

Managing Upland Rice Under Typical Traditional Slash-and-Burn Ecosystem in the Hilly Arunachal Himalaya of Northeast India

T. WANGPAN¹, S. TANGJANG^{1*}, A. ARUNACHALAM²

ABSTRACT

Slash-and-burn agriculture is the dominant farming practice amongst the lesser known Nocte and Wancho farming communities in the Arunachal Pradesh state of North East India. Agricultural biodiversity maintained by these tribes have not been explored, particularly that of rice. Upland rice still plays a critical role in most of the households' food security in the rural and remote villages. Here we have documented a total of 36 indigenous upland rice varieties grown by these indigenous farmers. Interestingly, each collected rice variety differs in local names for lack of common dialects/languages among the tribes. Traditionally, they use outer morphology, texture, flavour and aroma, presence of awns as a means to identify the indigenous rice varieties and each village was found to be an owner of atleast 2-3 varieties. Traditional knowledge and socio-cultural linkages involved in conservation practices are recognised for conservation and management of rice germplasm.

Keywords: Nocte, Northeast India, Upland rice, Slash-and-burn, Wancho

INTRODUCTION

Crop genetic diversity is the basis of our food supply and our survival which is equally true of subsistence-based as well as technologically advanced societies (Bellon 2004). Nonetheless, global food security has become increasingly dependent on a limited number of varieties of a few major crops and in the wake of climate change; such a situation makes farmers more vulnerable with regard to their nutrition and income security (Malice and Baudoin 2009). Rice, belonging to the family Poaceae is the second most widely consumed cereal next to wheat and is the staple food for two thirds of the world's human population (Raju 2003). The world's annual cultivating area of rice is about 148 million ha, of which about 12% is rainfed upland (Khush 1997). Traditional rice cultivars still extant in upland ecosystems and may provide the genetic diversity needed to diversify the depauperate gene pool of improved rice varieties. Owing to their adaptation to a wide range of agro-ecological conditions, traditional land races represent tremendous genetic variability not found in modern varieties. These cultivars could be

exploited to significantly enhance rice productivity in marginal upland areas (Lasalita-Zapico et al. 1997). Nevertheless, the rice genetic resources of Eastern zone of Arunachal Himalaya, Northeast India have so far been unexploited in terms of research of any sort. Attempt is being made in this paper to investigate and document the currently available upland rice varieties managed by 'Nocte' and 'Wancho' farming communities in Tirap district, Arunachal Himalaya, Northeast India.

MATERIALS AND METHODS

The grain samples of each available rice variety were collected during 2009-2011 to obtain information's on upland rice diversity by randomly selecting 24 remote villages (Fig. 1). The residents in the sampled villages were approached and the objective of the study was explained. The information on upland rice varieties and diversity with their corresponding local name and management were gathered from local informants using a semi-structured questionnaire and the information's gathered were further confirmed by

¹Rajiv Gandhi University, Rono Hills, Doimukh-791 112, Arunachal Pradesh, India.

²Indian Council of Agricultural Research, KrishiAnusandhanBhavan II, Pusa, New Delhi- 110012

* Corresponding author's E-mail: sumpam@gmail.com



Fig. 1: Map of the study sites

repeated field visits. Each selected village was visited at least 5-6 times consisting of ten days in each visit. The group interviews/discussions were conducted in the morning and evening when most of the people were available.

RESULTS AND DISCUSSION

Basically, the ethnic Nocte, Tutsa and Wancho are agrarian, very hard working and have made their living out of slash-and-burn agricultural practices (locally called as *jhumkheti*), where the farmers transform forests into a mosaic of rural landscapes. This farming practice is considered to be a key element of farming portfolios with the potential for sustainable development and enhanced livelihoods among the rural poor (Toledo et al. 2003). The farming communities have a vast store of local knowledge about their particular landscape and how best to maintain it for survival (Kerkhoff and Sharma 2006).

Wangpan and Tangjang (2012) reported that multi-cropping is a general rule in slash-and-burn agriculture that offers scope and foundation for cultivation of a wide variety of local agricultural crops including cereals, pseudocereals, millets, vegetables and tuber crops. Altogether, 36 upland rice varieties (Fig.2) were collected in the present study; each village recorded at least 4-5 varieties (Fig. 3).

