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A Comparative Pharmacological Study on Cultivation of *Shweta Musali* (Chlorophytum borivilianum) Using Three Different Methods with Emphasis on Substituting *Kunapajala* by *Vedamrit* Water

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Abstract

Introduction:

Shweta Musali (Chlorophytum borivilianum) is a highly valued medicinal plant in Ayurveda, renowned for its aphrodisiac, adaptogenic, and immunomodulatory properties. Overexploitation and unsustainable harvesting have placed this species under ecological threat. This study evaluates three cultivation methods for Shweta Musali—natural farming, organic farming using Vedamrit Water, and chemical farming with Single Super Phosphate (SSP). It emphasizes the viability of Vedamrit Water as a sustainable substitute for Kunapajala, a traditional organic fertilizer.

Methods: A randomized controlled trial was conducted on barren hilly land converted into fertile plots. Ninety-six planting materials were divided into three groups:

Group A: Natural farming (control).

Group B: Cultivation with Vedamrit Water.

Group C: Cultivation with SSP.

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Results:

Vedamrit Water significantly enhanced tuber quality and saponin content compared to natural farming. While SSP yielded the highest quantity of tubers, it negatively affected soil health and reduced pharmacological efficacy. Organic cultivation using Vedamrit Water preserved soil structure, improved microbial activity, and produced high-quality tubers, aligning with sustainable agricultural practices.

Discussion:

The study demonstrates that Vedamrit Water is a viable alternative to Kunapajala, ensuring ecological balance and high-quality Shweta Musali cultivation. Organic methods showed superior medicinal benefits and environmental sustainability compared to chemical farming.

Conclusion:

Vedamrit Water offers a sustainable, eco-friendly solution for Shweta Musali cultivation, bridging the gap between ecological conservation and increasing market demands. Its adoption can mitigate the overharvesting of wild resources and support the pharmaceutical industry sustainably.

Keywords: Vedamrit Water, Kunapajala, Sustainable Cultivation, Organic Farming.

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Introduction

Shweta Musali (Chlorophytum borivilianum), a widely revered medicinal plant in Ayurveda, is known for its aphrodisiac, adaptogenic, and immunomodulatory properties. Its roots are integral to several Ayurvedic formulations, making it a high-demand herb in national and international markets. However, unsustainable harvesting practices and habitat destruction have pushed this species towards the brink of being critically endangered. The escalating demand highlights the urgent need for sustainable cultivation methods to ensure its availability without compromising ecological balance.

Traditionally, Kunapajala, a liquid organic manure described in ancient Vrikshayurveda, has been used for cultivating medicinal plants. However, its preparation, involving animal remains, is often impractical on a large scale. This study investigates Vedamrit Water, an eco-friendly alternative to Kunapajala, composed of cow-based and plant-based ingredients. It explores three cultivation methods—natural farming, cultivation with Vedamrit Water, and cultivation with Single Super Phosphate (SSP)—to compare yield, soil health, and pharmacological efficacy. The findings aim to bridge traditional agricultural practices with modern sustainability needs, emphasizing organic farming's role in preserving soil health, enhancing medicinal value, and meeting market demands. This study is a step towards balancing conservation efforts and economic utilization of Shweta Musali, a plant of immense therapeutic and economic potential.

Objectives:

1. To evaluate the efficacy of three cultivation methods (natural farming, Vedamrit Water, and chemical fertilizers).
2. To identify the impact of Vedamrit Water as a sustainable substitute for Kunapajala.
3. To compare the pharmacological properties, including saponin content, of Shweta Musali tubers grown under these methods.

Methods:

Trial Design: This study followed a randomized controlled trial design, comparing three cultivation methods on the basis of yield, soil health, and

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pharmacological outcomes. The groups were as follows:

- **Group A:** Natural farming (control group).
- **Group B:** Cultivation using Vedamrit Water (experimental group).
- **Group C:** Cultivation with Single Super Phosphate (SSP; standard fertilizer).

Land: Barren hilly land in Udaipur district, Rajasthan, converted for cultivation. **Tubers:** Shweta Musali tubers procured from local sources and treated with cow urine before planting.

Intervention:

1. **Natural Cultivation (Group A):** The soil was prepared using farmyard manure and vermicompost, with no additional fertilizers.
2. **Vedamrit Water (Group B):** Organic liquid manure made from cow dung, cow urine, neem, jaggery, and herbs like Dhatura and Arka, prepared as per traditional Vrikshayurveda.
3. **Chemical Fertilizers (Group C):** SSP applied as per recommended doses.

