Applied Ecology and Environmental Sciences, 2015, Vol. 3, No. 5, 140-145
Available online at http://pubs.sciepub.com/aees/3/5/3

DOI:10.12691/aees-3-5-3

Traditional Farming System of Gond and Other Communities in the Pachmarhi Biosphere Reserve of India

Chandra Prakash Kala*

Ecosystem & Environment Management, Indian Institute of Forest Management, Nehru Nagar, Bhopal, Madhya Pradesh, India
*Corresponding author: cpkala@yahoo.co.uk

Abstract The modern system of farming has several advantages, which include increasing quantity of crop production to meet the demand of escalating human population however it has demerits, as well. The use of chemical fertilizers, pesticides and insecticides that has negatively impacted the human health has now compelled humans to revisit the environmental-friendly traditional system of agriculture. With this concept, the present study deals with documentation and analysis of traditional agricultural system of peasants in the Pachmarhi Biosphere Reserve of India. The cropping season, in the study area, was classified into two major seasons - rabi and kharif. The main cereal raised in rabi season was wheat, followed by pulses such as chickpea and lentil. In kharif season, mainly the farmers raised paddy, followed by soybean, maize, pigeon pea, black gram and sesame. The farmers who had sufficient water for irrigation cultivated black gram twice in a year, from July to October and March to May. The study reports that traditional agriculture system works along with values, cultures, traditions and belief systems of the community, and some of which is crystallized into the institution.

Keywords: *traditional agriculture system, Gond, Pachmarhi Biosphere Reserve, cropping seasons, sustainable development, ecosystem management*

Cite This Article: Chandra Prakash Kala, "Traditional Farming System of Gond and Other Communities in the Pachmarhi Biosphere Reserve of India." *Applied Ecology and Environmental Sciences*, vol. 3, no. 5 (2015): 140-145. doi: 10.12691/aees-3-5-3.

1. Introduction

Agricultural being a primary source of livelihood has been evolved long back with the evolution of human's understanding and knowledge on surrounding environment and natural resources. Social practices, rituals, festivals, and relations are intertwined very closely with traditional farming systems, which mainly depend on the local resources, skills and beliefs [1,2,3]. Though, agriculture is practiced across the world, it differs from one agro-climatic zone to other [4]. India harbors rich agriculture crop diversity, and within one agro-climatic zone varieties of food grains are grown by farmers using indigenous tools and techniques. Over 40 species of food grains are grown and managed by the local farming communities in traditional agro-ecosystems of central Himalayan region of India [5]. Traditionally, people have been increasing the crop production by adding different organic materials in their farmlands [6]. However, over the years, there has been rapid erosion in traditional knowledge of agricultural system, and till now many varieties and their cultivation and management practices are either completely lost or in the verge of extinction.

Despite the availability of modern scientific agricultural technologies, there are people in the rural areas who still practice traditional system of agriculture [2]. Though modern system of farming has several advantages, which include increasing quantity of crop production to meet the demand of escalating human population, it has demerits as well [7]. The use of chemical fertilizers, pesticides and insecticides has negatively impacted the human health [6]. Realizing the side effects of modern agricultural systems, in recent past, understanding and documenting traditional wisdom has gained significant attention world over. Besides, the traditional farming system educates how to develop and maintain the natural friendly environment together with the sustainable development of communities. With this concept, the present study deals with documentation and analysis of traditional agricultural system of peasants in the central part of India.

2. Methodology

2.1. Study Area

The present study was conducted in the buffer zone villages of Pachmarhi Biosphere Reserve (PBR) situated in Madhya Pradesh state of India. PBR lies between 20° 10' to 22° 50' N and 77° 45' to 78° 56' E, and it covers parts of Hosangabad, Betul, and Chhindwara districts. Being a biosphere reserve, PBR comprises of good forest cover (65.20%), besides the agriculture land which contributes 27.7% [8,9]. Among the ethnic groups in the study area, Gond is the major tribal community. This

tribal community dominates the central parts of India, and being the major ruler in this part of India the Central Province was known as Gondwana state. The major profession of Gond tribe and other communities in the study area are agriculture and collection of minor forest produce [10,11,12]. They collect forest produces from the local forest for consumption as well as for marketing [13,14]. Each household has a small patch of land locally called as '*badi'* (kitchen garden) in which they grow some seasonal vegetables including tomato and brinjal [9]. Majority of them have some patch of agricultural land.

