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Study of Soil Science in Making the Percussion Instrument Ghatam

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Abstract: Study of the various types, regions, climatic conditions, and chemical components in the clay composition for making ghatam and the usage of it in many creative ways and if conducive conditions were not favourable in the clay composition, how it could affect the pitch and tone of the percussion instrument bringing less symphony and harmony in music were analyzed.

Keywords: *Soil Science, Ghatam, Types of Ghatams, Clay Composition, Minerals, Process of Making Ghatam, Resonance, Rhythms, Sound .*

I. INTRODUCTION

Music is one of the performing arts that requires both creation and recreation and the percussion instrument-GHATAM - produces rhythmic effects of sound depending on the force and clay composition that could influence theacousticeffect.[1]

Clay can be molded when it is wet ,and iron can be molded when it is hot .Here during the process of making the instrument, the clay composition is added with metals and alloy in suitable proportions and are subjected to wet and hot conditions as a result, those metals invariably cause different sounds of specific pitch. [1]The periodic rhythm of sevens war as and different thal as produce mesmerizing effect in this field of instrumental music. In fact, the influence of soil science has created difference in human resource in the most entertaining and creative manner. But, in contrast to the above, if an aspect of soil governance is not taken into consideration, it could cause distress.

TERMS INVOLVED INSOIL SCIENCE:

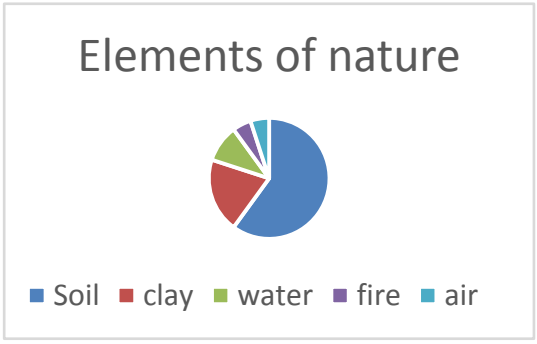
SOILis commonly referred to as "earth" or "dirt". In engineering terms, soil is referred as regolith, or loose rock material.'

Soil science includes edaphology and pedology. Edaphology is concerned with the influence of soils on living things and pedology is focused on the formation, description and morphology of soils. Soil texture[8]is a qualitative classification tool used in both the field and laboratory to determine classes for soils based on their physical texture.

CLAYEY SOIL is considered to be the "skin of the Earth and is the main resource consisting of mixture of minerals, organic, gases, liquids and interfaces with its lithosphere, hydrosphere, atmosphere, and biosphere. This clayey soil is only used for making ghatam.

DRAFT ABOUT THE INSTRUMENT:

GHATAM means pot in Sanskrit –and is a percussion instrument widely used in Carnatic music in South India.[3]



All five elements of nature [2]are invariably used while makingit andthey are earth, clay, water, fire and air. Earth means soil and clay getsbounded by water easily. Later the clay is baked and since air is there inside ghatam, it originates the sound creating its own unique timber.

TYPES OF GHATAMS:

Ghatams are of two types: Madras and Manamadurai.[4] The Madrasghatam is a light pot which requires less force to play while the Manamadurai ghatam is a heavy pot, which is difficult to play, and produces much sharp metallic ringing sound. Manamadurai ghatams have special tonal quality and are found to be of superior quality. Hence the study of soil obtained in that region has been discussed in detail.

COMPOSITION OF GHATAM: is mainly clay which is baked with brassor copper filings and mixed with a small amount of iron filings. It is believed that the mud is of special quality.

The tone of the pot and the walls of even thickness are made good to produce an even tone. The proportion of metals and alloy added during the process of making ghatam decides the pitch of the tone.

POSITION OF GHATAM WHILE PLAYING:

The ghatam is positioned with its mouth pressed against the player's stomach. The player taps the surface of the ghatam with fingers and the base of the palm and changes the pitch and resonance of the instrument by varying the pressure of the pot against the stomach.

