



Documentation of Traditional Agricultural Practices with some Scientific relevances in Selected Villages of Chitradurga District Karnataka India

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ABSTRACT: Traditional knowledge has two powerful advantages over scientific knowledge like it has little or no cost, and is readily available. Traditional knowledge is the accumulated knowledge, skills and technology of the local people, derived from the local interaction of human beings and their environment. The study was conducted at remote villages like Janukonda, Godabanahal, Pandarahalli and Talikatte of Chitradurga district with an objective of documenting the traditional agricultural practices adopted by the dry land farmers. Documentation of traditional agricultural practices was done by direct interview and group discussion methods. In the paper, some of the identified important traditional agricultural practices adopted by the dry land farmers are described.

Keywords: Traditional knowledge, Indigenous technologies, Scientific relevance.

I. INTRODUCTION:

Agriculture plays a vital role in India's economy. The Indian agriculture system began as early as 9000 BC. During this period techniques were developed for the settled mode of production in agriculture. New techniques were developed in the Neolithic period to improve the method of agriculture system like threshing, planting crops in rows and storage grains in granaries and they passed their improved techniques of agricultural production to the next generation. Indus valley civilization relied on the considerable technology achievements of the Pre-Harappan culture, including plough. The method of agriculture which Indus civilization people practiced was rainfall harvesting. Irrigation was developed in the Indus valley

civilization by around 4500 BC including artificial reservoirs at Girnardated to 3000 BC and an early canal irrigation system in 2600 BC (Bheemabai.S. Mulage *et al.*, 2017).

Traditional agricultural tools and implements refer to those invented in ancient times, and used for a long time, until recently or still being used now. Traditional farm tools and modified through experience over generations to meet emerging socio-economic and farming challenges. Traditional agricultural tools and implements were made up of locally available materials like stone, wood and iron, constructed at local level or standardized factory made implements. These tools and implements were economical in term of labour, money and time saving. Also they are operated easily without any special skills. Each of these tools and implements are usually used in connection with specific operation in the sequence of agricultural operations, land preparation, sowing, weeding, irrigation, harvesting, post harvesting operations and transportation(Bikash *et al.*, 2015).

There is a need to analyse the importance of traditional agricultural practices for allied agricultural activities. It is also reported that traditional agricultural practices is farmer friendly, economic and environmental friendly, socially accepted and suited to specific local and environmental conditions. So eventually, traditional agricultural practices are fruitful for sustainable development of the community and country as a whole. (Shanmugaraja *et al.*, 2019).

Study site :

The study was conducted in selected villages namely Janukonda, Godabanahal, Pandarahalli, and Talikatte villages of Chitradurga district in Karnataka, which falls in dry agro climatic zone, which receives

