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Some socio-economic plants of tribal dominated parts of southern Rajasthan, India

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Abstract
Ancient peoples were totally depending on the plants and plants products growing their nearby areas to fulfill their need to build houses and their requirements for their survival. Even today, tribal people residing in the remote areas which are far away from the modern facilities still uses plants and plants products for their survival. Keeping this in mind present study was carried out in the tribal dominated areas to collect, identify and document some socio economic plants and their use in the tribal dominated areas of Rajasthan such as Banswara, Chittorgarh, Dungarpur, Pratapgarh and Udaipur districts. The study was based on field surveys, personal and group interviews to gather informations about socio economic plants particularly used for house hold, food, fodder, agricultural implements etc. In the present investigation total 75 plant species belonging to 67genera and 52 families have been collected, identified and information about their uses have been documented.

Keywords: socio-economic plants, tribals, house hold, agricultural implements, fodder

1. Introduction
Rajasthan is one of the largest state and is located in the Northwestern part of India. Geographically, it lies between $23^0$3' to $30^0$12' longitudes and $69^0$30' to $78^0$17' latitudes. Southern part of Rajasthan comprises with Banswara Chittorgarh, Dungarpur, Pratapgarh, Rajsamand and Udaipur districts. It is also known as tribal belt of Rajasthan which is dominated by Bhil, Damor, Garasia, Kathodia and Meena tribes. Each tribe has its own socio-religious culture life and prefers to live in small groups in form of a small villages, which are generally situated between forests or adjacent to it, where there is sufficient supply of natural water in form of river, spring or water holes. The holes in these villages are either in form small huts of "Kaccha house" made up of either mud breaks and are coated by mud or completely plants and their parts.
The climate of tribal dominated part of Rajasthan is tropical with the maximum temperature ranging between 39.0 to 45.6^0C to 45.6^0C during summer and minimum between 7.1 to 11.7^0C during winter. Average annual rainfall has been recorded between 65.0 cm. The area is characterized by the tropical deciduous type of vegetation. The life of the tribes of this area is completely depends on plants and plant products. They use the plants growing their nearly areas is various ways to fulfill their needs. A significant contributions has been made by various workers in Rajasthan[1-12] but all these studies were mainly made together traditional knowledge about ethno-medicinal plants and document them but there was a lacuna about the socio-economic plants this area and document them. Therefore to collect the information about socio-economic plants tribal dominated areas of Rajasthan and to document was the main objective of this study.

Material and Methods
Both intensive and extensive surveys were conducted in tribal dominated areas and well protected forest areas of study site. The information's were recorded about the wild plants, which are used for various purposes by the tribal. The Performa of the field work as suggested by Joshi (1995) was followed during the field survey and collection of field data.
The data were collected by interviews, observations and participation with the tribals. On researching a village or locality, report was established with one or two persons and contact was then established with other tribals of the locality.
Two types of interviews were conducted, firstly of individuals and secondly of groups of individual. Persons were selected at random on the way or entering in hut, finding out knowledgeable individuals from the village or also the "Bhopa" (village priest) or the headman. In group interviews more than one individual were approached and their interviews were taken (fig.1) Interviews were taken at different sites as and when situation demanded. In forest with the ambient vegetation before then, the tribals were promoted to remark on the utility of species as food, especially when explained by a group.
Materials were packed in polythene bags and brought to the laboratory for identification and further taxonomic descriptions. Plants collected during the surveys were identified with help of published regional floras [14-17] and by comparing voucher specimens with identified herbarium collections in the herbarium. From the collected data to list of different families with their traditional uses for various purposes with family and local name (Table-1).

