

**Review Article****Micro evolution of bitter taste domain drugs**Shivangi Bhardwaj*, V.J. Shukla¹, C.R. Harisha², Switu Jani³

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ABSTRACT

Ayurveda classified the drugs in various ways and one of which the classification is based on *Rasa* (taste) dominancy. *Rasa* is essential to identify drugs and to know its therapeutic application. In this study the drug has been selected according to *Charaka* classification of *Tikta Rasa* (bitter taste) drugs with an aim to find out the similar characters among all the drugs having bitter *Rasa* dominancy. Till date there is no data available regarding the pharmacognostical evaluation in concern bitter taste. For the first time selected five bitter drugs are subjected to various pharmacognostical evaluation, result reveals that Organoleptic characters of all five drugs give bitter taste, microscopic evaluation revealed that presence of starch grain, vessels, fiber, brown content are dominant in all five raw drug and all the five powder subjected to alkaloid test by using dragondroff reagent and give positive result for alkaloids

Introduction

Ayurveda, the science of life, stands on its own fundamental principles. Ayurvedic pharmacology known as *Dravyaguna vijñana* is based on biophysical, experiential, inferential and intuitional mechanisms [1]. Taste (*rasa*) is essential to identify drugs and to know its therapeutic application. In various ancient books the drugs has been classified on the basis *Rasa* dominancy in *Charaka Samhita*, *Sushrut Samhita*, *Ashtang Hridaya*, etc

Rasa is an important quality manifested at the level of tongue and is the only principle or quality, among the *Rasapanchaka* which can be directly perceivable [2]. The taste perception and taste sensibility are complex bio-physical and psychological events and translation of *Rasa* cannot be exactly evaluated without the help of tongue.

According to *Charaka* substances are mostly composed of many tastes. Drugs having only one taste so as to be unquestionably included under one of the six groups are very

rare [3]. There may be possible if the group of drugs belonging to the same *Rasa* (taste) may show the same characteristics.

The biology of bitter-taste perception is poorly understood. The long-term challenge has been to explain how so many structurally unrelated compounds can give rise to a uniform bitter taste. Among bitter-tasting compounds are amino acids and peptides, sulfimides (saccharin), ureas and thioureas [6-*n*-propylthiouracil (PROP) and phenylthiocarbamide (PTC)], esters and lactones, terpenoids, and phenols and polyphenols [4].

In this study the drug has been selected according to *Charaka* classification of *Tikta Rasa* (bitter taste) drugs with an aim to find out the similar characters among all the drugs having bitter *Rasa* dominancy, evaluate a pharmacognostical pattern for bitter taste domain drug and Find out the powder characters responsible for bitter taste.

Materials and methods**Collection & authentication of raw drug**

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All the bitter taste domain drugs like *Kiratikta*, *Punarnava*, *Nimb Kutaj* and *Ativisha* were collected from Gujarat Ayurved University's pharmacy, Jamnagar. Authentication was done

in pharmacognosy laboratory of IPGT & RA. The botanical name, family and chemical constituents of the raw drugs are depicted in table No.1. [5, 6, 7]