Planting and Maintenance: Seeds were sown at 30 × 15 cm spacing. Regular irrigation, weeding, and crop protection measures were undertaken uniformly across all groups.

Outcomes Measured:

1. **Primary Outcome:** Yield of Shweta Musali tubers.
2. **Secondary Outcomes:**
    - Saponin content (phytochemical analysis).
    - Soil health parameters (pH, organic matter, and microbial activity).
    - Microscopic evaluation of tubers.

Randomization and Blinding: Plants were randomly assigned to cultivation groups. Blinding was applied for outcome assessment to ensure unbiased analysis of yield and pharmacological properties.

Results:

96 planting materials were randomly assigned to three groups:

- **Group A:** 24 plants (natural farming).
- **Group B:** 24 plants (Vedamrit Water).
- **Group C:** 48 plants (SSP fertilizers).

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Primary Outcome: Group B (Vedamrit Water) showed a significant increase in yield compared to Group A (natural farming) but slightly lower than Group C (SSP fertilizers).

Secondary Outcomes:

1. **Pharmacological Properties:** Group B plants exhibited the highest saponin content, a key therapeutic compound in Shweta Musali. Group C plants showed reduced medicinal quality despite higher yields.
2. **Soil Health:** Group B maintained soil microbial activity and organic matter content. Group C caused soil acidification and depletion of micronutrients.
3. **Macroscopic and Microscopic Analysis:** Tubers from Group B were of superior quality in texture, size, and medicinal composition. **Adverse Effects:** No adverse effects were observed during cultivation or analysis.

Discussion:

This study highlights the potential of Vedamrit Water as a sustainable alternative to Kunapajala for cultivating Shweta Musali (Chlorophytum borivilianum), a medicinal plant of significant Ayurvedic and economic value. The results demonstrate that Vedamrit Water-treated plants showed superior medicinal quality, including enhanced saponin content, compared to natural farming and chemical fertilizers. This validates the efficacy of Vedamrit Water in improving pharmacological properties without compromising environmental sustainability. While SSP fertilizers provided the highest yield, their long-term impact on soil health was detrimental, causing acidification and depletion of organic matter and micronutrients. On the other hand, natural farming methods preserved soil integrity but resulted in lower yields and reduced medicinal efficacy compared to Vedamrit Water. These findings suggest that Vedamrit Water strikes a balance between yield and quality, offering an environmentally friendly solution. The study emphasizes the relevance of integrating traditional agricultural wisdom with modern practices to address current ecological and economic challenges. Vedamrit Water aligns with the principles of Vrikshayurveda and organic farming, promoting nutrient recycling and soil fertility. Its adoption could mitigate the

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overharvesting of wild Shweta Musali, ensuring its availability for pharmaceutical use while conserving natural habitats. Future research should focus on optimizing Vedamrit Water formulations for scalability, assessing its impact across diverse climatic and soil conditions, and exploring its potential application for other endangered medicinal plants. Overall, this study underscores the importance of sustainable agricultural practices in preserving biodiversity while meeting the growing demand for high-quality herbal medicines.

Strengths: Integrates traditional knowledge (Vrikshayurveda) with scientific analysis. Systematic comparison of organic, natural, and chemical cultivation methods.

Limitations: Short-term study; long-term effects on soil health and yield stability remain unexplored. Single geographic location; further studies are required to validate findings across different climates and soils.

Implications for Practice: Adoption of Vedamrit Water can reduce reliance on chemical fertilizers, addressing ecological concerns. Sustainable cultivation practices can mitigate overharvesting of wild Shweta Musali, ensuring consistent supply for the pharmaceutical industry.

Conclusion:

This trial concludes that Vedamrit Water is a viable substitute for Kunapajala, promoting sustainable cultivation of Shweta Musali. Its use improves tuber quality, preserves soil health, and aligns with ecological conservation goals.

Funding and Conflicts of Interest:

No external funding was received for this study. The authors declare no conflicts of interest.

