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Traditional Agriculture, Culture and the Indigenous Knowledge (IK) among the Kondhs in Odisha, India

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KEYWORDS Culture.Conservation. Indigenous Knowledge. Interpretivism. Positivism

ABSTRACT The study aims to explore different types of agricultural practices including the shifting and the settled cultivation practices of the Kondhs in Kandhamal district in Odisha. The author attempts to understand their traditional beliefs, perception, rationality and knowledge in agricultural practices. Besides, the author briefly focuses on the issue of transformation in traditional agriculture, opportunities and challenges. The nature of the research is purposive and exploratory and is based on grounded theory. Field observation, household schedule and focus group discussions were employed for primary data collection. For information about indigenous knowledge, mainly elderly people were interviewed. The Kondhs' traditional agriculture has a strong cultural and ecological foundation. The community is not short of innovation. With the blend of both perception and rationality the traditional agricultural practice of the community continued for generations, but now in transition. Therefore, this practice needs to be protected from its potential threat of extinction.

INTRODUCTION

Traditional agriculture is an age-old practice that is associated with nature, culture, technology and food production through indigenous and scientific knowledge, rationality, etc. It is viewed as sustainable practice, where agriculture production is based on available local resources and crop species, and traditional tools and techniques embodied with culture are best adapted to local environments (Altieri and Toledo 2005; Netting 1993; Sabar 2012; DeWalt 1994). Traditional agriculture is an inherited practice, which is built on customary practices of the communities. Thus, it is regarded as a part of the indigenous knowledge system by which the communities have been largely successful in conserving forest and natural resources through subsistence economic practice, culture of conservation and with limited aspirations (Tang and Tang 2010; Agrawal and Gibson 1999; Gavin et al. 2015). It is associated with indigenous knowledge and technology, which is guided by individual and collective beliefs, perceptions, rationality, etc., and ensure food security of the local communities and conservation of biodiversities (Altieri 2004, 1990; Netting 1993).

Tradition itself is a product of a long period of growth and change. Tradition is never totally replaced. It is not irrational in total. As far as agriculture is concerned, there are opportunities in both traditional and modern technologies. Both have rationales (Hagen 1964). The conservationist however finds the beauty attached with the traditional technology and the knowledge system. It is widely studied that a traditional knowledge system is mostly natural and environmental friendly. It showcases the wisdom of a community or a particular ethnic group. Farmers are the silent and natural innovators. Their technology is developed through frequent experiments and rapid practical experiences (Gupta 1995; Nandy 1987). The innovation and technology adoption depend on cultural factors including rationality. Native farmers evaluate and rank according to their own particular preferences from the set of alternatives. A farmer will choose such course of action, which she or he ranks the highest. In other words, she or he will try not to forgo a high preference again (LeClair Jr. and Schneider 1968). Rajasekaran (1993) and Warren et et al.(1995) discuss the role of local taxonomies of rice varieties in the decision-making process leading to farmers' selection of rice varieties in south India. While drawing upon the peasants' innovation in Bangladesh it was found that farmers have excellent innovation in preserving and keeping plant varieties intact (Gupta 1995). Fujisaka's (1995) study on Philippines Tupi farmers' rice production strategy recorded their knowledge and technology adoption based on rationality. The tribal communities have a vast repository of such knowledge, which is unfortunately not adequately document-

ed and as a result of cultural assimilation these traditional knowledge is rapidly eroding (Dweba and Mearns 2011; Brodt 2001). This knowledge needs to be urgently documented and disseminated for benefits of scholars working on indigenous knowledge or working on synthesis of indigenous knowledge with modern scientific knowledge.

India has a long history and it has rich reservoir of indigenous knowledge. Similarly, Odisha is a historical land having enriched cultural heritage, which has varied communities and immense resources (Mahalik and Mahapatra 2010). The tribes of India in general and Odisha in particular perform different functions and indulge in different activities of agricultural production, which are mostly guided by their culture. Every agricultural operation, mainly production or harvesting is associated with a ritual, which is performed by the community as a whole or by individuals alone. Mahapatra (1982) discussed the role of rituals and their linkage with the agricultural production. The Santhals, the Hos and the Mundas of Jharkhand state in India practice different rituals that are associated with agriculture and harvesting. Kattakayam's (1983) study among Uralies in Kerala depicts that ritual performance is must in different stages of agricultural practices.Villareal's (2000) study identified that land ownership, access to other productive systems and organisation of agricultural production and technology adoptions are influenced by cultural practices and traditions. The agriculture among indigenous communities and tribes is an economic activity, which is deeply ingrained with culture, and the culture includes beliefs, perceptions, rationality, knowledge and technology adoption.

