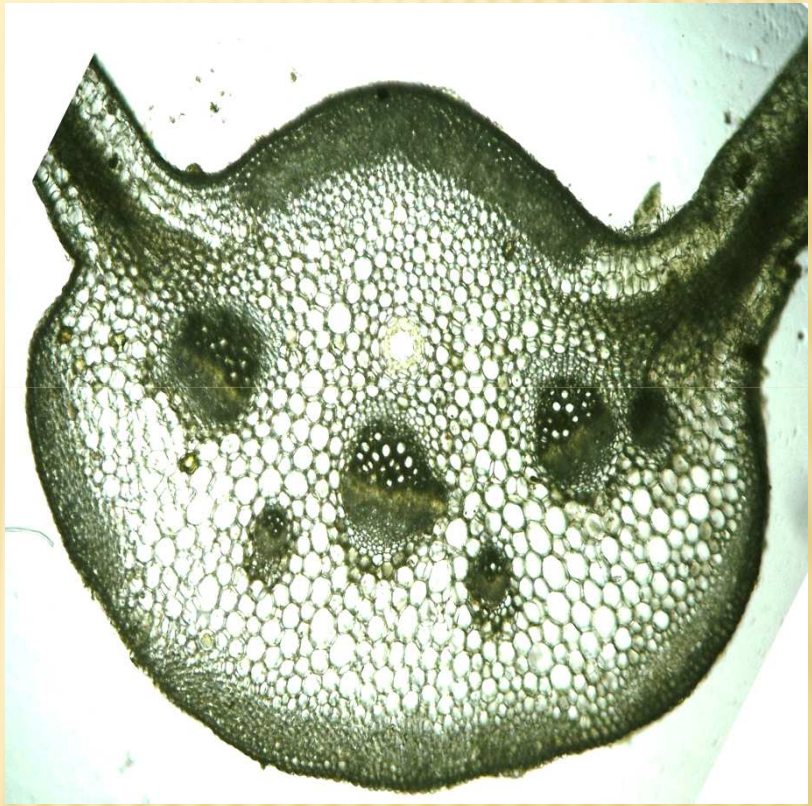
Transverse section of lamina

HISTOLOGICAL CHARACTERS

midrib



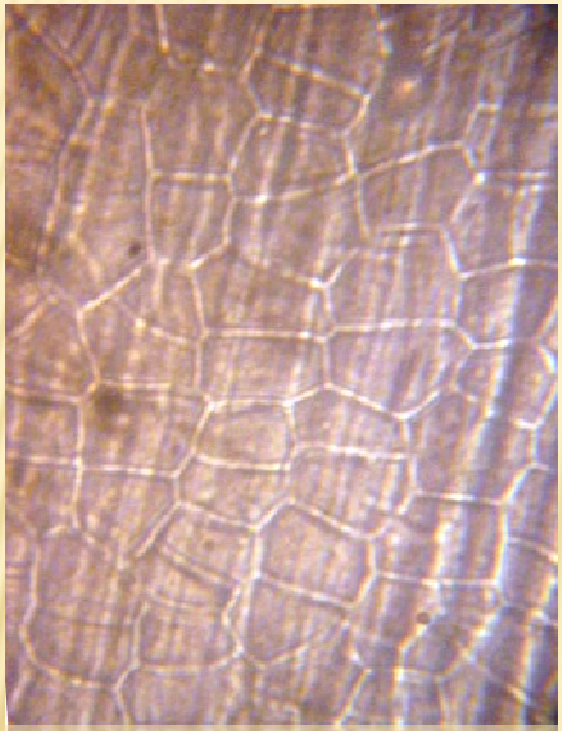
surface view



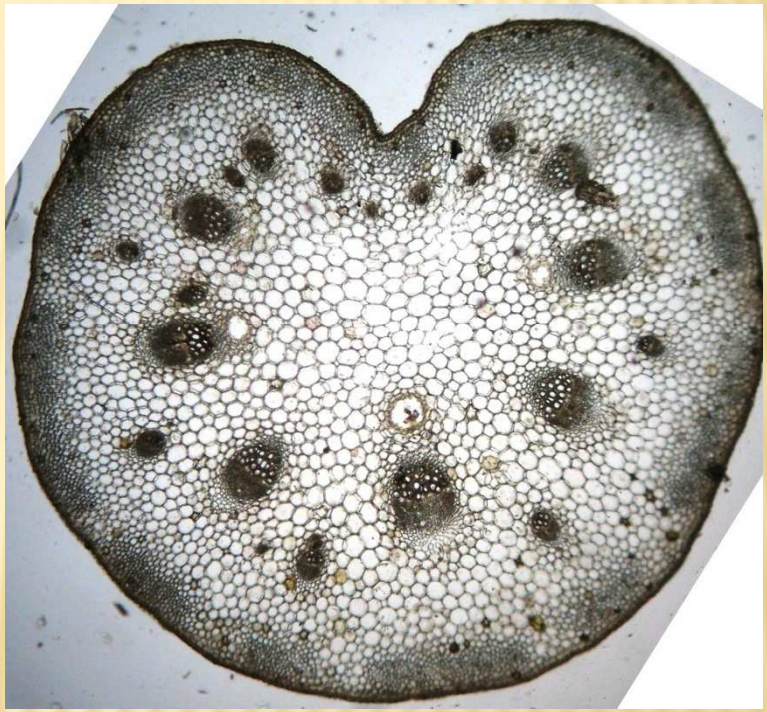
Transverse section of midrib

HISTOLOGICAL CHARACTERS

Petiole

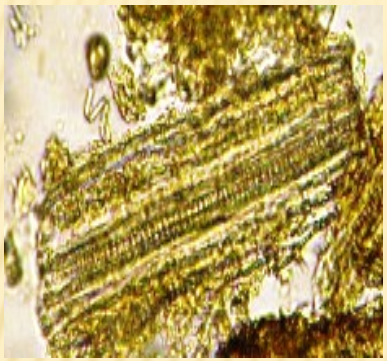
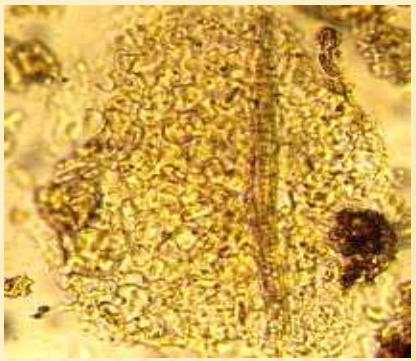
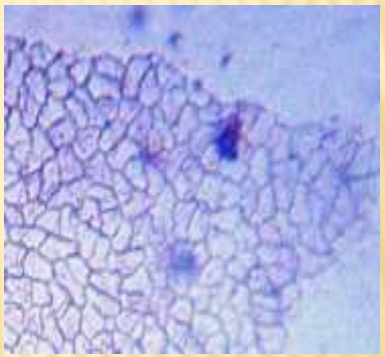
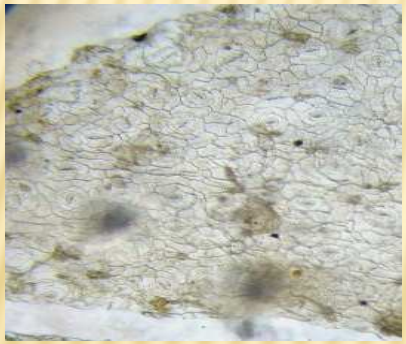
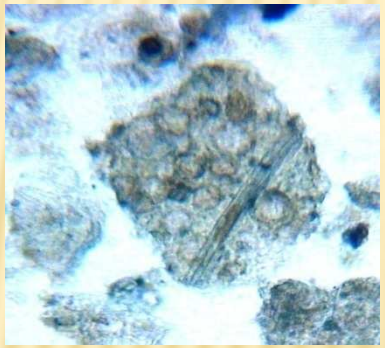


surface view



Transverse section of midrib

Powdered Leaf


TRADITIONAL MEDICINAL USES OF PREPARATION METHOD FOR COUGH AND ASTHMA

- The liquid of boiling betel leaf and decoction of ginger with a little amount of rock salt
- Salt packed with betel leaf is baked and made into powder.
- Slightly heated betel leaf smeared with coconut oil is applied on the fontanelle in an infant for coryza and also applied in layers over chest, especially of a child for the treatment of cough, pulmonary affections and bronchitis.

