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BEST PRACTISE IN INDIGENOUS FOOD SYSTEM (IFS) OF MEGHALAYA

A CASE STUDY OF JHUM AND BUN CULTIVATION

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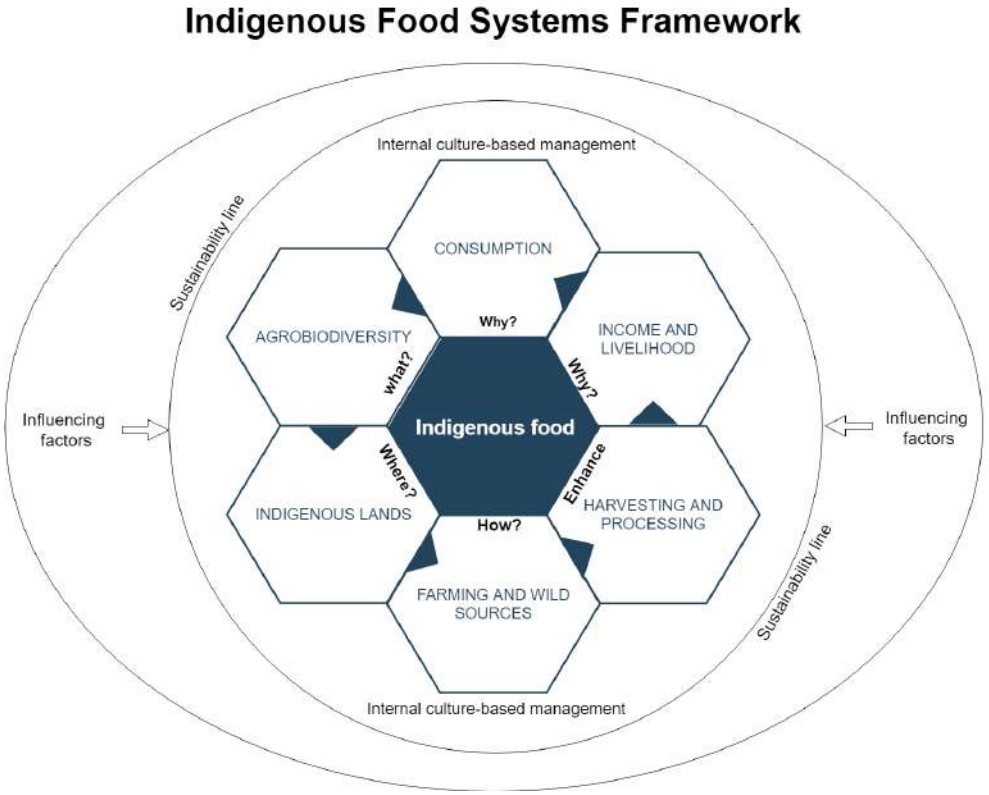
CONTENT

INTRODUCTION

To date, Indigenous Food Systems (IFS) does not have a formal definition. For our purpose, though, we can use the definition of traditional food systems given by the High-Level Panel of Experts on Food Security and Nutrition: In traditional food systems, consumers rely on minimally processed seasonal foods, collected or produced for self-consumption or sold mainly through informal markets. Food supply chains are often short and local, thus access to perishable foods such as animal source foods (ASF) or certain fruits and vegetables can be limited or seasonal. Food environments are usually limited to one's own production and informal markets that are daily or weekly and maybe far from communities **(HLPE, 2017).** By substituting indigenous for traditional, to put simply, IFS are food systems which are being practiced by indigenous people where food is harvested with traditional knowledge from the natural environment, and prepared and served in a local cultural setting **(Kuhnlein et al., 2013).**



Source: Lukas Pawera (2019)

Figure 1 Indigneous Food System (IFS) Framework

In the context of Meghalaya, the IFS constitutes of the distinct farming systems that are practiced by the indigenous communities, knowledge associated with it which includes the linkage to a wider ecological knowledge base, traditional markets, and the vibrant local food industry among others. It is also linked to the traditional land tenure system and the grassroots governance structure, which has continued to exist since the pre-colonial times. These institutions have come under a lot of stress since the post-independence period which has accelerated in recent times.