Traditional knowledge system is not about acceptance of a particular practice for generation but it includes a whole range of ideas, perceptions, thoughts, beliefs, knowledge and rationality. It practically induces a way of living, which is concerned with a culture of sustainability. Besides culture that includes beliefs, perception and knowledge, there is rationality in choosing practices like farming type, crop selection and its classification, cropping pattern, technology adoption, etc., on the basis of cultural prescription. Even some scholars find it as an adaptive forest management practice predicted on sound scientific principles that cautiously use hill and forest land, soil and water resources, etc. (Kerkhoff 2006; Namgyel et al. 2008).

The Kondhs and Their Beliefs

The word Kondh spells differently like 'Kandha' or 'Khond' or 'Kond' by scholars who have studied this ethnic community in Odisha or the border districts of Andhra Pradesh in India (Baily 1957; Boal 1997). Some writers have attempted to trace out the Telugu derivation from the word Konda, which means 'hill'(Thurston 1909). Those living on the hill tops are named the Kondh or the Kandha.

The ethnographic records suggest that the Kondhs are as tall as average Hindus and darker in complexion (Dalton 1872). Macpherson (1842) described the Kondhs as faithful friends, devoted to their chiefs, resolute, brave, hospitable and labourious. They are nature lovers who love to live with their rich tradition.

The Kondhs in Odisha are one of the agricultural tribes with the largest presence among the tribes in the state. It is one of the 62 scheduled tribes (STs) of Odisha recognised by the Constitution of India. The tribal presence in the district Kandhamal is above fifty percent of the total population of the district ("Kandhamal District Demographic Details" n.d.). At every stage of their agricultural operations, the Kondhs sacrifice either birds or animals as a part of ritual performance (Sahu 2015). In the past, these communities were extremely conservative and superstitious (Frye 1860; Sahu 2015). Several literature and field notes cite the Kondhs'animal sacrifice to propitiate deity, the most popular among them is the *Dharani Penu* (Mother Earth). A few centuries back they used to practice the rite of human sacrifice, called *Meriah* (Frye 1860; Padel 1995; Thurston 1909). The human sacrifice was banned considering it most superstitious and barbarian during the British rule in India in the nineteenth century. Now in some parts of the Kandhamal district, mostly inhabited by the Kondh tribe, the *Kedu* festival is organised in a gap of every 12 years in which a buffalo is sacrificed to invite grace from the deity, to receive good yield from the land, overcome dangers in life and attain good health for the community members. Besides this cultural practice, the Kondhs are considered one of the well-known

traditional agriculturists in Indian tribal history (Boal 1997; Padel 1995). The Kondhs are the most popular cultivators of turmeric and production, which has a special significance in their culture and economy. Almost, in every ritual and festivals of the community as well as in auspicious events of nontribal community, turmeric is used as a sacred item. It is grown as a cash crop in the district and the community fetches a better income from its production than other crops in the region. Traders from different parts of the state visit this district to collect best quality turmeric grown here, preferably the organic variety. As far as farming is concerned, this community grows varieties of crops with a mixture of both indigenous knowledge as well as modern scientific knowledge. There is continuation of both shifting cultivation as well as settled cultivation for production of staple crops and cash crops.

The Kondh community in the Kandhamal district of Odisha is an ethnic community on whom there is a vast array of lieterature available from the colonial period to contemporary period highlighting several dichotomies like both tradition and modernity, superstitions and scientific observations, rationalities and irrationalities. The literature available on this community is viewed from the perspective of either interpretivism or positivism. However, the present study is based on thegrounded theory and does not side with any other theory or method exclusively (Fig.1). Further, the focus on the study of traditional agriculture is associated with culture, nature (environment) and subsistence economy. This is an important contribution to the study of anthropology, particularly in human ecology.

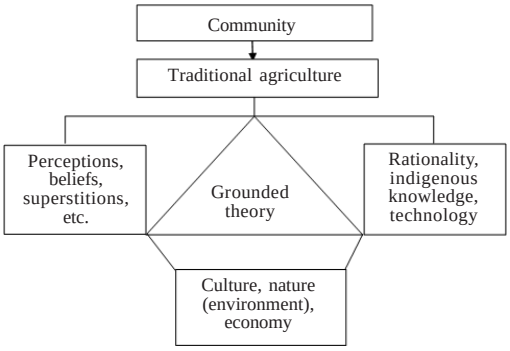

Fig. 1. Conceptual framework

Objectives of the Study

1. To study the different types of agricultural practices including shifting and settled cultivation practices of the Kondhs in the Kandhamal district of Odisha.
2. To understand the traditional beliefs, perceptions, rationality and knowledge in agricultural practices of the Kondhs.