2.2. Survey Methods

The buffer zone villages of PBR were visited for general understanding of people-environment relations (Figure 1). Based on the preliminary surveys, 10 villages were randomly selected for intensive study of traditional agricultural system and practices followed by the villagers. The selected villages are Sabarwani, Sahawani, Fatehpur, Mahuakheda, Khara, Taparwani, Anhoni, Deokho, Bandidhana and Singhpur. Door to door questionnaire survey was conducted in the selected villages. Information was gathered on the traditional knowledge of making agricultural tools, preparation of agricultural field, selection of seeds, cropping pattern, norms and customs in agriculture, practices of crop protection, harvesting, drying, seed storage knowledge and knowledge of making agricultural tools.

Besides, interviews of informants were also taken. Generally the male members were available for interviews, however, female were also cooperated during the interview. Information was also collected by participating in the agricultural related activities of local communities while they were sowing and harvesting paddy, wheat, pulses and other crops. During participation the community was observed closely. Observations were made on the storage practices of various grains and pulses and making of agricultural tools. The focus group discussion was also conducted in the selected villages in order to understand the overall perceptions of the people on the traditional agricultural systems. Ten to twelve people constituted a group comprising both male and female members.

Figure 1. A tribal village in the buffer zone of Pachmarhi Biosphere Reserve of India

3. Results

Earlier, the local people in the study villages were also practiced shifting cultivation. For about past three decades they have inclined more towards the settled agriculture. At present, they practice settled agriculture only (Figure 2). The cropping season, in the study area, was classified into two major seasons - rabi and kharif (Table 1). Generally, the crops grown during winter, from October to April, were grouped as rabi crops and the crops raised from June to October were placed under the kharif crops category. In Arabic, the term rabi stands for spring and kharif for autumn.

Figure 2. Farmlands of tribal communities in buffer zone of Pachmarhi Biosphere Reserve of India

Table 1. Cropping pattern and diversity of crops in the study villages of Pachmarhi Biosphere Reserve of India

Vernacular name	English name
Crops	
Kharif: July – October; maximum upto November	
Soyabean	Soyabean
Dhan	Paddy
Makka	Maize
Tur	Pigeon pea
Urd	Black gram
Til	Sesame
Jawar	Sorghum
Bazra	Pearl millet
Surajmukhi	Sunflower
Rabi: October – March; maximum upto April	
Gehun	Wheat
Chana	Chickpea
Masoor	Lentil
Sarson	Mustard
Matar	Pea
Dhaniya	Coriander
Kapash	Cotton
Twice in a year: July-Oct; March-May	
Urd:	Black gram
Summer: April to June	
Moong	Green gram
Vegetables: round the year	
Baigan	Brinjal
Tamater	Tomato
Pyaz	Onion
Vegetables: November – February	
Alu	Potato
Lahsun	Garlic

3.1. Selection of Seeds for Sowing

Selection of seeds was an important parameter before sowing them in the field. The local people followed different techniques for selection of good quality seeds. Before the onset of monsoon, farmers dried the seeds in the sun for a while in order to remove the moisture contents. Seeds of all possible crops, including paddy, wheat, and pigeon pea were dried in the sun. Such sun dried seeds were then selected for sowing on the basis of their quality, size and shape. The farmers also examined and tested the seeds quality by dropping some selected seeds in the water. If the seeds remained floating on the water surface, they were considered of inferior quality. The seeds drowned in the water were considered of good quality. This method was generally applied on the seeds of paddy and wheat. Following traditional techniques were adopted by the local people for selection of good quality seeds.

- The farmers dropped ten seeds in a bucket full of water. If the seeds did not float in the surface, they were considered of good quality seeds and thus were finally selected for sowing.
- They put ten seeds under one and half inch of soil. After an interval of five days a small amount of water was sprayed on it to provide some moisture. If most of the seeds (7 or 8) were found in germination stage then the seeds were considered suitable for sowing.

