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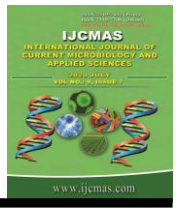

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Nutrition Sensitive Agriculture in Tripura, an Overview

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A B S T R A C T

Nutrition sensitive agriculture is one of the windows to eradicate malnutrition, hidden hunger and poverty elevation in sustainable and effective manner. Globally many initiatives were adopted to make countries free from the curse of malnutrition. India has also taken measures to check this problem by highlighting the term nutrition into the state comprehensive agricultural plans. With this view a comprehensive summery has been prepared with the published research materials on nutrition sensitive agriculture in Tripura. This study revealed that there are many unutilized fruit and crop spp. available in Tripura high in nutrient contain, traditional food preservation knowledge of ethnic tribes solve them off-seasonal nutrition requirement, and also there is increasing effort to set-up nutrition garden in every rural households of Tripura. Lack of regulated guidelines and focused nutritional studies may help to penetrate knowledge, understanding and adoption of nutrition sensitive agriculture by the farm families and agriculture practioners.

Introduction

Nutrition sensitivity gaining more weightage in the recent decades as many cases of malnutrition has been reported vigorously from different parts of the world including India. Despite all the advantages in agricultural and food industry hidden hunger slowly grasp future of humankind and sooner will become the hurdle of development. In the Sustainable Development Goals agenda has been set to eradicate poverty and hunger and achieve sustainable development in all three dimensions (social, economic and environmental) over the next 15 years (2016-2030) from the member nations of FAO. In this regard various attempts have taken to increase availability of nutritious food to the hungry mouths of unprivileged groups of people. The studies found that post harvest losses result of improper handling, transportation and packaging; poor storage and generally weak infrastructure are higher in India along with Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka[1].

In the second international conference on Nutrition held in November 2014 organized by FAO mentioned that Nutrition-sensitive

agriculture is a food-based approach to agricultural development that puts nutritionally rich foods, dietary diversity, and food fortification at the heart of overcoming malnutrition and micronutrient deficiencies. This approach stresses the multiple benefits derived from enjoying a variety of foods, recognizing the nutritional value of food for good nutrition, and the importance and social significance of the food and agricultural sector for supporting rural livelihoods. Nutrition-sensitive agricultural production can be implemented in three main areas (i) Making food more available and accessible, (ii) Making food more diverse and production more sustainable, and (iii) Making food itself more nutritious (such as micronutrient fortification). In these regards an experts opinion indicated that increasing knowledge data base and evidence of local agricultural systems, can bridge the knowledge gaps and attract researcher to devote more in local nutritional aspects; improved food and agricultural systems encourage Government to allot number of funds to shape nutrition more inclusively in state plans; strengthening local capacities to formulate and implement policies and programmes to improve nutritional status[2].

According to Comprehensive State Agricultural Plan (C-SAP) of Tripura various development vision and strategies were adopted like shift from mono/double cropping to triple cropping in areas under ensure irrigation; redevelopment and improvisation of Jhum and maximizing Jhum production; promoting integrated livestock, fishery, and farming system at household level; gainful utilization of forest land for sustainable farming and livelihood of tribal forest dwellers; encouragement of crop diversification and sustainable agriculture; encouraging Integrated Crop Management (ICM) practices and area under System of Rice Intensification (SRI); and popularizing hybrid paddy and maize cultivation to increase productivity. The report strongly recommended all the measures will be taken to bring self-sufficiency in food, feed, fodder, vegetable, fish, dairy products, meat, and egg to ensure nutritional and economic security[3]. Jhum crops can be promoted as high in nutritional value and these can fetch good price too being very close to organic, but efforts need to take for easy organic certification process for the Jhum crops. Due to diversified climate Tripura has a huge potential for vegetable cultivation, which are not only a good source of nutrition but also extremely important for the nutritional security of the state. Apart from agriculture and horticulture, animal husbandry products significantly contribute fulfilling the food and nutritional requirement of the farm family and also extend greater economic support. The people of Tripura rear pigs, goat, poultry, cow, buffaloes, etc. with this backdrop of the study an effort has make to prepare a draft on Nutrition sensitivity among the scientific community of Tripura from available the research evidence and published scientific articles.