Table No 1: Botanical name, family and chemical constituents of the raw drugs

Name	Botanical name	Family	Chemical constituents
Kiratikta	<i>Swertia chirayita</i> Karst.	Gentianaceae	swerchirine, 7-o methylswertianine, swertianine, weroside, chiratanine, amarogentine, swertone, swertenol, chiratenol, decussating, chiratol, picherenol, β -amyryn.
Ativisha	<i>Aconitum hetrophyllum</i> Wall.	Apocynaceae	atisine, atisenol, benzoyeheteratisine, F-dihydroatisine, heteratisine, hetisine heterophyllidine, heterophylline, hetidine, , hetisinone, β -sitosterol
Punarnava	<i>Boerhavia diffusa</i> Linn.	Nyctaginaceae	Alkaloid punarnavine, c-methylflavone, rotenoid analogues, beravionone A,B,C,D,E,F, amino acid Fatty acid, β -sitosterol, crystalline acid
Kutaj	<i>Holarrhena antidysenterica</i> (L.)Wall.	Apocynaceae	Alkaloid- conessine, concuressine, kurchimine, kurchlessine, conimine, concurchine, conessidine, holarrhinine, holafrine, holarrhetine, hollarrifine, regnolarrhenine D,E &F, kurchessine, holedienine, triterpine, β -setosterol
Nimba	<i>Azadirachta indica</i> A.Juss.	Meliaceae	Gedunin-c, tannin, bitter principle nimbine, nimbidine, nimbione, nimbone, nimbinol, margosinone, maragosolone, nimbisonol, methyl nimbiol, methyl nimbionone, margolone, iso margolone & oil.

Macroscopic

The collected samples were identified and authenticated by their morphological characters; observed as such with naked eyes, studied systematically as per the methods described in the textbooks of pharmacognosy [8].

Organoleptic characters of the powder

Evaluation of the powder samples were done by their various characters like: colour, texture, odour, taste etc [9].

Microscopic study

Powder microscopy

For powder microscopy, slides were prepared by using water, chloral hydrate as a clearing agent, stained with phloroglucinol

and conc. HCl for lignified tissues, glycerin as mountant. To locate the region for certain constituent of the drug few histochemical tests were also performed. For the presence of lignified elements, treat the section with phloroglucinol and conc.HCl [10].

Dragondroff test for alkaloid

Dragondroff reagent is poured on the slide contain powder of the selected drug and observed under microscope [11].

Results

Organoleptic characters- colour, odour, taste and touch of all the respected powder drugs are scientifically studied by using sensory organs, result are depicted in table no.2.

