

RESTORATION OF TRADITIONAL CROPS: THE NEED FOR NILGIRIS

^{*1}Dhandapani, M., ²Nanjundan, J., ²Berliner, J. and ³Manimaran, B.

^{*1}Tamil Nadu Rice Research Institute, Aduthurai

²ICAR-IARI, Regional Station, Wellington

³ICAR-IARI, New Delhi

The Nilgiri hills draw its uniqueness due to its geographical location, biological diversity, agro ecological settings, ethnic diversity and socio-economical features. The soil type, rainfall pattern and climatic conditions favour cultivation of sub-tropical and temperate crops viz., tea, coffee, cruciferous vegetables, carrots, potatoes etc which were introduced by Britishers during the colonial period.

This high-altitude terrain was discovered by the Britishers during the 1800s and Mr John Sullivan, the then collector of Coimbatore district was one of the first distinguished settlers of the Nilgiris. In later years, the salubrious climate of the Nilgiris attracted many British who were already suffering the sweltering heat of the Madras province. During that period the Nilgiris was inhabited by Thodas, Kotas, Kurumbas, Badgas and Irulas. Among them Thodas and Kotas were the aborigines of the high altitude, who subsisted mainly by herding buffalos in the vast grasslands of Nilgiris. The Irulas and Kurumbas were the shepherds and honey collectors, and occupied relatively lower altitudes of the hills.

The Badagas were settlers who were believed to be migrated from Mysuru area during the mid fifteenth century and were progressive in accepting modern crops and adopting new agriculture technologies in this landscape. Traditionally, they cultivated crops like ragi, barley, other minor millets, avarai (vegetable and field bean), gourds of various kinds and leafy vegetables as subsistence farming like mixed farming, intercropping with low input practices (Fig 1). These crops are typically suited to Nilgiris agro-climatic features and also co-evolved with its cultural evolutions. The vast grassland endowed with streams, and mini forests which supported the native animals for grazing, shelter and firewood needs of the population. These communities existed harmoniously with the nature for centuries together in the shola grasslands.



Figure 1: A) Diversity of traditional pulse crops grown in Nilgiris (seed source: Chandrasekar from Kagguchi); B) Wheat crop grown in small pockets in farmer's field at Kenthorai village; C) Amaranthus seed collected from Dhoddanni village (seed source: Mrs.L.Balamani)

The vast *shola* grassland ecosystem and its Biomes existed for more than 20000 years, which was characterized by vast grasslands dotted by groves of native trees in the mountain gullies. However, the British forest officials misconceived the vast shola grass ecosystem as an unproductive degraded forest system. Moreover, they felt the grasslands of Nilgiris were created due to forest fires and continuous anthropogenic pressure for grazing. Hence, without realizing the “Natural existence” of the shola grassland system since the Pleistocene epoch, they proposed the conversion of grasslands into forest lands by introducing the exotic tree species as well as increasing the coverage of native tree species.

The Britishers then established nurseries and commenced planting of exotic and native trees to meet the growing demand of wood (for construction and fuel wood) in the developing Ooty and Coonoor region with British inhabitants. Slowly, the trees of exotic origin dominated the native landscape and resulted in genetic erosion of native biomes. The introduction of coffee and tea plantations in Nilgiris further leads to mass conversion or destruction of native ecosystems. Even the

Botanical Garden of Ooty was established with the additional purpose of introducing exotic crops to the local inhabitants. Presently, exotic tree species like Eucalyptus, wattles, cyperus, prunes; plantation crops like tea and coffee; and vegetables like cauliflower, cabbage, carrot, beetroot, garlic occupies the area. So far 400 plants were reported to be introduced into Nilgiris in the last 200 years. The crops grown traditionally in Nilgiris were less input responsive due to their adaptation to local climatic and soil conditions. Those traditional crops had positive interaction with native microbiome for nutrient acquisition, mobilization, translocation, and in inducing systemic acquired resistance wherein the association of beneficial microbiome leads to antagonism against plant pathogens. The pre and probiotic nature of the native food grains coupled with the co-evolved gut microbiome of the native tribal people were the key features responsible for their healthy living. In contrast, the newly introduced vegetables are highly input responsive and demand usage of high amounts of fertilizers and pesticides (fungicide, herbicide and insecticide) to achieve higher yields. Moreover, the

indiscriminate usage of agrochemicals pollutes the water bodies and affects the aquatic life forms. It also alters the microbiome population and diversity of the native soil resulting in domination of soil borne pathogens and nematodes.

The introduction of exotic crops in a newer environment disrupts the already existing subterranean food chain via changes in the chemical composition of plant litter and root exudates. This causes imbalance in the native microbiome by facilitating the growth of disease-causing pathogens and nematodes in the soil (sick soil). Management of these sick and unproductive soils requires external input in the form of agrochemicals, which not only increases the cost of crop cultivation every year but also affects the biome and microbiome. Moreover, the consumption of exotic crops like rice instead of millets and exotic vegetables instead of native vegetables (*Amaranthus* sp., avarai - field and garden bean) by the native tribes of Nilgiris might have also affected or altered their gut microflora. The increased rate of health disorders observed in the native people of Nilgiris viz., Vitamin D deficiency, micro nutrient deficiencies, diabetics, blood pressures, urinary infections, cancers and gastrointestinal disorders might be the evidence of underlying alteration in their gut microbiome.

Hence it is impetus to restore the cultivation of native crops of Nilgiris for its environmental stability, ecological sustainability, economic feasibility and over all well being of its inhabitants. The various possible strategies for restoration of traditional crops in Nilgiris are briefly discussed below.

STRATEGIES FOR RESTORATION OF TRADITIONAL CROP CULTIVATION IN NILGIRIS

1. Exploration, collection and multiplication of seeds of native crop varieties of Nilgiris.
2. Formulation of low input / no input application protocols of crop production for yield maximization of native crops including Seed treatment and foliar spraying with *panchagavya*, adoption of Crop rotation, Mixed cropping system, Intercropping system etc.
3. Involving farmers and local Farm Producer Organization (FPO) in Seed multiplication of traditional crops. The crops will be raised in the farmers field itself with the proposed low input/no input response practices thereby the local farmers can witness the performance of the crop first handily.
4. In addition to that, farmers from nearby villages or interested villages can be sensitized about the importance of traditional crops in the aspects of "*Climate resilience, Health advantage, Soil fertility enhancement and Low input agronomic practice etc*" via a field day/ training program.
5. Another important strategy includes establishment of "*Village Level Seed Bank*" for in situ genetic conservation of traditional crops and distribution of seeds to needy farmers through mini kits.
6. Establishment of *Nutri-gardens* in schools and educational institutes to create awareness about traditional crops to the younger generation.

Genetic conservation of crop plants is a tedious process involving huge money and labour in a systematic way. Since the Nilgiri's sanctity in terms of ecological balances could be achieved through traditional crops, co-ordinated efforts should be made from research establishments (both central and state), state department of agriculture, horticulture, forestry, panchayats, progressive farmers, NGOs, marketing firms and education department for holistic execution of the movement of "**Restoration of traditional crops cultivation of Nilgiris**".