The quality seed selection procedure even began with harvesting of previous year's crops. During harvesting the farmers selected some specific rows of standing crops where the plants and the seeds appeared to be of good quality in comparison to the other rows of crops in the same field. They cut such crops from the selected rows separately and also thrashed them, separately. They used to clean such thrashed seeds by winnowing and by spinning they separated different type of seeds. It was considered that heavy, undamaged and fully ripened grains automatically separated from the light and damaged seeds. The heavy, undamaged and fully ripened seeds were stored for the next sowing.

3.2. Preparation of Field For Sowing

During rabi season, before sowing seeds, farmers cut down the remains of previous crops, which were left in the field either to dry or to decompose. If the remains of crops were not decomposed they were burnt to ash, which was believed to provide organic material and manure to the desired crops. Majority of people burnt the wheat straw of the rabi crops before starting the kharif crops. The land was prepared by removing stones, overturning soil and applying cow dung. Cow dung was generally piled up to decompose at a corner of the cowshed or the agricultural land. If the agriculture land was far away from the settlement, the cow dung was gathered in a corner of the kitchen garden or at the corner of the village. It was left for more than 6 months to decompose. Cow dung left to decompose for years was considered good manure by the local people. Farmers, who used to make manure in their kitchen garden, brought it to the agriculture land and scattered it in the field either on the same day or after sometime but before the start of rainfall.

In the first monsoon, farmers rolled the upper surface of agriculture land twice or thrice according to the nature and texture of the soil. The farms were rolled by a plough that was generally made up of either babool (*Acacia nilotica*) or khair (*Acacia catechu*) or bhirra (*Chloroxylon swietenia*; Table 2). The land was then leveled with the help of a leveler made up of either teak (*Tectona grandis*) or sal (*Shorea robusta*). Majority of the farmers dug out the land deeply to uproot and remove the unwanted grasses and bushes manually from the field. After tilling land once or twice in the first monsoon, the land was tilled again just before sowing the seeds. In case the farmer was unable to sow the seeds within a week of digging the land he had to till the land again to sow the seeds.

Table 2. Other plant used to support agricultural practices in the study villages of Pachmarhi Biosphere Reserve of India

Vernacular name	Latin name
Anjan	*Hardwickia binata*
Bamboo	*Dendrocalamus strictus*
Bhilwa	*Semacarpus anacardium*
Bhirra	*Chloroxylon swietenia*
Khair	*Acacia catechu*
Lantana	*Lantana camara*
Mahua	*Madhuca indica*
Malu	*Bauhinia vahlii*
Mehandi	*Lawsonia inermis*
Neem	*Azaridachta indica*
Nirgundi	*Vitex nigundo*
Sal	*Shorea robusta*
Teak	*Tectona grandis*

Generally, the seeds of paddy were sown by broadcasting while plowing the field. A limited number of farmers also raised nurseries of paddy and then transplanted them in the farms. Such nurseries were raised mainly in the '*bhurbhuria*' soil so that because paddy's plantlets could be uprooted easily from this type of soil. Before replanting the seedlings of paddy raised in the nursery, the water was stored in the field by closing all the bunds. Seedlings were uprooted by hand and then rapped in a bundle. Such bunches of seedlings were kept in water at some places in the agricultural field in order to remove the soil attached with their roots. Before planting the seedlings, the head of the household poured some cow milk in a corner of the agricultural land and planted a bunch of seedlings. Only after performing this ritual, the hired labors were allowed to plant the rest of the seedlings. Once plants began to sprout and gained about 30 cm height, the farmers closed all the bunds to store the water.

3.3. Cropping Patterns

The crops grown in rabi and kharif seasons were different. The main cereal raised in rabi season was wheat, followed by pulses such as chickpea and lentil, including pea and mustard. Earlier, cotton production was quite high but later it was reduced to the limited area. In kharif season from June to October, farmers mainly used to grow paddy, followed by soybean, maize, pigeon pea, black gram and sesame. Sorghum and pearl millet were also grown by some of the farmers in limited areas. The farmers who had sufficient water for irrigation cultivated black gram twice in a year, from July to October and March to May. The same farmers also raised green gram crops from April to June. The major landraces of paddy, which farmers used to cultivate, were *jhuli*, *dubraj* and *lachei.*