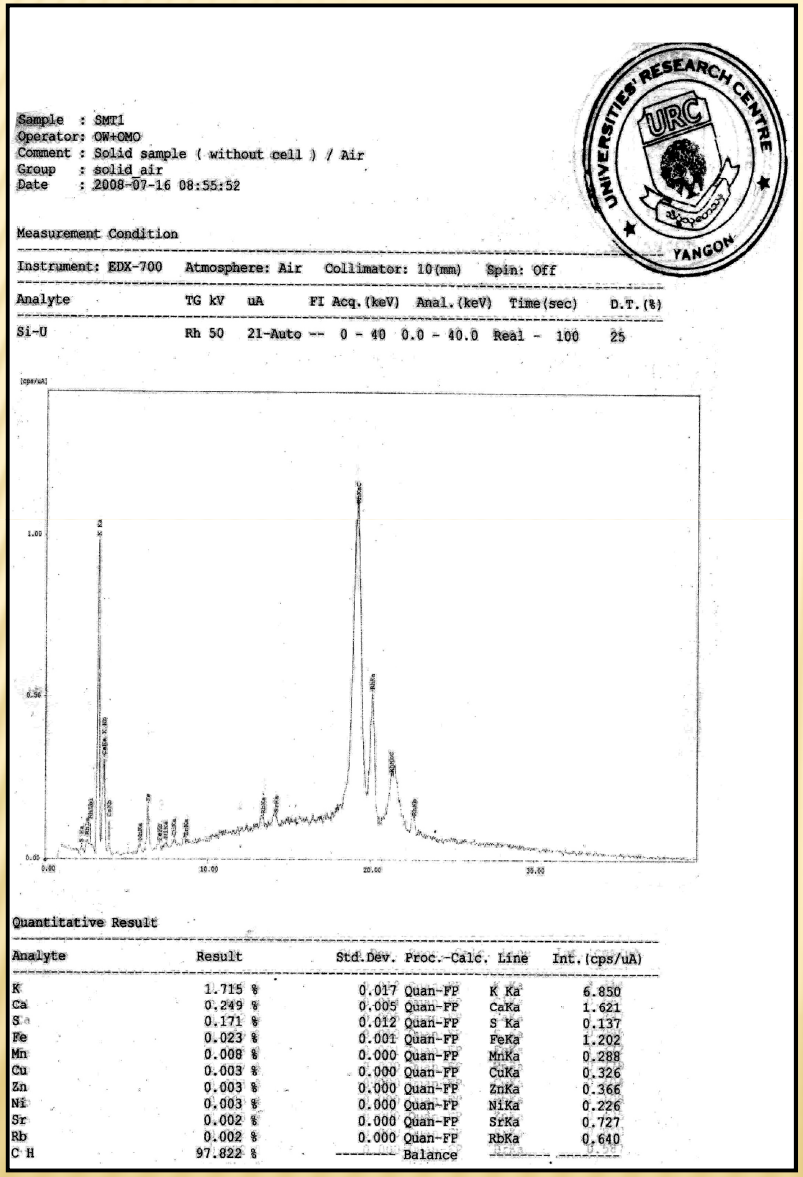
Preliminary Phytochemical Investigation

Constitution	Extract	Reagents	Observation	P.betle
Alkaloid	D/W	Dragendroff's reagent	Orange -red	+
Glycoside	D/W	10% lead acetate	yellow	+
Flavonoid	Ethanol	Dil.HCl + Mg	Pink	+
Terpene	Ethanol	Acetic anhydride	Reddish brown	+
Steroid	Ethanol / Petroleum ether	Acetic anhydride + H_2SO_4	green	+
Saponin	D/W	Distilled water	frothing	+
Reducing sugar	D/W	Benedict solution	Brick red ppt	+
Phenolic compound	D/W	1%Potassium ferocyanide	Deep blue ppt	+
Polyphenol	Ethanol	1% Ferric chloride solution	Blue	+
Lipophelic	D/W	0.5 M KOH	Rott deep colour	+
Tannin	D/W	Ferric chloride	Blue black ppt	+