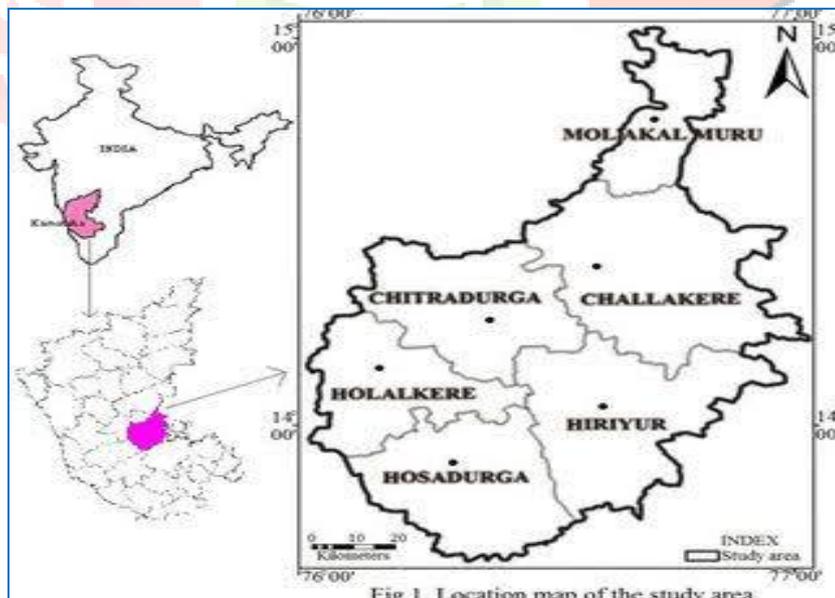


Fig 1. Location map of the study area

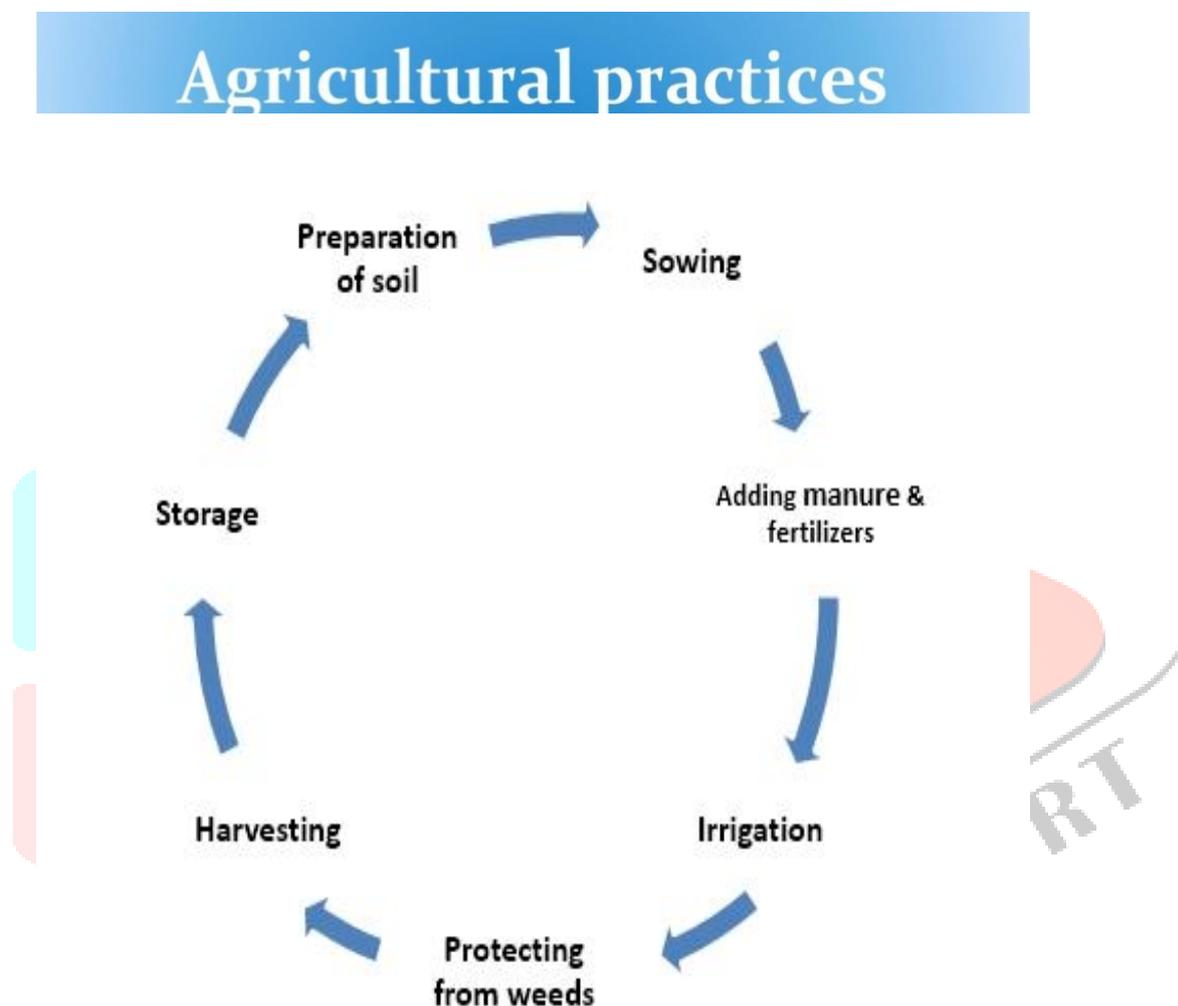
low to moderate rainfall and is one of the drought prone districts in the state, normal annual rainfall varies between 668 mm in Holalkere in Western part to 457 mm in Challakere in the northeastern part.