MATERIAL AND METHODS

The nature of the research study was purposive and exploratory. Considering the nature of study, Kandhamal district, which is located in southcentral part of Odisha in the eastern ghat region of India was selected for the purpose (Fig.2). The district is inhabited by above fifty percent tribal population, who mainly belong to the Kondh community. With predominantly agriculture and forest based occupation, the district also has a strong indigenous knowledge base. Besides, the district is well-known in the state for the tribal inhabitants practicing both shifting cultivation and plainland cultivation. The Kondhs are well-known turmeric producers.

The study was conducted in two rounds. In the first round, there was a pilot field visit in Kandhamal district of Odisha that included visits to several district offices such as the district rural development agency, district agricultural office, etc. After thorough introspection, Katingia Panchayat was selected from G. Udayagiri block of the same district for the detailed study. Two villages, namely Laburi and Sudhipara were selected (Fig.2) for further observations on the agricultural practices of the tribal membersthat include land selection and preparation, classification and selection of crops, etc. Some beliefs and perceptions of the community on agriculture and the rationalities behind selection of particular soil, crop or seed variety, etc., were reported. Elderly people were found to be the source of rich indigenous knowledge. Besides ethnographic approach and field based observation, use of household schedules, and the focus group discussions among Kondh farmers were undertaken for the data collection.

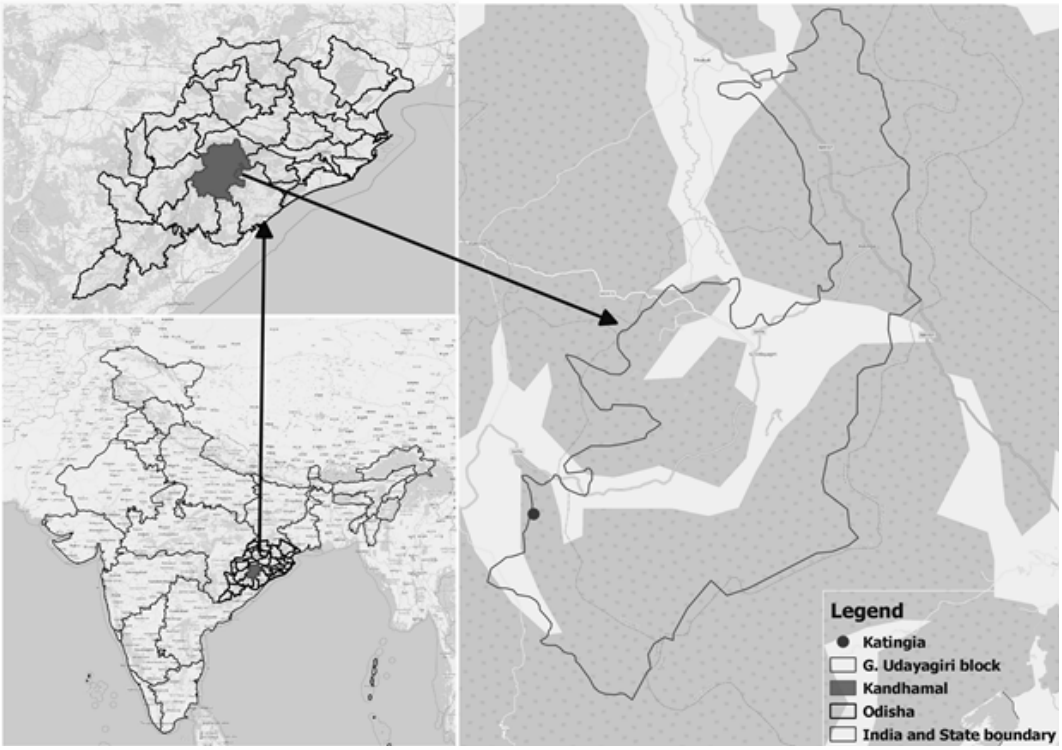

Fig.2. Mapping of the study area
Source: Author

RESULTS

Kondhs Traditional Belief

The Kondhs believed that their origin was in *Dangar* (Hill) along with other plants and animals. Therefore, all plants and animals are naturally related and the Hill is believed to be their mother. They respect mother Hill or *Dangar*. The Hill was addressed by them as the *Saru Penu* or *Soro Penoo*. It was the mother earth who decided the crops' survival and growth on its surface, and controls the rainfall and weather. The Kondhs also believed that man alone could not predict the weather or the climate. Therefore, they would take indications from some animals, birds or plants. There were several birds in the region, which alerted people for preparedness to cultivation in the approaching season. The sounds of birds alerted and enabled them to take decisions and step into action. For example, a bird sounding like *matatapu* indicated the time to store seeds for next season. The same bird with the sound of *birinpiyadi* indicated the onset of monsoon. Myna a common Indian bird had a special significance in the life of the Kondhs. Its sound enabled the tribe to identify auspicious days and time.

