

RESEARCH PAPER

A Pharmaceutical Study and Characterization of Lakucha Swarasa Bhavita Madhumalinivasanta Rasa

Aditya A. Samant^{1*}, Prashant G. Jadar², Sudhindra A. N³, Pooja Sharada Jagadeesh Shanbough⁴, Anuradha Selven Mudliyar⁵

¹Ph.D Scholar, Department of Rasashastra and Bhaishajya Kalpana, KLE Academy of Higher Education and Research, Belagavi, Karnataka, India.

²Professor & Vice Principal, Department of Rasashastra and Bhaishajya Kalpana, KAHER'S Shri B.M. Kankanawadi Ayurveda Mahavidyalaya, Belagavi, Karnataka, India.

³Professor and HOD, Department of Rasashastra and Bhaishajya Kalpana, Gomantak Ayurveda Mahavidyalaya and Research Centre, Shiroda, Goa, India.

⁴Assistant professor, Department of Kayachikitsa, Gomantak Ayurveda Mahavidyalaya and Research Centre, Shiroda Goa

⁵Assistant professor, Department of Rasashastra and Bhaishajya Kalpana, Gomantak Ayurveda Mahavidyalaya and Research Centre, Shiroda, Goa

ABSTRACT

Introduction: Madhumalinivasanta rasa is a well acclaimed herbo-mineral compound containing mineral, herbal and animal products. The reference of text Rasachandanshu is taken for its design using Lakucha swarasa for final bhavana. This study aims to design Madhumalinivasanta rasa formulation as per classical guidelines and its characterisation using modern gadgets. **Materials and Method:** The collection of literary data, collection and authentication of raw materials, further pharmaceutical study and then analytical study was carried out with instrumental exploration. **Results:** The final product was reddish orange coloured smooth powder having aromatic odour. Analytical study marks presence of Alkaloid, Flavonoid and Phenolic Contents. The ICPMS, SEM EDX, FTIR and XRD shows microcrystalline aggregates structure, marks presence of Sodium, Magnesium, Calcium, Manganese, Iron, Copper, Zinc, Oxygen, Carbon, Mercury etc having nitro group "N-O", Free -OH groups etc. **Conclusion:** The data generated using high end sophisticated instruments can be used as a hallmark in standardization of Madhumalinivasanta rasa

Keywords: Herbo-mineral Compound, Vasanta Kalpa, Instrumental Characterization, Rasayana, Hingula, SEM, FTIR

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1. INTRODUCTION

Ayurveda literature finds mention of various Vasanta Kalpas and one amongst them is Madhumalinivasanta rasa which finds mention in classics like Rasachandanshu¹, Rasayogasagar², Ayurvediya Aushadhigunadharma shastra³, Rasatantrasara va Siddhaprayogasanghrah⁴ with little compositional alterations, specifically containing mineral, herbal or animal products, and shows rasayana properties. We find various interpretations of this drug in its mapping however, here the reference of text Rasachandanshu is taken for its design using lakucha swarasa for final bhavana. Since the particulars of this drug are not mentioned in the Ayurvedic Formulary of India, to understand its action, the preparation of the drug along with its characterisation plays a vital role. This study

aims to design Madhumalinivasanta rasa formulation as per classical guidelines following SOP and its characterisation using modern gadgets assuring appropriate scientific data and documentation of study.

For any medicine to act to its fullest potency the pharmaceutical process plays pivotal role. In Ayurveda, standardization has been well defined and documented for formulating various drugs. But in today's era proper authentication and purity of raw materials, strict adherence to SOP's and characterization of final product helps as one of the pioneer step in standardization of Ayurvedic formulations.

Materials and Methods:

Collection of raw materials: Hingula (*Cinnabar—Sulphide of Mercury*), karchura (*Curcuma zedoaria* Rosc), shweta maricha (*Piper nigrum* Linn), and priyangu (*Callicarpa macrophylla* Vahl) were collected from authentic vendor. Shodhana dravya ardraka (*Zingiber officinale*) and bhavana dravyas dadima (*Punica granatum* Linn) & lakucha (*Artocarpus lakoocha* Roxb), Kukudanda were collected from the market.

