CHAPTER VIII

GENERAL DISCUSSION
General Discussion

Indigenous knowledge is the knowledge of the indigenous people inhabiting different geographical regions of the world with their own language, culture, tradition, belief, folklore, rites and rituals. In course of their close interaction with nature and natural resources, they are to make certain decisions as to the solutions of their problems they encounter in their day to day life while managing land and environmental resource for survival. Compelling situations motivate them to generate knowledge out of necessities. Therefore, the indigenous knowledge so developed is based on necessities, extinct, curiosity and observations of ethnic groups to mitigate the immediate situations. As the elderly persons in any ethnic group hold the key and custodians of the traditional knowledge, they are masters to make correct decisions to overcome the adverse situations of their immediate environment (Chhetry and Belbahri, 2009).

The linkage between agriculture and indigenous knowledge is not new; the two have been at the heart of anthropological literature since its origin. However, the evolving relationship between agriculture and IK concerning development and innovation is a recent history. The notion of agricultural innovation puts increasing emphasis on cross-disciplinary cooperation while focusing on blurring distinction between modern science and cultural science. The problems of development are no longer seen as residing in the traditional cultures of primitive people but rather in their partial and biased understanding of development. This understanding has apparently emanated from the un-reflexive application of western scientific rationality. Indeed traditional cultures and people are now seen to contain the basis for any sustaining development.

The main aim of the present study was to document the various traditional pest management techniques practiced by three major ethnic major communities of Barak Valley in Assam viz., Bengali, Bishnupriya Manipuri, Dimasa. The present study also aimed to investigate the traditional farming techniques practiced by these three ethnic communities and traditional storage structure pattern and condition and learn their indigenous soil classical nomenclature and method of identification. Another major objective of the present study was to assess the socio-economic condition of these ethnic farmers in the valley in respect to agriculture including their awareness level of various facilities available for the rural farmers. The each ethnic group of the valley holds by its own religion, its own culture and language, its own ideas and ways. Barak valley is the dwelling of various races, tribes and castes, such as Bengali, Bishnupriya Manipuri, Dimasa, Manipuri, Assamese, Khasi, Garo, Naga, Mizo or Lusai, Sakacheep, Chorei, Kuki (old and new) and the various communities of tea garden. For
this variety of demographic pattern this valley is known as the “Anthropological Garden” among anthropologists and historians (Das, 2011).

Bengali is the dominant ethnic community of Barak Valley. As far as Barak Valley is concerned it consists currently of three districts – Cachar, Karimganj, Hailakandi. Earlier they all formed only one district called ‘Cachar district’ of Assam, Karimganj became a part of Assam only in 1947. Cachar including Hailakandi was the habitat of diverse tribal and ethnic groups. Hailakandi is overwhelmingly Bengali Muslim, surrounded by number of tribal groups. While the Hindus and Muslims spoke a dialect of Bengali language known as Cachari-Sylheti, the tribal spoke a myriad variety of Indo-Burman languages. Similarly Cachar was the kingdom of the Dimasa rulers with Khaspur as their capital. This too is a largely multi ethnic region. Besides the Dimasa there was large number of Bengali Muslim population who constituted the functionaries and armed forces as well as revenue official of the kingdom. A small number of Bengali Hindu comprises priestly classes, all of whom spoke a dialect known as ‘Sylheti’ or ‘Cachari’, one of the dialects of the large Bengali language. During the Burmese invasion of Manipur a large number of Meithei, Bishnupriya, Rongmei and Koch communities migrated and settled in Cachar which is presently known as Barak Valley (Dey, 2013).

The Bishnupriya Manipuri claim themselves to be Chandrabanshiya Kshatriyas, that is Kshatriyas of the Lunar dynasty. According to the Khumal Purana, they are the descendants of Babruvahana, the son of Arjun (the third Pandav prince) and Chitrangada (the Manipuri princess). They believe that they got their name from their Bishnupur in Manipur. Others opine that the term Bishnupriya means ‘the devotees of Lord Vishnu’. Bishnupriya Manipuris have strong desire to be in Manipur, more particularly in Bishnupur. Anthropologically, this desire acts as a strong force which helps to preserve their cultural identity. The community’s mother tongue is Bishnupriya Manipuri. The Bengali script is used for written communication. The Bishnupriya Manipuris have a mainly vegetarian diet. Some of them often eat both live and dried fish, but they do not eat eggs and meat. Garlic is also avoided. Rice is the staple food. They eat all kinds of pulses, local seasonal vegetables, root, tubers and fruits. Mustard oil is used as the cooking medium (Singh, 1996). Agriculture is the dominant occupation of this ethnic community and they are the store house indigenous traditional farming techniques and traditional pest management methods. Bishnupriya Manipuri farmers possess an indigenous knowledge of post harvest storage of their grains (Das and Ray, 2012).