Materials and Methods

This study mainly focused on the agricultural aspects of nutritional and food security and efforts has made to put in place the available research evidence in a classified and sequential manner. The study was revolved around three research questions as (i) reported nutrition sensitive approaches taken by various organizations of Tripura (ii) research paper on documented nutritious crop species (iii) untapped areas agricultural development in view with nutritional aspects. After the summarization, the gathered information grouped into nutritional garden, traditional food & their nutrition value and different Cultivation practice.

Results and Discussion

Nutritional Garden

A project named 'Horticulture based eco-friendly development and promotion of women friendly entrepreneurship for livelihood improvement in rural area of Tripura' was implemented initially for three years time frame since 2018 with the collaboration of ICAR Research Complex for NEH region, Tripura Centre & College of Agriculture Lembucherra, Tripura. And the project was rightfully indicated one of the Nutrition Sensitive Agriculture initiative for the rural mass of Tripura. One of the objectives of this project aimed to develop nutritional garden with the indigenous horticultural crops and medicinal plants and also all conservational measures for the following years. Any individuals, women farmer or SHG member from Dhalai and West district of Tripura were the selected criteria to be a beneficiary of the project. Along with boosting entrepreneurial competencies of women, establishing Mushroom production units, promotion of nutrition enriched horticulture crops with extend all the technological support to set up nutrition garden was the mentioned agenda. Rural enterprise can be a viable livelihood opportunity to bring economic sustainability and nutritional garden can provide nutritional security. Raising nursery of horticultural crops with nutritional value and medicinal plants, running Mushroom unit, small scale processing unit for value addition of the horticulture crops are the intended livelihood opportunities for the beneficiaries[4].

INSIDENE, a dedicated web-portal for the youths of North-east India published an article on Farmers in Tripura to get healthy with 'nutritional gardens' as an initiative undertaken by the Krishi Vigyan Kendra (KVK) and Indian Council of Agricultural Research (ICAR) to be implemented by Home Science branch of the respective KVKs. This project aimed bring nutritional security among the farm families residing in the remote areas of Tripura and boost self sufficiency for the nutritional & healthy food produce during the pandemics like Covid-19. Initially to set up model nutritional gardens 50 farmers has been selected from each of the districts and for that all sorts of technical supports will be arranged[5].

Another study entitled 'Perceived Constraints in Adoption of Nutritional Garden in Tripura' was conducted by Krishi Vigyan Kendra, West Tripura among the 120 beneficiaries, researcher classified constraints into groups into input availability, technical knowledge, post harvest management and overall aspects. This study reported poor irrigation facility was the most perceived constraints faced by beneficiaries to adopt nutritional garden followed by less availability of fertilizer and other chemicals, unavailability of quality seed and planting material of HYVs, less availability of FYM as listed issues related input category. Among listed technical knowledge, lack of knowledge about seed treatment was the most serious issue perceived by the beneficiaries, followed by lack of knowledge on major pest and disease identification and their management, lack of technical knowledge about improved varieties, seed rate and sowing time, lack of knowledge about recommended fertilizer application and lack of knowledge about critical stages of irrigation. For, post harvest management lack of knowledge on preservation and processing of surplus produce had the highest rank followed by lack of storage system for surplus produce, difficulty in selling small amount of surplus produce and lack of marketing at village level. And, in case of overall issues high rainfall damages garden during rainy season were the most perceived constraints of

beneficiaries followed by less priority to nutritional garden than other farm activities and high soil PH. The mean score also indicated that post harvest management was the least preferred constraints followed by overall issues, input availability but the technical knowledge reported as most perceived constraints among the adopted beneficiaries of nutritional garden[6].