Physicochemical Characterization

Physicochemical character	P. betle
Moisture content	17.06
Total ash	20.87
Acid insoluble ash	27.00
Water soluble ash	77.00
Water soluble matter	24.00
Methanol soluble matter	28.00
Ethyl-acetate soluble matter	56.00
Ethanol soluble matter	80.00

Elemental Analysis of the Leaf by Using EDXRF



Sample : SMT1
Operator: OW+CMO
Comment : Solid sample (without cell) / Air
Group : solid_air
Date : 2008-07-16 08:55:52

Measurement Condition

Instrument: EDX-700 Atmosphere: Air Collimator: 10(mm) Spin: Off

Analyte	TG kV	uA	FI Acq.(keV)	Anal.(keV)	Time(sec)	D.T.(%)
Si-U	Rh 50	21-Auto	-- 0 - 40	0.0 - 40.0	Real - 100	25

Quantitative Result

Analyte	Result	Std.Dev.	Proc.-Calc.	Line	Int.(cps/uA)
K	1.715 %	0.017	Quan-FP	K Ka	6.850
Ca	0.249 %	0.005	Quan-FP	CaKa	1.621
S	0.171 %	0.012	Quan-FP	S Ka	0.137
Fe	0.023 %	0.001	Quan-FP	FeKa	1.202
Mn	0.008 %	0.000	Quan-FP	MnKa	0.288
Cu	0.003 %	0.000	Quan-FP	CuKa	0.326
Zn	0.003 %	0.000	Quan-FP	ZnKa	0.366
Ni	0.003 %	0.000	Quan-FP	NiKa	0.226
Sr	0.002 %	0.000	Quan-FP	SrKa	0.727
Rb	0.002 %	0.000	Quan-FP	RbKa	0.640
C H	97.822 %	--------	Balance		--------

Elements	Piper betle
K	1.715
Ca	0.249
S	0.171
Fe	0.023
Mn	0.008
Cu	0.003
Zn	0.003
Ni	0.003
Sr	0.002
Rb	0.002
Cl	ND
Br	ND
P	ND

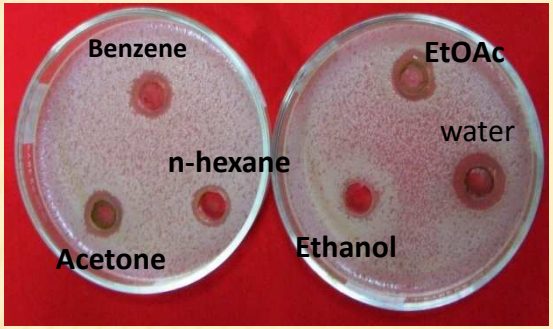
ELEMENTAL ANALYSIS OF BY USING AAS

Samples	Elemental conc: (ppm)		
	Ca	Cu	Mg
Piper betle	5.360 ± 0.010	0.01 ± 0.00	8.412 ± 0.007

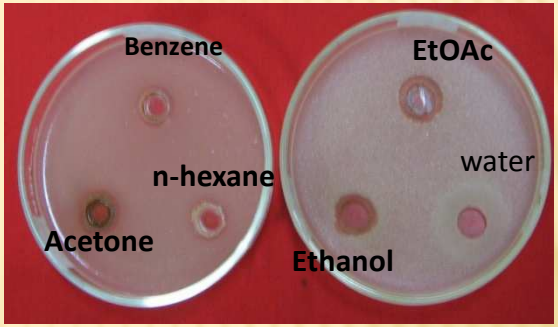
Antimicrobial Activities of Different Solvent Extracts

Solvents	**Organisms**					
	B.subtilis	*S. aureus*	*Pseudo-monas*	*B.pumalis*	*C.albicans*	*E.coli*
n-hexane	14mm(+)	13mm (+)	13mm (+)	12mm (+)	12mm (+)	13mm (+)
Benzene	15mm(+ +)	15mm (+ +)	14mm (+)	15mm (+ +)	13mm (+)	13mm (+)
Acetone	15mm (+ +)	17mm (+ +)	15mm (+ +)	15mm (+ +)	14mm(+)	15mm (+ +)
Ethyl-acetate	18mm (+ +)	16mm (+ +)	17mm (+ +)	19mm (+ +)	19mm (+ +)	18mm (+ +)
Ethanol	15mm (+ +)	15mm (+ +)	15mm (+ +)	13mm (+)	14mm (+)	17mm (+ +)
Water	12mm (+)	–	–	–	–	–