Observations
House Hold, Furniture and Fuels
Each tribe has its own socio-religious-cultural life and prefers to live in a small group in form of a small village, which is generally situated between forests or adjacent to it, where there is sufficient supply of natural water in form of river, spring or water holes. The houses in these villages are either in form of small huts or kaccha houses made up of

mud breaks and walls are coated by mud (Fig.2) a tribal hut is generally constructed near to his agricultural field and often inside the field. Usually these huts are constructed on a hillock (Fig.3). Rarely, a few tribals may have own two huts, one in the field if it is away. The huts are essentially rectangular constructions with the roof sloping down from a common point beyond the upper ends of the two longer walls of the huts. The roof style prevents overheating by direct scorching sunrays in summers and facilitates the torrential water drops to speedily flow down in rains. A hut usually has one room (sometimes more), separated into 3-4 portions by the large granaries kubla. One corner of the hut used as kitchen, an adjacent one-the 'dormitory' while the cattle and the pet animals are kept on the other side. Over the granaries, the several beams on poles/ bamboo fixed horizontally at a certain height to store seeds, cloths and weapons etc. The entry gate is usually in the center of a long wall, but in some huts the entry gate is through the smaller walls. The huts almost never have windows. The walls and the ground are plastered by clay mixed with cow dung.

The walls of the hut are traditionally known as Barnewali Bheetri, Samnewali Bheetri (the front wall), Sandari Bheetri (the back wall) and Deewal ki Bheetri (the side wall) respectively. A framework of bamboo is tied parallel to the sloping of roof on either side of opening of the front wall gate. *Phoenix sylvestris* leaves are fixed to form a screen. But there is no opening or gate in the back wall. A bifurcating stout pole of *Anogeissus pendula* used as a central supporting pillar (mob-walo-thamba).

Running from the front wall to the rear wall, forming the highest point of the hut is the mob-ro-adia(central pole) made of *Haldina cordifolia*. This pole is supported by slightly forking stout poles of *Anogeissus pendula* called mob walo thambo (or the pillar of mob). One such pillar is the inner central pole on which the main beam rests (generally in the middle of the hut interior), and the other is in the rear, also forming one of the ingredients of the back wall.

Two other long poles forming the individual peripheral limits of the slopping halves of the roof are also made of *Haldina cordifolia* (like mob-ro-adia) and are called barod ka adia. These are supported by the forking ends of four pillars at the four ends of the shelter (dayla ro thambo), fixed to the ground and also made of *Haldina cordifolia.*

Between mob-ro-adia and barod-ka-adia on either side are wall is or dandiyas. The framework of the roof is also made up of *Ficus racemosa, Ficus palmata, Haldina cordifolia*. *Apluda mutica* (grass) is stacked in compact bundles and tied to make the thatch work of the roof.

A rectangular screen of *Phoenix sylvestris* leaves with bamboo frame was however, sighted which was tied along one end to a pole shutting the opening of front wall that is the entrance. The hut walls are plastered of mud, wooden gates are seen.

Articles of Tribal Kitchen

Describing the state of Rana Pratap "the hero of Mewar" hiding in these regions during the dark days of Chittor, Tod (1829) mentioned the utensils used by the hero shunning the gold and silver dishes aside. "The first invented drinking up or eating vessel made from the leaf (pat) of particular trees, especially "palasa" (*Butea monosperma*) and burr (*Ficus benghalensis*)". These were and are today the utensils of the tribes of the very regions.

Cups and glasses are traditionally known as a doondlo (Photo plate 5.4). The abundance of *Butea monosperma* throughout southern Rajasthan attributes to the widespread usage of its leaves in cupmaking amongest all the tribes. Two or more leaves are sewn with acicular wood chips to make broad cup in which liquid food can be served as dishes. Spoons and ladles are traditionally known as chatu, doiya, dole and ulka. Spoons are carved out of *Wrightia tinctoria* wood almost universally. However, those of *Butea monosporma* wood were also seen. Often *Lagenaria siceraria* fruits of various sizes with a holes bored at the belly of the fruit serve as spoons for not only taking out water from pitchers but also serving liquor.

Flour kneading trough is known as Khatto. Kansata, Parato and Sagslota. This trough is usually carried out of the single wood block. Troughs of *Haldina cordifolia* are common amongst Bhill of Kotra region. Grassia troughs are made of *Baswellia serrata* wood, which is also used by other tribes.