3.4. Traditional Beliefs, Customs and Crop Protection

The agricultural practices, in the study area, were associated with some cultural practices. Before and after growing and harvesting of crops the local people celebrated some specific rituals and festivals. In the first phase of sowing seeds, the local people dug a hole in a corner of the agricultural land. They kept some crop seeds in the hole, apart from offering a coconut and a cup of 'mahua liquor' made up of mahua (*Madhuca indica*) flowers to the village deity, locally called as 'Sayenibuda'. This practice was performed only once in a year and was not repeated for each sowing. Before weeding, they again performed some rituals. The local deity was offered a coconut, a hen and some mahua liquor. A local deity, who was worshipped as a symbol of the first women in the Gond society, was worshipped before weeding. Women folks were engaged mainly in removing weeds from the field.

In order to protect crops from the infestation of insects, the local people believed that fixing a branch of bhilwa (*Semacarpus anacardium*) in the crop field on the day of lunar eclipse eradicate and ward off such insects. They used this traditional belief as an insecticide. Besides, they also sprayed ashes around the agricultural field in order to keep insects away from the crops. When the crop was affected by any unknown disease, a handful of rice was gathered by male members of each household, which was brought to the Khedapati temple – a temple of local deity. Once they all assembled at the temple with rice, the priest (locally called as Bhomka) chanted mantras and worshipped the village deities. Each member then asked to offer rice to the deity. This ritual was practiced with the belief that it kept their crops disease free. Holi, the festival of colours, was also linked with agriculture by the local people. The dried wood was burnt to ashes in this festival, which symbolized making land fertile and insects free. They also worshipped local deities such as 'Sayenibuda' for taking care of their crops. In case of low rainfall, they worshipped and appeased the Indra (the rain god) and Hardulla (goddess of harvest).

Apart from following traditional beliefs and rituals, immediately, after broadcasting the seeds, the local people began to keep close eyes on the presence of birds in the crop field and chased them away from field to protect the seeds. They also made temporary boundaries around their land by erecting and planting mehandi (*Lawsonia inermis*), lantana (*Lantana camara*) and nirgundi (*Vitex nigundo*) at the boundary of crop fields that acted as bio-fencing. Sometimes they built a hut in or near the crop field and camped there mainly during day time. Once the crops started bearing seeds they began to stay in the crop field overnight, as well. The walls of these huts were made up of bamboo *(Dendrocalamus strictus*) or anjan (*Hardwickia binata*) and the roof was covered by the leaves of teak (*Tectona grandis*). The local people often erected an effigy in their agricultural field that was made up of paddy's straw and was draped by white cloths in order to confuse and kept the wild animals away from the field.

3.5. Harvesting of Crops

The rabi crop was harvested during October and November, and kharif crop was harvested during March and April. The aboveground crop parts bearing grains and seeds were chopped off by sickle and then piled up in a place. Before harvesting the crops the head of the household offered some 'mahua' liquor and a handful of cow milk to the local deity, Sayenibuda, in a corner of the crop field. He then cut a handful of crops as a symbol and then others were allowed to harvest the crops. The harvested crop was then transported to a place to thrash. The place selected for thrashing was kept cleaned and splashed with mud and cow dung before it was used for thrashing the crops. The grains and seeds were then dried in the sunlight before to store using various methods. The underground parts of pigeon pea, including some other crops were considered important for soil fertility and hence not removed from the field.

3.6. Traditional Seed Storage Practices

It was believed that improper drying of seeds reduced their viability to the extent that they might loose their ability to germinate. Though, all varieties of seeds were dried before storing, much care was taken for wheat, paddy and chickpea. They were stored in the bamboo made baskets. A few leaves of neem (*Azaridachta indica*) were also placed in the container used for storing grains that acted as an insect repellent. Cereals like maize were simply tied with rope to hang at a corner of the house for drying. The grains of maize and pearl millets were not

detached from the mother plant. They tied into bundle and left hanging to a pole, in front of the house. The bundles were left to hang, till the next sowing. They were kept above 2-3 m from the ground, so that soil and other ground insects could be kept away from it. Sometimes in place of single pole, 3-4 poles were erected at about half meter distance from each other, in the form of a square or a triangle. The available space between the poles was packed with these crops to be stored. For giving support to the stored crops lying between the poles, they tied with ropes. To protect the stored material from livestock and birds, thorny twigs of bushes were also placed around these poles.