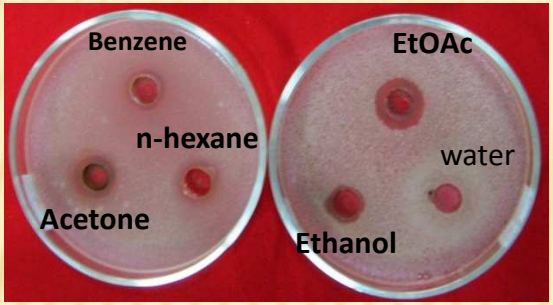
Antimicrobial Treatment of Different Solvent Extracts



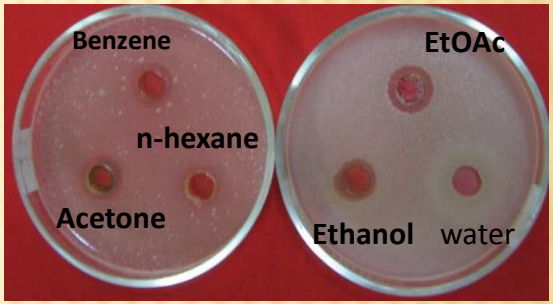
Treatment on *Bacillus subtilis*



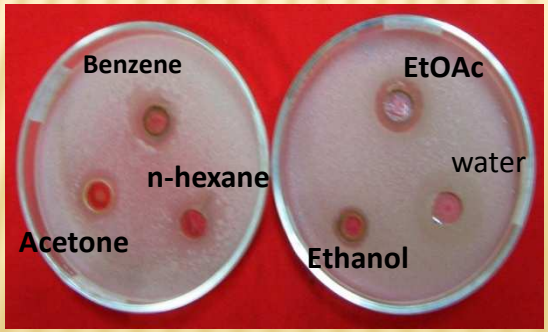
Treatment on *Staphylococcus aureus*



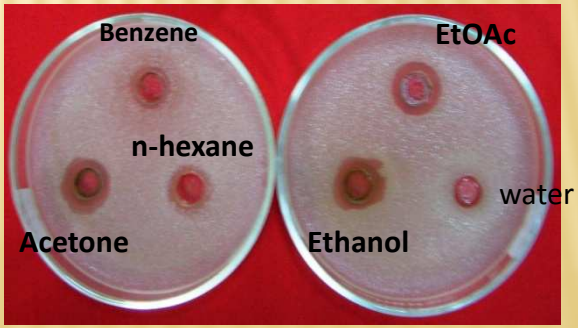
Treatment on *Pseudomonas aeruginosa*



Treatment on *Bacillus pumalis*



Treatment on *Candida albicans*



Treatment on *Escherichia coli*

DISCUSSION AND CONCLUSION

- betel leaves are not only used as expectorant, but also taken the boiled betel leaves with tumeric and a little amount of salt for fever.
- The juice of fresh leaf is used as eye drops for ophthalmic and fever in Myanmar folk medicine.
- Practitioners of Asian medicine have been used for asthma and rheumatic arthritis for a long time.

DISCUSSION AND CONCLUSION

- According to elemntal analysis of powdered drugs
- K and Ca are found as principle elements
- they showed no toxic metal Pb, Hg, Cd and As
- Devaraj (2001) mentioned that100g of betel leaves consist of vitamin A 9339 I.U., vitamin B_1 68 mcg, vitamin B_2 31 mcg, vitamin C 3.5 mg, carbohydrate 4.8 g, fat 0.7 mg, protein 3.8 g and phosphorus 10 g.

- The antimicrobial activity of various solvent extracts of the leaves showed the activity against the organisms
- *Bacillus subtilis,*
- *Staphyococcus aureus,*
- *Pseudomonas aeruginosa,*
- *Bacillus pumalis,*
- *Candida albicans* and
- *Escherichia coli*.
- **These may be believed useful for medicinal function.**

- This presentation will hopefully play a partially important role in improving the primary health care for the people, where there is no easy access to drugstores and hospitals.
- The plant which mentioned in this research is not only useful for common people but also for the researchers and the traditional practitioners.


Thank You