Churning rod is traditionally known as a ravaiya. Region wise the size of this device varies up to head height; it is made up of the wood of *Wrightia tinctoria*. A long stick is chiseled smooth with a tapering and where two wooden blocks with the long staff is swirled clockwise and anticlockwise by hands a using a string (netar). A simpler churning rod like the one common in some rural areas made of *Zizyphus mauritiana* root or stem through likely to be used in the tribal villages. The elongate root portion (or stem) is submerged in water for some time. At one end it is sliced longitudinally into four. Spreading the four portions apart, a stone or metal block is pushed in between (removed later). On drying they remain as such.

Winnowing pan is traditionally known as hoonpola, sup and supta respectively is made up of bamboo strips.

Scrubber is known as noriyal ka sinhara and it is made up of the mesocarp (coir) of *Cocos nucifera* fruits are used for scrubbing pots and scraping away the remnants.

Water receptacles and containers are various types such as pitchers or metal vessels, hollow fruits of the bottle gourd and wooden troughs (koondies), which are dug out, shallow wide containers of wood.

Pitcher stand is traditionally known as panni and pandini respectively is made up of longitudinally halved hallowed portions of branches or tree trunks of *Boswellia serrata* held in position by two or more bifurcating poles of *Diospyros melanoxylon* were seen in many villages.

Mortar and pestle is known as ookhla and sambela or mosai arespectively. The solid cylindrical pestle is made of *Cassia fistula, Holoptelea integrifolia* and *Acacia nilotica* wood. The mortar is either of stone or wood hollowed inside and embedded in the floor of the hut. Stone grinding-mill is known as ghanti. It consists of two circular stones placed in a wooden trough. The handle (dendyo) of the mill is made of *Dichrostachys cinerea* or any other wood.

Axe

An axe carried along may simply has an adorning function. The bamboo (or other wood) handles of such axes are smaller in length and the iron blandes larger.

Cots
The Bhilis name for such cots is Karkedu. The timbers entering the frame of the cots, the chief furniture of tribal hut, are many. The legs are usually of *Grewia tiliaefolia, Dalbergia sissoo, Tectona grandis* and even timbers as of *Butea monosperma* and *Woodfordia fruticosa* enter the frame of cots.

Cardles
Cardles are traditionally known as Panna. Bamboo is the chief material of a cardle-both for forming the framework and its body of woven strips.

Fans
Fan is traditionally known is Bijna. The fans are generally of rectangular shape, woven of bamboo strips one of the smaller sides tied to a bamboo handle. The sizes are variable.

Mats
Mat is traditionally known as Chatai or Path relnu made up of bamboo strips besides *Phoenix sylvestris*. Sometime *Cyperus rotundus* rhizomes or roots for gragrance and cooling effect in summers are woven along especially for mats serving as screens.

Baskets
Baskets traditionally known as Topla made of bamboo are most common. Roughly triangular baskets made of *Derris indica* (stem bark) and *Butea monosperma* (root bark, extracted after steeping the bark in water for a day, were observed.
A special flat basket Heernu used for caring the rubble up was seen being used by tribals constructing wells. Pulling the mud through the heernu and lowering it back below. The fibres used were of *Abelmoschus moschatus*. (Fig.4)

Brooms
Bamboo brooms are called Khurato or Kharao. The fronds of *Phoenix sylvestris* are also chosen for booms by the tribals. *Saccharum bangalense* is an important grass for brooms. Slender twigs of plants bundled together and used as brooms generally belong to *Nyctanthes arbor-tristis* and *Malvastrum coromandelianum*.

Headrests
The headrests are traditionally known as Aduni. Leaves of *Tactona grandis* or *Butea monosporma* are rolled and folded to from circular cushion, over which the tribal women place their burdens, whether water pots or stacks of fuel-wood. An aduni may also be woven of *Saccharum bengalense* culms. Aduni of longer duration are knitted of *Cordia gharaf* bark or better fibers like those of *Crotolaria juncea*.

Syringes
Syringes are known as Pichkari. One of the modesa of throwing coloured water during the "Holi" festival is by syringes made of bamboo.

Paper Storing Cases
A nearly half a meter long hollow bamboo open from one side serves as a case for preserving papers and a documents (as of land). The documents are rolled and inserted inside the case and the open and sealed by a cloth or a wooden piece.