Table No 2: Organoleptic characters of the powder

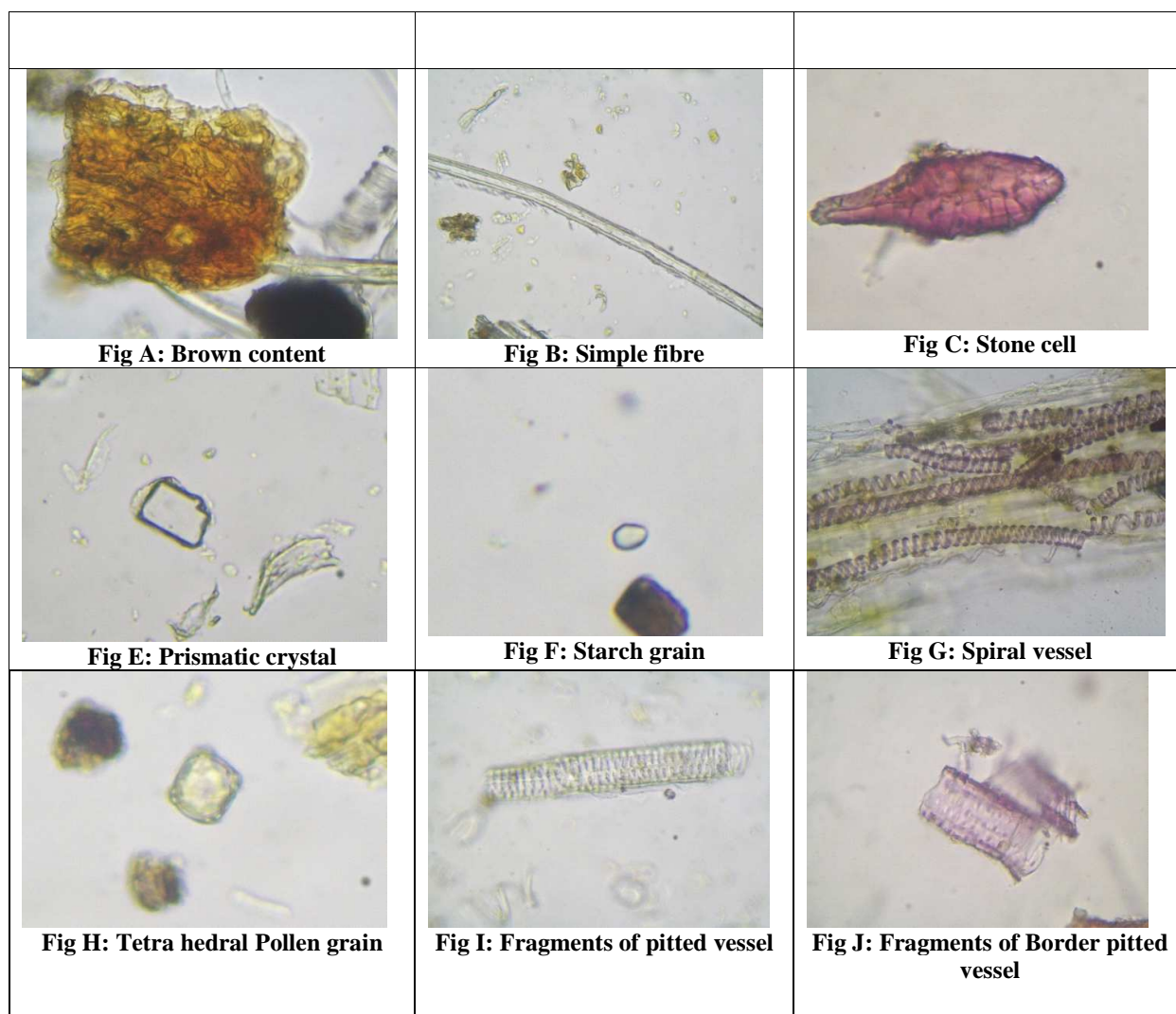
Name of drug	Color	Odor	Touch	Taste
Kiratikta	Brown	Characteristics	Rough	Bitter
Ativisha	Greyish white	Aromatic	Rough	Bitter
Punarnava	Brown	Characteristic	Rough	Bitter
Kutaj	Creamish brown	Characteristic	Rough	Bitter
Nimba	Brown	Characteristic	Rough	Bitter

Powder microscopy- The powder of concern raw drugs were subjected to powder microscopy, the results observed are as follow-

Prismatic crystal, Brown content, pollen grain, Fragments of pitted vessel, fragments of spiral vessel, starch grains with hilum, stone cell, and simple fiber. **Plate-1**

Kiratikta –Diagnostic characteristics of Kiratikta Powder showed the parenchyma cells, Epidermal cells, Trichomes,

Plate-1: Microphotographs of Kiratikta



Kutaj – Diagnostic characteristics of Kutaj Powder showed the cork in surface view with brown content, prismatic crystal, Rhomboidal crystal, brown content, fragments of Border pitted vessel, Simple starch grain with yellow content and simple fiber. **Plate-2**

Ativisha – Diagnostic characteristics of Ativisha Powder showed the prismatic crystal, Brown content, Fragments of pitted vessel, Simple and compound starch grains with hilum, and simple fiber. **Plate-3**

Nimba- Diagnostic characteristics of Nimba Powder showed Cork in surface view, prismatic crystal, crystal fiber, brown and yellow contents, starch grains with hilum, stone cell, and simple fiber. **Plate-4**

