Prospects of root and tuber crops in northeastern region of India

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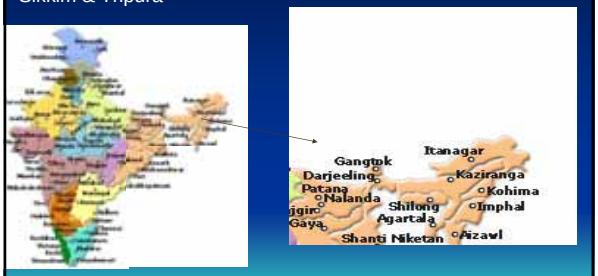
Introduction

The North-Eastern region comprising of states of Arunachal Pradesh, Assam, Manipur , Meghalaya, Mizoram,, Nagaland, Sikkim & Tripura



Introduction

- The tribals of this region are already in the habit of growing the crops like tapioca, colocasia and dioscorea in the jhum or shifting cultivation fields. Sweet potato and colocasia are grown considerably not only in the hills but also in the plains of Assam and Tripura.

Introduction

- Most of the tuber crops like sweet potato, colocasia, tapioca, dioscorea are grown as mixed crop with ginger, chilli, brinjal, beans etc.
- Organic by dfault.

Diversity of tuber crops in Northeastern region

- The region is considered to be the richest reservoir of genetic variability of tuber crops i.e. colocasia, *dioscorea* etc. Considerable diversity has been reported in several states
- In root crops radish is grown commercially in hilly area and small round to long and white to red fleshed are found.Carrot, beetroot and turnip are also becoming popular now a day due to change in food habit among tribals.
- Alocasia (*Alocasia macrorrhiza*) occurs in wild in humid tracts being more common. Much diversity occurs in shoot/leaf thickness, shape, colour & size of corm. However in colocasia (*Colocasia esculenta*) and xanthosoma (*Xanthosoma sagittifolium*) wild types vary in leaf size, petiole length etc. and possess both green and pigmented forms. More variability in respect of Kalla Kachu, Ban Kachu, Ahu-Kachu, Dukh Kachu, Mukhi, Panch Mukhi, Man Kachu, Jal Kachu, etc.

- In sweet potato mainly two types are available in the region i.e. red and white.
- In tapioca both sweet and bitter types are available.
- In *Dioscorea* about 28 species and 25 varieties have been reported from NE region mainly in the Garo hills (Sharma and Hore, 1995). Major species found in the region are *D. alata, D. esculenta, D. bulbifera, D. pentaphylla, D. hamiltonii, D. cylindrical, D. sativa, D. oppositifolia* and *D. deltoidea, D. floribunda* etc.
- Elephant foot yam (*Amorphophallus companulatus*) is widely grown in Tripura and Meghalaya.
- There are certain non-traditional tuber crops like, Chow-Chow (*Sechium edule*) Kakrol (*Momordica cochinchinesis*), Sohphlong (*Flemingia vestita syn Maughania vestita*) and *Vigna vexillata* which produce edible under ground tubers

Status of root and tuber crops in NE Region

- The productivity of tuber crops in this region is 5.6 tonnes/hectare, which is far below the national productivity of 15.45 tonnes/hectare (excluding potato).
- Crop wise sweet potato has maximum acreage in the region followed by cassava and colocasia.
- The area, production and productivity in all northeastern states are not available because the cultivation of these tuber crops are limited to kitchen/backyard in mixed cropping system.

A= Area in thousand hectare, P= Production in thousand tonnes, Y= Yield in t/ha

State		Sweet potato	Colocasia	Tapioca	Total tuber crops
Assam	A	9.4	-	2.5	
	P	32.6	-	11.7	
	Y	3.47	-	4.68	
Meghalaya	A	5.22	-	4.11	
	P	17.39	-	21.88	
	Y	3.4	-	5.3	
Mizoram	A	0.27	0.30	0.11	
	P	1.6	1.85	0.96	
	Y	5.92	6.11	8.64	
Nagaland	A	0.36	2.84	2.84	
	P	5.76	24.95	14.22	
	Y	16.0	8.8	5.01	
Tripura	A	1.3	-	0.5	
	P	11.5	-	2.2	
	Y	8.85	-	4.4	
NE Region	A	16.55	-	10.06	27.24
	P	68.85	-	50.96	153.1
	Y	4.16	-	5.07	5.6
India	A	120.6	-	264.3	1335
	P	1048.1	-	6681.9	520640.5
	Y	8.69	-	25.28	15.45

Tuber crop varieties identified/recommended for different northeastern states

Radish (*Raphanus sativus*)

Location	Variety	Yield (t/ha)
Basar, Arunachal Pradesh	Japanese White	49.6
	Pusa Himani	44.8
Barapani, Meghalaya and Sikkim	Meghalaya Local	66.8
	Pusa Chetki	33.2
	Japanese White	38.6
	Pusa Himani	44.2
Tripura	Pusa Chetki	25.30
	Japanese White	23.90

Turnip (*Brassica rapa*)

Location	Variety	Yield (t/ha)
Basar, Arunachal Pradesh	Pusa Chandrima Pusa Swarnima	47.6 31.6
Barapani, Meghalaya	Pusa Chandrima	45.0

Carrot (*Daucus carota*)

Location	Variety	Yield (t/ha)
Basar, Arunachal Pradesh	Nantes Pusa Meghali	40.0 35.2
Barapani, Meghalaya	Nantes Pusa Meghali	45.0 33.02