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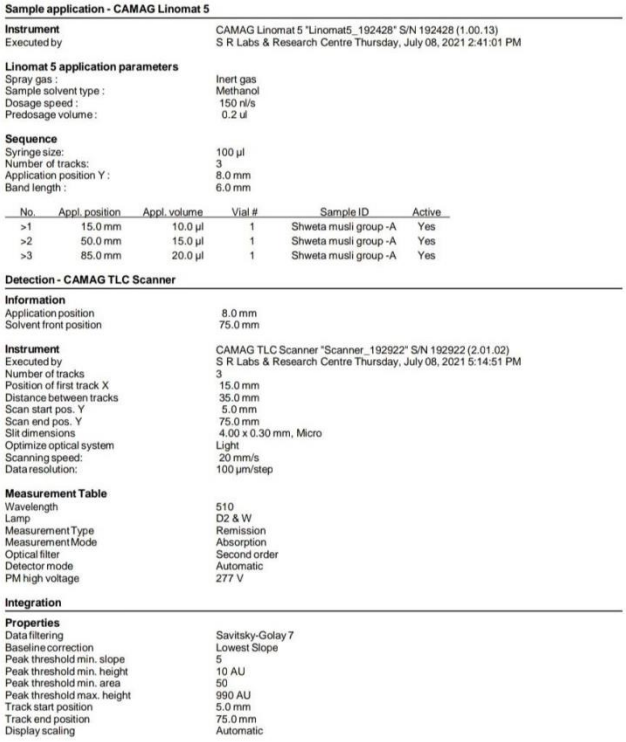
Figure 1: HPTLC reports of Group A



Sample application - CAMAG Linomat 5

Instrument	CAMAG Linomat 5 "Linomat5_192428" S/N 192428 (1.00.13)
Executed by	S R Labs & Research Centre Thursday, July 08, 2021 2:41:01 PM

Linomat 5 application parameters

Spray gas :	Inert gas
Sample solvent type :	Methanol
Dosage speed :	150 nl/s
Predosage volume :	0.2 ul

Sequence

Syringe size:	100 µl
Number of tracks:	3
Application position Y :	8.0 mm
Band length :	6.0 mm

No.	Appl. position	Appl. volume	Vial #	Sample ID	Active
>1	15.0 mm	10.0 µl	1	Shweta musli group -A	Yes
>2	50.0 mm	15.0 µl	1	Shweta musli group -A	Yes
>3	85.0 mm	20.0 µl	1	Shweta musli group -A	Yes

Detection - CAMAG TLC Scanner

Information

Application position	8.0 mm
Solvent front position	75.0 mm

Instrument	CAMAG TLC Scanner "Scanner_192922" S/N 192922 (2.01.02)
Executed by	S R Labs & Research Centre Thursday, July 08, 2021 5:14:51 PM
Number of tracks	3
Position of first track X	15.0 mm
Distance between tracks	35.0 mm
Scan start pos. Y	5.0 mm
Scan end pos. Y	75.0 mm
Slit dimensions	4.00 x 0.30 mm, Micro
Optimize optical system	Light
Scanning speed:	20 mm/s
Data resolution:	100 µm/step

Measurement Table

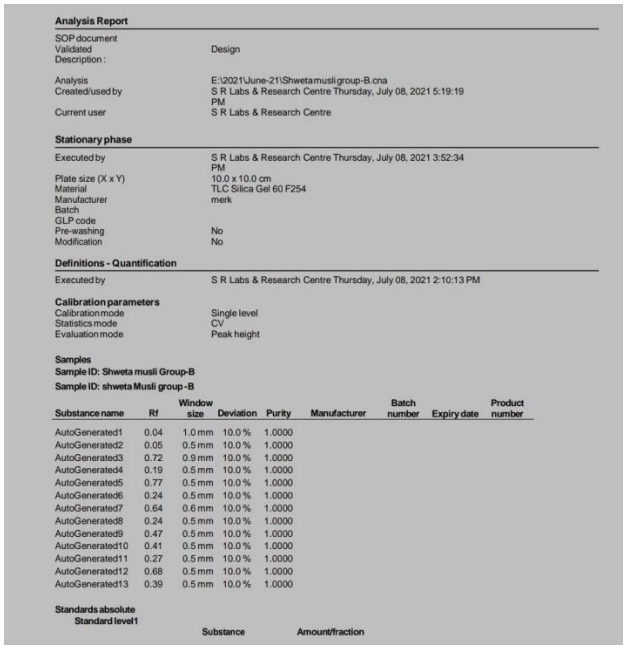
Wavelength	510
Lamp	D2 & W
Measurement Type	Remission
Measurement Mode	Absorption
Optical filter	Second order
Detector mode	Automatic
PM high voltage	277 V