Plate 2: Microphotographs of Kutaj

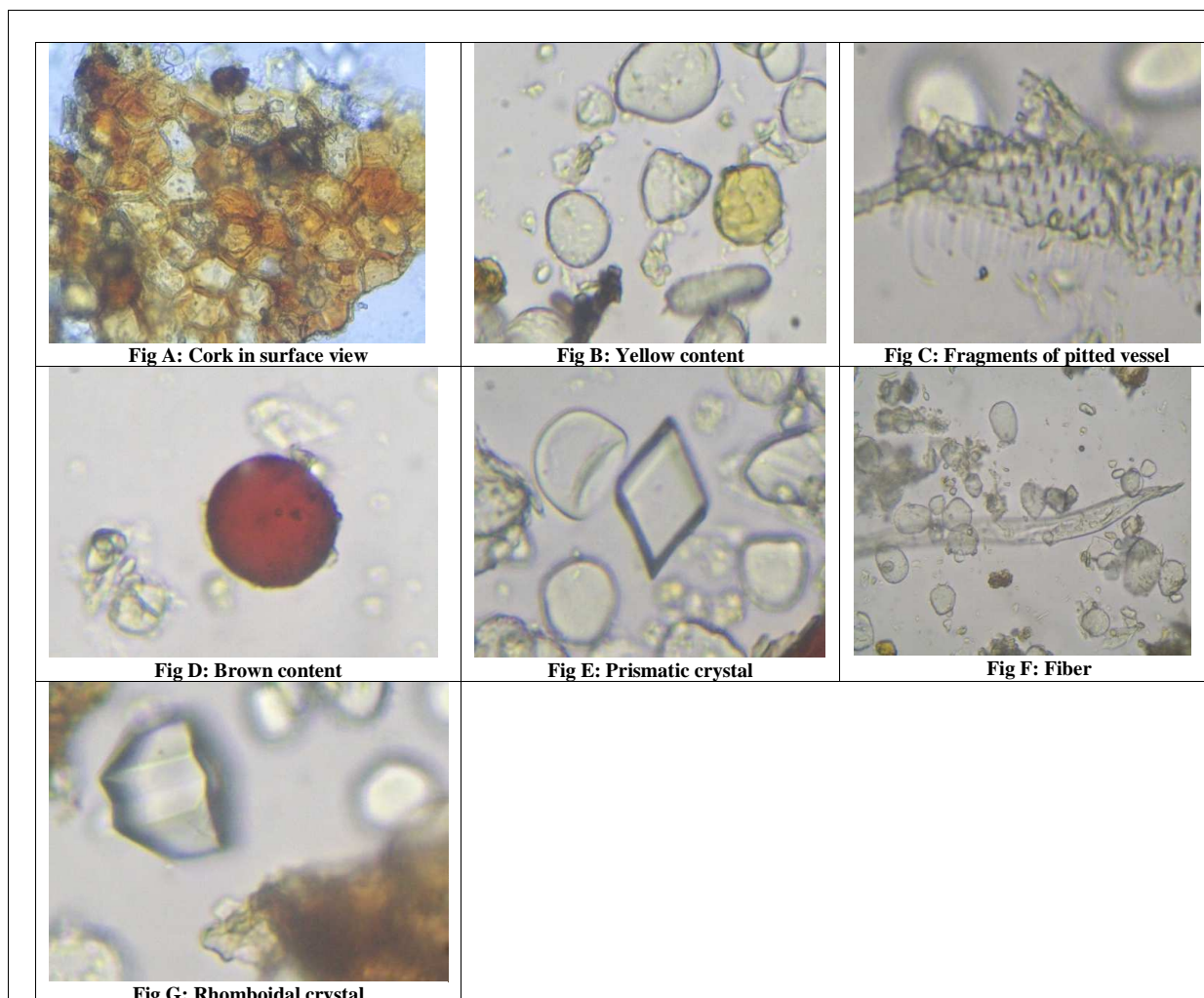
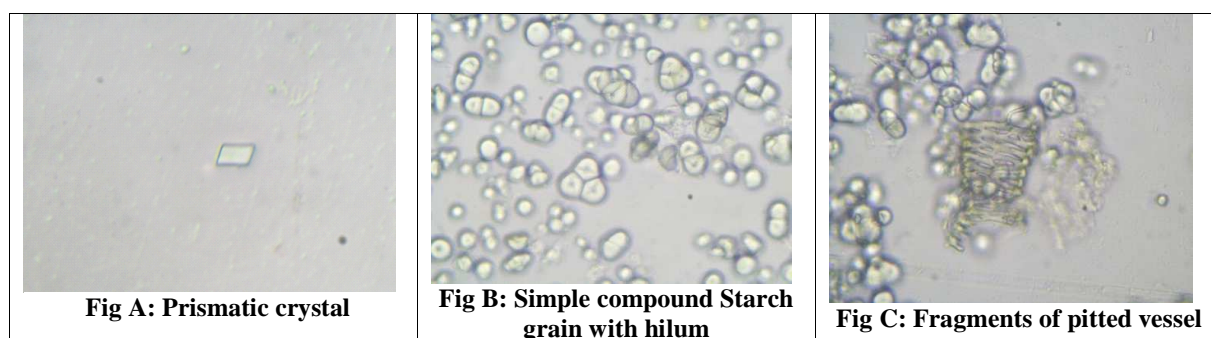


