

**FOLK BIOLOGICAL CLASSIFICATION OF
MINOR MILLET SPECIES IN KOLLI HILLS, INDIA**

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“ABSTRACT. - Key words: folk taxonomy, minor millets, Kolli Hills, *Malayali tribals*.

The paper attempts to present the classification of inter and intra specific minor millets by *Malayali* tribal farmers residing in Kolli Hills, Namakkal district, Tamil Nadu, India. The different species are *Panicum sumatrense* Roth ex Roem. & Schult., *Panicum miliaceum* L., *Paspalum scrobiculatum* L. and *Setaria italica* (L.)Beav. Tribal farmers classify different species of millets using a set of exclusive morphological characters. The different landraces of each species are categorized into two different levels. The primary level of categorization is based on certain morphological, agronomical and gastronomical characters of the landrace. The most useful parts are perceptually conceived and reflected in nomenclature, which subtly indicates the phylogenetic relationships among landraces. The secondary level categorization is based on practical usefulness of the landrace and several sub classifications exist based on a specific cultural value of the taxa.

INTRODUCTION

Millets are small seeded annual grass species whose seeds are harvested for food and feed. They are one of the oldest cultivated grain crops in the world. Nearly 85% of the annual world millet production is utilized as a human food and around 10% is used as an animal feed. Millets are the staple food for millions of people living in the arid and semi-arid tropics of the Asia and African countries. It is also cultivated for grazing, forage and silage.

Millets are generally fast growing; early maturing species perform well under marginal environments. The seeds generally store well for a longer periods and need less time for cooking. It has excellent nutritional profile, with high levels of essential elements such as iron and calcium and vitamins and high dietary fiber. Millets are categorized based on the seed size as major and minor millets. Minor millets are the group of crops encompassing fourteen species categorized as neglected and under-utilized crops. The growth of minor millet consumption has been declining during the last three decades, while the use of other millets (maize and sorghum) has almost doubled. In India minor millets are predominantly cultivated as a subsistence crop in the Eastern Ghats by several tribal groups, including the Malayali farmers of Kolli Hills. Four different species viz., little millet (*Panicum sumatrense* Roth ex Roem.& Schult.), Italian millet (*Setaria italica*(L.)Beav.), kodo millet (*Paspalum scrobiculatum* L.), common millet (*Panicum milliaceum* L.) have been traditionally cultivated by these people. Each species is further classified into landraces, which is similar to ‘folk-varietal’.

KOLLI HILLS, FARMING SYSTEM AND MINOR MILLETS

The Malayali community, one of the dominant tribal groups, constitutes nearly 55% of the total state tribal population concentrated in the northern districts of Tamil Nadu. Etymologically, the name Malayali comes from as '*malai*'- hill/mountain and '*yali*' inhabitants or rulers of the hill. The people prefer to call themselves Malayali *gounders*. According to tradition, the Malayalis originally belonged to the *Vellala* caste of cultivators who emigrated from the plains. Copper plates show that the migration occurred as early as the beginning of the sixteenth century (Thurston and Rangachari 1975). The total population of Kolli Hills is 35,883, of which the *malayalis* constitute 94.1 per cent. A homogeneous tribal Malayali community, which speaks the Tamil language, inhabits Kolli Hills. Kolli Hills is located in the southern end of the Eastern Ghats in the state of Tamil Nadu, south India. It encompasses a geographical area of nearly 280 sq.Km at an elevation of 1300 meters. The region receives an average annual rainfall of 1045 mm, with maximum precipitation occurring from June to August and again from October to December. Nearly 85% of the total cultivable area is under rainfed cultivation. Typically Malayali settlements are located on the slopes and on the plateau and consist of tiny scattered huts. The community is divided in to several exogamous clans. Marriage between hamlets is generally encouraged and patrilocal residence is the accepted norm.