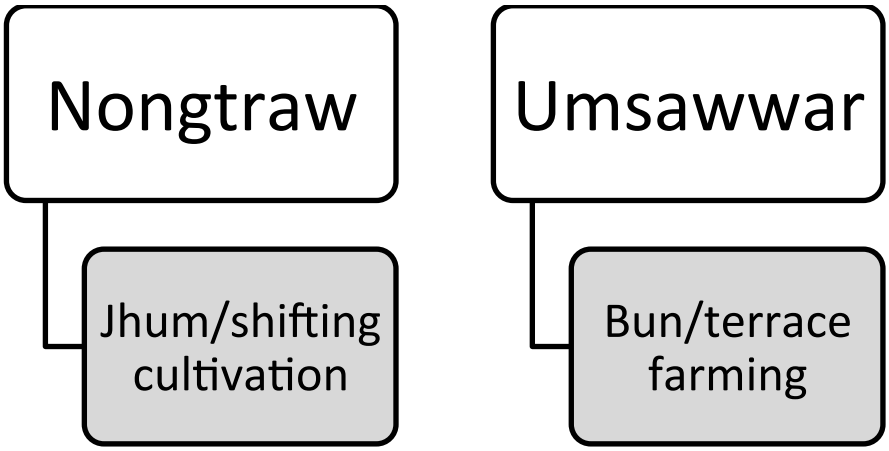


Figure 2 Main farming systems in selected communities

IFS involves a holistic approach towards farming, by utilizing the diverse agro-ecosystem within a community. It involves an integrated approach in every management system and every process or step of the farming activities. It aims to effectively and efficiently utilize the available resource to optimize productivity that fits the diverse community within the agro-ecosystem, which includes soil microorganisms, plant species, vertebrates and invertebrates, including human beings. The principle is to approach farming or agriculture more sustainably and which is harmonious to the environment as a whole. Therefore, there is a need in such a system to be vigilant and active at every stage of farming, to holistically integrate several practices for the overall optimization of production.

SELECTION OF THE COMMUNITIES

Although a food system consists of all the elements and activities that relate to the production, processing, distribution, preparation, and consumption of food in this report the emphasis is on production, to be specific the best practices embedded in the existing IFS in terms of crop production. Two indigenous food production systems, jhum (shifting cultivation) and bun (terrace farming) have been selected for documenting the best practices in these distinct indigenous farming systems. At the same time, there is a need to incorporate certain best practices to improve the efficiency of the system. Therefore, alongside documentation, NESFAS also suggested practices that can be integrated within the existing IFS as it is practiced. The analysis as such has been divided into two sections, viz., existing practices, and practices suggested for incorporation.

Jhum, or as it is generally known as shifting cultivation, involves moving cultivation from one location to another. When a new plot is to be opened, an area is selected by community leaders and is cleared of most of its vegetation during December and January. Fallen material is left to dry for two or three months, then it is burnt just before the onset of pre-monsoon showers, after which the seeds are planted. The crops are harvested at the end of the season, after which the land is left fallow for eight to 10 years, to allow the fertility of the soil to recuperate. Meanwhile, the farmer selects another plot of land and the whole process is repeated. It is important to note that fallow land remains an important source of food and other resources for at least the first three years of fallow. While *jhum* has been an important traditional land use among the indigenous communities of Meghalaya, in the *Khasi-Jaintia* region, it is the most important nowadays in the hilly areas of Khasi Hills with steep slopes. Nongtraw located in the Southern slopes is one such village and it was selected because of that reason.