Authentication of the raw drugs: The collected samples will be authenticated at approved drug testing laboratory for ASU drugs in KAHER's Shri. B.M.K. Ayurveda Mahavidyalaya Belagavi.

Preparation of Madhumalinivasanta rasa involves following steps:

- I) Hingula shodhana :7 bhavana of Ardraka swarasa.
- II) Bhavana to shuddha Hingula: 7 bhavanas of Dadima swarasa
- III) Blending of shuddha bhavita Hingula: Blending with Kukkutandarasa (white + yellow of egg) by frying the mixture on mandagni.
- IV) Preparation of vati: Blended Hingula is added along with other dravyas, which includes priyangu, karchura and shweta maricha are given 7 bhavana of lakucha swarasa and vati of one ratti is prepared.

Step I): Hingula Shodhana:⁵

Procedure: Ashuddha Hingula (250gm) was taken in a clean Khalwa yantra and pounded to fine powder form. Then, bhavana dravya, Ardraka swarasa (300ml) was added till Hingula gets totally submerged. Hingula powder was then subjected to trituration by Ardraka swarasa till total Ardraka swarasa was imbibed in Hingula and it gets dried. Same procedure is repeated for next six bhavana. Finally, shodhita Hingula after seventh Bhavana (282gm) was collected and preserved. (Fig. 1- 7)

Step II): Bhavana to Shuddha Hingula:

Procedure: Shuddha Hingula powder (200gm) was taken in a khalwa Yantra. Then, bhavana dravya, dadima swarasa (250ml) was added to it and subjected to levigation till total dadima swarasa gets soaked in Hingula and its powder gets dried. The procedure was repeated for next six Bhavana. Finally, after seventh bhavana Hingula (238gm) was collected and preserved. (Fig. 8-11)

Step III): Blending of shuddha bhavita Hingula:

Procedure: Shuddha bhavita Hingula (100gm) was taken in an iron cauldron. Then same quantity of Kukkutandarasa (white + yellow = 100gm) was added to it and exposed to mandagni. This mixture is constantly rubbed with a spatula to avoid lump formations. The process was continued till all egg yolk guts blended with the Hingula. Mandagni was given till mixture gets dried completely without any lumps. (Fig. 12-15)

Step IV): Preparation of vati of Madhumalinivasanta rasa:

Procedure: Herbal dravyas which includes priyangu, karchura and shweta maricha were pounded, sieved and weighed (75gm each) individually. Properly blended shuddha Hingula (75gm) was taken in a khalva yantra and these drugs were added to it and mixed thoroughly. Further bhavana of lakucha swarasa (330ml) was given to the mixture. The procedure was repeated for six more times. This formulation is called Madhumalinivasanta Rasa. Vatis of one ratti (125mg) weight were prepared. (Fig. 16-22)

Storage: Madhumalinivasanta Rasa was stored in airtight containers for further analysis.

Results and Discussion:

Analytical Study: The characterization of Madhumalinivasanta rasa with various analytical measures gives insight on use of authentic raw materials as well as standard operative procedures during the preparation of drug.

Physicochemical Analysis:

All the physicochemical and phytochemical procedures were carried out in AYUSH-approved drug testing laboratory as per the standard procedure.

Instrumental analysis

All the instrumental analyses like Scanning Electron Microscope (SEM), Energy-Dispersive X-ray Spectroscopy (EDAX), Fourier transform infrared (FTIR), Inductively Coupled Plasma - Mass Spectrometry (ICP MS) and X-ray Diffraction(XRD) were carried out for the characterization of the drug.

Physico-Chemical, Macroscopic & TLC Profile of herbal drugs results are depicted in Tables I-II. Macroscopic Description of Madhumalinivasanta Rasa is in Table III, Physico Chemical results in Table IV, Test for specified Micro- Organisms (Qualitative) and Microbial limit test (Quantitative) are in Table V & VI).