On the other hand, the Dimasa is one of the plain tribe of Assam inhabiting Barak Valley. They form a part of the greater Dimasa Kachari Society. Dimasa tribe, which belongs
to Indo-Mongoloid Kachari group, is found in North East region of India (Barman, 2012). Literally, the meaning of the word ‘Dimasa’ is ‘the children of the big river’ (Bardoloi, 1984). Agriculture is one of the major occupations in Dimasa tribe. Every year Dimasa Kachari family worships its god before sowing paddy. This small festive is known as Madai Khelimba. They also have vast knowledge for pre and post harvest techniques and have traditional knowledge of ethnic storage structure (Das and Ray, 2013).

The environment, local conditions, socio-economic and socio-cultural life of the people and also the festivals, functions, rituals associated with agricultural practices vary in the region. These ethnic societies with long history and traditions have developed indigenous farming systems, which have built in eco-friendly systems for conservation, preservation and utilization of natural resources (Singh and Gupta, 2002). Some of these practices and their knowledge in respect to agriculture were broadly surveyed and documented in the present study. There is an awakening to promote such traditional technologies in crop production in various countries including India. To cope-up with, efforts to document and revitalize the age-old agricultural practices of pest control are on the rise. It is in the background of the present research work to survey the valley to document the packages of pest control practices, traditional storage structure and soil classical nomenclature.

Agriculture has been the main source of livelihood of the three ethnic community in the villages of Barak Valley. This being practiced by the farmers of the village is still rooted in traditional notions of divine blessings for a good crop and the practice of appeasing rituals is still continued. Agriculture is not just an enterprise for livelihood but a socio-economic and cultural activity. While agriculture revolves around seasons, the socio-cultural life of the ethnic farmers in the region revolves around agriculture. However, many beliefs and religious rituals are now giving way to rational thinking in the cultivation of the crops. Perceptions about the use of pesticides and fertilizers vary between the rich and poor farmers. Rich farmers favour use of pesticides and fertilizers on all the crops, the small and marginal do not. This is because they believe that as long as the blessings of the god with them, pests cannot cause any damage. However, the latent reason may be that these farmers do not want to increase the cost of cultivation by application of fertilizers and pesticides for moderate increase in the yield (Kumar, 2010).

Farmers selection and management of crop diversity shape the crop genetic diversity. An important aspect in the management of crop diversity is the seed flow and traditional seed storage systems. Smallholder farmers of traditional farming systems are the main managers and preservers of agrobiodiversity. Such farmers continue to cultivate rice landraces even as
they adopt newer varieties. Certain agromorphological characteristics, their adaptation to stressful environmental conditions are hotspots of rice diversity (Das and Das, 2006). Collective action was crucial to the creation of crop genetic resources, and it remains critical to maintain the evolutionary system that generates these resources, and it remains critical to maintain crop genetic resource is substantively different from that involved in managing fixed assets, such as irrigation systems, pastures, and other factors that are associated with common property (Brush, 2005).