Pulses such as green gram and pigeon pea were stored either in leaf bags or basket made up of bamboo, called as 'dole'. Before keeping seeds in the basket, they pasted cow-dung at the inner and outer surface of the baskets in order to prevent the air entry. The basket was then properly dried in the sunlight. Finally, after keeping the required amount of seeds the opening of basket was closed with the leaves of malu (*Bauhinia vahlii*) to make it airtight. The opening was again plastered with cow dung. Besides, the local people also stored their grains, particularly of paddy and wheat, in a big shallow earthen pot made inside the house. It was known as 'Kuthia'. They often mixed leaves of neem or ashes with the grains to keep insects pests away.

The seeds of vegetables were also stored. They selected good quality, healthy and ripened fruits of vegetables. They allowed such fruits to ripen completely in the mother plant. Once ripened, such fruits were collected and placed in a clean cloth. It was then dried in the sunlight to remove the moisture contents. Once it is completely dried they kept it in a safe place away from the reach of rodents and insects.

4. Discussion

The agriculture practices of the local people in the study area were mainly interwoven with their culture, beliefs and availability of the natural resources. They mainly used the organic materials to increase the fertility of soil, though they were aware of modern fertilizers [14]. They preserved seeds by specific traditional methods in which they ensured to keep the seeds free from moisture in order to prevent their germination. The leaves of some specific plants were also placed with stored seeds to protect the seeds from insects. These traditional practices of storing grains were reported from other parts of India, including Andaman and Nicober [15]. A study conducted in Andhra Pradesh state of India has documented the traditional local practices of storing grains [16]. The use of earthen pot and cow dung for storing pulses by the local people of Andhra Pradesh are in conformity of the present study area. The technologies used in traditional system of agriculture are mostly based on forest resources. In Maldives, the local people are known to use some plant medicines for controlling pests [17].

The agricultural practices in India vary across the agro-climatic zones. The diversity of soil types and diverse geographical conditions lead to the diverse agricultural production. From past couple of decades, the importance of traditional agriculture has been recognized for food security [18], and for biodiversity conservation [19]. Some agro-forest based agriculture studies show that traditional agriculture enhances the soil quality and help growing the crops in a sustainable ways [20].

The traditional agriculture practices lead to the assumption that farmer's indigenous knowledge and technologies are generally well-adapted to the surrounding environments, and farmers adjust changes simultaneously, which finally gives way to a model for sustainable agricultural development [21,22,23]. There are reports, which suggest that traditional system of cultivation is more sustainable and environmental-friendly than the commercial and industrial agriculture [24]. The traditional agriculture system works along with value, culture, tradition, and epistemology of knowledge and over a period of time some of which is crystallized into stable structure and institution [25].

Performing rituals during various agricultural activities indicate the intimacy and interrelationship of local people with their surrounding environment and ecosystem. Worshipping local deities in the form of plants at every important occasion of agriculture activity shows the respect of local people to the plant resources and thus these traditional practices seem to be environmental friendly. At present, when environmental degradation and climate change are known to impose a major threat on the natural ecosystem due to industrialization and use of synthetically prepared hazardous products, the traditional knowledge system may help to maintain the natural ecosystem and environmental health. The community practicing environmental friendly methods should be encouraged to continue their traditional practices of resource use.

Acknowledgements

I thank Director, Indian Institute of Forest Management, for providing logistic support. Bhubaneswar Saber is acknowledged for helping in collection of data during the fieldwork. The project is funded under the grant IIFM/RP-Int./CPK/2009-11/04.

References

[1] Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological applications*, *10*(5): 1251-1262.

[2] Kala, C.P. 2010a. Status of an indigenous agro-forestry system in changing climate: A case study of the middle Himalayan region of Tehri Garhwal, India. *Journal of Forest Science*, 56 (8): 373-380.

[3] Sabar, B. 2012. Bringing culture back: traditional agricultural knowledge, food production and sustainable livelihood among Chuktia Bhunjia of Orissa. *Social Change*, 42 (2): 203-227.

[4] Coelli, T. J., & Battese, G. E. (1996). Identification of factors which influence the technical inefficiency of Indian farmers. *Australian journal of agricultural and resource economics*, *40*(2): 103-128.