II. MATERIALS AND METHODS:

For this study we randomly selected some experienced farmers, farmer women' s, and farm labors, and aged farmers of the villages are involved during the process of data collection. The data is collected

from them by questionnaire method, by conducting the responds through one to one interaction, group discussion and interview methods. Information comprised of description about organization of agricultural work, durability of agricultural tools, fabrication of storage structures, methods and maintenance, uses and other special features. Photographs of agricultural tools, equipments, storage structures and conservation techniques were collected by visiting some farmers houses in the villages.

III. RESULT AND DISCUSSION



INDIGENOUS METHODS FOLLOWED IN AGRICULTURE

1) Preparation of Soil:

Land preparation is the first step in indigenous agricultural system all variety of cropping requires adequate land preparation, optional operations including land cleaning, weeding, ploughing, harrowing, and leveling. The main objective of land preparation is to create a favorable environmental for plant to germinate and grow.

Ploughing and harrowing: Was done weeks before sowing at regular interval of time,

Scientific Relevance: It improves soil structure better ventilation, permeability, and loosening of root zone help in easy penetration of roots, exposure of deep soil to sun rays help to kills harmful bacteria and fungi in the soil and obtain good recovery and fertilized.

Cleaning and weeding the field: Cleaning and done before sowing, it is the removal of unwanted, and harmful plants and other materials from the crop field, it is done manually by workers

Scientific Relevance: Cleaning helps to easy percolation of water in to the soil, weeding prevent cross pollination, and also prevent use of nutrients from unwanted plans.



Fig1: Plough with mould board plough



Fig2: Plough with iron plough



Fig3: Plough with wooden plough



Fig4: Plough with leveller



Fig5: Cleaning and weeding



Fig6: Burning of plant residues

2) Sowing:

Putting seeds in soil is called as sowing, in indigenous method, selection of seeds for sowing is done by the experience of farmers based on color, shape, size, sowing is done manually by hands or by using some wooden sowing equipments by using ox or bull.

Indigenous method of pre treatment of seeds: Pre treatment of seeds is done before sowing.

Pre treatment of seeds helps to improve the seed germination.

- **Soaking of seeds in water:** Seeds are soaked in water before sowing and soaking time is varies from seed to seed.

Scientific Relevance: Soaking of seeds in water may helps to activating the biochemical mechanism required for germination and improves seed germination, and breaks the hard seed coat by softening the seed.

E.g.- Corn, Vegetable Seeds (Tomato), Peas, Beans, Carrot, Radish Seeds.

- **Soaking of seeds in cow urine:** Seeds are soaking in cow urine over night before sowing

Scientific Relevance: It increases the percentage of germination by conducting physiological parameters like growth regulators and nutrients, and also inhibits seed born diseases, breaks seed dormancy and drought resistance.

E.g.- Ground Nut, Cotton Seeds, Ragi, Maize Seeds.

- **Soaking seeds in cow milk:** Seeds are soaked in cow milk 24 hrs before sowing

Scientific Relevance: Milk contains enzymes and fungicidal properties that may restrain growth of mold and bacteria and also it help to fight against various diseases including fungi, and also increase germination.

E.g.- Tomato Seeds, Brinjal, Bendi, Beans etc.

- **Soaking of seeds in butter milk :** Seeds are soaked in butter milk for 5 hrs before sowing

Scientific Relevance: Butter milk contain lactobacillus bacteria which can be effectively act as bio inoculants or bio fertilizer to enhance the yield of crop. E.g.- Bendi, Beans, Pea Seeds.

- **Seeds are mixed with cow dung:** Cow dung and water mixed properly and then seeds are soaked for about 24 hrs and kept in cool and dry place and sow immediately in the next day.

Scientific Relevance: The cow dung slurry is mixed with seeds during sowing helps in good germination of seeds, cow dung contains rich materials like Nitrogen, Phosphorus, Potassium. It helps to growth of beneficial micro organisms in soil and also helps to maintain moisture content of seeds during germination and act against soil born diseases E.g.- Cotton Seeds, Chilli Seeds.

Levelling of soil: Covering of soil over seeds after sowing is called as leveling of soil. Indigenously it is done by using some of wooden leveling equipments.

Scientific Relevance: Covering of soil after sowing help to prevent the loss of seeds by wind or rain and also protect the seeds from birds picking.