IPM has had many successes, but the magnitude of the problem which farmers currently face forces us to look once again at pest and diseases and at their management. While it may be necessary to critically assess the extension method followed during these last two decades, it seems equally relevant to stress and emphasise again one of the basic ideas behind the “different pest management systems” which we called for more than twenty years ago: that pest and diseases are not an isolated part of agriculture, but rather a symptom of a broader problem, and need thus to be seen-and managed accordingly (Tafur et al., 2007). The best strategies for pest management are based on ensuring optimal conditions for plant growth, a soil rich in organic matter, balanced nutrition, good plant population and high diversity of plants attracting, repelling harmful insects and promoting predators of all kinds. It is necessary to look wider than at only one field: the whole cropping pattern of a farm and an area will promote or control pests and diseases. The natural environment too can contribute to controlling or promoting pest incidence. If we can fully understand the ecology of pest and diseases, we can live harmony with them instead of fighting with them (Lanting, 2007). The innovative nature of indigenous communities can be seen among the farmers of Barak Valley, and is evident from array of pest management methods they have developed based on locally available resources. These methods (Table 4.3.1) are environment friendly because chemical pesticides are not used, and most importantly, because they have strong foundations in well established biological and ecological principles (Sinha et al., 2007). The main principle of ecologically based management is that farming communities must act together. Individual acting on their own crop field will have little impact on the overall pest population as they quickly migrating back into areas from where they have been removed. This implies that communities must coordinate and communicate effectively over a large scale, and it is important to encourage high levels of community cohesion to be successful. This can be challenge, particularly in more semi-urban situations (Belmain, 2007). The propose of methods of traditional pest management seems to be acceptable among farming communities as proven that it is economical, environmentally sound and easy to practice. The collection of
traditional pest management practices are easy to practice in the field will help the subsistence farmer to reduce his production cost (Amuwitagama, 2002).

The practices of introduced varieties have considerably changed the traditional protocol of rice cultivation and exacerbated some problems. High nitrogen fertilizers produce luxury growth, which provides a favourable habitat for insects. Therefore, it requires attention towards crop losses both in the field and in storage. Crop losses due to pests can be higher if the farmers do not take adequate care. The present study reveals that the farmers in the valley are aware about the performance of each landrace under a variety of situation (Table 3.6 to Table 3.19). The traditional knowledge helps them to select the appropriate landrace for a given climatic condition. The present study enlisted few of the landraces which are flood resistant and mentioned that the farmers in the valley select specific landraces for their yield or their ability to withstand natural stress such as floods, droughts or pestilence. Thus, paddy landraces with resistance against major stored grain pests can play an important role in minimizing losses during storage. Stored products include materials, which may be dried, rendering them storable for future use as food, industrial raw materials, medicines or as planting materials. This includes cereals, pulses, dried seeds and root crops. Insect infestation is a major contributor to quality deterioration of stored products kept in warm and humid climates. Considerable physical and nutritional losses sustained are due to infestation of stored products by weevils, bruchids and other insects. Apart from the detrimental economic impact, these losses pose a major threat to food security. Traditional methods of applying spices, medicinal plants and their extractives, and inert materials with pest control potential as storage protectants, have increasingly been explored and exploited in the developing world as alternatives for the control of pests of stored products. These include microorganism (mainly fungi and bacteria, which cause infection and deterioration), mites, rodents and birds. Plants and plant products can affect insect and other storage pests in various ways by exhibiting pest control activities as toxicants, attractants, repellents, antifeedants and growth regulators; they are also effective as antimicrobials antifungals. Nearly one thousand species of insect have been found associated with stored products in various parts of the world. The majority of the pests belong to the order Coleoptera and Lepidoptera, which account for about 60 and 8-9% respectively, of the total number of species of stored product insect pests (Chomchalow, 2003) and insects are the major cause of loss of stored products Lal (1988) in India. Insect infestation and rodent attack have effect on quality of produce because they feed on products thereby reducing the nutritive value, contaminate the products with their fragments, faeces and urine. They also contribute to objectionable and repulsive condition of foodstuff on display for sale.
in market. Moldiness spoils the flavour of stored grains and pulses. Some losses and damages are also encountered during processing of harvested products or even during harvesting (Njoku and Adesope, 2007).