Integration

Properties

Data filtering	Savitsky-Golay 7
Baseline correction	Lowest Slope
Peak threshold min. slope	5
Peak threshold min. height	10 AU
Peak threshold min. area	50
Peak threshold max. height	990 AU
Track start position	5.0 mm
Track end position	75.0 mm
Display scaling	Automatic

Figure 2: HPTLC of Group B



Analysis Report

SOP document	
Validated	Design
Description :	
Analysis	E:\2021\June-21\Shwetamusligroup-B.cna
Created/used by	S R Labs & Research Centre Thursday, July 08, 2021 5:19:19 PM
Current user	S R Labs & Research Centre

Stationary phase

Executed by	S R Labs & Research Centre Thursday, July 08, 2021 3:52:34 PM
Plate size (X x Y)	10.0 x 10.0 cm
Material	TLC Silica Gel 60 F254
Manufacturer	merk
Batch	
GLP code	
Pre-washing	No
Modification	No

Definitions - Quantification

Executed by	S R Labs & Research Centre Thursday, July 08, 2021 2:10:13 PM

Calibration parameters

Calibration mode	Single level
Statistics mode	CV
Evaluation mode	Peak height

Samples

Sample ID: Shweta musli Group-B

Sample ID: shweta Musli group -B

Substance name	Rf	Window size	Deviation	Purity	Manufacturer	Batch number	Expiry date	Product number
AutoGenerated1	0.04	1.0 mm	10.0 %	1.0000				
AutoGenerated2	0.05	0.5 mm	10.0 %	1.0000				
AutoGenerated3	0.72	0.9 mm	10.0 %	1.0000				
AutoGenerated4	0.19	0.5 mm	10.0 %	1.0000				
AutoGenerated5	0.77	0.5 mm	10.0 %	1.0000				
AutoGenerated6	0.24	0.5 mm	10.0 %	1.0000				
AutoGenerated7	0.64	0.6 mm	10.0 %	1.0000				
AutoGenerated8	0.24	0.5 mm	10.0 %	1.0000				
AutoGenerated9	0.47	0.5 mm	10.0 %	1.0000				
AutoGenerated10	0.41	0.5 mm	10.0 %	1.0000				
AutoGenerated11	0.27	0.5 mm	10.0 %	1.0000				
AutoGenerated12	0.68	0.5 mm	10.0 %	1.0000				
AutoGenerated13	0.39	0.5 mm	10.0 %	1.0000				

Standards absolute

Standard level1

Substance	Amount/fraction

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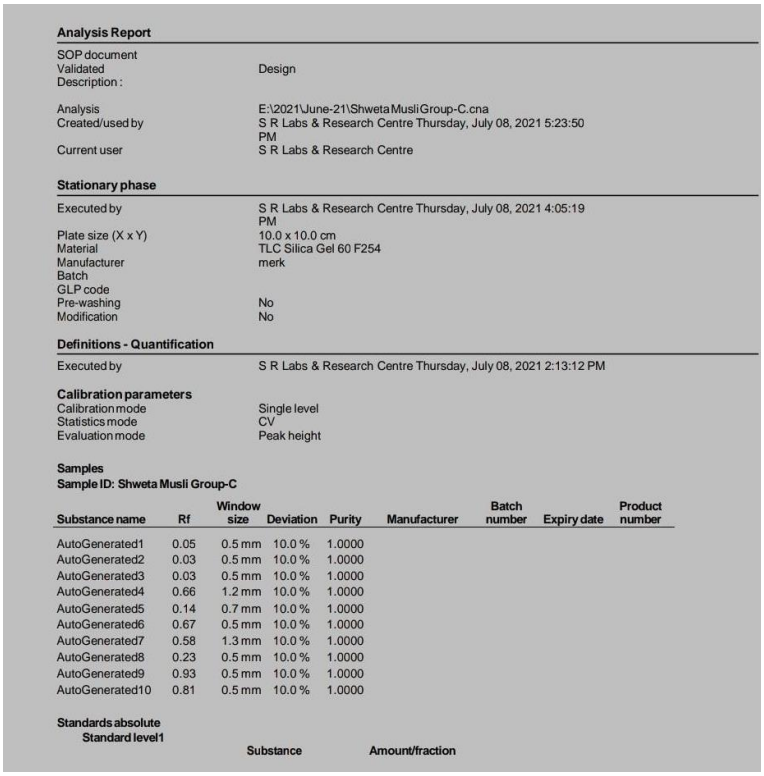
Figure 3: HPTLC results of Group C