Transport Vehicle
The most common and an important transport vehicle are traditionally known as Gado. The various part of this Bullock cart are made of *Acacia nilotica, Diospyros melanoxylon*. A mat is used to carry additional material also made of stripts of *Butea monosperma*.

Fig 1: A tribal hut.

Fig 2: A Basket (Topla) carrying

Fig 3: Tribal basket used as container made of *Dendrocalamus strictus.*

Fig 4: Wooden cart. A means of transport for tribals

Food and Fodder

Tribal people depend upon their cultivated crops and other products available from the forests. The tribals of the study area mainly cultivate maize, rice, wheat, black gram and green gram. Cultivation in the study area mainly depends upon rains. The tribals still have not been touched by the modern civilization and advanced techniques of agriculture. Although their little need is completed by the agricultural products but they have to depend on forest produce for their food, vegetable and fodder. Their knowledge about the plants is worth appearing. They are extremely well versed with the plants and they know which is edible. The plants and their parts, which are used by the tribals as food, vegetables and fodder are as follows:

Acacia leucophloea (Roxb.) willd. MIMOSACEAE
Ln. "Ronj" Loc. Mahad

Young pods are used as vegetables and the seeds are ground and mixed with flour. In scarcity besides these, the powder of the bark is reported to add to flour.

Acacia nilotica (Linn.) Del. MIMOSACEAE
Ln. "Babul", "Bowalia", Loc. Kotra-Khedbramha Road

Gum is used in sweetmeats. Fresh exuding gum in eaten and liked by children. Tribals eat roasted seeds during acute scarcity of food.

Aegle marmelos (Linn.) Correa RITACEAE
Ln. "Bel" "Billi". Loc. Sara

Ripe fruits are eaten raw. Unripe fruits boiled and eaten without any other treatment.

Alangium salvifolium (L.F.) wang. ALANGIACEAE
Ln. "Ankol", "Ankola". Loc. Kyari

Ripe fruits are Souris sweet, mucilaginous ripe barriers are eaten.

Amaranthus caudatus Lin. AMARANTHACEAE
Ln. Dundi-chandloi Loc. Peepla

Coocked leaves are used as vegetable.

Amaranthus hybridus Linn. AMARANTHACEAE
Ln. "Kangani" Loc. Malwa ka Chora

Seeds are grind to flour, this flour is used for the preparatiaon of bread.

Asparagus racemosus Willd. LILIACEAE
Ln. "Shatavari" Loc. Goodrooj

Tuberous roots are edible.

Azadirachta indica A. Juss. MELIACEAE
Ln. "Neem", "Limda" Loc. Was

Ripe fruits eaten.

Bauhinia racemosa Lamk. CAESALPINIACEAE
Ln. "Jezya". Loc. Gura

Flowers and pods are used for vegetable.

Bauhinia variegata Linn. CAESALPINIACEAE
Ln. "Kachnar", "Hintri". Loc. Nayawas

Flowers and buds are cooked as vegetable. Dried and grinded fruits are used with flour to make bread.

Bombax ceiba Linn. BOMBACACEAE
Ln. "Shalmali", "Semal" Loc. Gura

Flower buds and fleshy calyx are eaten raw. Unripe fruit are cooked as vegetable.

Capparis decidua (Forssk.) Edgew. CAPPARIDACEAE
Ln. "Ker" Loc. Jher

Unripe fruits are used for vegetable and pickles. Ripe fruits are eaten raw.

Cassia tora Linn. CAESALPINIACEAE
Ln. "Punwad" Loc. Teja ka Was

Fresh juvenile leaves and flowers are cooked as a vegetable.

Commelina benghalensis Linn. COMMELINACEAE
Ln. "Kallni", "Mokta" Loc. Mandwa

Young leaves and tender shoots are cooked as a vegetable. The Pakoris made by mixing leaves and tender shoots with basan (gram-flour). Whole plant is purgative.

Cucumis melo Var. utilissimus Duthie & Fuller. CUCURBITACEAE
Ln. "Kakdi", "Kachri" Loc. Mahari

Ripe fruits consumed raw, vegetable cooked of unripe ones

Curcuma amada Roxb. ZINZIBERACEAE
Ln. "Ambahaldi" Loc. Mohad

The fresh rhizomes are used for pickle and vegetable whereas, dried powdered rhizome is used as spice. Leaves are smeared with paste of gram flour, cooked in steam and then roasted.