Traditional food & their nutrition value

The nature has abundance of foods however tend to be neglected and underutilized by research organizations, food processers and marketers and consumers. Most of the underutilized fruits are cheap and highly nutritious, not only that due to medicinal and therapeutic properties used by the local tribes to cure various diseases. Many of the plant parts are used as curative foods in the traditional Indian medicine and ayurveda[7]. Understanding the importance an increasing number of descriptive studies have reported from different countries on locally available indigenous or traditional plant foods (fruits, vegetables, grains, roots and tubers) and their contribution to energy and micronutrient intakes of rural and indigenous communities[8].

With this view, a group of scientist leaded by Sankaran, Prakash, Singh and Suklabaidya (2006) documented 40 edible fruit species of Tripura which not only enriched with nutrition but also can be a potential market of raw or value added products of these fruit crops. These untapped fruit species has historical evidence to be produced once upon a time in large scale as many places of Tripura named related with fruit crops. With popularization of mono-cropping, subsidized farming culture, this indigenous fruit crops loses it acreage in production now only available in local markets as a seasonal fruit for few days. This article also mentioned a classified table with seasonality data and form of uses of these untapped fruits. Many of these identified fruit species of Tripura having high nutrient content and need more research support with dietary recommendation[9].

There are 60 numbers of unutilized vegetable crops reported to play significant role of food and nutritional security for poor and tribal mass of Tripura. This study urges to widen the food security basket by incorporation of many minor and underutilized vegetables for both sustainable food and nutritional security for the people of Tripura[10]. Uplands and foot hills of Tripura are suitable for many tuber crop spp. which can provide food, feed and nutritional security for the rural people[11].

Tripura is home of 19 ethnic tribes and many sub tribes depends substantially on nature for their survival. They have been practiced many age-old indigenous knowledge-based technologies for survival in the forest-dominated Tripura. Several wild plant parts were being used as medicinal purpose by the rural women of the region but there is no recorded data available to preserve this as indigenous technological knowledge. Again, to accomplish the demand of food for nutritional security, various fermented and non-fermented foods have been used in different combinations along with traditional vegetables grown in this region.

Majumder (2020) mentioned in his recently published literature ‘Ethnic Fermented Foods and Beverages of Tripura’ many traditional foods of Tripura. Many these products are predominantly prepared by rural women mainly as small scale production and these are Sheedal (salt-free fish fermentation of *Puntius* spp. & *Setipinna Phasa*); Lona Ilish (fish fermentation of *Tenualosa ilisha* as immersed in saturated brine) widely consumed in Tripura and entire Northeast India and adjoining country Bangladesh; Langi (known as rice beer prepared from dry cake made up

with herbal products and rice); Chuwarak (a distilled variety of alcohol); Moiya Koshak, Melye Amiley, Midukeye and Moiya Pangsung (fermented bamboo shoot products) indigenous to the Debbarma, Chakma and Uchoi tribes; Batema (Fermented Elephant Foot Yam i.e. *Amorphophallus paeoniifolius*) indigenous to Debbarma tribes; Amlai Ntoi (fermented Indian gooseberry or amla i.e. *Phyllanthus emblica*) indigenous to the Uchoi tribe; Kosoi (fermented Lima bean i.e. *Phaseolus lunatus, L.)* indigenous to Jamatia tribe and Bikang (fermented Sword bean i.e. *Canavalia gladiata*) indigenous to Uchoi tribe; Bochu-mba (fermented flower of *Bombax ceiba L*., commonly known as 'cotton tree') indigenous to the Uchoi tribe. These fermented products usually consumed by tribes of the state are intimately associated with their socio-cultural, spiritual life and health. As acculturation effect, these tempting fermented products became part and parcel in cuisine of Bengali speaking people the ethno linguistic majority of Tripura. The literature also reported the nutrient content of each of the product, recorded evidence of medicinal use, detail procedure local processing of fermentation along with popular methods culinary preparation. Despite of all these facts, there is no industrial support for value addition, marketing and comprehend these traditional knowledge to save the local producers[12].