Scanning Electron Microscope (SEM):

Scanning Electron Microscope (SEM) helps to understand the shodhana process since levigation with different medias substantially reduces particle size and alters surface morphology, transforming minerals into nanostructured materials. (Fig. 23-27)

Energy-dispersive X-ray spectroscopy (EDX): In this study EDX was carried out in association with SEM. EDX is semi quantitative method of investigation as it does not incorporate entire sample but considers the elements only at the area of focus. Still, it is very valuable method as it is non-destructive which helped to identify and quantify the elemental composition of Madhumalinivasanta Rasa. It gives fingerprint spectrum of each element. The elements like Oxygen, Carbon, Magnesium, Sulphur, Iron, Mercury etc. were mapped with the different concentrations. (Fig. 28-30 and Table VII)

Fourier Transform Infrared spectroscopy (FTIR): Fourier Transform Infrared (FTIR) spectroscopy is a powerful analytical technique used to identify organic, polymeric, and some inorganic materials by measuring their interaction with infrared (IR) light. The chemical composition and structure of various bonds of MMVR were mapped with 18 peaks of various intensities. (Fig. 31 and Table IX - X)

Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)

Inductively Coupled Plasma Mass Spectroscopy also referred as ICPMS is an analytical technique for detection of trace metals and Ultra-trace level of elements and their isotopes. ICPMS is highly sensitive and capable of determination of range of metals and several non-metals at concentrations below parts-per-trillion (ppt). It is based on coupling together inductively coupled plasma as method of producing ions with the mass spectrometer as the method of separating and detecting the ions. It is extreme Sensitive and has wide elemental Coverage simultaneously in a single analysis.

The ICP-MS study of Madhumalinivasanta Rasa revealed the presence of Sodium (Na) with the concentration of 702.2231237 ug/g, Magnesium (Mg) 5061.041244 Conc. [ug/g], Calcium (Ca) 978.5395538 Conc. [ug/g], Manganese (Mn) 39.84584178 Conc. [ug/g], Iron (Fe) 364.6355646 Conc. [ug/g], Copper (Cu) 12.50574713 Conc. [ug/g] and Zinc (Zn) 23.75118323 Conc. [ug/g] along with other few trace elements. (Table X)

X-ray diffraction (XRD)

X-Ray Diffraction is a versatile non-destructive technique that reveals detailed information about chemical composition and crystallographic structures of natural and synthetic materials. It Act as a powerful tool for detecting the presence of various phases in the given sample. The basic principle of the phase analysis using powder XRD technique lies in the presence of diffraction peaks corresponding to various inter planar spacing which are characteristics of given material. The relative intensities of various peaks occurring are also different for different phases. (Fig 32-34)

Pharmaceutical Study

The drug to have its action to its full potential requires stringent pharmaceutical adherence. Right from selection of raw materials as per classical guidelines and modern authentication till preparation of final product was carried out following SOP. As per the classics Hingula should be Japakusuma (*Hibiscusrosa - sinensis*) bright red in colour, when triturated should give beautiful, pleasing colour, great lustre, like pravala (coral), it should possess white lines or shalaka like structure and heavy in weight. So hingula was chosen which fulfils all these criteria. Even Geological identification and authentication reveal Hingula as Red Sulphide of mercury having brownish red colour, Scarlet / pale brown streak adamantine lustre, 2-2.5 hardness, sectile tenacity, sub-conchoidal fracture, fibrous cleavage, prisms, slender prismatic needles of form and habitat and chemically HgS.

Ashodhita Hingula which was shining and dull red coloured gets changes in its characters like shine and colour during each bhavana process with ardraka swarasa. After 7 bhavana procedure Hingula turns in smooth, fine powder form and colour got brighter. After levigation with Dadima swarasa for 7 times Shodhita Hingula got crimson red colour. The blending with Kukkutanda (egg white and yellow) was unique process which was guided under mild fire of temperature ranging from 120 to 140°C. the total process took 22min to complete. As mentioned in classics, lumps were getting formed during this

process which were crushed intermittently. After addition of all 3 herbal drugs priyangu, karchura & shweta maricha and giving seven bhavana of Lakucha swarasa, the final product Madhumalinivasanta rasa had a distinct noticeable aromatic pleasant herbal drug dominating odour, fine powder form, smooth texture and Scarlet red Colour.

The pharmaceutical study begins with classical method of shodhana of Hingula with Ardraka swarasa. The weight of Hingula increased after purification due to addition of starchy material found in Ardraka swarasa. It was observed that the Raw Hingula changed slightly to brick red and fine powder form after purification.