Sweet potato (*Ipomoea batatas*)

Place	Variety	Yield (t/ha)
Basar, Arunachal Pradesh	71-OP-219 71-OP-217 H-633	24.34 20.86 19.00
Barapani, Meghalaya	Sree Bhadra Sonipat-2 H-42	37.50 35.80 35.20
Tripura	Cross-4 V-35	25.30 23.90

Colocasia (*Colocasia esculenta*)

Place	Variety	Yield (t/ha)
Basar, Arunachal Pradesh	AR-1	32.70
Barapani, Meghalaya	ML-1 ML-9 ML-2	22.7 20.5 20.0
Mizoram	MZ-2 MZ-3	18.5 20.2
Manipur	MR-5	-
Assam	AS-2	-
Tripura	ACC-293 TR Local	23.2 21.6

Cassava (*Manihot esculenta*)

Place	Variety	Yield (t/ha)
Barapani, Meghalaya	H-165 Sree Vijaya H-312	41.4 30.0 34.0
Basar, Arunachal Pradesh	H-312 H-2304	26.8 24.7
Manipur	H-1687 H-165	- -
Nagaland	H-1687 Local	27.5 25.1
Tripura	H-1687 H-3641 H-43	41.0 39.5 36.0

Prospect in North eastern region

Strength

- Soil and climatic conditions are highly favourable for different tuber crops.
- Rich biodiversity of tuber crops in the region.
- Tuber crops are already integral part of food of tribals of the region.
- These crops requiers less care and can be grown on marginal land.
- Complex diverse and risk prone (CDR agriculture).
- Scope for organic production

Weaknesses or Problems of Tuber Crops

- Vegetative propagation is probably the most important single limitation.
- Non-availability and high cost of quality planting materials.
- It requires more labours for handling .
- Digging on hill slopes causes heavy soil erosion.
- Tuber crops are generally consumed by tribals or poor people,therefore, policy maker as well researcher do not give much attention.

Production constraints

- Germplasm conservation for root and tuber crops is difficult because of heavy dependence on vegetative propagation and non-availability of planting material of improved varieties.
- In case of colocasia disease like *Phytophthora* blight and corm borer insect, in cassava viruses, however in sweet potato weevil and rat etc.

Constraints in human/animal diet

- Low protein content in most of the tuber crops.
- Presence of cynogenic glycosides in cassava, which on hydrilysis yields HCN
- Presence of calcium oxalate in colocasia and amorphophallus
- Presence of trypsin inhibitor in sweet potato, which reduces the protein digestibility in mixed feed.

Processing constraints

- No industry for making sago, alcohol, chips, flour, etc. of cassava in NE Region.
- No industry for starch extraction in tuber crops in NE Region.

Opportunities in tuber crops in the region

- Huge genetic diversity could be used for creating the gene bank (field and *invitro*), collection, conservation and utilization of tuber crops would benefit the farmers of the region.
- Root and tuber crops play vital role in human nutrition, livelihood for rural people for employment generation and income generation. In other way in overcoming insurgency which is prevalent in the region due to unemployment.

- There are lot of ITK's (Indigenous Technical Knowledge) viz. preference of tuber crops in tribal folks, food habits and techniques to reduce acridity, extension of shelf life of yams by applying the ash at the cut ends.
- Further, these crops are mainly grown as inter crops in coconut, areca nut, fruit orchards and integrated farming system as well as mixed crop with maize, ginger, turmeric, chilli, French bean (pole type) etc
- There is ample opportunities for exploring opportunities for export of tuber crops in the bordering countries like China,Nepal, Bangladesh, Bhutan and Myanmar.

Strategies for commercialization

- Identification of short duration, high yielding varieties of sweet potato suitable for inter cropping.
- Dual purpose with high tuber yield sweet potato varieties like Sree Bhadra and Sonipet-2 needs to be commercialized especially in *jhum* (shifting cultivation) areas.
- Introduction of β carotene rich varieties in sweet potato for overcoming malnutrition of tribals.

- Mass multiplication and commercialization of high yielding and moderately resistant to *Phytophthora* blight varieties of colocasia namely ML-1, ML-2 having low calcium oxalate content.
- Mass multiplication and commercialization of Gajendra variety of *Amorphophallus*
- Introduction of non-bitter and sweet type cassava varieties with low HCN content.
- Identification of yam varieties with high diosgenin content for industrial uses.
- There is need to establish processing unit for manufacturing of chips, flour etc. in cassava and extraction of starch from cassava & diosgenin from yam.

- Standardization of cassava, sweet potato and taro as feed concentrate along with good supplements for pig, poultry, fish etc. as tuber as well as leaves are already fed by tribals in the region. There is also need to prepare, silo from leaves, vines/stem of these tuber crops.
- Mixed/inter cropping of tuber crops with legume vegetables like French been (pole type) and cowpea should be advocated.
- Need more research work on standardization of package of practices for cultivation in different inter/mixed cropping systems or farming systems.
- There is need for standardization of post harvest handling & processing

Conclusion

- The high nutritional qualities indicate that the cultivation and consumption of these crops may be helpful in overcoming the nutritional deficiencies predominant in many rural areas of the region.
- In the present context of rapid increase of population and consequent shortage of food grains, collection and utilization of various types of tuber crops are considered very essential.
- There is need for post harvest management and value addition for exploitation of these tuber crops provided processing units are installed.


Thank you