Dendrocalamus strictus Nees. POACEAE
Ln. "Bans", "Vanhedo" Loc. Mamer

Tender shoots are used as a vegetable or pickle with unripe fruits of mango.

Diospyros melanoxylon Roxb. EBENACEAE
Ln. "Timbru", "Tendu". Loc. Khadbramha

Ripe fruits are edible. Dried fruits are stored as famine food.

Ficus palmata Subsp. virgata (Roxb.) Browiez MORACEAE

Ln. "Jungli Anjeer" Loc. Ambadeh

Receptacle shows resemblance with the receptacles *Ficus carica* are fondly eaten and called anjeer or Jangli anjeer.

Lagenaria siceraria (Molino) standley CUCURBITACEAE
Ln. "Dhokdka", "Tumbo", Loc. Loharcha

Fresh fruits are used as a vegetable.

Lagerstroemia parviflora Roxb. LYTHRACEAE
Ln. 'Kakarwa' Loc. Bekria

Fruits are eaten raw or cooked as vegetable.

Leptadenia reticulata Wt.&Arn. ASCLEPIADACEAE
Ln. 'Jhumka' Loc. Jogiwar

Green unripe fruits are eaten raw.

Madhuca longifolia var. latifolia (Koenig) Macbr SAPOTACEAE
Ln. 'Mahuwa' Loc. Ajni

The flower (succulent corolla) and fruits are eaten raw or cooked. The flowers are compressed into laddoos. Seeds are called dolma are eat en and edible oil is extracted.

Mangifera indica Linn. ANCARDIACEAE
Ln. 'Amba' Loc. Kyari

Unripe fruits pickled, ripe ones and kernels are eaten raw and roasted.

Momordica dioica Roxb. ex willd. CUCURBITACEAE
Ln. 'Kinkoda' Loc. Jogiwar

Cooked unripe fruits are used as vegetable.

Moringa oleifera Lamk. MORINGACEAE
Ln. 'Sargaana', 'Sainjaana' Loc. Gura

Cooked fruits, flowers, buds and pods are used as vegetable.

Oxalis corniculata Linn. OXALIDACEAE
Ln. 'Khatti butti'. Loc. Sara

Leaves are sour in taste and commonly used as a substitute for tamarind by the tribals.

Panicum miliaceum Linn. POACEAE
Ln. 'Chinna', 'Samlai' Loc. Mahad

Grain flour is used for making bread.

Pithecellobium dulce (Roxb.) Benth. MIMOSACEAE
Ln. 'Jangel-Jalebi', 'Kiker' Loc. Panarwa Road

The ripe juicy fruits are eaten.

Polygonum barbatum Linn. POLYGONACEAE
Ln. 'Ghar-ki-sabji' Loc. Loro ka was

Leaves are used as vegetable.

Polygonum bistort Linn. POLYGONACEAE
Ln. 'Jhinu' Loc. Ghata

Tubers are edible. Leaves are flower are used as vegetable.

Polygonum glabrum Willd. POLYGONACEAE
Ln. 'Saka' Loc. Peepla

Leaves and flowers are used as vegetable.

Solanum nigrum Linn. SOLANACEAE
Ln. 'Saemi', 'Charpoti' Loc. Was

Ripe fruits are eaten raw and tender shoots are used as vegetable.

Tamarindus indica Linn. CAESALPINIACEAE
Ln. 'Imli' or 'Amli' Loc. Thep

Leaves sour, eaten raw by children. The ripe fruits are eaten as such or cooked along with vegetable. Children along with vegetable eat seeds.

Zizyphus nummularia (Borm.F.) Wt. & Arn. RHAMNACEAE
Ln. 'Jhari-bor'. Loc. Jher

Fresh fruits cherished. Dried and stored in sufficient quantity.