The second step involves giving seven bhavana to shodhita hingula with Dadima swarasa. This levigation process helps Hingula to attain finer particle size and even imbibe many micronutrients which were seen in final product analysis, since pomegranate is exceptionally rich in phenolic compounds and flavonoids, which are major contributors to its potent antioxidant activity. The third move includes blending of Bhavita Hingula with Kukuutanda (Egg White +Yellow) on mild fire. This mixture is constantly rubbed with a spatula to avoid lump formations. The process was continued till all egg yolk guts blended with the Hingula. Mandagni was given till mixture gets dried completely without any lumps, which was completed in 22min. Initially the mixture got totally wet and slurry form but slowly started drying and small lumps were seen which were pressed with spatula to get final dried powder form. The colour of mixture was dull orange colour. Then last step was performed of taking above mixture (75gms) in khalva yantra and addition of Herbal dravyas which includes priyangu, karchura and shweta maricha (75gms each) and mixed thoroughly. Further bhavana of Lakucha swarasa (330ml) was given to the mixture. The procedure was repeated for six more times. This formulation is called Madhumalinivasanta Rasa. Vatis of one ratti (125mg) weight were prepared. The colour of final product was reddish orange with aromatic odour.

Analytical study:

Physicochemical analysis and TLC Profile of herbal raw drugs is in accordance with the Ayurvedic Pharmacopoeia of India (API) standards. These values are used to ensure the purity and authenticity of the drug. Thin Layer Chromatography (TLC) identity test markers Piperine as a major alkaloid for Shweta

Maricha (White Pepper). The Karchura contains curcumin, sesquiterpenes and lower curcuminoid concentrations. Priyangu contains flavonoids, diterpenoids and tannins. The fruit of Lakucha contains bioactive constituents such as beta sitosterol, quercetin, apigenin, and specialized compounds like lakoochamide. The prominent spot at Rf 0.14 in daylight and short-wave UV is a primary identification marker for the fruit's methanolic or ethanolic extract.

The final product Madhumalinivasanta Rasa was having powder form, Reddish Orange colour which is typically dominating Hingula colour, pungent Taste may be due to presence of maricha churna and Aromatic odour due to presence of herbal drugs finally forming herbo-mineral compound. The physico chemical standards like Moisture Content 8.554%, Ash Value 7.129%, Acid Insoluble Ash 5.082%, Water Soluble Ash 1.666% are within permissible limits indicating standard quality of sample. Water Soluble Extractive 81.243%, determines the quality, purity and chemical nature of a drug. High values help detect the presence of acids, tannins, mucilage and indicates proper exhausted drugs.

Alcohol-soluble extractive 23.689%, value is a vital physicochemical parameter used to determine the concentration of bioactive constituents that dissolve specifically in alcohol compounds such as alkaloids, glycosides, flavonoids, steroids, resins, and phenols. In qualitative microbiological testing absence of micro- organisms indicates that the specific pathogenic microorganisms like Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa and Salmonella enterica sub sp. enterica serovar Abony were not detected in the final product. It indicates product safe and fulfilling regulatory compliance. The absence of these specific pathogens significantly reduces the risk of drug-induced infections or spoilage of most of the herbal drug.

In a Quantitative Microbial Limit Test (MLT), a result of "No Growth" for both total Bacterial Count and Total Fungal Count indicates that the sample is highly clean and complies with the strictest safety standards and signifies the microbial load is effectively zero or below the detection threshold since herbal products, which are naturally prone to fungal contamination during drying and storage needs extra care.

Morphological changes observed via SEM indicates that due to continuous trituration in mortar and pestle, there is marked reduction in the particle size, which is