SIGNIFICANCE OF GHATAM:

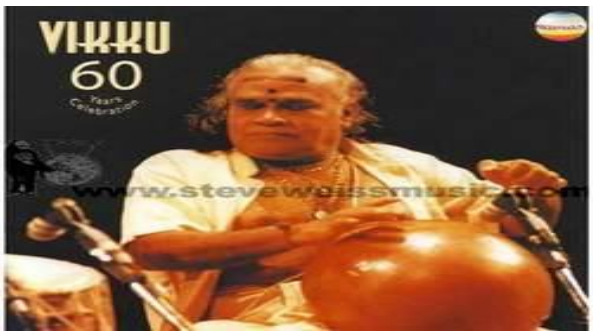
This instrument is significant and formidable in making amazing and spectacular sound rhythms with resonance and gives different pitch on the application of different quantities of plasticine, clay and water on the inner surface of it. The security professionals who manufacture them advocate the sustainable and responsible usages of the soils to ensure safety and security to the instrument while playing it with force.

MAIN PLACE OF MAKING GHATAMS:

They are mostly manufactured in Manamadurai, a place near Madurai in Tamilnadu, India. This instrument is also manufactured in other places like Banrutti, Chennai , and Bangalore.

GHATAM GIVEN GLOBAL RECOGNITION BY NOTABLEPE RSONALITIES:

With enough experience of strategic and versatile handling of such delicate instruments, we ought to be proud to have the one and only master of ghatam-the great Grammy award winner -VIKKU VINAYAKA RAM- the male leading artiste,(fig2) who brought revolutionary changes by making this instrument well recognized globally by doing fusion with western music, and also his disciple, -SUKANYA RAMGOPAL[6]-female artist-leading mistress of ghatam in India(fig3).



DATA COLLECTION ABOUT SIVAGANGA DISTRICT –TAMILNADU, INDIA
MAJOR PLACE TO COLLECT THE RICH CLAYEY SOIL IN CAUVERY BASIN

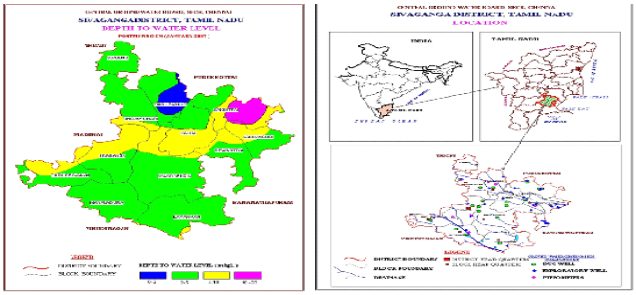


Figure 4 and Figure 5

The districts part of Capecomerin to Cauvery Basin and includes Kottakaraiyar, Tirumanimuttar, Vaigai and Pambar sub basins. Alluvial soil comprising of sand and clay is well developed along the vaigai river courses and Black Soil in Illayangudi, Manamadurai and TiruppathurTaluks.[7]

Flood plains are found along Vaigai river and alluvial plain in Devakottai, Sivaganga and Manamadurai Taluks.The thickness of the alluvium varies between 6 and 32mm and the alluvium comprising of sand and clay is well developed along the Vaigairiverbed and is found to be thick and viscous and is found to contain red-lead and manganese which are found to be the prime factors for increasing the sturdiness of the ghatam.

The soil governance is given utmost importance in Mana madurai and includes the study of physical and chemical properties, its corrosive stability, its water absorption, its reactivity, its soil reactivity which is expressed in terms of pH, a measure of hydrogen ion concentration in an aqueous solution and ranges in values from 6 to 9 and is a measure of the acidity or alkalinity of the soil. The rainfall pattern in that region also adds in deciding the textural feel of the soil and specific regions are periodically monitored with respect to time and space for collection of the correct soil sample by experts.