The mainstay of the economy is agriculture combined with cattle herding and swine keeping. Malayalis supplement their income by collecting non-timber forest products for sale as well as own use, and by working as laborers in coffee plantation estates. Agriculture provides the major part of their subsistence. The staple food of Malayalis was minor millets, grain legumes and wild yams supplemented with rice and wheat. Even though they are non-

vegetarians, the sacred tag attached to cow prevents them from eating beef. Pigs are an essential part of Malayali household economy and ritual aspects and they also hunt small game for food. Though agriculture is a household enterprise, social norms demarcate the division of labor based on sex and age. The traditional agriculture of Malayali people has been undergoing changes during the last three decades due the introduction of cash crops such as tapioca, coffee and pineapple. Numerous fruit crops, spices and commercial crops have been introduced over a period of time, which has accelerated the process of decline of minor millet cultivation. Consequently their diet has changed and their main staple food today is rice.

Traditionally Malayalis classify agricultural land based on soil type and topography - *vayal* (fields in the valley), *mettankadu* (terraced beds on slopes), *kollakadu/kothukadu* (rocky terrain on the highest slopes). The cropping system varies with topography and minor millets are grown as rainfed subsistence food crops either in *mettankadu* as mono crop or in *kollakadu/kothukadu* under bush fallow system. Little millet, proso millet, kodo millet and Italian millet are the common minor millet species, which have been cultivated with wider intra specific diversity. The land races differ in maturity period, agronomic quality and gastronomic character. The late maturing landraces are cultivated under bush fallow system, while early maturing ones are grown on terraced fields. Bush fallow farming is the predominant method of minor millet cultivation in rocky terrain (*kollakadu*) with an average cycle of three to five years.

On the past, landraces of different species were geographically isolated. Each village, hamlet, household would cultivate two to three different land races primarily to spread the risk and to optimize the utilization of natural resources. To this day, Malayali farmers keen on

maintaining the pure strains. In the selection process much attention is given to manage the seed quality rather than improving the productivity. Seed selection and storage practices vary depending on the type of crop species. For little millet and kodo millet, the women collect the seed from the threshing floor after harvest. There is no selection of promising plant types in the field. In the case of italian millet and finger millet, the plants are selected in the field itself for disease free, bold and fully filled ear heads. The selected ear heads are dried separately, bundled and tied to the roof about the hearth. The accidental mixtures are not removed deliberately, when necessary farmers obtained pure seed from neighbouring farmers. In this process, because of the breeding system and the reproductive biology of the species, opportunities for the development of intermediaries are very minimum even in the mixed cropping system.

The minor millets have not wholly disappeared from the Kolli Hills region. During 1970 –71 the total area under minor millet cultivation was nearly 1799 ha and it was drastically reduced to 840 ha during 2000-01. Currently out of 247 hamlets in the Kolli Hills, more than 120 hamlets continue cultivating millets (the average millet growing area per household was around 0.25 – 0.50 ha). On an average each hamlet has 30 households and around 25% of the total households cultivate millets (Village Records during respective periods).

Gastronomic, agronomic and social factors play an important role in maintaining the millets in cultivation. The preference for millets in the diet is due to its non-starchy polysaccharides, which slowly release glucose to the blood stream during digestion. Malayali women prepare several dishes with millets for daily consumption and for festivals. Its use as a special food in prenatal care of women and its fodder quality are important factors in maintaining

this traditional resource. Even now in many households pregnant and lactating women prefer a millet-based diet. Millets provides energy and prevents weight gain. They believe that during pregnancy and the consumption of millet helps to induce lactation and maintain body temperature after delivery. The millet based cropping system helps to get multiple food products like mustard, pulses and coriander, maintains soil fertility and prevents soil erosion. Most of the cultivable lands were cleared from forestland. The establishment of a permanent cultivable field from a forest/bush fallow field takes nearly 10-12 years. In this process of conversion millets are cultivated as a first crop for nearly 8-10 years in order to stabilize the soil and maintain soil structure.

Millets are also significant in ritual practices and bring social prestige to *Malayali* households. The *Malayalis* follow the convention of offer a special dish made with the Italian millet flour mixed with brown sugar while worshipping The goddess *Mariamamma*, one of their main deities. The social status of the household goes up in the village when the household manages to offer more diversified grains, which includes all minor millets cultivated in the hills. Also during marriages it is customary that seven kilo grams of little millet are given as a part of *parisam* (bride price).