Fodder

Agriculture is the main occupation of tribals of the study area. In additi agriculture milk production is an additional income-generating source for tribals. Tribals of the study area have been facing draught since last few decades therefore fodder for cattles is main problem. Although, some fresh and dry fodder is obtained by the cultivation of certain cereal crops like maize, jawar, wheat, barley etc. But this fodder is not sufficient throughout the year. In form of an alternative fodder (but now a days it is a main fodder) certain plants as such or plant parts are used. Some of the important plants and plants parts, which are used as a fodder, are given below:

Acacia nilotica (Linn.) Del. MIMOSACEAE
Ln. 'Khejra' Loc. Jher

Plant parts use - Leaves and mature pods.

Themeda arundinacea (Roxb.) Ridley. POACEAE
Ln. 'Dhab' Loc. Loharcha

Plant parts use- whole plant.

Zizyphus nummularia (Burm.f.) Wt. & Arn. RHAMNACEAE
Ln. 'Jhari-bor' Loc. Jher

Plant parts use - Leaves. (Fig.5 and 6)

Fig 5: Traditional system of storage of fodder

Fig 6: Tribals carrying fodder for their animals *(Cymbopogon martinii)*

Agricultural Implements

Agriculture is the main occupation of tribals. Although advanced agricultural implements are used by farmers in various parts of Udaipur even Kotra but due to lack of many/poverty tribals of this particular regions are unable to manage these implements. They still depend on traditional methods and implements. For the manufacture of these traditional implements tribals farmers totally depend on plants. Plough, traditionally known as a hal or har. The yoke and beam of the plough is made up of Acacia nilotica. The wood for the share is taken from Acacia catechu. For fixing the parts strongly wooden pieces of *Tectona grandis* are inserted along.

Leveller traditionally known as maido, ken and hamada is a thick rectangular block of wood around ten feet long. Generally using two poles it is connected to a yoke to which the beasts of burden are tied. One or more persons stand on it while the oxen pull it.

The commonaly used timber for making a leveller is of *Terminalia tomentosa*. *Acacia catechu* and *Zizyphus sylopphyrus* may be used.

A leveller is also employed for covering seeds after broadcasting or levels the soil after ploughing.

Seed drill traditionally known as penni or parani is a seed-sowing device made of hollow bamboo. Its one end is sliced into several parts, the ring separated parts are shaped into circular rem of the cone or funnel so formed. Sewing leather on the inside is an optional reinforcement.

The ripe crop is harvested with iron sickles traditionally known as dantali or danteda with bamboo handles.

Threshing is carried out under the hooves of oxen generally. The har vested grains are heaped around a wooden post to which two-three oxen are tied with a rope. A person with a stick ushers the oxen round and round the post (mend) treading the grains.

Though a pole from the durable wood of any species may be planted as mend, enquiries in several crops field revealed that the usual species selected are Acacia catechu, *Diospyros melanoxylon, Tactona grandis* and *Terminalia tomentosa*.

Kadela

For moving and sifting of the beaten crop, a fork made of *Acacia nilotica* or *Anogeissus latifolia* wood is employed.

The resultant of threshing (i.e. the grains and husk mixture) is generally allowed to drop from a bamboo basket or winnowing pan, in the presence of sufficiently blowing wind, by a person standing on a wooden log or stand.

Field Fences

Although improved techniques are available. Tribal still uses brushwood and thorny branches as a safeguard against cattle intrusion in his farm (Saxena, 1981) for obvious reasons. Fencing the boundaries of their field to protect the crop live plants or branches of a single species or two or more ledges of *Butea monosperma* and *Diospyros melanoxylon* are used. Such fencing of stout wooden logs is common in areas with timber resources. Live fencing of *Jatropha gossypifolia* were found interspersed with *Delonix elata* shrubs and branches of *Zizyphus xylopyrus*.

Plants Supported by Fences

The fences generally are strewn with cucurbitaceous cultigens like *Coccinia cordifolia, Lagenaria siceraria* (fruits seen in various stages of development) and *Lablab purpureus* (an almost usual feature) important vegetables. Perhaps for the aesthetic value of their scarlet rate fruits, plants of *Trichosanches bracteata* allowed to grow.

Frightening Devices

Scare Crows

As in rural communities elsewhere the use of scare crows (Kakbha goda, bijuka, ujka and howaz etc.) is also in vogue in this tribal region, which are called mannis. As far plant usage, sticks of any root are diagonally fixed their being no particularly important species. A clay pot, straw and cloth form the accessories.