The Kondhs are traditionally shifting cultivators and food gatherers. Besides, they used to depend on some traditional cash crops such as turmeric for bartering in the weekly market or with the middlemen and moneylenders in exchange of goods and services.

Shifting Cultivation

Shifting cultivation is also called *podu* cultivation in Kandhamal region of Odisha. The word *podu* is derived from the word 'burn'. Therefore, this type of cultivation is also called the slash and burn cultivation. The land in hill pockets or upland is preferred by the community for slash

and burn cultivation or *podu* cultivation, also called the *bagad chas* by the same community. The *podu* land is most preferred to grow pulses as well as maize, sorghum and other such cereal crops that can better grow in the soil without stagnant water, and the plants require porous soil for better air and water absorption.Therefore, the site selection itself begins with knowledge and thorough introspection. Several works discuss about the nature of land preparation in shifting cultivation (Conklin 1961; Vidyarthi 1962). The community starts preparing land by clearing bush during February-March. After the plants dry up, the community members perform a *puja* (ritual) at the place called, *bagad* (hill). Therefore, the ritual is also called the *bagadpuja*. The community members assemble in large numbers to offer their obeisance at the sacred venue, which is performed with the sacrifice of domestic fowls,or if it is a low affair, at least a few eggs are offered to propitiate the deity. Rice and turmeric are the two essential ritual items, which after some readings of hymns by the ritual leader called *Dehuri,* are given to the sacred fowls. The fowls are then sacrificed and the blood is sprinkled on the dried woods and twigs. The ritual leader then sets these woods and twigs on fire. The community members assembled there take some pieces of charcoal or burnt end of the wood to add into the *podu* soil with hope for better harvest from the crops grown thereafter. It is believed by some community members that by observing this ritual with good faith and reverence would protect their plants from attacks of wild animals or even from the bad human elements and natural disaster. Thus, the *podu* cultivation is primarily concerned with faith and practice through indigenous knowledge and belief systems.

The podu land is cultivated in a zigzag and crisscross manner in order to make soil more porous and lighter. Ploughing is done both horizontally and longitudinally. The ploughing that is made longitudinally is called '*ekasiuhasu*' and the ploughing made horizontally is called '*rasilakuhasu*'. There is no ridge found on the podu land unlike for each parcel of private lands. Water is allowed to flow down smoothly to the down side of the hill. The seeds are transplanted with caution so that it will not be washed away by rain. To prevent soil erosion the podu land is protected by forest from all sides, mainly at the lower side. Thus, the podu land is called forest land or *gassa ketanga* or *bagad* in their local *kui* or *kuvi* dialect.

Unlike modern agriculture that is associated with aggressive production and agricultural intensification, the *podu* cultivation is mainly for the subsistence use, conservation of nature and preservation of culture. *Podu* cultivation requires intensive labour and thus, it is a community affair. Community cooperation in labour contribution is essential for shifting cultivation. It is the community that takes decision on *podu* land distribution.

Soil Type

The *podu* land contains black soil (*kala bira*) and sandy soil (*balu bira*). Both black and sandy soils are considered most fertile, porous, and the moisture content is normal throughout the year. According to some Kondhs, even forty years back the *podu* land was so fertile that a single pigeon pea plant (*kanga*) could produce five kilograms of seed. As the soil is porous, light, air and water can pass through it to make the seed germinate early and grow faster. In order to maintain soil fertility, once the crop harvested the land is left fallow for a minimum period of four to five years for the soil to regenerate its health and allow other plants to grow again. The *podu* land is also used for mixed cropping.

Crops Cultivated

Varieties of crops are grown on *podu* land. Common cereals such as paddy, sorghum and maize, spice products like turmeric and ginger, millets namely, and kodo millet (*kuiri*), finger millet (*ragi*) and other local millet (*klingiraka*) are grown on the *podu* land. Until 1970s the millets were main staple crops of the Kondhs. The community was aware of their nutritional value and rich mineral contents that benefit health. *Kodo* millet or *kuiri*, finger millet or *ragi* and other local millets not only have rich nutritional values but also have special significance in tribal food. A few crops have special significance in the Kondh life. Sorghum (*jowar*), maize and rice (*kudinga*) are among cereals, kodo millet (*kuiri*) and finger millet (*ragi*) among millets, pigeon pea (*kanga*) as a lentil (*dal*) variety, turmeric (*sidiganga*) as a condiment or spice product, and lab lab beans

(*sainga*) as a vegetable are most popular and among the oldest traditional crops grown by the Kondhs. Both millets and pulses used to be grown on a rotation basis in alternative year on the same land. No millet is grown in isolation. But the seeds of different millets are sown with a limited interval of time in the following order (Fig.3).

