11 TOWARDS RICE SELF-SUFFICIENCY IN NORTHEASTERN INDIA

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Introduction

The spectacular improvement in rice production due to adoption of high-yielding varieties (HYVs), utilization of irrigation facilities, application of fertilizer, plant protection measures and use of improved farm implements has not been realized in Northeastern states. This region accounts for 7.8 per cent of the total rice area in India while its share in rice production is only 5.9 per cent. The average rice productivity of 1.4 t/ha is below the national average of 1.9 t/ha (Anonymous, 2000). There is also wide interstate disparity in rice production and productivity. Assam has around 73 per cent of the rice area in the region followed by Tripura (8 per cent). Rest of other states have less than 5 per cent area. Productivity is more than 2 t/ha in Manipur and Tripura, and lowest in Meghalaya and Arunachal Pradesh. Except in Manipur, rice area has increased in all the north-eastern states. The increase in rice production and productivity over past 30 years is marginal and much below the national average; most part of which are attributed to expansion of rice area mainly in the summer season in 90’s. Rice self-sufficiency is only about 80 per cent in north-eastern India. Ten million tonnes of rice is annually being imported in the region from the Central Pool. Household food and nutritional security is the key issue for both the rural and urban consumers. States like Assam, Manipur and Tripura can easily produce surplus rice. Others can improve their production potential and productivity with suitable interventions.

Constraints in Rice Production

The HYVs bred for situations with assured nutrient and water supply could not largely replace the traditional land races having tolerance to local adverse growing conditions in the region. Even promising HYVs for favourable conditions could not be grown as seed of the desired varieties are in short supply and are not available on time. High humidity prevailing in the region during most part of the year causes quality deterioration of the seed. Diverse and variable rice-growing ecologies prevail even in a
small geographical area of a village Panchayat or a Block level. Upland, favourable shallow rained lowland, unfavourable deep-water and flood prone area, swampy land, and hilly area etc. co-exist together in a block requiring completely different problem-solving approaches.

Heavy, erratic and torrential rain causes recurrent flood in many parts of the region. Inherent poor response of the local land races to high dose of fertilizer, its poor recovery due to various type of losses restrain the farmer from investing more on fertilizer. Development of full irrigation potential has not been done properly due to various reasons. The region is rich in good quality ground-water which has to be fully exploited. Rice crops are found in various growth stages favouring perpetuation of different insects and pathogens. This frequently causes severe incidences of pests like hispa, stemborer etc. and diseases like blast, bacterial leaf blight, RTV, sheath blight and sheath rot. Insecticides and fungicides to control these are not popular and are in short supply in the region (Anonymous, 1986).

**Strategies**

A thorough analysis of the rice-growing ecologies, seasons, trend in rice production and consumption over last 30 years, and its comparison with other agriculturally-developed states of the country leads to identification of 6 major areas where technological intervention with the prevailing knowledge can ensure sustainable rice production for future. These are listed as follows:

Seed production, storage and distribution

1) Technological *innovation* in *Boro* rice
2) Technological *intervention* in *Ahu* rice
3) Technological *intervention* in *Sali* rice
4) Technological *intervention* in *Bao* and flood-prone rice
5) Participatory varietal selection

**Seed Production, Storage and Distribution**

Seed is the basic input in modern agriculture. Healthy seed producing vigorous, disease free seedlings, is pre-requisite for a good harvest. It ensures a crop free from seed borne diseases. Therefore good quality seed of the new improved *rice* varieties, which the farmers prefer to grow must be available at the time of sowing. Unfortunately seed of desired varieties are mostly in short supply, often reaches the farmer after the sowing
season. Due to high relative humidity prevailing in the region, the seed viability quickly deteriorates and rarely remains viable for more than a year. There is need to identify widely-grown varieties and its seed requirement for the next 3-4 years. Production of breeder seed, foundation seed and certified seed to be organized at appropriate level involving research farm, government or private seed, producing agencies and farmer. If required, other state seed agency may be assigned the responsibility of producing and supplying good quality seed. Seed storage is the major problem in the NE India. Storage facility at all the district headquarters with appropriate temperature and relative humidity needs to be developed. Seed must reach the farmer well in advance of the growing season.