Fig1: Sowing with seed drill



Fig2: Sowing by dibbling method



Fig3: Soaking of seeds in water



Fig4: Soaking of seeds in cow urine



Fig 5: Soaking of seeds in cow milk



Fig6: Soaking of seeds in butter milk



Fig7: Soaking of seeds in cow dung



Fig8: Levelling of soil



Fig9: Levelling of soil by leveller

3) Adding Manure:

Manures are plant and animal wastes that are used as source of plant nutrients they release nutrients after their decomposition, the art of collecting and using wastes from animals, human, and vegetables sources for improving crop productivity is practiced since from olden days.

Type of manures used in indigenous agriculture practice:

- **Farmyard manure:** Farmyard manure refers to the decomposed mixture of dung and urine is farm animals along with litter and left over materials from roughages or fodder feed to the cattles, this manure can be applied twice one, time before sowing and after sowing.
- **Sheep and goat manure:** The sweeping of sheep or goat sheds are placed in pits for decomposition and it is applied later to the field.
- **Poultry manure:** The excreta of chicks are collected and it is left for few months for decomposition and then it is applied to the field.
- **Oil cakes :** After oil is extracted from oil seeds the remaining solid portion is dried as cake which can be used as manure

E.g. - Castor Cake, Neem Cake etc. (these are especially for horticulture crops)

- **Mulching** : Mulching is a protective cover of organic matter and plant leaves applied to the surface of soil by using plant leaves, hay, straw, bark, and animal manure etc.

Scientific Relevance:

* These manures are naturally available and organic and do not cause any harm to the crop plants and also to the soil.

* Cow dung, cow urine, sheep, goat and poultry manures are very rich in Nitrogen, phosphorus, potassium, and also contain some beneficial salts and nutrients, which help in good growth and yield of crops.

* Mulching helps to prevent loss of soil fertility and soil erosion, and more retention of water in soil.

* These manures also act as fertilizer, and also have some, pesticidal, fungicidal, insecticidal, property, So that they can fight against soil borne pathogens which cause diseases.



Fig1: Farmyard manure



Fig2: Sheep and goat manure



Fig3: Poultry manure



Fig 4: Oil cakes



Fig5: Mulching

4) Irrigation:

Irrigation essentially means the watering of land to make it ready for agricultural purposes to maintain the moisture of the soil for healthy crop growth fields have to be watered regularly. The supply of water to crops at different intervals is called irrigation. The time and frequency of irrigation vary from crop to crop, soil to soil and season to season, in summer the frequency of watering is higher, whereas India is a monsoon dependent country. Therefore rainfall has a huge impact on our agriculture. Most of the farmers depend on rain for farming.

In India, the period of rain is restricted to only four months in a year, June to September, when the monsoon arrives. The remaining eight months are dry besides the nature of rain in India is uncertain and irregular. Sometimes it gets delayed, it causes uncertainty in agriculture and may result in drought condition in large area. To overcome this problem some indigenous or traditional methods are followed by the farmers in villages.

Traditional water harvesting methods for irrigation:

Since ages, People experienced either excess or scarce water due to varied rainfall and land topography. Yet they have managed to irrigate their agricultural fields using localized water harvesting methods by their traditional ways.

- **Construction of ponds and Lakes:**

Ponds and lakes are constructed outside the villages by using stones to store huge amount of water, during rainy season and water is used for agricultural activities throughout the year.

- **construction of wells (Bhavi) and katte:**

Wells: Wells are constructed in the form land to collect the ground water, and it is used for irrigation.

Katte: Katteis a temporary structure made by binding mud and stones build across small streams near the agriculture fields. So that the water collected in it is used for irrigation. During summer water gradually sweeps into the ground and increase the water level of nearby wells.



Fig1: Pond



Fig2: Lake



Fig3: Well



Fig 4: Katte

5) Protection from Weeds and Pests:

A. Weed control :

- **Removal of weeds:** Weeds are the unwanted plants / grass grown in crop field, traditional agriculture the weeds are removed from crop field, in indigenous agriculture the weeds are removed from crop field manually by labor women's in the village villages.

Scientific Relevance: Removal of weeds from the crop field helps to prevent the extract nutrients from the parasitic weeds that lived with crop plants, it also improve soil conditions by reducing evaporation from soil surface and also reducing the competition of weeds with crop for light, nutrients and water.