METHODOLOGY

The study was carried out between June 1997 to December 2001. Participatory methods, interviews and observation were used to elicit the information. Nearly 25 millet-growing villages out of 247 villages in Kolli Hills were selected and participatory appraisals were carried out.

Subsequently, 10 to 12 knowledgeable men and women farmers in a village were identified and interviewed. Also participant observations and visits to the farmer's field during different phases of crop growth as well as storage and post harvest processes were carried out. The techniques of Participatory Rural Appraisal (PRA) such as historical timeline analysis was used to determine the historical knowledge of the crop introduction and transect analysis to identify the millet growing ecology and to identify the main characteristics used to distinguish and describe landraces in the field (Robert Chambers, 1980). Pairwise comparison of varieties resulted in understanding the criteria used by farmers in differentiating the landraces and gender specific prioritizing of varieties. Activity profiles enabled to get information about the social division of labor between men and women in production and management of millet species. Triangulation at the end helped to validate the data. In addition, participant observation helped to understand the different agronomic practices with in the context of annual crop calendar. During June 1999-2000 all the landraces of different folk species were grown in a single experimental field and on which selected informants are requested to view and name, independent of one another. It is carried out to elucidate the differential knowledge with 14 women and 16 men (of age 25-60) at the different phases of crop growth. The voucher specimens, which include the whole plant and the seed materials, were collected and deposited in the Community herbarium of M.S.Swaminathan Research Foundation, Chennai, India.

FOLK SYSTEMATICS

Farmers classify the crops into folk-species and folk varieties (Table 1). The folk-specific and folk-varietal level categorization is structured in a hierarchical system that

corresponds to evolutionary relationship and has practical use. It resembles the Linnaean taxonomy system, based on the morphological species concept.

FOLK SPECIFIC LEVEL IDENTIFICATION AND CLASSIFICATION

At the folk specific level, four millet species were differentiated by the people interviewed using a set of characteristics of seeds such as colour, texture and shape, and the characteristics of the growing plant such as stem, hairiness, ear structure and shape. Processing strategy and meal quality were also used as variables by the people. The following are the characteristics used by farmers to differentiate all four species from one another at different phases of crop growth:

- ✓ Vegetative stage - Stem thickness and hairiness; leaf sheath and plant architecture
- ✓ Reproductive stage - Ear shape and structure
- ✓ Seed/grain - Shape, size, color and texture
- ✓ Post harvest operations – processing strategy and food quality

Nomenclature. - The farmers organize their practical knowledge into a folk taxonomic structure that is stored, retrieved and communicated using specific terminology. The linguistic constituents of local names of common and kodo millet species (differ in common names) in Kolli Hills, represent the phenotypic character. In the two species, the principle differentiating dimensions used to contrast among specific taxa are lexically encoded in the names of taxa. The local name adequately characterizes the species. Common millet is locally called by Malayalis as ***varikora***, ‘striped kora’, as the seed has series of brown lines. Kodo millet is commonly referred as ***thrivaragu*** ‘*twisted varagu*’, because the earhead shape and the arrangement of grains in earhead

looks like a twisted object. Little millet and Italian millet are differentiated at the generic level as *samai* and *thinai* respectively, which are lexically unanalyzable (Table 2).

FOLK VARIETAL LEVEL DIFFERENTIATION AND NOMENCLATURE

Malayali farmers categorize the landraces along two dimensions. The first one differentiates among the landraces following a taxonomic hierarchical model (Hunn, 1982), and is reflected in the nomenclature of the taxa. The second dimension is a functional classification in which the categorization is based on the uses of the taxa.