Analysis Report

SOP document
Validated — Design
Description :

Analysis — E:\2021\June-21\Shweta Musli Group-C.cna
Created/used by — S R Labs & Research Centre Thursday, July 08, 2021 5:23:50 PM
Current user — S R Labs & Research Centre

Stationary phase

Executed by — S R Labs & Research Centre Thursday, July 08, 2021 4:05:19 PM
Plate size (X x Y) — 10.0 x 10.0 cm
Material — TLC Silica Gel 60 F254
Manufacturer — merk
Batch
GLP code
Pre-washing — No
Modification — No

Definitions - Quantification

Executed by — S R Labs & Research Centre Thursday, July 08, 2021 2:13:12 PM

Calibration parameters
Calibration mode — Single level
Statistics mode — CV
Evaluation mode — Peak height

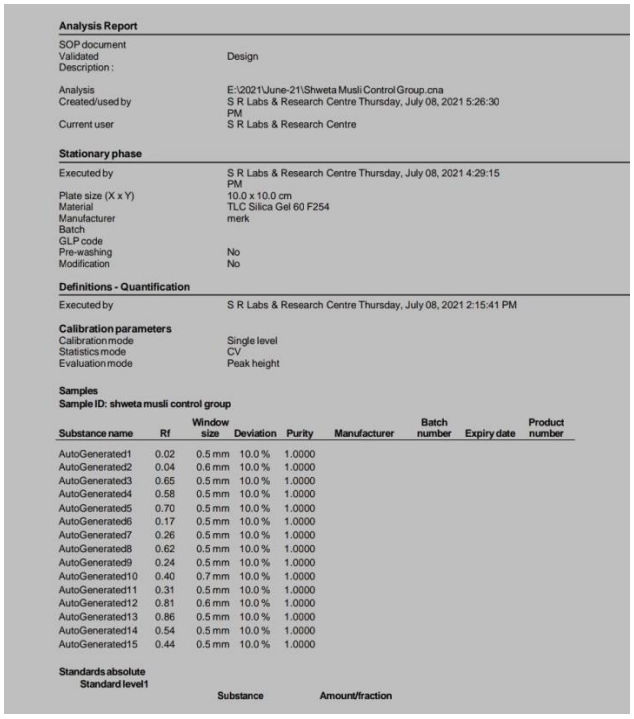
Samples
Sample ID: Shweta Musli Group-C

Substance name	Rf	Window size	Deviation	Purity	Manufacturer	Batch number	Expiry date	Product number
AutoGenerated1	0.05	0.5 mm	10.0 %	1.0000				
AutoGenerated2	0.03	0.5 mm	10.0 %	1.0000				
AutoGenerated3	0.03	0.5 mm	10.0 %	1.0000				
AutoGenerated4	0.66	1.2 mm	10.0 %	1.0000				
AutoGenerated5	0.14	0.7 mm	10.0 %	1.0000				
AutoGenerated6	0.67	0.5 mm	10.0 %	1.0000				
AutoGenerated7	0.58	1.3 mm	10.0 %	1.0000				
AutoGenerated8	0.23	0.5 mm	10.0 %	1.0000				
AutoGenerated9	0.93	0.5 mm	10.0 %	1.0000				
AutoGenerated10	0.81	0.5 mm	10.0 %	1.0000				

Standards absolute
Standard level1

Substance	Amount/fraction

Figure 4: HPTLC results of control group



Analysis Report

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Current user — S R Labs & Research Centre

Stationary phase

Executed by — S R Labs & Research Centre Thursday, July 08, 2021 4:29:15 PM
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Material — TLC Silica Gel 60 F254
Manufacturer — merk
Batch
GLP code
Pre-washing — No
Modification — No

Definitions - Quantification

Executed by — S R Labs & Research Centre Thursday, July 08, 2021 2:15:41 PM

Calibration parameters
Calibration mode — Single level
Statistics mode — CV
Evaluation mode — Peak height

