Improving Pulse Biodiversity in Rice Fallow Areas of Tribal Belts of Central and East Indian States

17th-18th December 019

Indian Social Institute (ISI),
10, Gokalpuri, Institutional Area, Lodi Colony,

Concept Paper

India is second largest rice producing country of the world with ~40 m hectare area under rice cultivation. About 30% of i.e. 12 million ha of this area is left fallow during the following rabi (post-rainy) season. Of the total rice fallow area about 82% lies in the Central and Eastern Indian states of Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, and West Bengal.

India is deficit in pulses and imports 2-3 mt to meet the domestic pulses demand. The careful selection of pulses for cultivation in rice fallow areas of this tribal rich belt offer opportunites for an additional crop for them utilising the moisture that the soil retains post monsoon and thereby offers food and nutritional security.

Due to stagnant production, the net availability of pulses in India has come down from 60 gm in 1951 to 41.7 g/day/person in 2012 which is way less than the Indian Council of Medical Research recommended 65 g/day/capita.

82% of the total 12 million hectare rice fallow area in India lies in the Central and Eastern Indian states. Non availability of seeds of short duration varieties of Rabi crops along with lack of moisture at planting time of Rabi crop, lack of irrigation and socio- economic problems have been the main reasons behind this huge rice fallow area. It is a big challenge for food security and farmers economy as farmer's of this area are cultivating only one crop per year at present.

Day-1

Indigenous Knowledge Systems and Documentation- Indigenous peoples and local communities are the holders of traditional knowledge about the use of biodiversity for food security and community health. The development and adaptation of plants and crops to different ecological conditions, such as soils, rainfall, temperature, altitude, and to meet specific community nutritional, medicinal, cultural, and spiritual needs, is the product of traditional knowledge. This knowledge mobilizes sophisticated and complex observations and understandings of, and experience with, the properties of living organisms and their interactions with all elements of local ecosystems. Indigenous peoples, local communities and peasant farmers practice and retain traditional knowledge through dynamic practices of seed saving, storage and exchange that allow for continued innovation in plant breeding. There is a wealth of information that farmers have. Rather than imposing methods and information on farmers, it is important to listen to them. In farmers' fields, scientists are discovering a dynamic living laboratory of tremendous biological diversity sustained primarily by small-scale farming communities.

Local Seed is the lifeblood and foundation of agriculture for smallholder and marginal farmers. Good quality seeds, which have genetic and physical purity, health standards, high germination and moisture percentage can increase farmers productivity. In India, 70% of the country's seed system is managed by farmers' traditional practices, which involves saving seed from own harvest, and using seed for re-sowing, sharing, exchanging/bartering and selling. The formal seed sector has made some progress in certain crops but very little in others (i.e., legumes/pulses) where the traditional (informal) system remains dominant. Approximately 80−90% of all planting material used is largely sourced from farmers' own-saved seed or the informal seed sector. Farmers save seed of local varieties and use this continuously for about 3−4 years (Figure 1, i.e., pigeonpea) with low seed replacement ratio of 2−3% because the proportion of quality seed available each year is only 10−12% (Ravinder Reddy et al. 2007).

Community Seed Bank Although community level seed-saving initiatives are not new. Community managed seed banks established in all program villages have enhanced the resilience of smallholder farmers of communities and households most affected by climate change by securing improved access and availability of diverse, locally adapted crops and varieties. This helps smallholder to restore related indigenous knowledge and skills in plant management including seed selection, treatment, storage, multiplication, and distribution.

Community seed banks are the source of local genetic diversity that is often adapted to prevailing climate conditions, including biotic stresses. They are very useful to contribute to community-based strategies for adaptation to climate change. However, community seed banks have received little attention in the literature related to climate change adaptation.

As climate change has a significant impact on agricultural production, growing local varieties, which have a high degree of genetic diversity is highly important because these varieties have the ability to better withstand and adapt to environmental stresses and changes. Community seed banks helped to preserve local seeds of the most adapted varieties for the region. The selection of the most suited varieties for a region was mutually done by the smallholder farmers collectives and district farmers forums flowed by trials with necessary technical support, but after the identification of best varieties, the community seed bank plays a very important role in maintaining the availability of good quality local seeds. Smallholder diversify their crops and varieties to reduces the risk of total production failures and contributes to strengthening family resilience.

Communities use their local knowledge to meet their communities' food security, nutritional, medicinal, cultural and spiritual needs. The selection of the seeds as well as seed saving, storage and exchange are often based on knowledge, which have been tried and tested by them and allowed for continued innovation in plant breeding. Traditionally, it has been the role of women to preserve seed, as they were involved in the selection and deciding upon the quantity and variety of seeds to be stored.