STUDY DETAILS OF SOIL SAMPLE COLLECTION

Climate	Tropical
Annual Rainfall	861.8 To 988.6 Mm,
Major Types Of Soils Found In Manamadurai	Red, Lateritic, Alluvial, Black Cottonand Loamy Soils.
Soils Used For Ghatam	Alluvium Andloamy Soils.
Minerals Found In Vaigai Riverbed	Redlead, Manganese
Metals And Alloy Added During The Process.	Copper, Iron And Brass.
Salts Found In Vaigai River-	Sodiumchloride, Magnesium Chloride, Sodium Nitrates And

	Flourides
Instrument Used For Separation Of Soil Components	Grading Sieves.
SUITABLE Ph	6-9
Study Of Soil Texture Studied By	Soil Texture Triangle[8] 
Variety Of Richness In Soil Found	Ferrogeneous.

Experimental Steps Followed In the Methodology of Making the Clay Composition

i. Collection of the suitable clay
ii. Sieving
iii. Dissolution
iv. Filtration
v. Wedging
vi. Mixing with suitable metals and alloy
vii. throwing on the potter's wheel,
viii. Brisk firing,
ix. trimming and
x. drying

People residing in manamadurai region carry different methods to analyze soil samples and the Particle-size distribution (PSD) isa qualitative quick, simple and reliable means to assess the clayey soil's physical characteristics.

Hand analysis, is aneasy, simple, effective way to detect the physical properties of soil and all the steps should be correctly followed to have rapid and frequent assessment. The soil components are separated by grading sieves and dissolved in water followed by filtration .A small amount of clayey soil is rolled into small balls and then by adding proportionate quantity of water, it is further softened well and moistened to the sticky point, (the point at which it begins to adhere to the finger) and then the ball is well molded to check its work ability and strength. It was found very surprising to know the size of clay particles were found to be having diameters of 0.002mm.

Every clay sample has its own apparent density, critical moisture content, porosity and specific mechanical strength and absorptioncapacity.[8] The above parameters increase as the homogeneity of the grain composition reduces. The quality of clay composition is primarily decided by its grain composition and it only decides their various important characterstics.[9]Clay particles get lined up in straight lines and hence are more likely to break and is one factor that mainly judges the process of wedging.

Basically, all these clay varieties are ferrogenous – rich in iron and they have the plasticine quality (a kind of sticky, paste-like consistency) which produces the metallic sound and the interaction of water adsorption on iron is faster and takes only 0.4μs.[10] To the clayey weighed mass which is rich in calcium lime, red lead ,manganese ,ash, sodium silicate, a binding agent is added to fill and cover pores and suitable weighed proportions of copper, iron, and brass are also added and well beaten and then subjected to throwing in the potters wheel , firing in kilns, trimming and finally well shaped and dried. The proportions of metals added will cause variation in the sound and pitch. The approximate weight of the ghatam could vary from 5-7 Kgs.

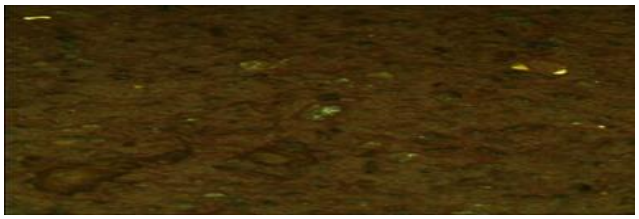


Figure 7

The above image depicts the amazing aspects of clayey soil under the microscope before wedging. If any of the above steps are not duly done it could hamper the process of making ghatam and cause distress.

In ancient times ,it was an instrument used to accompany the vocalist (fig1), but nowadays due to utmost creativity and innovative ideas, this percussion instrument has occupied the main stage.(fig 2 would justify).

CONCLUSIONS

Principles of proper clay molding, study of its physical, chemical properties could result in making of good quality ghatams which could spread positive energy and good vibrations around it. To make this instrumental music more pleasing and universal, certain aspects of soil governance ought to be taken utmost care as it plays a vital and significant role.

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