due to continuous mechanical pressure and rightly seen in Madhumalinivasanta rasa showing particle size up to microns. It also accounts to surface modification leading to smoother particle surfaces and the formation of compact microcrystalline aggregates. Trituration with liquid media which includes Ardraka swarasa, Dadima Swarasa and Lakucha swarasa facilitates the coating of organic molecules onto the mineral, creating a uniform herbo-mineral complex. Energy-Dispersive X-ray Spectroscopy (EDX) of Madhumalinivasanta rasa shows the peaks on the spectrum correspond to specific elements present in the sample. Oxygen (O) the tallest peak, indicating a highest concentration. Carbon (C) shows significant peak at a lower energy level. Mercury (Hg) has prominent peaks around 2.0-2.5 keV and a smaller one near 9.9 keV., Sulphur (S) peak is around 2.3 keV, likely overlapping with the mercury L-lines. Magnesium (Mg) peak around 1.25 keV, Calcium (Ca) peak around 3.7 keV, Iron (Fe) Peaks around 0.7 keV and 6.4 keV, help in characterisation of Madhumalinivasanta rasa. This relative height and area of each peak indicate the approximate abundance of that element in the sample, with oxygen and carbon being the most abundant. The elements identified in the sample (Hg, S, O, C, Mg, Ca, Fe) would likely form several ionic or covalently-bonded compounds or be present as a mixture. We can interpret following potential Compound Forms, having the large oxygen peak, it is highly likely that many metals are present as oxides. For example, mercuric oxide (HgO), iron oxides (FeO), magnesium oxide (MgO), and calcium oxide (CaO) could be few forms. The presence of both mercury and sulphur strongly suggests the potential for mercury sulphides, such as cinnabar (HgS) which forms the base of formulation. Iron might also be present as iron sulphides/sulphates. Since Whole egg was used in the preparation calcium and magnesium which were traced in the formulation commonly form carbonates when combined with both carbon and oxygen. The substantial carbon peak, combined with oxygen and the other elements, could also indicate the presence of organic materials (carbon-containing compounds) within the sample.

The FTIR spectra of Madhumalinivasanta Rasa revealed diverse functional groups associated with their chemical composition. Key results included the identification of hydroxyl (-OH), carbonyl (C=O), aliphatic C-H, and even Metal-Oxygen (M-O) ligand. These functional groups are responsible for therapeutic properties and also contributes chemical stability.

The ICP-MS study revealed the presence of Sodium (Na), Magnesium (Mg), Calcium (Ca), Manganese (Mn) Iron (Fe) Copper (Cu) and Zinc (Zn) along with other few trace elements, indicating the Madhumalinivasanta Rasa contains the micronutrients or microminerals which help to increase strength and in biological systems for enzyme function and proper metabolism. Key trace elements that boost immunity include Zinc, crucial for immune cell development; Selenium, protecting against oxidative stress and inflammation; Copper, supporting immune cell function; and Iron, vital for immune cell activation. These minerals help develop, regulate, and activate immune cells, strengthening the body's defense against infections.

The XRD of MMVR definitely points out the crystalline nature since the graph shows multiple peaks which are very sharp in appearance. The crystalline structure offers better consistency and superior stability to the drug.

Conclusion: This study underlines the significance of the SOP in the preparation of Madhumalinivasanta Rasa and importance of bhavana with ardraka, dadima & lakucha swarasa. The sophisticated instrumental characterisation of this drug gave insight on biochemical fingerprint, elemental profiling to measure trace metals and their limits, nature and phase of minerals and functional groups and chemical bonds which serves as a molecular fingerprint for quality and consistency. More in vivo and clinical study is recommended to validate these findings and explore Madhumalinivasanta Rasa's full medicinal potential.

Table I: Physico-Chemical, Macroscopic profile of herbal raw drugs

Test / Parameter	<i>Shweta Maricha</i> (Fruit)	<i>Karchura</i> (Rhizome)	<i>Priyangu</i> (Fruit)	<i>Lakucha</i> (Fruit)
Part used	Fruit	Rhizome	Fruit	Fruit
Colour	Creamish yellow	Greyish-buff to cream	Yellowish brown	Dark brown to reddish-brown
Taste	Pungent	Slightly bitter	Astringent	Sour, astringent
Odour	Pungent	Camphoraceous	No characteristic odour	Faint sour
Loss on drying (%)	10.411	9.751	6.989	—
Foreign matter	Nil	Nil	Nil	Nil
Ash value (%)	3.266	2.332	2.417	8.329
Acid insoluble ash (%)	0.926	1.068	0.641	0.925
Water soluble extractive (%)	12.323	16.271	19.594	34.925
Alcohol soluble extractive (%)	11.904	11.044	7.080	30.552