[5] Maikhuri, R.K., Semwal, R.L., Rao, K.S. and Sexana, K.G. 1996. Traditional crop diversity for sustainable development of central Himalayan agroecosystems. *Ind. J. of Sustainable Development and world Ecology*, 1: 56-68.

[6] Kala, C.P. 2014. Changes in traditional agriculture ecosystem in Rawain Valley of Uttarakhand state in India. *Applied Ecology and Environmental Sciences*, 2 (4): 90-93.

[7] Trewavas, A. 2002. Malthus foiled again and again. *Nature*, 418 (6898): 668-670.

[8] EPCO 2001. *Pachmarhi Biosphere Reserve*. Bhopal: Environmental Planning and Co-ordination Organization.

[9] Kala, C. P. 2010b. Home gardens and management of key species in the Pachmarhi Biosphere Reserve of India. *Journal of Biodiversity*, 1 (2), 111-117.

[10] Kala, C.P. 2011a. Indigenous uses and sustainable harvesting of trees by local people in the Pachmarhi Biosphere Reserve of India. *International Journal of Medicinal and Aromatic Plants*, 1 (2): 153-161.

[11] Kala, C.P. 2011b. Traditional ecological knowledge, sacred groves and conservation of biodiversity in the Pachmarhi Biosphere Reserve of India. *Journal of Environmental Protection*, 2 (7): 967-973.

[12] Kala, C.P. 2015. Forest structure and anthropogenic pressures in the Pachmarhi Biosphere Reserve of India. Journal of Forestry Research.

[13] Kala, C.P. 2013a. Harvesting and supply chain analysis of ethnobotanical species in the Pachmarhi Biosphere Reserve of India. *American Journal of Environmental Protection*, 1 (2): 20-27.

[14] Kala, C.P. 2013b. Traditional ecological knowledge on characteristics, conservation and management of soil in tribal communities of Pachmarhi Biosphere Reserve, India. *Journal of Soil Science and Plant Nutrition*, 13 (1): 187-199.

[15] Bandyopadhyay, A.K. and Saha, G.S. 1998. Indigenous methods of seed selection and preservation on the Andaman and Nicobar Islands. *Indigenous Knowledge and Development Monitor*, 7 (2): 26.

[16] Reddy, B.S. 2006. Indigenous technical knowledge on pulses storage and processing practices in Andhra Pradesh. *Indian Journal of Traditional Knowledge*, 5 (1): 87-94.

[17] Hunter, D. 1996. Traditional pest control and agriculture development in Atolls of Maldives. *Indigenous Knowledge and Development Monitor*, 4 (3): 10-12.

[18] Rajasekaran, B. and Whiteford, M.B. 1992. Rice-crab production system: The role of indigenous knowledge in designing food security policies. *Food Policy*, 18 (3): 237-247.

[19] Jodha, N.S. 1990. Mountain agriculture: the search for sustainability. *Journal of Farming Systems Research-Extension*, 1 (1): 55-75.

[20] Ramakrishnan, P.S. 2002. What is traditional ecological knowledge? In *Traditional ecological knowledge for managing the biosphere reserve in south and Central Asia*, eds. P.S. Ramakrishnan, R.K. Rai, R.P.S. Katwal and S. Mehndiratta, 3-12, New Delhi*:* Oxford University Press.

[21] Jana, S. 1999. Some recent issues on the conservation of crop genetic resources in developing countries. *Genome*, 42: 562–569.

[22] Cleveland, D.A. 1998. Balancing on a Planet: Toward an Agricultural Anthropology for the Twenty-First Century. *Human Ecology*, 26 (2): 323-340.

[23] Kala, C.P., Dollo, M., Farooquee, N.A., and Choudhury, D.C. 2008. Land-use management and wet-rice cultivation (Jebi Aji) by the Apatani people in Arunachal Pradesh, India Traditional knowledge and practices. *Outlook on Agriculture*, 37 (2): 125-129.

[24] Netting, R. 1993. Smallholders, householders: farm families and the ecology of intensive, sustainable agriculture. Stanford University Press, Stanford.

[25] Richards, P. 1985. Indigenous Agricultural Revolution. London: Hutchinson.