Samples
Sample ID: shweta musli control group

Substance name	Rf	Window size	Deviation	Purity	Manufacturer	Batch number	Expiry date	Product number
AutoGenerated1	0.02	0.5 mm	10.0 %	1.0000				
AutoGenerated2	0.04	0.6 mm	10.0 %	1.0000				
AutoGenerated3	0.65	0.5 mm	10.0 %	1.0000				
AutoGenerated4	0.58	0.5 mm	10.0 %	1.0000				
AutoGenerated5	0.70	0.5 mm	10.0 %	1.0000				
AutoGenerated6	0.17	0.5 mm	10.0 %	1.0000				
AutoGenerated7	0.26	0.5 mm	10.0 %	1.0000				
AutoGenerated8	0.62	0.5 mm	10.0 %	1.0000				
AutoGenerated9	0.24	0.5 mm	10.0 %	1.0000				
AutoGenerated10	0.40	0.7 mm	10.0 %	1.0000				
AutoGenerated11	0.31	0.5 mm	10.0 %	1.0000				
AutoGenerated12	0.81	0.6 mm	10.0 %	1.0000				
AutoGenerated13	0.86	0.5 mm	10.0 %	1.0000				
AutoGenerated14	0.54	0.5 mm	10.0 %	1.0000				
AutoGenerated15	0.44	0.5 mm	10.0 %	1.0000				

Standards absolute
Standard level1

Substance	Amount/fraction

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PHYTOCHEMICAL ANALYSIS (QUALITATIVE)

Aqueous Extract

TEST	GROUP A	GROUP B	GROUP C	CONTROL GROUP
CARBOHYDRATES	+ ve	+ ve	+ ve	+ ve
PROTEINS	- ve	- ve	- ve	- ve
ALKALOIDS	- ve	+ ve	+ ve	- ve
SAPONINS	+ ve	+ ve	+ ve	+ ve
GLYCOSIDE	- ve	- ve	- ve	- ve
TANNIN	+ ve	+ ve	+ ve	+ ve
FLAVONOIDS	+ ve	+ ve	+ ve	+ ve

ANALYTICAL REPORT: SHWETA MUSALI (chlorophytum arundinaceum)

TEST	GROUP A	GROUP B	GROUP C	CONTROL GROUP
APPEARANCE	Fresh Tubers ,	Fresh Tubers ,	Fresh Tubers	Fresh Tubers
SIZE	5 to 6 cms long, 1 cm thick	7 to 8 cms long, 0.5 to 1 cm thick	5 to 6 cms long, 1 cm thick	8 to10 cms long, 1.5 cm thick
NO OF ROOTS	8 TO 10	5 TO 7	5 TO 7	4 TO 5
COLOUR	Off White	Light Brown	Light Brown	Off White
ODOUR	Characteristic	Characteristic	Characteristic	Characteristic Pleasent
TASTE	Slightly Bitter	Slightly Bitter	Slightly Bitter	Slightly Bitter
MOISTURE CONTENT	19.22 %	15.56 %	18.87 %	16.25 %
ASH	6.84 %	8.23 %	7.07 %	5.94 %
ACID INSOLUBLE ASH	0.16 %	0.45 %	0.91 %	0.66 %
WATER SOLUBLE ASH	0.65 %	0.98 %	0.95 %	1.05 %
ALCOHOL SOLUBLE EXTRACTIVE	6.19 %	6.19 %	6.19 %	7.22 %
WATER SOLUBLE EXTRACTIVE	3.37 %	3.37 %	3.37 %	5.65 %
SAPONIN CONTENT	4.5 %	6.1 %	5.9 %	5.6 %
				

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References:

[1] Vrkshayurveda of Surapala, manuscript available in Bodleian Library, Oxford University, Oxford No. 324 B (Ms. Walkar 137), Oxford, London.

[2] Comparative performance of transplanted seedlings of safed musli (Chlorophytum species) from sexual and asexual means. Jan 1990; R.D. Jat; P.C. Bordia.

[3] In vitro anthelmintic studies of Chlorophytum borivilianum Sant. & Fernandez tubers Jan 2010; Sharada L Deore; Somashekhar Khadabadi.

[4] Isolation and characterization of phytoconstituents from Chlorophytum borivilianum; Nov 2010; Sharada L Deore; Somashekhar Khadabadi.

[5] Chlorophytum; October 2013 • International Journal of Pharma and Bio Sciences; Pankaj K. Sahu.

[6] Phytochemical screening of root of chlorophytum Borivilianum L. (Safed Musli): A medicinal plant. Article in International Journal of Pharma and Bio Sciences 4(4): B237-B241 • October 2013.

[7] Shrivastava DK, Mishra PK, Verma S, Gangrade SK. Studies on propagation methods and dormancy in Safed Musli (Chlrophytum sp.). Journal of Medicinal and Aromatic Plant Sciences. 2000; 22(4a): 275-276.