

REVIEW ON MUSHA: AYURVEDIC CRUCIBLES

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ABSTRACT

A *Musha* is defined as the one which removes the *dosha* (impurities) from *Rasa Dravya* (mineral compound). They are known as Crucibles in the contemporary science. *Musha* are the special devices mentioned in *Rasa Shastra* to process the *Rasa Dravya*. They are mentioned in every text of *Rasa Shastra*, depicting its equal importance to other devices like *Yantra* (Instruments) and *Kosthi* (furnaces). *Musha* are of different kinds like *Samanya Musha*, *Vrintak Musha*, *Gostani Musha*, and *Maha Musha* etc. It has got unique synonyms like *Krounchika*, *Karhatika*, *Pachani* and *Vahnimitra* etc. Their description in *Rasa grantha* draws attention to know about *Musha* in a scientific way. Therefore, an attempt to review the different *Mushas* is made in this article.

Keywords: *Musha*, *Dosha*, *Samanya Musha*, *Krounchika*, crucible.

INTRODUCTION

In *Rasa Shastra*, there is description of *Yantra*, *Musha*, *Kosthi* and *Putra* (quantum of heat) to understand the science of *Parad* processing and its formulations.

The concept behind explaining each separately is to know their functions and necessity as per the particular processing.

One among them is *MUSHA*.

MUSHA is explained after *Yantra*¹. It shows that *Musha* is also a form of *Yantra* which helps to conduct the *Rasa Karma* (processing of metals and minerals).

Musha is defined as the one, which make *Rasa Dravya* to undergo definite duration of transformation. Therefore, it does the purification of *Rasa Dravya* by removing their *Dosha*².

There is no definite number of *Musha* in the texts, because they are mentioned as per situation and necessity.

One can find the interesting synonyms of *Musha* like *Kumudi*, *Krounchika*, *Vahnimitra*, *Karahatika* suggesting its versatile features³.

Musha are of different kinds like *Samanya Musha*, *Pakva Musha*, *Vajra Musha*, *Vajra Dravini Musha* etc

AIMS AND OBJECTIVES:

This study is aimed for reviewing the details of *Musha* in *Rasa granthas* and analyzing their practical importance.

MATERIAL AND METHODS:

Here, the sources of data selected are Ras Ratna Samucchya and Rasa Tarangini. Datas of *Musha* regarding its derivation, definition, synonyms, types, contributing factors in its preparation and functions are collected. They are analyzed and interpreted to extract the

conceptual knowledge of *Musha* in a simple way.

OBSERVATION:

1. Basic Terminologies⁴:

While studying about *Musha*, some important terminologies have been observed.

Musha: A special device which takes away the *dosha* from *Rasa dravya*

Pidhanak: The lid or covering which prevents the *Rasa dravya* from spilling off from the *Musha* pot and helps in handling or lifting the *Musha*.

Sandhi lepana : It is application of a mixture of *Loha kitta*(Iron rust), mud etc which seals the joint of *Musha* and *Pidhanak*. It is also known as *Sandhibandhan*.

2. Classification of Musha and their Nomenclature

Musha have been classified or named as per their shape, the material used in their preparation and the purpose for which they are made.

Table 1: Classification of *Musha*⁵:

Sl. No	Based on shape	Based on material used in their preparation	Based on purpose they serve
1	<i>Gostani Musha</i> (resembling like cow's udder)	<i>Gar Musha</i> (mud from lakebed is used)	<i>Samanya musha</i> It serves the general function of <i>Musha</i>
2	<i>Vrintak Musha</i> (resembling like Brinjal)	<i>Vid Musha</i> (kshar+amla+lavan etc varg dravya used)	<i>Vajra musha</i> As strong as <i>Vajra</i> Can sustain high degree of heat
3	<i>Manduk Musha</i> (resembling like Frog)	-----	<i>Vajra dravini musha</i> It is used in liquefaction of <i>Vajra</i> , <i>Abhrak</i> etc
4	<i>Mall musha</i> (resembling like Plates)	-----	<i>Varn musha</i> They are used to enhance the colour of <i>rasa dravya</i> Used in <i>loha vada</i>
5	<i>Gol musha</i> (resembling like a Rounded device)	-----	<i>Yog musha</i> They are used to obtain high quality of <i>Parad bhasma</i> .
6	<i>Pakv musha</i> (resembling like a potter's pot)	-----	

7	Musal musha (resembling like a pounder)	-----	
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3. Parts Of Musha

Structurally, these have two parts ie one *Pidhanak* or the lid which covers the *Musha* and the lower basal part in which *Rasa Dravya* is kept.

The *Pidhanak* is again designed with some purpose. For example, in *Gostani Musha* the *Pidhanak* is with an elevation (*Shikha*) to lift up the lid easily and check for the *Dravan* or *Shodhan* of the *Ras Dravya*⁶.

In *Vrintak Musha*, the *Pidhanak* is in the shape of *Dhatura* flower with an open tube which helps to introduce the drugs inside the *Musha*⁷.

4. Heat Sustainability

Although being different in structure and function, these have one common feature i.e. to withstand the high temperature. They neither break nor get liquefied till certain degree of temperature.