**Technological Intervention in Growing Boro Rice**

*Boro* rice is grown from mid-October to June under three broad categories: rainfed flood-prone areas; Irrigated flood-prone areas; and Irrigated flood free areas (Pathak et. al, 1999). Traditionally, *Boro* rice is grown in rainfed swampy areas, which are not in cultivation during rainy season due to chronic flood problem. These areas are generally saucer-shaped and have various levels of soil saturation and submergence. Old seedlings (2 months age) are transplanted initially in the periphery. Tillers are detached from the mother culm in this zone and are used in the lower zone for planting with reducing water level. In the event of sufficient winter rain, these low-lying areas get inundated while in case of continuous dry spell, the crop in the upper ridges suffers from moisture stress. Therefore, traditional varieties with tolerance to both excess and deficit moisture predominate in this ecology. In irrigated flood-prone ecology, flash flood is a problem. However, cold spell of 2 to 3 months is the major problem in all the *Boro* growing areas. It is more acute in high elevations (650 m above MSL). Due to lack of cold tolerance in HYVs in NE states, some varieties have been introduced from Bangladesh. It is difficult to maintain the water level in uplands with light texture soils. Stemborers, case worm, sheath blight, BPH, leaf folders, rice bugs, hispa, brown spot, sheath rot, neck blast and stem rot are the important insect pests and diseases affecting the *Boro* crop. Jaya is the popular variety for *Boro* season in Assam. Other varieties with disease and pest resistance are being recommended (Table 1).

*Boro* rice has high potential for increased production because of abundant sunlight, control of water level in field and lesser pest problem. The breeding strategy should include developing high-yielding rice varieties with intermediate height for rainfed swampy situation, and semi-dwarf for irrigated area with stiff culm, moderate tillering ability, early cold tolerance, early-maturity, seed dormancy, and tolerance to stemborer, seedling blast, neck blast and sheath rot. The important agronomic measure is to raise successful nursery and healthy seedling under polythene tunnel in a shorter
period. This will help in timely planting of seedlings of appropriate age. This method of raising nursery ensures higher germination and lesser incidence of blast. Research is to be undertaken to develop variety-specific crop management as well as Integrated Pest and Nutrient Management (IPNM) practices. Development of irrigation facility either by gravity irrigation or shallow tube-well to expand the area in view of high production potential of the crop is needed. Since the weather at the time of harvesting is generally rainy, drying facilities are to be developed. Use of fertilizer and weedicide is to be popularized to improve the yield. Mechanization is to be adopted for ploughing, transplanting, harvesting, and drying etc.

<table>
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<td>Broadcast Ahu</td>
<td>Bala, Kalinga III, Govind, Heera, DR 92, Luit, Sunil</td>
<td>Drought and blast</td>
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<td></td>
<td></td>
<td>VL 206, Megha rice 1, Megha rice 2, RC PL 3-2, RC PL 3-6, VL Dhan 81</td>
<td>Blast, acid upland soil</td>
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<td>Hill rice</td>
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<td>VL 206, Megha rice 1, Megha rice 2, RC PL 3-2, RC PL 3-6, VL Dhan 81</td>
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<td>Irrigated</td>
<td>Transplanted Ahu/Wet season</td>
<td>Lachit, IR 36, IR 64, Kapilee, Saket 4, IR 50, Rasi, Gopinath, Luit, Chilrai, Satyaranjan, Vasundhara, Jayant, KD 2-6-3, Paicos 1</td>
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<td>Boro rice</td>
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<td>Low yield</td>
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</table>
Technological Intervention in Growing *Ahu* Rice

Advancing the sowing season by 15-30 days is beneficial in escaping rains and flooding at maturity. With the expansion of irrigated area, *Ahu* crop can be transplanted instead of direct seeding and by growing HYVs of 100-115 days duration, a major quantum jump can be achieved in rice production. By expanding shallow tubewell irrigation facilities, the area under transplanted *Ahu* can be expanded substantially. Varietal development programme should emphasize in incorporating drought and cold tolerance at early stage and grain dormancy as additional attributes. ‘Vandana’ variety released for rainfed upland ecology in Bihar will be suitable for direct-seeded *Ahu* in Assam. Weedicides available in the market are not yet popular. These, along with fertilizer, are to be popularized amongst the farmers. It requires emphasis on variety, specific crop management practices as well as integration of nutrition-pest-disease management. Use of pre-germinated drum seeder in puddled soil will be suitable in place of transplanted *Ahu*, and will reduce the growth duration of crop by a week. Threshing and drying facility at harvest should be developed as the period coincides with rain. Heavy rain at harvest is the major risk for the *Ahu* rice. Hence, limited mechanization for harvesting, threshing, cleaning and drying is essential without which the scope of *Ahu* and *Boro* crop is very much limited.