B. Pest and disease Control:

- **Cow urine:** Locally available cow urine is mixed with water/Neem solution which is pest control solution, sprayed over plants which directly act on white flies responsible for damage to cotton plants.

Scientific Relevance: Cow urine act as bio pesticide because it contains different types of salts, iron, calcium, phosphorus, lactose, so that it shows disinfection activity so that it kills the disease causing pests.

C. Growing of marigold flowers with crops : Marigold flowers are grown between the main crop plants is one of the methods followed to protect the crop from pest attack.

Scientific Relevance: Marigold flowers are bright attractive and secrets nectories so that they attract pollinators, helps in pollination in crop plants, marigold flowers has Insect repellent properties, so that they repels aphids, caterpillars, and flies which cause diseases to crop.

D. Bird scarers:

Bird scarers are made by clothes like the image of man which is placed in middle of the crop field.

Scientific Relevance: Use of bird scarers does not have any scientific reason but it is used only to scare the birds which destroy the crop or recently planted crops.

E. Spreading of Charaga or puffed rice around the crop:

The festival of shige hunnime which falls in the month of August has significances which are associated with pest control in agricultural fields by spreading of charaga or puffed rice around the crops.

Scientific Relevance: Spreading of charaga or puffed rice around the crop field help to attract the birds which feed on insects present in the crop field.

F. Growing of oil and millet plants at the border of crop field:

Growing of millets like saje, navane (millets) etc. and oil seeds like castor seed plants at the border of crop field.

Scientific Relevance: Millet plants are more taller than maize, ragi, cotton crops so that birds attack or feed more on these plants so that main crop is protected from birds which are good source of health.

G. Mixed cropping and inter cropping system:

Mixed and inter cropping are very old cropping formula, against crop failure due to abnormal weather condition, crops are chosen by the experience of farmers based on root pattern, crop duration, such a way that no crop competes for source of light, nutrients, water.

- **Mixed cropping:** Growing of two or more plant species in same field in same year simultaneously
E.g.- Growing of Pulses, Vegetables, Flowers, Legumes, Along with Main Crops like (Ragi, Cotton, Maize,).
- **Inter cropping:** Growing of two or more crops simultaneously in the same field in a definite pattern.
E.g.- Growing of Maize in Areca Nut plantation.

Scientific Relevance: Both mixed cropping and inter cropping increases soil fertility, and there is less risk of crop failure minimizes the pest infestation and disease attack and also suppresses the weeds.

H. Growing of leguminous plants:

Leguminous like lima bean, pea plants, bean plants etc. are growing along with main crops

Scientific Relevance: Leguminous plants root contains root nodules which has rhizobium bacteria which fix the atmospheric nitrogen into the soil and increase the soil fertility, decomposition leguminous plants after harvesting enriches the soil fertility.

Multiple cropping helps in integrated pest management, resulting in minimizing the insect by attracting insect towards them so main crop is unharmed and act as trap crops.

I. Crop rotation:

Crop rotation is the practice of growing a series of different types of crops in the same area across a sequence of growing season. It is one of the methods of disease management.

Scientific Relevance: Change of crops in a sequence decreases the population level of soil borne pathogens and pests by interrupting life cycle of pests and pathogens, and also interrupting habitat of pest and pathogens, change of host may cause difficulty in survival of pest, pathogens, and nematodes in the soil.

Table1: Some important products used in pest management

Material	Properties
Root of vasika (Justicia adhatodaa)	Soothing effect, insecticidal, antifungal, antibacterial, anthelmintic.
Branches and leaves of atimuktaka(Hiptage enghalensis)	Leaf juice insecticidal; bark contains glucoside (hiptagin) and tannins`
Mustard (Sinapis alba = Brassica alba)	Insect antixenosis and antibiosis; acaricidal; nematicidal; antifungal
Bidanganga (vidanga) (Embelia ribes)	Anthelmintic; antibacterial insecticidal
Ash	Dessicates insect eggs on seed; speeds up germination by softening seed coat through mild alkalinity; provides micronutrients

(Source:www.AgriMoon.Com)

**Fig1: Removal of weeds****Fig2: Weeding****Fig 3: Cow urine****Fig 4: Marigold flowers with maize**



Fig 5: Bird scarers



Fig 6: Spreading of charaga



Fig 7: Growing of border crop



Fig 8: Mixed cropping



Fig 9: Inter cropping



Fig 10: Growing of legumes



Fig 11: Crop rotation

6) Harvesting, threshing, winnowing, and drying:

- **Harvesting:** Once the crop has reached the maturity, it now needs to be harvested so harvesting is the cutting and gathering of matured crop, traditionally harvesting is done manually by group of workers in the villages, the term harvesting also generally includes the immediate post harvesting practices such as threshing, winnowing etc.