Table 2: Heat sustainability of different *Musha*

Sl. No	<i>Musha</i>	Duration of heat sustainability
1	<i>Vajra dravini musha</i>	10-14 hours ⁸
2	<i>Pakva musha</i>	3-12 hours ⁹
3	<i>Gaar musha</i>	6 hours ¹⁰
4	<i>Var musha</i>	3 hours ¹¹

5. Upadana Of Musha (Base of Musha)

As Per *Rasa Ratna samuchhya*, *Mrittika* (clay) and *loha churna* (iron powder) are the basic requirements for the *Musha* construction.¹²

Rasa taranginikar specifies *musha nirmanochita mrittika* as *sasarkara*, *pandura*

sthula and *vahnitapsaha*¹³. In their substitution, *Valmika Mrittika* (Ant hill mud) or *Kaulali Mrittika* (potter's mud) can be used¹⁴.

Apart from these two, some materials specific to particular *Musha* are added, as shown in table no 3.

Table 3: Specific factors in *Musha* Preparation:

Sl.no	<i>Musha</i>	<i>Upadana</i>
1	<i>Samanya Musha</i>	Black clay, <i>valmika mrittika</i> (Ant hill mud), burnt husk, jute fibres, charcoal, horse dung ¹⁵
2	<i>Gar musha</i>	Mud from lake bed ¹⁶
3	<i>Vajra musha</i>	White stone powder ¹⁷
4	<i>Vajra dravini musha</i>	Mud from lake bed, excreta of earthworms, buffalo milk ¹⁸
5	<i>Yog Musha, Vid Musha</i>	<i>Vida</i> ¹⁹

6. Contemporary View; Crucibles

The term Crucible is derived from a latin word "crucibulum" i.e. melting pot for metals²⁰.

The Crucible is defined as a vessel of a very refractory material used for melting

and calcining a substance that requires a high degree of heat²¹.

Refractory material²²

A refractory material is a material that retains its strength at high temperature Refractory

materials must be chemically and physically stable at high temperatures.

Refractory materials are used in for furnaces, kilns, incinerators, and reactors. They are also used to make **crucibles** and moulds for casting glass and metals.

The oxides of Aluminum (alumina), Silicon (silica) and Magnesium (magnesia) are the most important materials used in the manufacturing of refractories. Another oxide usually found in refractories is the oxide of calcium (lime).

Fire clays are also widely used in the manufacture of refractories.

Fire clay²³ is a range of refractory clays used in the manufacture of ceramics, especially fire brick. The United States Environmental

Protection Agency defines fire clay very generally as a "**mineral aggregate composed of hydrous silicates of Aluminium ($Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$) with or without free Silica.**"

To be referred to as a "fire clay" the material must withstand a minimum temperature of 1,515 °C (2,759 °F)

Fire clay is resistant to high temperatures, having fusion points higher than 1,600 °C (2,910 °F), therefore it is suitable for lining furnaces, as fire brick, and for manufacture of utensils used in the metalworking industries, such as crucibles, retorts and glassware.

Table 4: Types of Crucibles²⁴:

Sl.no	Crucibles	Can withstand temp. up to
1.	Vitreous carbon crucible	3000 °C
2.	Silica crucibles	1600°C
3.	Platinum Crucibles	1200°C
4.	Porcelain crucibles	1050°C
5.	Nickel crucibles	600°C
6.	Carbon steel crucibles	500°C
7.	Zirconium crucibles	450°C

DISCUSSION

Inventing *Musha* was to create a special container which can hold *Rasa Dravya* into it, and when exposed to heat, it can do the *Paka* of *Ras Dravya*.

The *Agni Samskar*(processing with fire) taking place here can modify the *Ras Dravya* physically as well as chemically.

For example, in *Varna Musha* the lower metals are transformed into higher metals²⁵.

In *Musal Musha*, *Parad Bandh* can be achieved.²⁶

In *Yog Musha*, best quality of *Parad Bhasma* can be obtained²⁷.

The materials required to make *Musha* are special. They are selected considering the following features of *Musha*, i.e. to give them stability in high degree of heat, to provide them good texture so that *Musha* is dried without any cracks, to bring better mould ability, so that *Musha* can be shaped into desired shape.

For such purpose special quality of **clay, burnt husk, jute fibers, charcoal, horse dung and iron powder** are mentioned. The more beating is stressed here to make better mould.

In modern days while making crucibles, **fire clay** has been used. And it comes under refractory range of clay. Such type of clay has the ability to withstand high temperature. They are aggregates of minerals like *Aluminum, Calcium, and Magnesium* etc²⁸.

Similar properties have been found in the **Ant hill mud, Potter's mud** or the specific clay mentioned in **Rasa Shastra**. Also **Bhu Nag Satva** (Excreta of Earthworms) for *Vajra Dravini Musha*, contains Copper and Iron which contribute to its heat resistance²⁹.

Now a day, Usage of *Musha* is limited. It has been replaced by the cup shaped container called Crucibles. They are specially designed for liquefactions of the metals.

But the ideology of *Musha* cannot be ignored. The concept behind them reveals truly scientific theory.

The same principle can be applied in modern days too to conduct the *Rasa Karma*.

CONCLUSION

Explanation regarding *Musha* told in *Rasa Shastra* is very scientific. Its properties have important applications. Its utility in *Rasa karma* is vast. This review helps to understand the concept of *Musha* in clear way.

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