Hoda

A stick is planted in the ground with in the crop field. Over this and covering it up side down in it hung a metal can, with the moving gusts of wind the can, hangin with a string swings to and fro striking against the stick. The rattling din frightens away the birds. Such a device is also hung near fruiting branches of fruit tree like mangoes by Bhils in Kotra.

Petia

A string made of such species as *Crotalaria spectabilis* to which a stone has been tied is swung round and round to derive of birds.

Gophan

An improvement of the petia is the gophan. It is made of *Abelmoschus moschatus* or any other fibers woven into a rope with a broad netlike collar at one end. Holding the ropea at other end, and keeping a stone in the collar the farmer climbs up on a high point in the field (e.g. the watch place) and swing it in circle with gathering speed. The birds fly away from the whirring sound made by circularly moving stretched string, cutting the air. Aiming and maneuvering, the stone may be release as projectile to bring down the pests.

Plants in Irrigation

The charas is the indigenous water drawing system from

wells. A leather pitcher full of water pulled by a pair of the bullocks through a rope made of *Crotolaria juntia* and root of *Butea monosperma.* A roller of wood of *Acactia nilotica* supported by two pillar of *Acacia nilotica* rolls through the pulling rope.

Another important traditional system of drawing water from wells is Rehat, it is of two types, man operated and Bullock operated Rehat.

A traditional refined system to lift raw material during construction, repairing and digging of well is known traditional lift. A rope is made of *Butea monosperma* root fibers, supporters made of *Acacia leucophloea* and other parts of *Acacia nilotica.*

Dry wood of *Acacia nilotica* is used to manufacture various part of Rehat. Somewhere *Phoenix sylvestris* trunk is used as water canal through which water is passed from one place to another even from one field to another field. Clay pitchers are tied on the ropes made from *Bauhinia vareigata* and *Butea monosperma* roots. Bullocks also operate this well (Fig.7 and 8).

Enemies

Porcupines

The porcupines avoid *Madhuca* trees. The corollas and fruits of Madhuca keep falling from the branches. The head of these animals is susceptible and falling fruits on this tender spot of the body proves fatal.

Rats

Habitually, rats drill holes through mud walls, ganaries etc. and where once they have begun they do not rest till their jobs done. When such a sit e is noticed, Bhils fetch carefully the fruiting body. *Girardinia zeylancia* and place it there. When the rodent comes again it collides against the fruit - its nose, mouth and whiskers, become loaded with irritating hairs putting it to untold misery and making it forget returning to the place.

Bins for Storage

The main occupation of tribals is agriculture and they use to store grains for long time for floor as well as seeds for next season. They store these grains in granaries traditionally known as Kabla, Kothi or Kubla. These grains bins generally made of plant materials frame work plastered with clay. *Dendrocalamus strictus*, *Nyctanthes arbot-tristis*, (stem) *Butea monosperma* (root) and *Bauhinia recemosa* (stem) are mainly used for this purpose.

After storage of grains initially the lid of granaries is not sealed but after drying of grains the lid is sealed by mud but a hole is present at the bottom of granary for drawing grains out. This hole is temporary sealed by specially wooden man lid. Some times grains are placed in bamboo baskets and stored at a high place in the tribal hut or on the roof of hut in open place. In addition to this some times fruits *Lagenaria siceraria* serve as storage bottles, known as kholru they are hug from a peg or any other thing. On drawing for 2-3 months, the contents of the fruit shrivel. Forcing an opening some where near the stalk these are away evacuated by shaking.

A Kholru can bwe seen in many tribal huts contained *Abelmoschus esculantus. Cucumis sativus* and *Cucubita moschata.*

Fig 7: A tribal paddle Rehat. The ropes seen are woven of *Butea monosperma* root fibers and other parts from *Acacia nilotica* wood. A trunk of *Phoenix sylvestris* used as water canal**.**

Fig 8: A tribal leveler and its accessories made of *Acacia nilotica*. A stick to control bullock made of *Zizyphus sylopyrus*.

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