Table 2: Criteria for harvesting of some crops

Crop	Maturity symptoms and criteria for harvesting
Maize	Husk color turn pale brown, 25 to 30 days after tasseling
Ragi	Brown color with hard grain
Cotton	Bolls fully opened
Sorghum	40 days after flowering yellow colored ears with hard grain
Pearl millet	28 to 35 days after flowering compact ears, on pressing hard seed come out
Red gram	35 to 40 day after flowering pods turn brown

(Source: Information collected from farmers)

Scientific Relevance: Harvesting at proper maturity time help to prevent crop loss by weather conditions, pest and pathogen attack, and also help to maintain quality, moisture content and health of seeds.

- **Threshing and winnowing :**

Threshing: Threshing is the process of separation of grains from the stalk on which it develops and form the chaff or unit that covers it, in this process edible part of the crop is loosened but not the fiber part. It is done after harvesting which requires pre drying of harvested crop, pre drying helps in easy separation of grain. In villages threshing was usually carried out in an isolated plot of land called threshing floor (Kana), it is coated or plastered with mixture of cow dung and cow urine.

Traditionally threshing is done by two methods

- **Hand threshing:** Some of the crops like maize, cotton, ground nut, pulses etc. are threshed manually by using hands or by beating with sticks or by rubbing.
- **Animal threshing by using threshing stone:** Ox or Bullock's carrying threshing stone was made to walk in circular path on crop spreading on threshing floor.

Wind Winnowing: Winnowing is an agricultural method developed by ancient cultures for separating grains from straw it is done after threshing of grains, it involves throwing the mixture into air so that the

wind blows away the light chaff while heavier grains fall back down for recovery by using winnowing basket.

Scientific Relevance:

* Traditional method of threshing and winnowing helps to avoid the heavy loss of seeds because traditional method of threshing and winnowing is done in an isolated area which protected from the pest, insects and, rodents etc.

* The threshing floor is plastered or coated with mixture of cow urine and cow dung which act as disinfectant so that it prevent the attack of fungi or bacteria to seeds which causes disease to seeds or grains.

* In traditional method of threshing and winnowing there is less chance of seed breaking.

Sun drying: After threshing and winnowing the cleaned grains or seeds sun dried for few days. Only well-dried seeds should be stored. Seeds with moisture in them become damp, moldy and vulnerable to insect attacks. For drying, lay the seeds under the sun on a mat and spread them thinly. Mix and turn the seeds 4 to 5 times in a day. Repeat the process for about 2 to 3 days. On a hot sunny day, the seeds spread on a mat in the morning should be heaped for some time and again spread frequently to avoid sun-burn and damage of the embryo.

Scientific Relevance: Drying of seeds under sun helps to kill the harmful bacteria and fungi if present on the surface of seeds, which causes fungal or bacterial disease to seeds or grains during storage, and it also helps to attain optimum moisture level of seeds or grains.



Fig1: Harvesting by using sickle



Fig2: Harvesting by hand method



Fig3: Threshing by hand method



Fig4: Threshing by using animals



Fig5: Wind winnowing



Fig6: Sun drying

7) Conservation Techniques:

Seed or grain storage is an vital step in the indigenous agricultural practices followed in villages, it plays an important role in preventing loss of seeds or grains from pest, pathogen, insects and birds attack during storage.

- **Red soil coating:** Red soil and water are mixed to form a paste then seeds are mixed with it, so that soil is completely adheres to seeds then seeds are dried under shade and transferred into pots.

Scientific Relevance: As the red soil covers the grains and seeds the insects could not able to feed, lay eggs as it acts as barrier. Soil absorbs left out moisture in the seeds and grains and avoids spoilage, improves germination.

E.g.- Lima bean, Red gram and Some pulses.