Different Cultivation practice

Rice based farming systems can be an easy choice for resource conservation and to ensure food security for the farmers of Tripura. Livelihood of farmers in north-eastern region entirely dependent on rice based farming systems (RBFS). Lowland rice fields commonly known as lungas in Tripura are the major ecosystems for indigenous small indigenous fish species. The Rice based ecosystem is also the major habitat for crabs, eels, edible snails, roots etc. that provides nutrition to thousands in northeastern region and Livestock like cattle, buffaloes, poultry etc. are also the integral part of it. The fertility of rice these fields are maintained over the centuries through efficient residue recycling, livestock penning, application of organic manure and composts etc. The strength of the indigenous RBFS is not only as it provide staple food rice but also effective utilization of its habitats to serve the nutritional demand of farm families and the neighborhood. As scientist are recommended many times to adopt integrated farming system for small and marginal farmers to get subsistence earning year around this RBFS can be a well-suited model with less hurdles. However, there is need research recommendation to blend improved technologies and high yielding varieties/breeds to this indigenous RBFS for ensuring family food security of the increasing population in the state[13,14].

Homestead gardens consider efficient in farm waste management, contribute to income security, and minimizes the risk associated with conventional cropping system. Agro forestry home gardens are the age-old and traditional land use systems with protection and production functions, contributing particularly to the small holders. This study was conducted during the year 2011–2014in two agro-ecological situations (AES) of Tripura i.e. Plains land cultivation areas (Rupaichari and Bokafa block) as AES-I and hilly areas mostly populated with tribal groups (Matabari, Kakraban and Satchand blocks) as AES-II. In all most households of Tripura have homestead gardens comprising with planned and unplanned perennial plant species. Upscaling of homestead gardens with a number of components such as vegetables, spices, tubers, fruits, mushroom, poultry and goatery ensured a year-round supply of diversified food for farm families. Moreover with ensuring household food and nutritional

security, this large variety of homestead garden products facilitate to bring income security of the farm family. The study also examined the contribution of homestead gardens to nutrition security poor and marginal families in terms of supply of essential minerals, vitamins and calories[15].

Jhum or shifting cultivation is unique and very much popular among the indigenous tribe farmers of Tripura adapted to live and survive with the forest. This primitive method of cultivation ensures production of a range of ethnic foods which are nutritious and compatible to the civilization. This Shifting cultivation practice conservation of agro-biodiversity, they usually cultivate 8-10 verities of crop items in a particular jhumming land, in that way they can produce more food in a single time-frame. In the process, a small piece of jhumming land accomplishes almost all the needs of Jhumias and reduces his reliance with other allied activities or external inputs[16]. These hill farmers or Jhumias are predominantly practicing natural farming and their produce is rich in nutrient. However, the dependency of people on the Jhum cultivation has declined over the years may be due to the change of habitats, rural migration, and strong desire of secure livelihood activity and burden of population growth. Farmers practicing Jhum had low livelihood status; they are mostly selling non timber forest products (honey and fruits) collected from forest and practicing almost organic agriculture. Despite of many raising issues related Jhum cultivation in recent days, strong research support needed to preserve the knowledge of Jhumias with suggesting recommended models otherwise most of the hilly tracks of Tripura will remain unutilized and many nutritious crop varieties of jhum will become extinct without in-situ crop preservation[17].

In conclusion after the evaluation of the research data mentioned in this study it can be summarized that scientific community of Tripura is align with the growing country-wide awareness on nutrition sensitive agricultural. Initiatives have been started in many patches by different organization time to time. Again collected evidences indicated that there is strong research base for the advanced scientific studies like to develop models of agricultural practices to eradicate malnutrition, recommendation on traditional food baskets for ethnic tribes etc. set to be an example for the other part of the country.

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