Food from prehistoric times to-date, remains one of the basic needs of man across the world. Apart from cultivating crops needed for consumption and sale preservation constitute a vital aspect of ensuring sufficient and quality food for given population (Ogundele, 2007). The grain storage strategies are adopted by the indigenous community in their ethnic storage structures leading to economize the effective against pests. They further prevent pollution of the environment, rendering the products pesticides-free and quite safe for human consumption (Kiruba et al., 2008). Women folk have accumulated knowledge of household practices over generations by observation, experimentation and by handling age old people’s experiences and wisdom. Certain practices are unique to a given culture of a society and vary between countries, regions, villages and even communities (Karthikeyan, 2009 a). The selection of a traditional storage system by an ethnic group often related to climate (Kiruba et al., 2006). The techniques used in traditional storage are embedded in custom and have passed through generations. There are many good quality storage bins that could be made out of locally available, low cost materials that would successfully protected properly dried stored grain from moisture, mold, insects, rodents and birds (Karthikeyan, 2009 b). With the passage of time, traditional storage structures are being replaced by improved metal bins. Rural people feel that traditional storage structures are fixed, required regular maintenance and need local skilled person for their construction whose number decreasing day by day. Moreover, improved granary storage structure is the status symbol for the rural family (Kanwar and Sharma, 2006). The rodents not only eat away considerable quantity but also contaminate/spoil the product in such a way that sometimes it becomes unfit for human consumption. The number of storage units varies from one to two per farming household (Sarangi et al., 2009). Pest prevention, early detection and pest control would greatly reduce grain losses during storage (Nukenine, 2010). The study indicates the prevalence of a substantial number of traditional post-harvest pest management methods in the rural areas of Northeast India. Lack of access to modern deliverables and close proximity of the communities with nature might have triggered accumulation and continuance of the knowledge base. The non-accessibility to modern deliverables may be bliss in disguise to them who are mostly marginal and economically poor, and large scale storage practices are not suitable for them. In addition, the reported human health implications associated with chemical grain protectants is probably avoided with the use of these traditional methods (Sinha, 2010) but Aziz (2011) mentioned
that natural compounds from plant resource may have the advantage over conventional fumigants in terms of low mammalian toxicity and compound of plant origin can be used only for small-scale applications or for space treatments whereas in Barak Valley Das and Ray (2012) found that traditional storage structure can modify the moisture content of the grain and hence reduce the extent of damage by pest infestation. The reduced moisture content in traditional storage structure and reduction of occurrence of pathogen also confirmed by Babu et al., 2013. The worldwide research carried out in last three decades has significantly extended our knowledge about the role of plant products in stored grain pest management (Shukla and Toke, 2013). Indigenous traps are very common in this northeastern region specially for rat as the ethnic farmer knows the behavioural ecology of the rat with respect to this region (Thakur et al., 2013).

Many soil properties involved in indigenous soil determination are visible to the eyes (Osunade, 1989). The most important of those is soil colour being used throughout world for many descriptions. In general, dark soils are considered more fertile than light soils, associated with their organic matter content (Marten and Vityakon, 1986). Farmers distinguished colour classes and related these to land degradation: black soil (Kala matti), which is fertile and contains high level of organic matter, where degradation is more in red soil (Lal matti) (Taylor-Powell et al., 1991). Soil fertility is also referred to by the adjectives ‘cold’ or ‘hot. This refers to the amount of rainfall, the soil needs to be productive. Water thus adds coldness to the soil. Hot and cold soils not only need different amounts of rain, but also different intervals of rain (Lars and Laursen, 1997). Landuse classification connects soils very effectively with the agro-ecological processes. Also, landuse classification, being a human decision, is as much socioeconomic as it is agro-ecological in nature. For a farmer, soil management is an interactive and interdependent component of managing water, crops and labour. Management of soil depends, not only on biophysical properties but also on factors such as seasons, crop rotations, and weather conditions, availability of labour, subsistence requirement and market. Often the latter factors dominate over the former in farmers soil management decisions (Talawar and Rhoades, 1998) Farmers in the study area see soil fertility as a broader concept than the soil’s nutrient status and closely related to crop productivity. They use various indicators to assess changes in soil fertility, such as yield levels, the degree of weed infestation, the appearance of rocky outcrops, and crops wilting early. The local system for classifying soils, which determines soil fertility management practices, is based mainly on soil colour and texture. Socio-economic factors such as shortage of land and land fragmentation have led to a decline in traditional soil fertility management practices. This will
have substantial effects on soil fertility, unless farmers use other measures to add nutrients to their soils. Farmers in the study area were aware of the problems caused by declining soil fertility (Corbeels et al., 2000). Through runoff sediment management, soil properties in agricultural fields change (Sandor et al., 2002). Local farmers have profound knowledge of their soils and they develop local taxonomic systems that are usually use vernacular names for different soils and this can facilitate communication between farmers, extension workers, and researchers. Local farmers are also able to identify vertical and lateral soil variation and they use more than one soil name when the variation implies different responses to the same use (Braimoh, 2002). The vegetation can also be used to differentiate soils according to the original vegetation cover. Plant species can also be used as soil fertility or infertility indicators.