- **Use of Ash:** Seeds are filled in earthen pots to its 3/4th volume and 1/4th volume filled by wood or cow dung ash and after six month pots are sun dried and again fill with fresh ash.

Scientific Relevance:

* Ash contains silica which interferes with insect feeding and also hinders fungal pathogen multiplication.

* Ash dust reduces the relative humidity of the storage condition and dries the seed surface.

* Prevent the movement of insect by friction of dust particles.

E.g.- Pulses.

- **Sun drying of grains:** Sun drying is the common traditional practice followed before grain and pulses storage.

Scientific Relevance: Sun drying destroys existing insect, pest and their different stages. It helps to reduce spoilage and enhance the dormancy period of grains.

E.g.- All crops.

- **Storage of pulses with common salt:** Common salt is mixed with pulses and filled into mud pots.

Scientific Relevance: Salt had an abrasive action on the skin of insects so it prevents movement inside storage containers, and also salt has hygroscopic and insecticidal property. Salt absorb the moisture and keep the grain dry so that it avoid spoilage.

Eg: Pulses and Legumes.

- **Use of Lime powder:** Lime (Calcium carbonate) is powdered and mixed uniformly with grains and stored in gunny bags at dry place.

Scientific Relevance: The Lime has repellent and antecedent property and lime also prevent insects to get multiplied.

E.g. - Cereals and Pulses.

- **Use of Neem (*Azadirachtaindica*):**Neem seed power or neem leaves are mixed with seeds and stored in earthen pots.

Scientific Relevance: Neem has several properties like repellence feeding, and ovipositional deterrence, growth inhabitation etc.

E.g. - Pulses.

- **Use of Tulsi (*Ocimum sanctum*) seeds:** Seeds of maize are mixed with dried seeds and leaves of tulsi.

Scientific Relevance: Tulsi has very good repellent property, the palmitic acid, linolic acid, stearic acid present in tulsi have antecedent and larvicidal effect.

E.g.- Maize.

- **Use of dry Chillies:** Dry Chillies are placed in the bins or bags containing seeds.

Scientific Relevance: pungency of dried chillies keeps the insects and pests away.

E.g. - Little Millets, Pulses.

- **Plastering of storage bins or pots with clay and cow dung:** Storage pots are plastered with clay and cow dung, after filling the seeds in the pots.

Scientific Relevance: Soil absorbs left out moisture in the seeds and grains, avoid spoilage. Soil and cow dung plastering act as a barrier between grains and insects.

Indigenous seeds or grain storage structure:

A safe storage place must be provided for the grain produced until it is needed for the grain produced until it is needed for consumption and multiplication purposes. Since grain production is seasonal, and consumption is continuous, So that in indigenous agricultural system storage structures play important role in safe storage, and maintenance of quality and quantity of food grains.

Kinds of storage structures or storage facilities:

- Temporary corn storage:**Field storage of corn is accomplished on platform the stack of unpeeled ears is covered by a cap of partially woven grasses.

E.g. - Maize.

- Underground grain storage pit:**It is locally called as Hagevu. This is a versatile and low cost structure for grain storage. The pit is dug beneath the ground either in the front yard or backyard of the house, with square, rectangular or circular shape.

These pits mainly used for storing the millets like sorghum, pearl millet, finger millet or Ragi, and other millets. Before filling the grains, it is plastered with cow dung and chaffy ear heads, bran or other crop wastes are spread at the bottom of the pit. Then it's inner wall is lined with the dried stalk of sorghum or pearl millet. Sometimes paddy straw is coiled into rope and used for lining the pits in concentric circles. After lining, pit is filled with grains and covered with rectangular stone blocks. Again covered with gunny clothes and finally with dry sand to avoid moisture. Grains are usually stored in these underground for about 5-6 months and it is moisture proof and free from pest and pathogens .However rainy season is avoided for storage in these pits.

- Mud pots or earthen pots:**These mud pots are locally called as Madike or sorae. Mud pots of different capacity and size is made up of burnt clay and soil by the local person called kumbara. Before arranging the pots firstly circular ring made up of areca nut spathe is placed. On this ring the mud pots filled with grains or seeds are placed one above the other then the top most pot is closed with lid. This arrangement was usually made inside the house at the corner region. The grains or

seeds stored in this mud pots were kept safe away from wide range of storage pests for nearly 6 months ,after grain are taken out and subjected to sun drying and again stored in mud pots.