Table II: TLC Profile of herbal raw drugs

Test / Parameter	<i>Shweta Maricha</i> (Fruit)	<i>Karchura</i> (Rhizome)	<i>Priyangu</i> (Fruit)	<i>Lakucha</i> (Fruit)
TLC – Mobile phase	Toluene: Ethyl acetate	Toluene: Ethyl acetate	Toluene: Ethyl acetate	Toluene: Ethyl acetate
TLC – Ratio	7: 3	7: 3	7: 3	7: 3
TLC – Short wave R _f	0.08, 0.38, 0.56	0.09	0.05	0.14, 0.21
TLC – Long wave R _f	0.70, 0.26, 0.56	0.14, 0.27, 0.43, 0.77, 0.87, 0.98	0.15, 0.22, 0.44, 0.95	0.13, 0.32, 0.40, 0.63, 0.81
TLC – Day light R _f	0.70, 0.26, 0.56	0.05, 0.22, 0.41	—	0.14

Table III: Macroscopic Description of *Madhumalinivasanta Rasa*

Tests	Result
Form	Powder
Colour	Reddish Orange
Taste	Pungent
Odour	Aromatic

Table IV: Physico Chemical Standards:

Tests	Results
Moisture Content	8.554%
Ash Value	7.129%
Acid Insoluble Ash	5.082%
Water Soluble Ash	1.666%
Water Soluble Extractive	81.243%
Alcohol Soluble Extractive	23.689%
Total Flavonoid Content	4.58+/- 0.34 mg QE/gram of extract
Total Phenolic Content	11.32 +/- 0.54 mg GAE/gram of extract
Total Alkaloid Content	103.00 mg AE/100 gram of sample

Table V: Test for specified Micro- Organisms (Qualitative)

<i>Escherichia coli</i>	Absent
<i>Staphylococcus aureus</i>	Absent
<i>Pseudomonas aeruginosa</i>	Absent
<i>Salmonella enterica subsp. enterica serovar Abony</i>	Absent

Table VI: Microbial limit test (Quantitative)

Total Bacterial Count	No Growth
Total Fungal Count	No Growth

Table VII: EDAX Result – Analysis

Element	Weight %	Atomic %	Error %
C K	34.0	50.8	10.6
O K	38.9	43.6	10.0
Mg K	1.0	0.8	9.8
S K	3.8	2.1	4.4
Ca K	1.5	0.7	10.4

Fe K	0.8	0.3	23.7
Hg M	20.1	1.8	4.1

Table IX: FTIR Peak List

Wed Nov 19 11:07:33 2025 (GMT+05:30) FIND PEAKS: Spectrum: MMVR Region: 4000.00 400.00 Absolute threshold: 98.999 Sensitivity: 60	Peak list:
	Position: 404.11 Intensity: 97.141
	Position:412.23 Intensity: 96.797
	Position:427.73 Intensity: 97.545
	Position:450.97 Intensity: 98.052
	Position:465.70 Intensity: 97.654
	Position:481.02 Intensity: 97.514
	Position:578.19 Intensity: 96.663
	Position: 1021.97 Intensity: 94.333
	Position: 1159.98 Intensity: 96.252
	Position: 1234.47 Intensity: 96.513
	Position: 1365.56 Intensity: 95.461
	Position: 1420.57 Intensity: 95.587
	Position: 1560.77 Intensity: 95.680
	Position: 1630.93 Intensity: 91.016
	Position: 1685.50 Intensity: 94.555
	Position: 1709.73 Intensity: 94.113
	Position: 2853.72 Intensity: 95.186
	Position: 2924.94 Intensity: 92.446
	Position: 3437.45 Intensity: 82.085
	Position: 3727.77 Intensity: 98.626

Table X: FTIR Peaks with functional groups

Peak (cm ⁻¹)	Functional Group	Interpretation
404.11, 412.23, 427.73, 450.97, 498.052, 465.70, 481.02	Metal - Oxygen (M-O) Stretching or bending vibrations	MMVR may have formation of Hg-O ligand
1021.97	C-O stretching (alcohols, carboxylic acids, esters, ethers)	Alcohols or esters
1420.57	Methyl (-CH ₃), methylene (-CH ₂) groups Aromatic C=C stretching	Aromatic rings
2853.72	Stretching vibrations of C-H bonds Aliphatic methylene (-CH ₂ -)	Lipid marker, Fatty acid chains
3437.45	O-H stretching	Hydrogen bonding, typical in alcohols or phenols
3727.77	Hydroxyl (-OH) stretching Si-OH groups	Presence of alcohols or water