Taxonomic hierarchal system of classification is based on morphological and gastronomical characters, which are reflected in nomenclature. This suggests a common ethnobiological principle of a positive relationship between cultural importance and lexical differentiation (Berlin, 1992). Also, nomenclature reflects contrasting morphological characters among the cultivars. The most useful parts of the plants are labeled in the nomenclature using morphological cues such as plant height, earhead structure and arrangement, and agronomical and gastronomic qualities. The name *mallia sama* ‘white sama’ means gastronomic quality, which is its appearance (like jasmine flower, pure white in colour). *Sadan sama* ‘braided sama’ as the secondary branches of panicle are arranged like a braid and *thirikula sama* ‘twisted sama’ as the grains are densely arranged in the tertiary branches represent the arrangement of grains and secondary and tertiary panicles. *Pillu sama* ‘grass sama’, the stem is very thin like a grass. *Kattavetti sama* ‘hard sama’, the stem is very hard to cut at the base and so denotes difficulty in harvesting process. *Kottapatti sama* ‘castle sama’, gives higher yield and so represents higher

productivity. *Perum sama* ‘big sama’ reflects the size and robustness of the plant, as well as the duration of the crop. The further subdivisions *Vella perum sama* ‘white big sama’ and *Karum perum sama* ‘black big sama’ denote the colour of the grain.

In Italian millet the primary classification is also based on morphological cues. *Killan thina* ‘nipping thina’ represents the harvesting practice. *Mossakkana thina* ‘dense hairy thina’/ *Koran thina* ‘bristles thina’ reflects the dense hairs in the earhead. *Karum thina* ‘black thina’/ *sen thina* ‘red thina’ represents the colour of the grain. *Perum thina* ‘big thina’ reflects the size of the earhead. *Palan thina* ‘milky thina’ reflects the colour (milky white) of the grains. In Kodo millet, there are two landraces differentiated on the basis of grain colour, *karungkali* with a black seed coat and *sengali varagu* with a red on.

Functional classification. Categorization by the people is based on multiple use values (food and fodder), harvesting method (cutting the whole plant or ear head alone), and duration and landscape specific (early and late maturing landraces in relation to the agro-ecosystem and soil fertility) (Table 3). Some landraces of little millet can be grown only in bush fallow cycles because they need fertile soil whereas others need less fertile soil in terraced beds with annual crop rotation. On the basis of the day-length, landraces are classified into early (90-110 days) and late maturing landraces (150-180 days). The late maturing landraces are cultivated in rocky terrain, do not have fodder value, the panicle alone is harvested, and they are suitable for intercropping and monocropping. The early maturing landraces have fodder value, cultivated in the terraced bed with crop rotation, and harvested near the root. This system of classification is highly context sensitive and location specific and is structured on the basis of practical utility.

Several functional variables are identified to comparatively assess the practical significance of the taxa:

1. Method of harvesting
2. Maturity period
3. Cultivation niches (micro environment) and cropping system
4. Tolerance to seasonal drought
5. Ease of processing
6. Meal quality and fodder value

These functional variables are used individually, and most of them are utility-based. The functional variables are practically motivated categories that reveal the diversity and management strategies of Malayali farmers in conceptually organizing the core taxa. Farmers frequent and intense encounter with the millets for practical reasons of food production and optimizing resources resulted in awareness and use of the agronomic, gastronomic and post harvest qualities of landraces for cultivation. Table 4. shows the differentiating criteria at the inter-and intra-specific levels, and also level of stratification within the species.

Italian millet landraces are also categorized on the basis of agronomic qualities (functional variables), such as like crop duration (short/long), harvesting practice (cutting the whole straw and ear head alone) and suitability in cropping system (intercrop/ pure crop). The criteria for differentiating folk generics are based on morphological distinctions both at plant and grain level, which shows the way people process and use plants. Criteria that are phenotypically identifiable and heritable (inherited by the next generation) are reflected in the nomenclature. Both the folk-specific and folk -varietal levels reflect cultural importance that is conceptually

and linguistically recognized by Malayali farmers. The characters used for identification of the different landraces are qualitative characters, heritable and not influenced by the environmental perturbations.

The functional classification is based on functionally constructed groupings based on agronomic values. It is a special purpose taxonomy that organizes practical knowledge about landraces. It is a local classification used by the Malayali men and women as indicated in the hierarchical classification. Farmers prefer characters in a specific landrace that are distinct from those used to differentiate or name the taxa. The gastronomical, morphological and agronomical characters are perceptually prominent for the farmers and have adaptive significance for the survival of little and Italian millet landraces. According to Harlan (1975), landraces are the products of human selection for such characteristics as colour, texture, utility and these characteristics are widely used by farmers in naming their landraces. The nomenclatural pattern in most of the folk-varietal taxa correlates with morphologically distinguishable and genetically transmittable characteristics, which could facilitate the identification and utilization process.