It is interesting to note that the number of the local rice varieties cultivated and its occurrence in a particular village was never fixed which is in agreement with Appa et al. (2002) who informed that the diversity of varieties is high with most

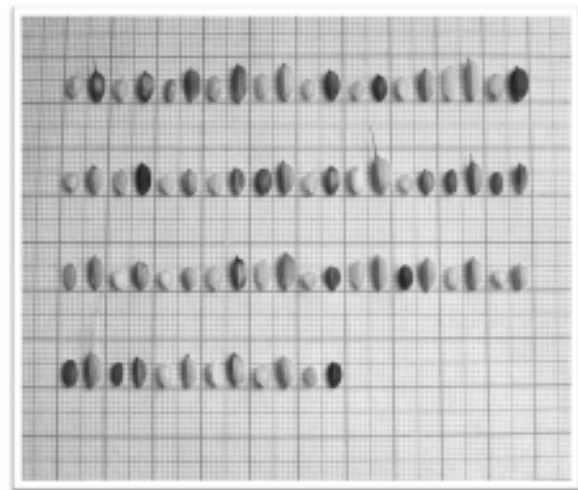


Fig. 2 : Collected upland indigenous rice varieties

villages growing 10 to 20 different varieties and a single farmer growing at least 4-5 varieties on an average. Zhu et al. (2003) reported 20 varieties of rice from Yunnan Province, China.

The local names of the collected rice varieties (Fig. 2) differ from village to village for lack of common dialect/language among the farming communities. Therefore, utmost care was taken to avoid repetition of a same variety in the next encounter. Interestingly, they followed traditional nomenclature and the varieties' names in the local dialect often reflect the rice's appearance. For instances, chahtho (chah=rice, tho=white), gongkhee (gong=rice, khee=red), tsahmai (tsah=rice, mai=good), zungnak (nak=black), zaamlo (zaam=glutinous rice, lo=long), zaamnu (zaam=glutinous rice, nu=big), maichong (good and healthy) etc. Thus, each variety was named according to its special characters. Also,



Fig. 3: Graph showing the villages in terms of number of rice varieties

traditionally, rice varieties are distinguished by differences in morphological, physiological and ecological characters such as growing habit, plant height, shape, size and aroma (Organisation for Economic Co-operation and Development 1999). The presence of awns was also one of the criteria for identifying local rice varieties. Four varieties i.e. Aaosah, Khoney, Lailo and Tsahnu (Fig. 2, sampl no. 1st, 17th, 19th and 31st from left respectively) were found to have awns. Among them the variety Tsahnu with 1.55 cm possesses longest awn while Lailo with 0.2 cm was recorded with shortest awn. In addition, the very fact that constant attachment of traditional farmers in the fields also help them to identify the rice variety precisely which help them in selection and preservation for future. Interestingly, the collected rice varieties were not confined only in the villages from where it was collected, but was flourishing in the adjacent villages too. Therefore, some more rice varieties could be expected through intensive survey. Cox and Wood (1999) considered that farmers’ decisions, influenced by economic, social, cultural, natural and historical factors, are the principal determinants of crop diversity. Nonetheless, seeds

of different rice varieties are exchanged among neighbours and relatives. One peculiarity of the Nocte and the Wancho is that, each season they keep a proportion of harvested grains for re-sowing in the following year. In the selection process, the farmer’s very consciously select from current crop a sample on the basis of phenotypic characteristics to act as seed for the following year and enhance the crop’s production in the local environment.

Despite the growing interest in on-farm conservation of crop diversity, yet there is little published information specifically relating to farmers’ management of agricultural biodiversity. Implementation of biodiversity management approaches will require conducive policy environment in order to be truly effective and sustainable (Sthapit et al. 2006). For promoting the conservation of landraces in a farming system, it is important to encourage farmers to continue to select and manage local crop populations, and a possible method for reaching this goal is to increase the value of local and diverse crop populations to farmers who might otherwise stop growing them. The loss of these local varieties has taken a heavy toll on the livelihoods of rice farmers. Conserving rice diversity – or any crop diversity – is essential in helping the world face new environmental challenges and a changing climate.

CONCLUSIONS

Despite so many limitations and shortcomings the traditional slash-and-burn farming practices still enjoys a central role among the traditional communities to make their agricultural system sustainable even in harsh physical features and environmental conditions. The knowledge on conserving upland rice is the need of the hour for the farmers, young generations, researchers and scientists in the wake of acculturation and modernization. In this regard, proper scientific intervention and approach is needed to make such policy to help ethnic farming communities in conserving the biological resources on-farm. Nonetheless, very recently, efforts are being made to motivate the farming communities for permanent cultivation like commercial agroforestry/ homegarden, cash crops garden, etc. So, innovations built on integration of merits of traditional and modern farming systems could offer

more effective means of addressing the problems of mountain agricultural farming system than a strategy aiming for replacement of traditional agriculture by the modern one.

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