- d) Large mud jars:**These are locally called as Vadevu. It is large cylindrical structure made up of burnt mud and clay. Which is middle bulged shape and narrow ends. Top opening is closed with lid after filling the grains and plastered with cow dung or with mud, to prevent the entry of pests and small opening or out present at the bottom of the jar to collect the grains when ever required and it is closed with cloth or with coconut shell. It is used to store grains like. Ragi, Sorghum, with a capacity of 2-3 quintals.
- e) Large bamboo storage structure:**It is locally called as Kanaja. It is a grain storage container made out of bamboo. And plastered with mud and cow dung mixture, it prevents the spillage of grains and entry of pest by closing the pores of bamboo.
- f) Unhusked ears tide and hanged on poles:**Crops like maize, ragi. The grains are not singled out from their panicles or straw, the kernels of maize are tied into bundles and left hanging to a pole in front of the houses.

The bundles are left to hang till the next season of sowing. And the thorny twigs of bushes are covered around them. So that birds do not damage the stored plant materials.

- g) Vegetable Seed Storage Method:** The vegetable seeds are normally stored by women folk for their kitchen garden requirements by securing the seeds of different vegetables into knots tied around them in a white cloth. While doing so the seeds are mixed with wood ash / dried neem leaf powder.

After this these are conveniently put into Bottle guard, sprinkled wood ash on the top and closed the mouth of the bottle guard. Safe Grain Storage Methods for Wheat, Pulses etc.

Importance of seed storage:

- * Storage structures helps to protect the grains or seeds from weather, molds and other microorganisms, moisture destructively huge temperatures, insects, rodents, birds, objectionable odors and contamination and from unauthorized distribution.
- * To maintain initial seed quality viz. germination, physical and physiological purity, vigour etc. All along the storage period from harvest until planting, by providing suitable or even better conditions.
- * Main objective of seed storage is maintenance of an acceptable capacity for germination and emergence. It can only be accomplished by reducing the rate of deterioration to the degree required to maintain an acceptable level of quality for the desired period.



Fig1: Red soil coating



Fig2: Seeds mixed with ash



Fig3: Sun drying of grains



Fig4: Storage of pulses with salt



Fig5: Seeds mixed with lime powder



Fig6: Seeds mixed with neem leaves



Fig7: Seeds mixed with tulsi leaves



Fig8: Seeds mixed with dry chillies



Fig9: Plastering by clay



Fig10: Plastering by cow dung



Fig11: Temporary corn storage



Fig12: Underground storage pit



Fig13: Earthen pots



Fig14: Large mud jars



Fig15: Bamboo storage structure



Fig16: Unhusked ears tide

Traditional Agricultural Implements



Sickle(kudugolu)

Chopper(macchu)

Spade (salaake)

Stone mill(beesekallu)



Wooden pole(mere)

Bamboo basketputti

Winnower(mara)

Wooden plough(maranegilu)



Wooden rake(halube)

Leveller(kunte)

Ox-drawn plough

Iron plough



Threshing stone(ronagallu)

Seed drill(koorige)

Harrow

Land leveller(koldu)



Bamboo seed drill(sedde)

Country

V. CONCLUSION:

It can be concluded that traditional knowledge is vital for the wellbeing and for sustainable development as it has evolved after thousands of years of observation and experience by linking the indigenous knowledge system of people with farmers, research and extension, the output of researchers can be made more fertile and usable. Indigenous Traditional Knowledge (ITK) is a valuable asset to indigenous and local rural communities who depend on ITK for their livelihood as well as to manage and exploit their local ecosystem in sustainable manner. However, there is still a long distance to cover in scientific validation of indigenous agriculture knowledge. Farmers have wealth of knowledge, which eventually do not extinct but transfer from generation to generation on its own strength and influence. It is very important to concretize this experience in to a system. Identifying, documenting and incorporating ITK in agricultural extension organization are essential to achieve agricultural development. ITK system provides a frame of reference for strengthening agricultural extension programmes. The participatory technologies that are developed through ITK integration will provide diversified technological options. Indigenous traditional knowledge being low in cost will also benefit national economy besides sustainable agricultural development.

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