GENDER DIFFERENTIAL KNOWLEDGE

Variables such as gender and age influence the way people categorize millets. According to the traditional division of labor in Kolli Hills, men exclusively perform the activities like plowing, seed sowing and cross plowing. Malayali men and women jointly take decision on crop and landrace selection and allocation of area for cultivation of different minor millets. Men and women make decisions about when to sow, women suggest the best time for the men to cross

plow based on their close observation of crop growth. Even though some of the activities are shared by both *malayali* men and women, the nature of the roles and the responsibilities of close watching/caring of the crop put the women in the situation to take almost all decisions regarding millet cultivation. (Rengalakshmi *et al*, 2001). Women engage in many vital activities such as maintaining optimum plant population per unit area, weeding, and continuous monitoring and seed management including seed selection, storage and seed exchange and post harvest utilization. Both men and women do harvesting, threshing, winnowing and transporting. An in-depth comprehensive analysis of gender roles and decision making in small millet cultivation and utilization illustrates how women's role is linked to the cultivation of millets and conservation as well.

Malayali women and men have different experience with and knowledge of millet landraces. Women and men characterize folk-specific and folk-varietals in different ways were noticed, which largely attribute to differences in the traditional division of labor. Both men and women use seed colour and plant vigour. But women differentiate the little and italian millet landraces on the basis of geographical distribution, edaphic and climatic requirements, plant height, arrangement of grain in the panicle and shape of the panicle, processing and meal quality, and impact on health. In contrast, Malayali men differentiate them on the basis of agronomic practices and productivity.

With regard to specific characteristics such as susceptibility to damage from birds, early ripening, threshing and pounding requirements only women are able to discriminate between different landraces. Intimate involvement of women in seed management, processing and food preparation helps them to gain deeper biological and gastronomic knowledge. This is reflected in

a more detailed categorization that uses subtle characteristics. For example, Malayali women characterize a little millet landrace *kottapatti sama* as a wonderful taxon, greatly preferred because of its higher productivity, adaptation to diverse agro-ecosystems, meal quality and ease of processing. The active role of women in seed management, particularly in selection of elite plants helps them to acquire breeding knowledge and, consequently, taxonomic classification/perspectives based on practical motives in utilizing resources. Irrespective of the gender elder malayali men and women (>40 years) identify and classify using phenotypic characters, geographical distribution, agronomy, relative gastronomical qualities and uses than the younger generations (<40 years). The latter age group could not able to distinguish the landraces and identified all as general folk specific groups. It might be due to lack of experience and less frequency of interaction with different landraces. However, with in the group women are more knowledgeable than their counterparts in seed selection, threshing, pounding and gastronomic qualities. Thus the process of knowledge acquisition is dynamic, gendered and responsive to evolutionary changes and adaptation through natural and cultural selection by women and men.

SUMMARY

Folk-biological classification of millets by Malayali tribal farmers of Kolli hills shows that Agronomic, morphological and gastronomic characters are pragmatically applied to classification. The millet nomenclatural structure reveals the cognitive understanding of the biological characteristics of the species as well as practical knowledge that comes from intimate relationship with the species. Farmers classify minor millet species and landraces in a

hierarchical manner using a set of exclusive characters. Malayali farmers classify the folk varieties in two different dimensions. The hierarchical classification helps them to differentiate taxa on the basis of characters that is reflected in nomenclature. Most of the differentiating and nomenclatural categories refer to qualitative heritable characters and are least influenced by environmental factors. This indicates stability of differentiating characters and the deeper understanding of the Malayali farmers. In functional classification, each of the taxa is classified a limited number of categories on the basis of utilitarian values. It is a special purpose classification dealing with the organization of the functional knowledge of the Malayali farmers. It is used in restricted domains of activity. Though common characters are used in functional classification the characters of each taxon within the group varies between regions. Social variables influence the categorization process, particularly the gender division of roles and responsibilities related to millet cultivation and utilization.