Plate 3: Microphotographs of Ativisha



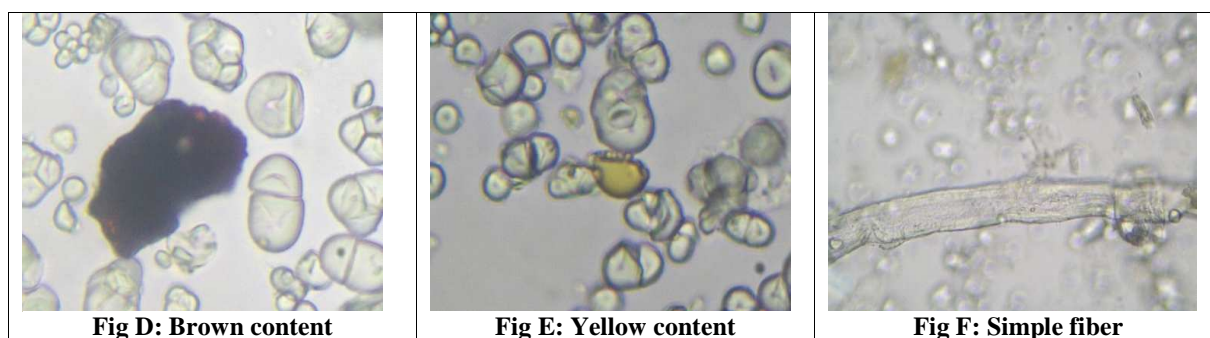
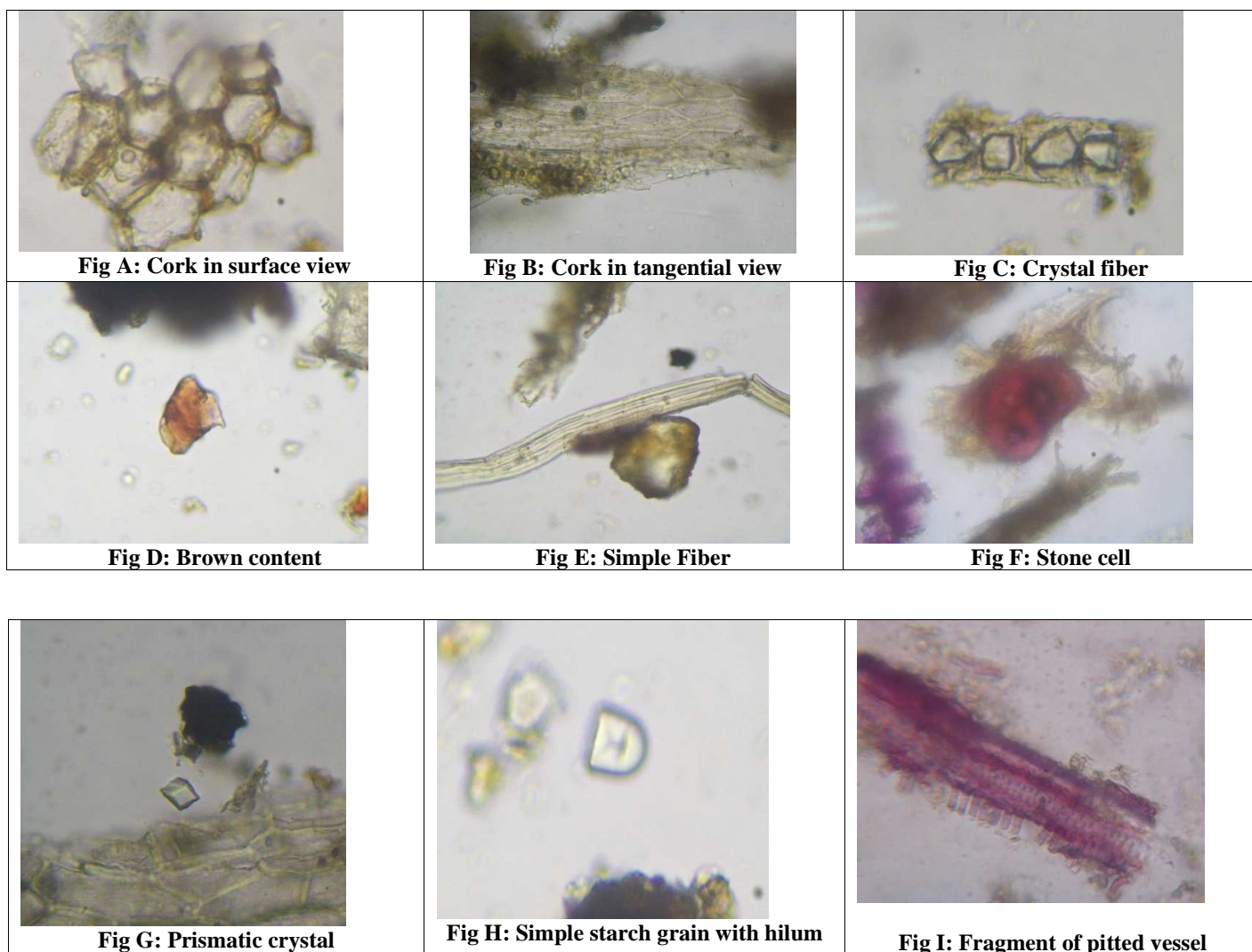