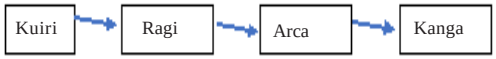

Fig.3. Millets sown with limited intervals by the Kondhs
Source: Author

The purpose to broadcast a variety of seeds in the same land is to maintain the fertility of the soil and for producing multiple variety of millets from specific cultivation procedures at one go that can save time, energy and also protect the crop from wild animals as collective efforts are intact for certain period under *podu* cultivation.

The Kondhs are aware that millets are rich in minerals and thus they are good for health. Also, the pigeon pea is very rich in protein. The non-polished crushed lentils (*dal*) is used as protein supplement by the community. The pigeon pea is so important in the culture of the Kondh that the community performs a specific ritual called *kanganenju* for its better harvest. The first fruit harvested is offered to the deity as a mark of respect.

Turmeric is the most significant spice grown for its cultural value as well as importance as a cash crop. This spice is locally called *sidiganga*. It is believed that the origin of production of this crop dates back to the Mauryan dynasty in the 9th century.

The growth of turmeric is almost a religious rite with the Kondhs and it was to improve its culture and output that human sacrifices used to be performed since the mid-nineteenth century. It was also their chief source of income, as they exported it in large quantities, bartered it for grain and salt to drivers of pack bullocks, who came from Ganjam, Sambalpur, Cuttack, Puri and other tributary states (O' Malley 1908).

For production of turmeric the sandy soil is preferred to red and lateritic soil. Therefore, both hill land and uplands with sandy soil are preferred for turmeric production. The entire turmeric production cycle is around one year. In turmeric production, maximum labour requirement is called for during the time of twigs collection. Both men and women collect twigs of Sal (*Shorea robusta*) trees from the nearby forest. Using a serrated knife they cut down tree branches and cover the turmeric field like a sheath. This is a traditional mulching method to retain wetness of the soil and protect it from heavy sunlight and rain. After the mulching activity, the burden of labour is reduced. The land is then left untouched for nine to ten months till the time of harvesting. During harvesting time both men and women contribute almost equal labour. While the men engaged in digging soil and separate the tuber from soil, women carefully extract tubers from the soil and clean them properly before processing. After the harvesting of turmeric, women carry home the basketful of it and dry this in the open field under sunlight. After some days the dried turmeric is again boiled in containers. After thorough boiling, the people, mainly the women, allow it to dry up again in the open field under sunlight until the wetness and moisture content is completely vanished. In this way, the processing of turmeric is underaken manually using locally available resources with labour contribution from both men and women.

The *podu* cultivation appeared to be not only an economic pursuit of the Kondh community, but also it is an account of their culture and social life. *Podu* cultivation signifies their way of living and ensures their livelihood is based on the vision for good health and conservation of nature.

Settled Cultivation

The settled cultivation has a different meaning. First, the land area is not shifted or kept fallow for certain periods unlike in the *podu* cultivation. Second, it is surveyed and settled by the survey and settlement department and records are created for private landholders.The *podu* land is communally managed, whereas the community land hold some rights of usages over it. The state on the other hand is mainly vested with proprietary rights. The Kondhs traditionally preferred *podu* land to plain land, however, in due course the latter became the predominant cultivable land among the community members who could exert individual ownership over it under the statutory provision of land rights.

Paddy Crop

Paddy is the most preferred crop, which is mainly grown in the plainlands. Until 1970s there