Day-2

Pulses Biodiversity and Tribals in Central and East India

Like many large tropical countries, India is characterised by a complex mosaic of distinct agro-ecosystems, differentiated by their climatic, soil, geological, vegetational, crop-growing, and other, features. A recent classification distinguishes 20 broad agro-ecological zones, separated by natural features and crop growing periods (Sahgal, et al., 1992).

Over centuries Indian farmers have continuously adapted and modified the rich genetic material available to them from nature. The diversity of crops and livestock is not only accidental, nor is it purely natural; it is more the outcome of thousands of years of deliberate selection, planned exposure to a range of natural conditions, field-level cross-breeding, and other manipulations which farmers have tried out.

Adaptation to localised environments is one mechanism or reason for diversification. What is even more striking is the use of a large diversity of the same crop within a single village, and sometimes within the same field. Many tribal villages in the hills of north-east India have been known to grow over 20 rice varieties within a single year in their terraced fields. In one region of Koraput district of Orissa alone, scientists identified over 1500 varieties (Richaria and Govindaswami, 1990).

Pulses**,** the food legumes, have been grown by farmers since millennia, and these have contributed in providing nutritionally balanced food to the people of India. While pigeonpea, black gram, green gram, lablab bean, moth bean, and horse gram have definitely originated and domesticated in the Indian subcontinent, there is a probability that chickpea and lentil (Indian type) were also domesticated in the Indian subcontinent. Pea, grass pea, and cowpea were introduced in India millennia ago. Only faba bean was introduced in medieval times.

The Eastern Indian region consisting of Orissa, Jharkhand and Chhattisgarh constitute the primary Centre of Origin of rice, in other words, its birthplace. This is the region where several thousand years ago, rural and tribal communities bred rice from wild grasses and where large numbers of land races and farmers' varieties are found.

The dominant crops are mainly determined by the duration of rainy season and supply of water. Paddy is the predominant crop grown in Kharif (wet Season). While gram and wheat in Rabi (Post-Monsoon) on deep Black soils with sustainable irrigation facilities. Few showers from NW monsoons received during January and February; benefit Rabi crops – wheat, gram and linseed on soils high in clay.

In predominantly paddy growing areas, direct seeding of lathyrus/kulthi has been practiced immediately after harvesting of Kharif wet land paddy. Some farmers grow tuar (redgram) on bunds. Pulse crops like green gram, black gram and lentil are also grown with residual soil moisture. These pulses enrich fertility of paddy soils.

In Bastar (Chhatisgarh), Agriculture is almost totally dependent on rainfall (subsistence farming).Owing to difficult terrain, extensive forest cover (59.6 percent of the TGA), and shallow soils, the net sown area in BASTAR cover only 22 to 24 percent under cultivation of various crops (Singh 1971, Shaw 2000). The remaining area is either under fallows or barren / unculturable and put to non- agricultural use.

Being predominated division of Chattisgarh State (67.4 percent tribals out of 22.7 lakhs total population as per 1991 census) the practices of shifting cultivation (Podu chasa) is still prevalent in some areas of the forests. According to 2011 census, 9 % ST population live in India.

Scheduled Tribe population in Madhya Pradesh (14.69%), West Bengal (6%), Jharkhand (26 %), Chhattisgarh (31%), Bihar (1%). The Scheduled Tribe (ST) population in the State of Bihar is 758,351 as per 2001 census, constituting 0.9 per cent of the total population (82,998,509) of the State (Katihar district has the highest proportion of STs (5.9 per cent) followed by Jamui (4.8 per cent).

Discussion And Opportunity

The post monsoon rice fallow season offers a window of opportunity (October-December) to cultivate short-duration pulses and oil seeds. Pulse cultivation is important as (i) per capita availability of pulses have reduced from 60 g to 41.7 g/ person/ day in the past 60 years due to enhanced irrigation facilities in the northern India (where pulses used to be cultivated) pushed farmers to grow water intensive crops like rice and wheat which get them assured returns from government procurement (ii) pulses are an important source of proteins to the vegetarian and socio-economically weaker sections of the population. The reduced per capita availability of protein has decreased causing Protein-Energy-Malnutrition (PEM) especially among children below the age of five years in India.

Despite the government’s effort in the past 8 years to strengthen seed production and distribution, a shortage of 50,000 tonnes of seeds of pulses have been a major roadblock for increasing area under pulse production highlighting the requirement of decentralized model of seed production for a climatically diverse country like India. At the same time, there is a diverse genetic resource of nontraditional underexploited legumes (tribal pulses) and other varieties of pulses available but due to the absence of robust local seed system they remain underutilized.

****