Fig. 1 Ashodhit Hingula



Fig. 2 Hingula Powder



Fig.3 Ardraka Kalka



Fig. 4 Ardraka Swarasa



Fig. 5 Hingula + Ardraka Swarasa



Fig. 6 Bhavana of Ardraka Swarasa (7 times)



Fig. 7 Shodhita Hingula



Fig. 8 Dadima Phala



Fig. 9 Dadima Swarasa



Fig. 13 Kukkutanda (Yellow + White)



Fig. 10 Bhavana dadima swarasa (7 Times)



Fig. 14 Bharjana of Hingula with Kukkutanda



Fig. 11 Dadima swarasa bhavita Hingula



Fig. 15 Kukkutanda Bharjita Hingula



Fig. 12 Kukkutanda



Fig. 16 Shweta Maricha Choorna
(Piper nigrum Linn)



Fig. 17 Karchura Choorna (*Curcuma zedoaria*)

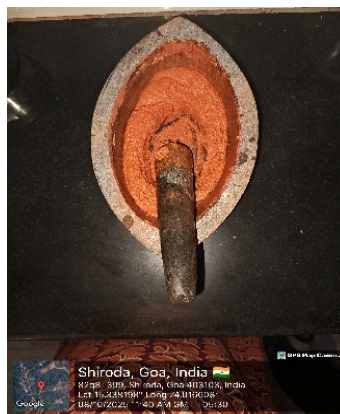


Fig. 21 Bhavanas of Lakucha Swarasa (7 Bhavana)



Fig. 18 Priyangu Choorna (*Callicarpa macrophylla* Vahl)