Plate 4: Microphotographs of Nimba



Punarnava – Diagnostic characteristics of Punarnava Powder showed the cork in surface view, acicular crystal, Brown content, and starch grains with or without hilum, lignified fiber, Fragments of pitted vessel. **Plate-5**

Alkaloid test the selected drug powders were treated with dragondroff reagent, when observed under microscope, all drugs shows the orange brown contents. **Plate-6** Similarity and dissimilarity among the powder drug are depicted in table no.3

Plate 5: Microphotographs of Punarnava

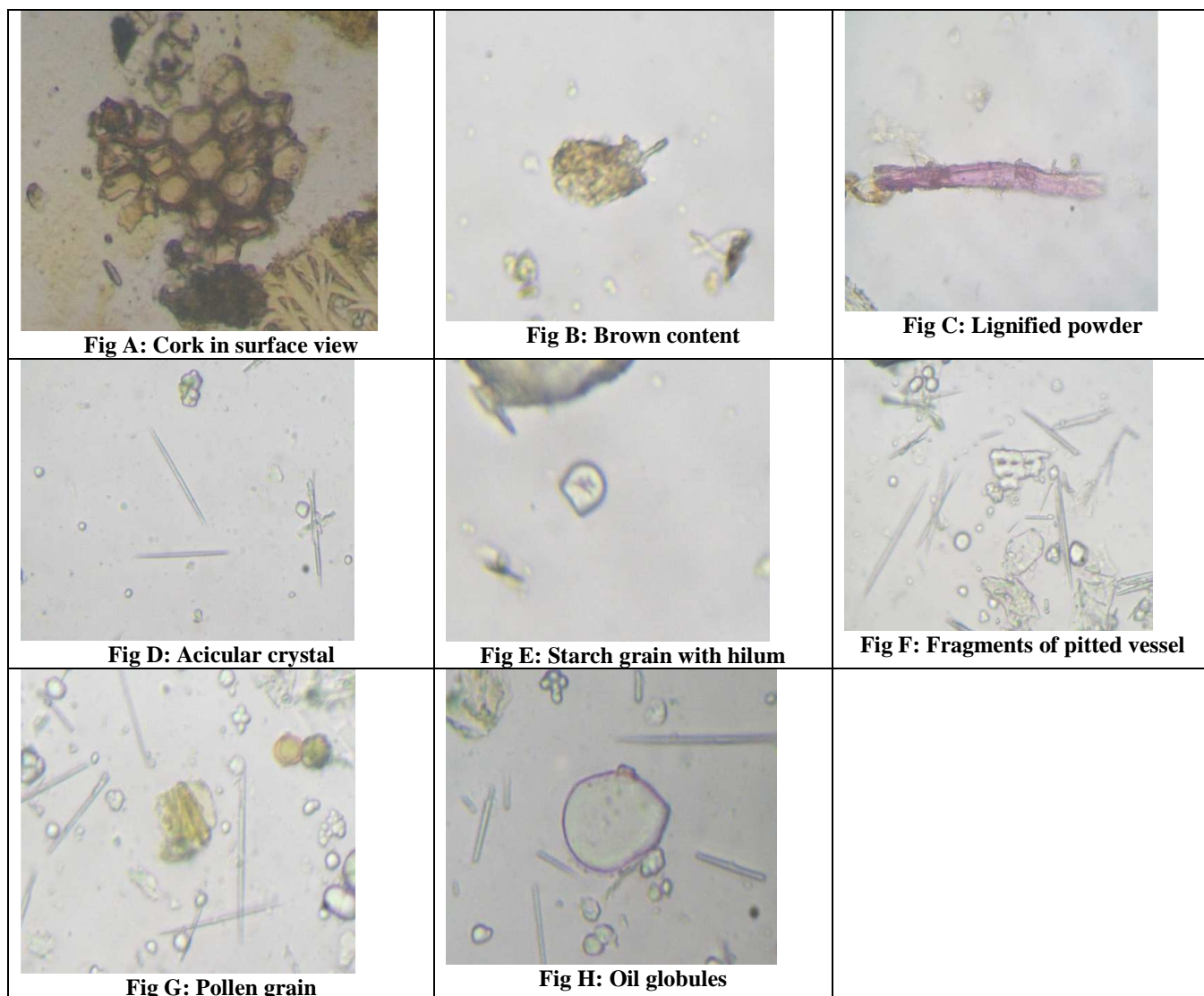
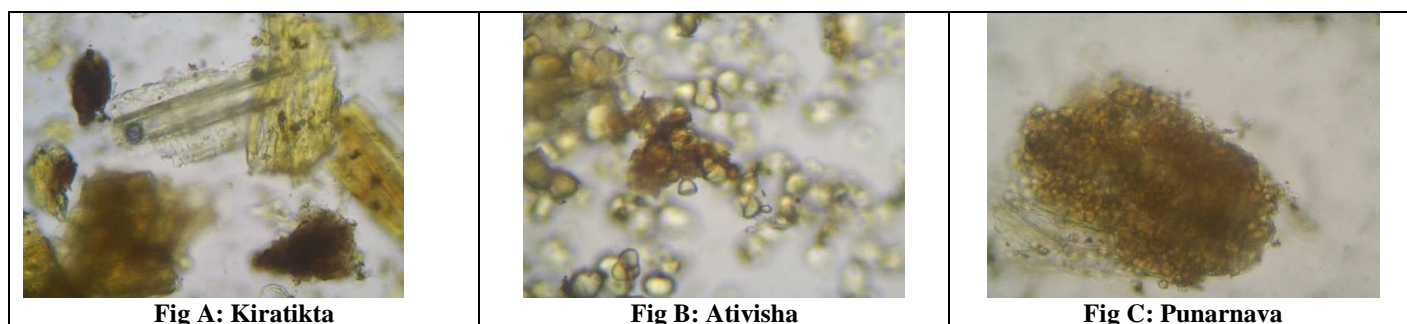