Table 1 Villages selected for study

District	Block	Village	Total Household	Total Population	Indigenous Population
East Khasi Hills	**Khatarshnong-Laitkroh**	**Nongtraw**	32	180	180
	Mawkynrew	**Umsawwar**	71	409	408

Bun cultivation is a relatively more settled form of cultivation. Terraces are constructed that run across hill slopes, and raised mounds are created on which crops are grown **(Jeeva et al., 2006)**. Before cultivation begins, the buns are covered with plant residues that are left to dry for two or three months. Just like the initial stages of shifting cultivation, the dry residue is then burned just before the onset of the rains, to effectively fertilize the soil with ash from the fires. Seeds are then planted and crops are harvested when they are ready. The bun plot is used for another three seasons, after which it is left fallow for five to six years. This system marks a transition from jhum to more intensive land use by the Khasi farmers – a move motivated by concerns over increasing limits on the availability of land. Bun has already replaced jhum as the most important farming system in the grassland region of the Khasi Hills tableland. Umsawwar, located in the Mawkynrew block, is situated on the tableland and has bun as the main farming system. For this reason, the village was selected for the study.

EXISTING PRACTICES

Land preparation

Shifting cultivation/"Rep Shyrtie" is a method of slash and burn agriculture, whereby a plot is razed to the ground and cultivation is done on the burnt land. The residual ash adds calcium and potassium among other nutrients to the soil. Calcium balances the pH level and potassium is an essential nutrient for plants **(Arshad et al., 2012; Rebecca, 2017).** Burning also destroys the resting stages of diseases and pests. After burning is done and the temperature is brought down, preparation of beds or "Buns" is done. At this time, farmers incorporate well-dried manure (cow manure/swine manure) into the beds, at least two weeks prior to sowing. This allows the nutrients in the manure to convert into plant available forms in the soil. If large amounts of compost are available, then they incorporate the compost as well.

In "Bun" cultivation, land preparation starts with weeding which includes the removal of diseased and other weed plants. The next step is to invert/turn the soil for drying, whereby later, the burning of the dried organic matter is done. Inverting/turning of soil is a method of soil solarization (to destroy pest and disease resting stages) and drying of plant organic matter

before burning. Following which, the process of burning the plant organic matter in the "Bun" is done. Just like in shifting cultivation, the residual ash adds calcium (balances the pH) and potassium (an essential nutrient for plants), among other nutrients to the soil **(Arshad et al., 2012; Rebecca, 2017)** and destroy the resting stages of diseases and pests. Weed plants, if not burnt is not be left in the field, but collected and disposed of separately for composting, as leaving them in the field will leave a chance for resting stages of pests and diseases to infest the crops. After burning is done and the temperature is cooled down, preparation of beds ("Buns") is done.

Sowing stage

Farmers in the shifting cultivation plot and bun, are growing legumes which help to improve soil health and enhance plant nutrition **(Peoples et al., 2009)**. Roots of legumes fix atmospheric nitrogen into the soil. They can also be incorporated into the soil in-situ after harvest as green manuring plants. The farmers in shifting cultivation also treat the sowing material (injured or damaged seeds, tubers, corms, rhizomes) with soil obtained after slashing and burning of the plot to be used for sowing.

A very good practice followed in shifting cultivation as well as the bun is intercropping **(Alam, et al., 2015; Peoples et al., 2009)**. The diversity of crops though is higher in the shifting cultivation compared to the bun. Intercropping promotes agro-biodiversity, prevents the spread of insects from one part to another, and act as trap crops for pests or attractants of insect natural enemies (like wasps, ladybird beetles, etc.) **(Afrin et al., 2017)**. As biodiversity increases (ibid.) there are higher chances of natural enemies being present. This in turn will keep pest levels under threshold levels.

Vegetative stage

During the vegetative stage, an important observation made in both shifting cultivation and bun is the practice of at least three weeding at different times during the vegetative stages of the crop. Regular weeding is in fact one of the most labor-intensive parts of these farming systems. The work is done mostly by women who would use a knife or bare hands to remove the weed from the plot. Another observation was the placing of millet/rice hulls inside the stem of taro (colocasia) to prevent boring by the corn borer. Corm borer was identified by the farmers as the main pest affecting their taro crop.