was only a local variety of paddy that used to be grown by the farmers in the region. This local variety of paddy is of different types. Traditionally, the Kondhs cultivated more than fifteen varieties of paddy in the study villages alone. For the purpose of analysis only 10 varieties of paddy are taken into account (Table 1). These are *Matasaka, Nadiasatanga, Kalitolashaka, Bukurnaga, Ajalanga, Brihadalanga, Kundadhan, Tureka, Nagardhan, Daspalianga,* and *Putkudianga. Matasaka* is dwarf in size but fat, white in color, and produces better gruel. Therefore, this variety is used daily. *Nadiasatanga* is thin and in medium size, white colour, with a normal scent, medium yield and grown in plain land. *Kalitolasaka* is medium in size, thin, black colour, scented, low yield and is of early variety. This is used occasionally, but mostly in festivals and rituals. *Bukuranga* is very thin, smaller size, white colour, pleasant odour and grown in low land, and can be grown in upland also. It has medium yield and is primarily of early variety. This variety is used occasionally in rituals as well as in festivals. *Ajalanga* is large sized, white in colour, of medium yield and is an upland variety. This is used daily or occasionally based on its availability. *Brihadalanga* is large sized, both elongated and fat, red colour, low land is preferred, resistant to pest and insect infection, and this variety is used daily. *Kundadhan* is large sized, brown or redish coloured pod, good for husk for fodder, and this variety is grown in upland. It is known for early production and used for daily consumption. *Tureka* is another early variety, occasionally and mainly used for puffed rice and pressed rice. *Nagardhan* is a medium sized, red, and late variety for which low land is preferred, as it needs much water to be grown. It is used daily. *Daspalianga* is large sized, with red coloured pod and for production low land is preferred. This variety is used in social occasion, also used for puffed rice. *Putkudianga* is small sized, scented and a low land variety. It is used occasionally, particularly during rituals and other special purposes (details in Table 1).

Rationality in Selecting a Variety

The better yielding of paddy is not always preferred. Their consumption pattern determines the preference. For instance, traditionally, the Kondhs preferred such varieties of rice, which produced better gruel. Rice after boiling produc-

Table 1: Local (indigenous) paddy varieties

S. No.	*Name of the variety*	*Characteristics*	*Use/consumption pattern*
1	*Matasaka*	Dwarf and fat, white colour, and produce better gruel.	Daily
2	*Nadiasatanga*	Thin and medium size, white, normal scent, medium yield, grown in plain land.	Daily
3	*Kalitolasaka*	Medium, thin, black colour, scented, low yield, and early variety.	Occasional, mostly used in festival and rituals
4	*Bukuranga*	Very thin, smaller size, white colour, well scented, preferred in lowland, but can also be grown in upland, medium yield, early variety.	Occasionally used in rituals and festivals
5	*Ajalanga*	Large size, white, medium yield, upland variety.	Daily
6	*Brihadalanga*	Large size, long and fat size, red colour. Low land is preferred. Resistant to pest and insect infection.	Daily
7	*Kundadhan*	Large size, brown, red coloured pod, good for husk, upland is preferred, early production.	Daily
8	*Tureka*	Medium size, early variety.	Occasional, mainly for preparing puffed rice as well as pressed rice
9	*Nagardhan*	Medium, red, low land is preferred as it needs much water, late variety.	Daily
10	*Daspalianga*	Large size, red colour, low is preferred.	On special occasion. Used for puffed rice
11	*Putkudianga*	Small, scented, low land variety.	Occasional

es gruel, which is rich in starch. Traditionally, this gruel is consumed by Kondhs. There are many other factors, which also determine the selection of the variety. For example, the Kondhs also consider the crop resistant to heat or drought, insect and pest attacks, etc., as important factor for the selection of a variety.

Other Crops

Discussed above are the crops, which are most popular and produced relatively in large scale. The community however produces more varieties of crops such as black gram (*masanga*), green gram (*munguka*), horse gram (*kaltaka*), cow pea (*kadkanga*), etc. These crops thrive well in uplands with fertile black soil. The community prefers crops with short gestation period. Crops like millets, pulses and even cereals are seasonal crops with short gestation period are thus preferred. These crops also grow well in hill lands and some in low land areas. The Kondhs grow turmeric and ginger preferably on sloppy lands in order to avoid excessive water that affects the tubers.

The Kondhs are also traditional growers of papaya, plantain (*jadeka*), lablab beans (*sim*) locally called *sainga*, etc. Lablab (*sainga*) is a popular seasonal pea variety especially grown during winter without much care. Due to the drought resistant nature of this plant, it grows widely and produces abundantly, which in turn helps providing protein supplements to the community members.

Both land preparation and sowing of seed do not require much labour and regular attention. People just dig the soil with the help of spade or *pikash tools*, place the seed inside and cover with the soil again. Thereafter, people continue watering it until the plants grow upto a medium size. They are preferably sown near fencing sites to support the creeper to grow effectively.

Indigenous Knowledge About Crop Protection

The pest control mechanisms of the farmers included the using of traditional herbs and other natural ingredients. In the paddy field, the Kondh farmers use twigs of sal or leaves of sago palm (*salap*) to repel pests and insects. They fix them in the centre of the paddy field to arrest the breeding of insects and pests. The farmers have experienced that the odour of *sal* and *salap* leaves acts like pest and insect repellant. In some cases, the spiders are allowed to grow near paddy fields to prey on other insects and pests to prevent crop attack.