Plate 5: Alkaloid test for all drugs (Dragandroff reagent)



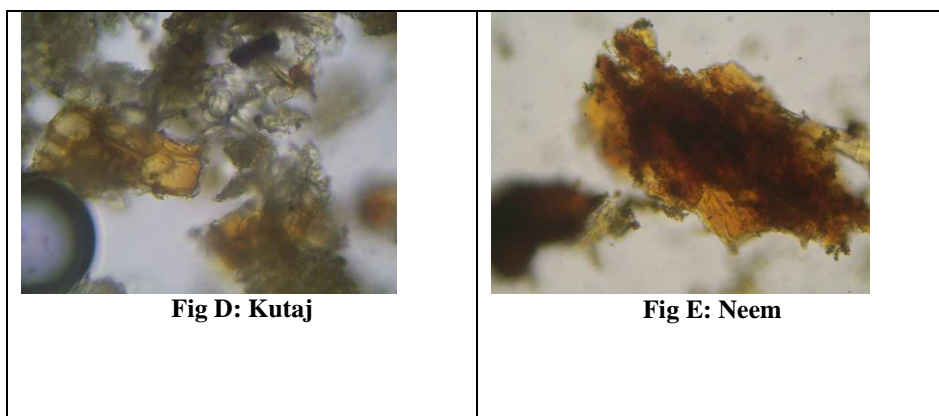


Table No. 3: Similarity and dissimilarity among all powder samples

Name	Cork	crystal	Brown content	Starch grain	Fiber	Vessel	Stone cells
Kiratikta	-ve	+ve	+ve	+ve	+ve	+ve	+ve
Kutaj	+ve	+ve	+ve	-ve	+ve	+ve	-ve
Ativisha	-ve	+ve	+ve	+ve	+ve	+ve	-ve
Nimba	+ve	+ve	+ve	+ve	+ve	+ve	+ve
Punarnava	-ve	+ve	+ve	+ve	+ve	+ve	-ve

Discussion

In this study all the drugs are selected on the basis of their bitter taste as classified by Charaka. All drugs *Kiratikta*, *kutaj*, *Ativisha*, *Nimba* and *Punarnava* consist of bitter taste. On the basis of organoleptic characters it was found that *kiratikta*, *Ativisha* and *Punarnava* consisting of more bitterness as compare to *Kutaj* and *Nimba* i.e. more bitterness found in herbaceous plant as compare to tree. The reason behind this may be that the utilization of chemical constituent is more in tree as compares to that of herbaceous plant.

The table number 2 showed many convenient similar characters, these conflicts that most of the common characters may be reason for the bitter taste.

The test conducted for the detection of alkaloids showed positive results for all the five powders. This may be also responsible for the bitter taste.

All the plant material containing alkaloid as major chemical constituent like *Kiratikta* consist *Sweritamarine*, *Kutaj* consist *Conessinne*, *Kurchemine*, *Ativisha* consist *atisine*, *heterotisine*, *Nimba* consist *Nimbin*, *nimbidine*, and *Punarnava* consist *punarnavine*. Mostly alkaloid consists of bitter property.

Conclusion

Micro evaluation of bitter taste drugs is very difficult but this type of scientific study enlightens towards to convenient method to access the raw drug. This work may consider for further research purpose.

Conflict of interest statement

We declare that we have no conflict of interest.

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