Today, this traditional form of land management is coming under threat, mainly due to increase in the population within the rural areas. Parcels of land furthest away from the village and other marginal soils are increasingly brought into the crop production system and fallow periods becoming shorter. The recent tendency towards more a more intensive crop production and the application of increased amount of fertilizer threaten the existence of traditional sustainable use (Mikkelsen and Langohr, 2004). The holistic view of soil fertility of farmers differs from the more reductionist view of many researchers. Farmers are interested in soil productivity and appropriate management practices, and as such, generally only take the topsoil or the arable layer into account. Similarly, their classification and indicators rely on soil characteristics that they can experience, so that the names they give to soils do not necessarily correlate to the scientific classification, particularly at the national and international levels (Desbiez et al., 2004) but Das and Das (2005) reported that in Barak Valley, the local soil knowledge of the rice farmers for cultivation in such conditions help to shape the crop diversity. Since farmers knowledge is based mainly on experience and observation, the analytical methods used by research could complement this knowledge and help substitute land management for rice cultivation and conservation of diversity. One major drawback of farmer management of soil is to manage soils for short-term maximization of benefits rather than with a longer term perspective of soil resource use optimization and miss out the long term benefit of ecosystem service (Barrios et al., 2006). The major reason behind this is that, their economic factor as the farmers are poor so they cannot wait longer without harvesting their crop and the fallow period becomes shorter (Asfaw and Agren, 2007) and the soil becomes degraded. Soil degradation is processes that negatively affect soil fertility. Soil properties affected by soil degradation are nutrient content, water holding capacity, acidity, salinity, porosity and soil biomass.
The Processes of land degradation are physical, and may be initiated or accelerated by human interference, the impact is ultimately viewed in financial and economic terms. From the perspective of the individual household the financial costs may be felt directly. Lost production due to declining crop yields following soil degradation is a direct cost as are higher farming cost arising from increased application of fertilizer to compensate for declining soil fertility. Deforestation and deteriorating water supplies means more time and effort, especially for the female household member, has to go into collecting fuelwood and water. There is an opportunity cost to this as it decreases the amount of family labour available for on-farm productive activities. Financial consideration will figure highly in the decision making process within small-scale farming households. Specifically a farm household will seek to maximize its present and future well being by allocating its resources to those productive activities which can be expected the highest returns with the minimum risk. These resources will include the household access to farm, range, accumulated capital goods, financial resources (Cash or credit), family labour and the skills and knowledge of its individual members. The household decisions on which particular activities have to pursue at any one time are also influenced by its perceptions of the local constraints and potential opportunities (FAO, 1999).

The agriculture developed in Southeast Asia as early as 9,000 years ago. Beside the staple crop of rice, farmers grow vegetables, fruits trees. These crops provide not only for human consumption and cash, but also for social and cultural needs within the family and community (Thandee, 1986). There is a significant relationship in between the socio-economic characteristics and their adoption in farm technologies of rural women (Ani, 2004).

Sixty five percent of Indian agriculture is heavily dependent on natural factors, particularly rainfall. Studies have established that rainfall variations account for more than 50% variability in crop yields. Crop losses can be reimbursed through proper weather risk management. Risk management should address yield, price, credit, income or weather related uncertainties among others. Management of weather risks deserves top priority in the government agenda. Several risk management tools such as agriculture insurance, calamity relief funds, minimum support price (MSP) etc are available. Agriculture insurance is counterfeit tool for nature induced risk (Bhise et al., 2007). Financial institutions or bank are important stakeholders in the development of crop insurance scheme. The participation should be counted from the beginning of the insurance scheme process. In the absence of agricultural bank, micro credit financial institutions will play vital role in the implementation stage. Moreover, the government, at the early stage is expected to cover premium and cost of operation in the form of subsidy (Pasaribu, 2010). During the survey for the present study, it is
suggested by the elder farmers that there is a need to extend the scheme to safeguard the farming community of the valley. The awareness about the crop insurance is limited among farmers in this Valley of Assam hence mass awareness programme for promoting crop insurance is needed. Crop insurance should be compulsory irrespective of loaned or non loaned farmers. Calculation of agricultural loan and crop insurance scheme premium and other benefits pertaining to loan should be transparent and easily accessible. Creating awareness among the farmers about agricultural loan, agricultural scheme, and crop insurance can improve the socio-economic condition of the farmers in Barak valley of Assam (Das and Ray, 2013).