Technological Intervention in Growing *Sali* Rice

*Sali* rice is the predominant rice crop in NE India occupying about 70 per cent area and contributing 75 per cent to the production. It is grown between June-July and Nov-Dec. and is known as *Sali* or winter rice. It is generally grown in shallow rainfed lowland, irrigated, and shallow flood-prone lowland. The land is generally fertile and has high production potential. Inundation by flood water and sporadic occurrence of diseases like leaf blast, neck blast, RTV, sheath blight, bacterial leaf blight, and insect pests like stem borer, hispa, green leafhopper are the major problems. In spite of being the most favourable area, the average productivity is much below the national average. Some of popular varieties for *Sali* season in Assam are Manoharsali, Mahsuri, Ranjeet and Joha rice. Rice is found all-round the year at various growth stages in Assam favouring perpetuation of pests and pathogen. Specifying the sowing and transplanting time will help in reducing the pest and pathogen population in the off-season. The breeding programme should emphasize in incorporation of resistance to all biotic stresses mentioned above.

Variety-specific crop management as well as integration of nutrition-disease-pest management practices is to be developed and popularized. Water
stagnation is another major problem of lowland where Salī crop is grown. Drainage system connected to rivers and rivulets should be constructed. Fertilizer, weedicide, insecticides and fungicides are to be made available and popularized. For better yield and minimum loss, farm operations like ploughing, transplanting, harvesting, threshing and drying are to be completed in a shortest possible period to utilize the surplus labour force of the region. Limited mechanization of the operations are necessary to reduce the peak labour requirement.

**Technological Intervention for *Bao* (Deep water) and Flood prone Rice**

It is generally grown in low-laying areas with water stagnation beyond 50 cm for more than a month in the season. The area covered has no option but to grow Bao rice with very low productivity and full of risk, both abiotic and biotic. Some of the varieties grown for Bao cultivation are Negharibao, Dal-bao, Panindra and Maguribao.

Low plant population due to early inundation is the reason for the poor yield of Bao rice. Advancing the sowing season to March-April and direct seeding ensure early crop establishment and higher plant population. Agronomic practices like basal fertilizer application to tolerate submergence are to be developed and popularized. Varietal development programme should aim at incorporating both submergence tolerance and elongation ability in addition to biotic stresses like stemborer, ufra, hispa, BLB etc. Transplanting two months old seedlings of suitable variety after flood water recedes in the 1st week of September is another promising alternative. Local rice varieties like Hatipanjar, Banskathi, Mala, Manoharsali, Biron etc. are suitable for the purpose. Drainage facilities, as discussed earlier will definitely reduce the problem (Bhowmick et al. 2000).

**Farmer Participatory Varietal Selection**

Peculiarity of northeastern states lies in its diversity in rice-growing ecology and ethnic tribes even in a small geographical area. The taste and requirements are varied. Therefore, it is wise to involve farmers in selecting the appropriate varieties from a few selected good performing ones so as to suit their local need. The first 5-10 varieties from co-ordinated trials can be multiplied and a mini-kit consisting of 2 kg seed of each variety along with local checks for various duration group can be distributed at block levels and farmers’ group can be invited and associated to select the best ones. This will allow the selection of location, specific best varieties and also their spread with minimal effort. In addition, it will provide feedback to the researchers about the problems and requirements of farmer.
The present day’s technologies are not percolating to the farmers, as their problems are not properly understood by the researchers. The farmer’s participatory varietal selection approach opens the frontier to the researcher in properly accessing the difficulties of the farmers and their requirements. Thus the research gaps whenever exist can easily be filled up.

Conclusion and Outlook

Rice self-sufficiency at household level and at regional level is the need of hour in northeastern India. Farmers should be made aware of the new rice varieties and technologies through State Extension Personnel and news media. Providing subsidy for shallow tubewell to farmers is the most appropriate policy intervention by Assam Government towards food self-sufficiency. Working with farmers through participatory approach and close linkage of various ICAR and state research organizations is needed with NGO’s and State Department of Agriculture for technology transfer, adoption and feedback.

References

Anonymous (1986). Constraints and suggestions for increasing rice production in Assam. Central Rice Research Institute, Cuttack, Orissa.