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Table. 1 - Nomenclature details of four minor millet species in Kolli Hills

General name	Botanical name	Folk name	Meaning
Common millet	<i>Panicum milliaceum</i> L.	<i>Varikora</i>	Striped grass
Kodo millet	<i>Paspalum scrobiculatum</i> L.	<i>Thirivaragu</i>	Twisted varagu
Little millet	<i>Panicum sumatrense</i> Roth ex Roem.& Schult.	<i>Sama</i>	Samai
Italian millet	<i>Setaria italica</i> (L.)Beav.	<i>thina</i>	Thinai

Table. 2 - List of small millets cultivated in Kolli Hills

General name	Botanical name	Landraces
Common millet	<i>Panicum milliaceum</i> L.	-
Little millet	<i>Panicum sumatrense</i> Roth ex Roem.& Schult.	<i>Malliasama</i> <i>Sadansam</i> <i>Thirikulasama</i> <i>Kattavettisama</i> <i>Kottapattisama</i> <i>Karumperumsama</i> <i>Vellaperumsamai</i>
Kodo millet	<i>Paspalum scrobiculatum</i> L.	<i>Sengalivaragu</i> <i>Thirivaragu</i>
Italian millet	<i>Setaria italica</i> (L.)Beav.	<i>Killanthina/Mukkananthina</i> <i>Mossakkannathina/koranthina</i> <i>Karumthina</i> <i>Senthina</i> <i>Perumthina</i> <i>palanthina</i>

Table.3 - Functional variables of little millet landraces classified based on their utility

<i>Functional equivalents/Landraces</i>	<i>Little millet landraces#</i>							
	<i>ms</i>	<i>ts</i>	<i>ss</i>	<i>ps</i>	<i>vps</i>	<i>kps</i>	<i>kvs</i>	<i>Pis</i>
Method of harvest								
Whole plant (<i>adiarrupu</i>)	✓	✓	✓	-	-	-	✓	✓
Panicles alone (<i>Melaruppu</i>)	-	-	-	✓	✓	✓	-	-
Maturity period								
Short duration – 3-4 months	✓	✓	✓	-	-	-	-	✓
Long duration - 5-6 months	-	-	-	✓	✓	✓	✓	-
Cultivation niches (Agroecosystem)								
Terraced beds – middle of the slope	✓	✓	✓	-	-	-	✓	✓
Rocky terrain	-	-	-	✓	✓	✓	-	-
Cropping system								
Mixed cropping	-	-	-	✓	✓	-	-	-
Pure cropping	✓	✓	✓	-	-	✓	✓	✓
Tolerance to seasonal drought								
Tolerant	-	-	-	✓	✓	-	-	-
Susceptible	✓	✓	✓	-	-	✓	✓	✓
Ease of processing – comparative rating from 1-3 (1- two poundings, 2- two to four poundings and 3 – more than four poundings)	1	1	1	2	2	1	3	3
Meal quality in terms of taste and texture - rating from 1-3 (1- good, 2- medium and average)	1	3	2	1	2	1	2	3
Fodder value								
Suitable	✓	✓	✓	-	-	-	✓	✓
Not suitable	-	-	-	✓	✓	✓	-	-

ms-malliasamai, *ts*- thirikulasamai, *ss*- sadansamai, *ps*- perumsamai, *vps* – vellaperumsamai, *kps*-kottapattisamai, *kvs* – kattavettisamai and *pis* – pillusamai.

Table 4. - Contrasting criteria at the inter and intra specific level

Species level	Intra species level in little millet		Intra species level in italian millet	
	Primary	Secondary	Primary	Secondary
Plant morphology (e.g., stem character) ✓ Hairiness ✓ Ear head – shape and structure ✓ Seed color, shape and luster	✓ Maturity periods ✓ Growing niche/habitat ✓ Method of harvest ✓ Fodder value and ✓ Suitability to cropping system	✓ Ear head structure, shape and arrangement of grains and secondary and tertiary panicles ✓ Meal quality ✓ Texture of the stem ✓ Architecture of the plant ✓ Color of the grains	✓ Method of harvest ✓ Suitability to cropping system ✓ Crop duration	✓ Hairiness ✓ Color of the grain ✓ Size of the ear head ✓ Method of harvest