It is believed that the varieties that yield more are prone to diseases. The less yielding varieties usually possess some better qualities like odour, taste, etc. Therefore, post-harvesting risk is higher due to possible pest and insect attack.

The practice of inter-cropping or mixed cropping is better than monocropping in the rainfed areas, which ensures some yield during the aberrant weather conditions. In order to avoid pest attack on some crops, mix cropping is preferred so that some plants can be resistant and ensure some return. The practice of sowing seeds in the field with standing crops reduces the burden of land preparation, and overcomes water scarcity for the second crop. This practice is primarily a drought resilient mechanism of the community in the Kandhamal region.

DISCUSSION

The discussion on traditional agriculture is not confined to land selection, land use, crop selection and crop production. It also includes collective consciousness of the community and controlled behaviour of the individuals to refrain themselves from exploitation of nature, the land, forest and habitats. The indigenous communities' land use patterns are shaped by string of spiritual beliefs (Kapoor 2004). The Kondhs are no exception to these beliefs, faith and spirituality that are associated with various forms including in the form of traditional agriculture. They undertake cautiously the activities like digging soil, ploughing, cutting down bush, sowing and seedlings, etc.To supplement it, Cochrane's (1975) explanation on traditional agriculture is added, where he says, the traditional agricultural sector is characterised by subsistence production, use of simple technology, acceptance to the practice by division of labor based on sex and age, associated with rituals and ceremonial cycles, and also often dealt with low energy harnessing and technology intervention.

The cultivation of multiple varieties of cereals such as paddy and jowar, millets, vegetables, and spices and condiments by the Kondhs depicts the nature of diversification in traditional agriculture and their knowledge about taxonomy, crop rotation, mulching method, soil health regeneration, storage, etc. Turmeric has been a far more accepted cash crop amongst the Kondh communities in Odisha, where the districts like Kandhamal (28,828 tons from 11,088 hectares), Koraput (7,761 tons from 3,168 hectares), and Nayagarh (5,343 tons from 2,473 hectares) have secured the first, the second, and the third positions, respectively (Babu et al 2015). In view of the potential of turmeric production, the state was recognised for the Agri Export Zone. The rhizomes (turmeric) are widely stored in an indigenous way in the open field or in the backyard under the mango or jackfruit trees. The indigenous people use pits in the floor to store them and cover it with sal leaves or turmeric leaves to avoid pest or insect infection. They use this practice to control post-harvest loses (Babu et al. 2013).The Kandhamal *Haldi* (turmeric) has now got a Geographical Indication (GI) tag in 2019 (Hindustan Times 2019). The organically grown turmeric got wide recognition after it was named after Kandhamal district, which counts for more than a half of the total population belonging to the Kondhs. The Kandhamal district is by far the most organic, as the rate of use of chemical fertiliser, insecticide and pesticide is the lowest of all other districts in Odisha, and perhaps in India. The people here have a natural instinct to grow organic and attach with traditional crops despite market constraints.

Odisha was earlier well-known for production of wide variety of rice species. In the 1950's an official survey suggested that the farmers in Koraput region alone grew over 1,700 kinds of rice, which can grow in different agro-climatic conditions, low and upland, and at different altitudes and weather (Choudhury 2017). Although, there was no exact record on the kinds of rice available in Kandhamal, but as a bordering district to the undivided Koraput district, there should not be much distinction in the number of varieties of rice between these two districts due to more or less similar agro-climatic condition, geographical position and ethnic composition. The adoption of multiple varieties of paddy by farmers in the region is the result of their frequent experiments, both trial and error, and experience of failures and successes.This practice of agricultural diversity and conservation are universally practiced among indigenous communities (Gadgil et al. 1993; McNeely and Schroth 2006), so as among the Kondh community in the state. In Kandhamal district, some varieties of paddy are of local origin and inherited from their forefathers, and some are from the outsiders such as traders coming from other districts and towns. This is known from the very etymological classification of crop varieties. For instance, *nagardhan* (a paddy variety used by the Kondhs in Kandhamal district), for which the etymological meaning is'paddy of cities'. This signifies that this variety is broughtin from other towns or cities possibly by traders, teachers appointed in Phulbani (Kandhamal) from the outside and agricultural extension workers. It was observed that the Kondhs grew such varieties of paddy that are suitable for their land, their consumption pattern, ritual behaviour, exchange value, etc. The adoption of multiple varieties was done since the time of inception.The better yielding varieties are used for the daily consumption and less yielding but scented varieties are for occasional and auspicious events.

Several changes in culture and agriculture are noticed now as the community is mostly integrated with plain inhabitants from different caste groups, ethnic communities and religions.