SUGGESTED PRACTICES

Seed treatment stage

A very important stage where interventions can take place for farmers practicing shifting cultivation and the bun is regarding seed treatment. Seed treatment **(Sridhar and Kumar, 2013)** is done to destroy disease inoculum (mycelium, spores, etc.) and resting stages of insects (egg, pupa), which might be attached to the seed while harvesting in the previous season. Seed treatment also helps to break seed dormancy and induce germination. The following methods were suggested to the farmers:

- **Hot water treatment:** Heat water to about 50° C and soak the planting material in this for 30 minutes and dry for at least one hour.
- **Treatment with cow dung and cow urine:** Take 2 litres of cow urine + 1 kg of cow dung + 1 kg of soil. Take this mixture and mix with the seeds. Dry this under shade before sowing. Alternatively, seeds can be soaked in cow urine overnight prior to sowing.

Sowing stage

Farmers in both shifting cultivation and bun are already growing legumes. They can increase the area under legumes to cover 30% of the total area of the plot. Intercropping practice can also be improved by incorporating Legumes/Pulses or Perilla **(Kim et al., 2019)** which will help in suppressing insect growth and development. Intercrop can also be done with different families to prevent spread and the alternate host survival of pests (e.g. Taro with Perilla/Rice Bean/Beans, Maize with Legumes/Pulses, root crops with mustard, legumes/pulses, intercrop crops with mint, coriander, etc.). Compost can also be incorporated while sowing in both bun and shifting cultivation plots. While sowing, proper and adequate spacing should be maintained **(Alam, et al., 2015)**. This helps the plants absorb adequate nutrients and reduce competition for resources. Adequate or proper spacing also helps to reduce the spread of diseases and pests. For protecting the seed against soil pests, lime can be spread around the seed. Care, though, should be taken such that the lime does not come in contact with the seed, in order to prevent rotting of the seed.

Vegetative stage

During the vegetative stage, a survey of the field **(AESA, 2020)** can be done in the morning or evening hours for pest control (as insects are most active during these hours). Farmers can manually remove insect eggs or the insect themselves and destroy them before they spread to other parts of the field. The survey is to be done at the germination stage, seedling stage, vegetative stage, budding, flowering, fruiting and ripening stages. Checking should be done on the base of the plant or roots, stem or heart, base of leaves, lower surface of leaves, flowers and fruits, for eggs of insects or for the insect themselves.

Harvesting

Crops can be harvested **(Acquaah, 2008; El-Ramady et al., 2015)** when they are mature, or depending upon the crop, they can be harvested at different stages. This is applicable for vegetables and herbs, where the edible or economical part to be harvested need not appear until the ripening or fruiting stages. For grains, crops can be harvested when they are mature and ripened, and when the crop moisture has reduced.

Post-harvest:

Post-harvest activities **(Acquaah, 2008; El-Ramady et al., 2015)** should include two main activities. Firstly, the store produce is in a clean and dry, well-shaded area. Sort out produce from among damaged and damage-free produce. Separating them will prevent the spread of diseases and pests from damaged to non-damaged produce. Secondly, provide proper ventilation in the storage facility. Avoid storing inside damp or high moisture areas to prevent the development of diseases. Keep produce in low temperatures, but not freezing temperatures.

CONCLUSION

It is to be admitted that the study is not an exhaustive one and there are many best practices found in the IFS which might have missed the gaze of the researchers. As for the suggested practices to be incorporated they already exist in the system. The suggestions attempt to improve their efficiency. IFS is known for its agro-biodiversity but generally suffers from low yield. This has led to a call for increasing intensification and homogenization of the food production system **(Ickowitz et al., 2019)**. The corollary to such homogenization is the shift towards dependence on commercial crops with lower agricultural diversity. This shift to market-oriented production and crop specialization in turn has led to increasing dependency on market for household consumption **(Blundo-Canto, 2020)**. The outcome of the narrow focus on intensification supported by national-level policies is unintended negative consequences on the nutritional sensitivity of food systems adversely affecting the dietary quality of millions of rural (including indigenous) communities **(Ickowitz et al., 2019)**. Thus, there is an urgent need to improve the efficiency of IFS in terms of production so that they can be spared from the threat of intensification and its attendant negative consequences. The suggested practices aim to do just that.

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