Traditional Wisdom of Apatanis: Wet Rice cultivation

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1 Introduction

Rice (*Oryza sativa* L.) is a premier staple food for more than 3.23 billion people (half of the total global population of 6.46 billion) of the world. During 2004, about 60.6 million tones of rough rice was produced from 15 million hectares (about 13 per cent of the total arable land) of land (Shukla *et* al.,2006). Rice is a staple food for more than 67 per cent of India's population having the largest acreage (44.6 million hectares) under cultivation. Rice is one of the most important crops of the North Eastern Hill states and it shares about 1.89 % area in rice cultivation and 1.65 % of the production of the country (FAI, 2005). It occupies a distinct position and has well defined role in the food and nutritional security of tribal, backward and hilly areas because it provides access to sufficient food for livelihood and household level. In North Eastern Region, the agricultural practices are diverse ranging from a variety of shifting agricultural system, fallow system and secondary system such as wet rice cultivation (Swift *et al.*, 1996). These traditional system based technologies developed over many generations are often energy

efficient, at the same time it provides high economic returns to the farmers. In this context, there is a renewed interest in this traditional agro-ecosystem.

Through shifting cultivation, also known as slash and burn agriculture, rotational bush fallow agriculture and as *jhum* cultivation in North Eastern India is an ancient method of agriculture that is still practiced by many communities of the region. The Central Forestry Commission estimated that 6.7 million hectares of cultivable area was affected by *jhum* in India. According to the task force on Shifting Cultivation, as many as 54,000 families in Arunachal Pradesh practiced *jhum* cultivation bringing 70,000 hectares under this method of cultivation annually. The status of *jhum* cultivation is highlighted in the table given below:

Table 1. Status of *jhum* cultivation in north Eastern Region

State	Annual Area under Shifting culti-vation (sq.km.)	Fallow period (in years)	Minimum area under shifting cultivation one time or other (sq.km.)	No. of families practicing shifting cultivation
Arunachal Pradesh	700	3-10	2100	54000
Assam	696	2-10	1392	58000
Manipur	900	4-7	3600	70000
Meghalaya	530	5-7	2650	52290
Mizoram	630	3-4	1890	50000
Nagaland	190	5-8	1913	116046
Tripura	223	5-9	1115	43000
Total	3869	-	14660 (5.7 %)	443336

The contribution of *jhum* in the North Eastern states is closely linked to the ecological, socio economic, cultural and land tenure system of tribal communities.

2 Highly Evolved Agro-ecosystem in *Apatani* Plateau

The *Apatani* with a highly developed valley cultivation of rice perfected over centuries has often been suggested to be one of the relatively advanced tribal societies in North Eastern Region of

India (Hamindorf, 1985). *Apatani* rice ecosystem is highly productive (40-45 q/ha) 3-4 times of the average yield of rice in the state. It is economically viable because the cost of cultivation being low with minimal external input, highly organic and making good yield and sustainable.

2.1 Cropping pattern

In *Apatani* village, people make effective use of their irrigated land by planting early and late varieties of rice. Early variety is sown farer away from the village where disturbances by animals and poorer irrigation facilities could be major constraints (Kumar and Ramakrishnan,1990). Thus, the rice plots closer to the village are nutritionally richer than those farther away. Fish culture done here synchronizes well with late ripening rice variety. Further, rice is supplemented with *Eleusine coracana* (Fox tail millet) cultivated on elevated partition bunds between the rice plots. In the case of early variety of rice had higher density but with reduced basal area compared to the late variety. Economic yield per plant and per unit area of the early variety was significantly lower compared to the late variety. The yield per hectare of *Eleusine coracana* grown on partition bunds of rice plots was higher in plots with early variety than in those with late variety. Fish production done only along with late variety of rice was substantial. Labour input for rice/rice + millet, rice + fish where early variety of rice is grown was higher than late variety of rice. The *Apatanis* do not use draught animal power for the cultivation of rice as well as other crops. The output from this system and net return to the farmer was higher under late variety grown alone or with millet/fish, than under early variety of rice. The economic and energy efficiencies and output/unit labour/hr were also higher under the agro-ecosystem with the late variety of rice. The higher energy efficiency shown here also contrast with that recorded for *jhum* in North East India, which does not exceed 50 per cent (Ramakrishnan, 1992). In the present context, it is significant that labour is free input being largely obtained from within the family itself, and for specific task alone through co-operative efforts.

3 Cultural Management Practices Used by *Apatanis*

3.1 Soil management

The soil of the valley is humid, black and reddish in colour developed from genesis and schist overlaid on a wide area with

older alluvial deposits. The soil surface (26 – 65 cm) is sandy loam to clay loam in texture, soil pH ranged from 5.1 – 5.6, organic carbon (1.25-2.87%), available phosphorus (19-32 kg P_2O_5/ha) and exchangeable potassium (300-365 kg K_2O/ha). The terraces in the main valley are quite broad, perfectly leveled and provided with strong bunds. These bunds are made up of soil and supported by bamboo at base, if the height is more or there is the chance of erosion due to runoff. Slope of land in the main valley ranged from 1-8%. Perfect leveling of plots and well managed irrigation cum drainage channels reduce the soil erosion to a negligible level. Nursery of rice is raised in the month of February exclusively for market purpose. Duration of seedling ranges from 60 – 80 days. Beds are prepared wet and sown with dried seeds 7 – 30 kg/ha. Land preparation starts in the month of April and all the operations are done manually by indigenous wooden tools like ***hilta*** and ***hitta***. Farmers prefer some local varieties *viz., Emo, Pyaping, Pyat, Mipya*, etc. having long duration i.e. 190 - 278 days but in average of 220 days from seed to seed are grown.P roductivity of rice varieties is high in *Emo* variety covering 68 % area and produces 52 q/ha followed by *Pyaping* (40 q/ha) in 15 % area and *Pyat* (32 q/ha) in 10 percent of area.