Opportunities and Challenges

There is a significant tribe-caste interrelation, economic cooperation and cultural integration taking place everyday. There is constant intervention of state and administrative machineries to roll out and implement flagship developmental schemes for livelihood promotion, agricultural and rural development, health, education, and other infrastructure development, etc. As the district is habited by heterogeneous social groups from different faiths and cultures there is a natural course of cultural integration. With cultural integration, it is imperative that the food habits also undergo changes so as the change in agriculture and cropping. New crops such as French beans, potato, peanuts, etc., are grown with adoption to high yielding variety seed and new farm mechanisation. Motor pumps for lift irrigation, application of fertilizer, pesticide, insecticide, herbicide, etc.,

are used by Kondhs, which is self-supported or under the public schemes and NGO's support system.

The Hindu festivals such as the Rathayatra, the Dusserah, and the Ganesh Puja are celebrated together, and youth clubs in the district become active in organising the festivals. Besides, the Christmas is also celebrated with great fervor across religions, castes and tribes. These popular cultures and festivals have been a driving force for socio-cultural transformation and change in the belief system and traditional perceptions of the communties. Although some positive changes are observed in superstitious beliefs, perception about sacrifice, and propitiating deities, etc., but then changes in their practice of conservation and cultural harmony have been affected due to dominant cultural contacts and religious conflicts, and violence in the name of religion, culture and ethnicity. For instance, the Kondh and the Pana conflicts in the mid-1990s were resulted due to socio-religious conflicts, economic relation and breach of trust (Bauman and Young 2014; Bauman 2010).

The traders from other districts and towns throng into the region with new products for sale, exchange and sometimes to barter with local agricultural and forest produce of the community. Besides regular market, the weekly market has beenthe popular avenue for exchange of agricultural and forest based produce. Best quality turmeric grown in this district has attracted traders from several cities of India. Popular turmeric production has developed new entrepreneurial opportunities in the region for small-scale industries as well as cooperatives for processing, branding and packaging of the best quality and organic product available in the district. The communities across tribes and castes are now having access to new technology, electronic media including television with cable connection and mobile handsets (smartphones with 3G/4G connectivity). Barring few hill pockets, almost every tribal and nontribal household of plain areas has a mobile handset or a smartphone mostly owned by youth members of the household who can have access to social media. In this way, new technology is replacing old technology, new ideas replacing the old ones and knowledge is being updated continuously. Several myths that persisted for generations are now vanishing. But some old ideas, knowledge, technology and practice survive and thrive due to adaptability and socio-cultural significance realised by people even now.

The traditional agriculture is fast fading worldwide (Dweba and Mearns 2011; Brodt 2001). In this context, it is important, but most challenging for academics, policy makers, implementors and others to develop the model for conservation of traditional knowledge, resource base and foster indigenous culture while interfering the least in their everyday life. Fernández Llamazares and Cabeza (2018) study on rediscovering the protential of indigenous story telling for conservation practice is important. The authors were interested in linking conservation actions to indigenous world views, foster indigenous peoples and their landscapes, facilitate intergenerational transfer of indigenous knowledge, promote local participation in conservation and development intervention. As the Kondhs' agricultural practice is deeply connected with culture, the cultural ingredients such as beliefs, perceptions, rationality and knowledge system become crucial in determining agriculture and economy.

CONCLUSION

Traditional agriculture includes a wider range of practices including crop selection, crop diversification, taxonomy, technology adoption and resource conservation amongst others. It is based on the thrust of culture (beliefs, perceptions, rationality and indigenous knowledge system, etc.), subsistence economy and natural resource utilisation, which is mainly guided by community norms and ethos. The analysis of traditional agriculture indicates that the community is not short of innovation, observation and experimentation. They have accepted such practice, which is adaptable and resilient to local environment. Moreover, their practice is associated with ethics of resource conservation by which their future generations can survive without stress. With the blend of both perception and rationality the community continues to sustain for generations without harming the society and environment. However, like any other community, this community is also not unaffected from the challenges of modernisation and other social change processes taking place at both the macro and micro level.

Therefore, it requires preservation of indigenous knowledge through proper documentation, and dissemination of such knowledge for social and societal awareness and welfare.

RECOMMENDATIONS

Traditional agriculture has many key elements of culture such as beliefs, perceptions, rationality and indigenous knowledge system that should be studied from the insiders' perspective. Although technology in traditional agriculture is simple, yet they are environmental friendly. Some elements are essential for community engagement, social cooperation, and natural resource management. Therefore, efforts should be made to promote indigenous knowledge, and encourage organic production through incentivisation and effective government and civil society organisations' (CSOs) participation.

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