Fig. 22 Madhumalinivasanta Rasa vati



Fig. 19 Lakucha Swarasa

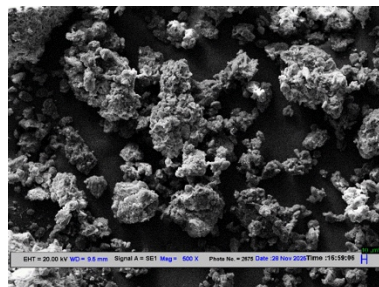


Fig. 23 SEM Magnification 500X



Fig. 20 Mixing of Hingula with Herbal Drugs

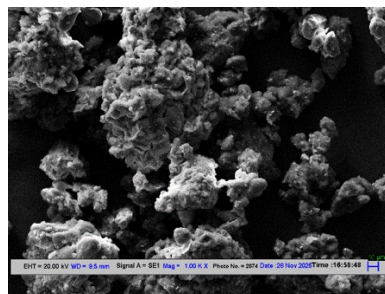


Fig. 24 SEM Magnification 1000X

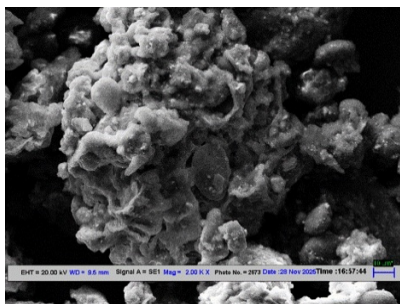


Fig. 25 SEM Magnification 2000X

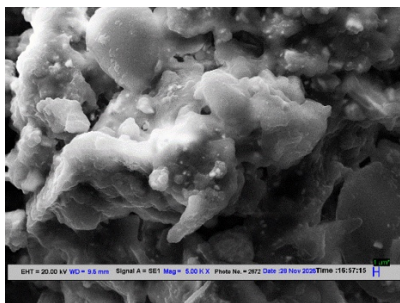


Fig. 26 SEM Magnification 5000X

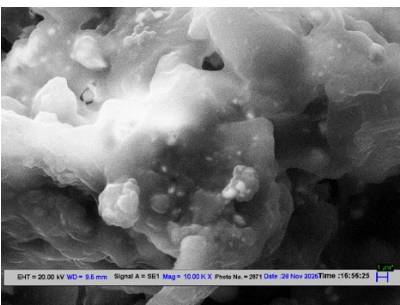


Fig. 27 SEM Magnification 10000X

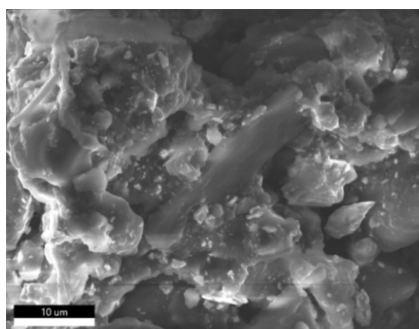


Fig. 28 EDAX APEX

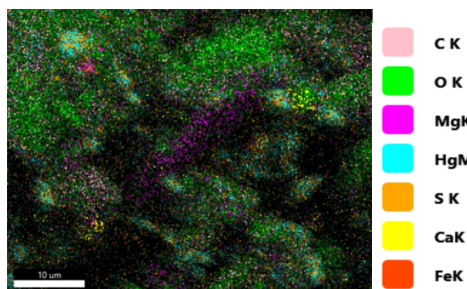


Fig. 29 EDAX- Elemental Overlay

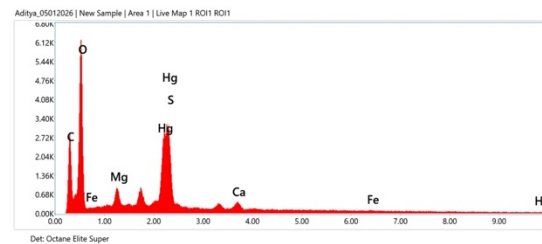


Fig. 30 EDAX - Sum Spectrum

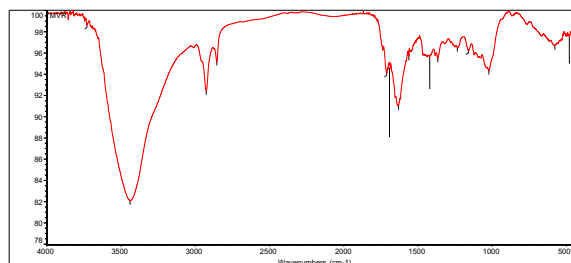


Fig. 31 FTIR Peaks of Madhumalinivasanta Rasa

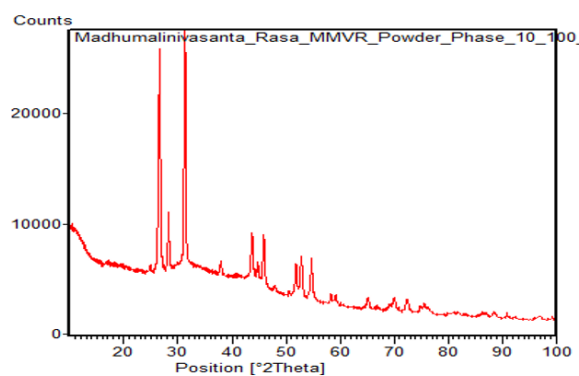


Fig. 32 XRD Peak Graph

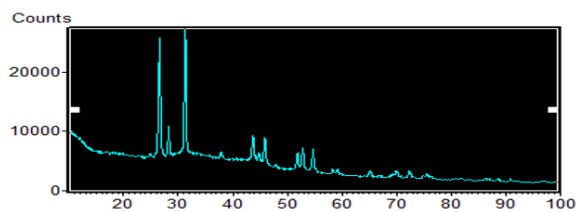


Fig.33 XRD Peak Graph

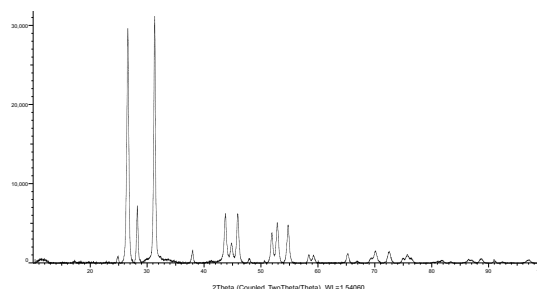


Fig. 34 XRD Graph

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Conflicts of interest

There are no conflicts of interest.

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