3.2 Water management

The most important aspect of scientific water management is to keep the water layer on the soil at the permissible depth. Fields are drained time to time at tillering (twice), flowering (once) and maturity (once) stages of rice increase the yield. Ten centimeter water level is maintained in the plot by adjusting the height of the outlet pipes.

4 Economics of *Apatani* rice production

The *Apatani* economy is largely depend upon agriculture (Kumar and Ramakrishnan, 1990). The net per capita monetary returns through agriculture is highest much as 40 % of the rice produced is sold to the economically weaker neighbouring tribes such as *Nishis* and the hill *Miris.* Widening plots by digging adjacent higher ground down to an irrigable land level seems to be successful response to population increase and new market opportunities. However, the agro-ecosystem of *Apatanis* could be improved through appropriate crop rotation and product utilization of the land during the winter season. In spite of these possibilities, the *Apatani* village

ecosystem are a good example of good example of economic self sufficiency of a traditional agricultural society that produces ecologically sound sedentary agriculture in the North Eastern Hill Region of India (Ramakrishnan,2000).

5 Traditional Management Practices used for the Rice Cultivation by *Apatanis*

There are many traditional practices used by the *Apatani* tribes for minimizing the insect pests and diseases of crops. But here we emphasized only some prompt practices used for controlling the infestation of insect pests and diseases.

5.1 Management of gundhi bug (*Leptocorisa acuta*) of rice

Gundhi bug is a major pest of rice in Upper Subansiri district of Arunachal Pradesh, but it is also a destructive pest of rice in other rice growing states. It usually appears in the rice field at the time panicle initiation stage.

5.1.1 ITK used by the tribes for the Gundhi bug control

i. As soon as the pest appears in the field during flowering, local farmers fix several short wooden/bamboo stick randomly at certain intervals in the rice field.
ii. Dead frog/crabs are placed on the top of each stick.
iii. Some tribal people are also seen to purchase dry salted fish (which emits some fishy odour) make them into small pieces and tie them with each stick.

5.1.2 Philosophy behind this ITK

Due to this practice, the dead frog/fish/crab emitting of this foul smell attract the adult Gundhi bugs remain busy in large number with these rotten frog/fish kept on stick for at least 5-6 days. In the mean time, milk stage of rice floret turns into thick dough stage. Naturally Gundhi bugs then do not prefer to feed on rice floret and damage rice automatically.

5.2 Trape

Gorhe (bird traps)

It is bow shaped noose trap for killing birds. One end of the bow is made into a small triangle by means of canes or bamboo strips. On the other end of the bow a string is fixed with a wooden spike. In order to set the trap, the bow is given tension by fixing the

wooden spike lightly inside the triangle forming a noose on which the bait is placed. As a bird attracted by the bait, sits on the noose, its weight presses the wooden spike and release the bow which shoots up and strangles the bird in between the string and the side of the triangle. This trap is very effective for killing small birds within a very short time.

***Odi and Uju* (rat trap)**

It is very common to kill the rats. A box like cage is made by two sides closed with iron spikes. The base is made of wood. A stone is supported by means of two bamboo sticks which are adjusted to the bait inside the cage through the open passage and touch the bait, the two bamboo stick supported the heavy stone give way and the rat is crushed inside the cage.

***Edir* (fish trap)**

It is a skillfully designed basket which is used for fishing. It is conical in shape in which the fish entered in basket it never comes out. This trap is commonly usedduring dry period of the river. The *edir* is kept downward to trap the upward moving fish.

6 Strategies for Intervention

Apatani wet rice cultivation practices is one of the oldest ITK used by the *Apatani* tribes of Arunachal Pradesh. This system provide food security to the people adopting this practice. This system found more productive and remunerative and need to be adopted in some of the area of the region. But so far this could not happen may be due to some or other reasons. If this system is evaluated and documented scientifically, no doubt it can be easily accepted by the farmers of the region. If required some modification can also be done according to the need of the area. The need of the time is to transfer the indigenous technology from the tribe to another or one area to another. Secondly Introduce appropriate rural technology such as rain water harvesting tanks, mini hydels, bio-gas to strengthen village ecosystems. Also introduce early maturing and improved varieties of rice would help in obtaining two or even three harvests in a year because the rice varieties, which are being used by the *Apatani* are long duration and suitable only to have mono-cropping system. Adoption of short duration varieties will help to

increase the cropping intensity, besides improvement of food and nutritional security of the State.

7 Conclusion

Many of the people feels that these traditional methods are not scientifically validated. But one would agree that the art of cultivation has descended from one generation to another and thus this traditional wisdom has been sustained through experience over a number of generations. There is a need to learn about additional indigenous practices so that these could be improved more efficient than at present and can be used for crop intensification, diversification for sustainable production.

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