

Long-term Strategies and Programmes for Mechanization of Agriculture in Agro Climatic Zone-II: Eastern Himalayan region

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1. NAME OF AGRO CLIMATIC ZONE : Eastern Himalayan region
2. STATES UNDER THIS ZONE : Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, West Bengal (Hilly region)



3. SUB-AGRO-CLIMATIC ZONES WITH THEIR CHARACTERIZATION

This zone includes Sikkim, parts of north West Bengal and the entire North Eastern region. The hill areas are sparsely populated with a mix of several ethnic origins and culture. The climate varies from tropical in the plains to Alpine in the high hills. Nearly a third of the cultivation is of the shifting (*jhum*) type.

3.1 Himalayan Hills

This is the northern tip of West Bengal—Darjiling and the further northern territory of Sikkim. The soil here is brown hilly and the climate is per humid to humid. The area receives 2,700 mm of rainfall in a year. The forest cover is high, and the net sown area is low. Canal irrigation is quite low at around 12–13%. In Sikkim, un-terraced farming on the slopes and unprotective covers to the canal irrigation system leads to serious soil erosion.

3.2 North East Hills

This sub-region covers Karbi Anglong and Cachar Hills in Assam and the entire territories of Arunachal Pradesh, Nagaland and Meghalaya. The region has a per humid to humid climate and receives copious rains of about 3528 mm in a year. The soil is classified red sandy to laterite. Most of the land in Arunachal Pradesh is uncultivated and a large part (nearly 94%) is classified under forests. In Nagaland more than half the land is under forests and only about a third is cultivated. A little over 40% of the area in Meghalaya is cultivated and a similar proportion is under forests. The rest is mostly barren and uncultivated.

3.3 Southern Hills

The Southern Hills sub-region covers Manipur, Tripura and Mizoram. It receives 2,052 mm of rains and the climate is per humid to humid. The soil is acidic. Most of the land in Manipur is barren and considered unculturable. In Tripura and Mizoram, about a quarter of the land is cultivable and over half the land is classified under forests.

3.4 Lower Brahmaputra

This is the most populous part of Assam. It covers the districts of Barpeta, Dhubri, Nagaon, Darrang, Kamrup, Goalpara, Kokrajhar and Sonitpur. The sub-zone has alluvial, red loamy and terrai soils. The climate is per humid to humid. It receives 1,840 mm of rains. However, nearly two-thirds of the region is flood prone. Nevertheless, this region is agriculturally better

developed than the others in the East Himalaya zone. Nearly a quarter of net sown area is irrigated.

3.5 Upper Brahmaputra

The Upper Brahmaputra valley comprising of the districts of Lakhimpur, Sibsagar, Cachar, Dibrugarh, Jorhat and Karimganj (all in Assam) and Jalpaiguri and Koch Bihar in West Bengal receive rains of 2,800 mm per annum. The soil is alluvial and red loamy. The climate as in other parts of the State is per humid to humid.

4. GENERAL TOPOGRAPHY OF THE ZONE

The region is characterized by difficult terrain, wide variation in slopes and altitudes, land tenure systems, and cultivation practices. For historical reasons, the region has remained behind the mainstream of the country in agricultural development in many areas. Infrastructural facilities are still inadequate. Majority of population is dependent on agriculture and allied land based activities. Shifting cultivation (slash and burn agriculture) is still the chief means of livelihood of tribal people because of an inhospitable terrain.

5. OPERATIONAL LAND HOLDING PATTERN BY MAJOR SIZE GROUP

State-wise number of operational land holdings are given in Table 1.

Table 1. State-wise Number of Operational holdings by major size groups (1995–96)

Name of State/Union Territory	(in '000)					
	Marginal	Small	Semi-medium	Medium	Large	Total
Arunachal Pradesh	21	20	29	28	6	104
Assam	1,669	561	351	96	5	2,683
Manipur	69	49	21	3	Neg.	143
Meghalaya	72	44	39	6	Neg.	160
Mizoram	28	26	12	Neg.	Neg.	66
Nagaland	9	21	40	64	14	149
Sikkim	24	10	6	3	Neg.	44
Tripura	247	40	12	1	Neg.	301
West Bengal (Hilly region)*	5,003	1,101	382	60	1	6,547

Note: Neg. - Negligible; NA - Not Available; * - for the entire State.

Source: Agricultural Statistics at a Glance 2004, Agricultural Statistics Division, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.

6. IMPORTANT SOIL TYPES

In West Bengal—Darjiling and the further northern territory of Sikkim, the soil is brown hilly. In Karbi Anglong and Cachar Hills in Assam and the entire territories of Arunachal Pradesh, Nagaland and Meghalaya, the soil is classified red sandy to laterite. In the most populous part of Assam which covers the districts of Barpeta, Dhubri, Nagaon, Darrang, Kamrup, Goalpara, Kokrajhar and Sonitpur, the soil is alluvial, red loamy and terrai. In the Upper Brahmaputra valley comprising of the districts of Lakhimpur, Sibsagar, Cachar, Dibrugarh, Jorhat and Karimganj (all in Assam) and Jalpaiguri and Koch Bihar in West Bengal, the soil is alluvial and red loamy.

7. CLIMATE AND ANNUAL RAINFALL

The climate of the zone is per humid to humid. Himalayan Hills Region receives 2,700 mm of rainfall in a year. North East Hills Region receives copious rains of about 3,528 mm in a year. Southern Hills Region receives 2,052 mm of rains while Lower Brahmaputra receives 1,840 mm of rains. Upper Brahmaputra Region

receives rains of 2,800 mm per annum.

8. POPULATION AND POPULATION DENSITY

The structure of the population in the zone is given in Table 2.

9. BRIEF SCENARIO OF AGRICULTURE SECTOR

Rice is the staple food and occupies 81% of the total area under cereals followed by maize (12.8%). Wheat is cultivated in small areas in Arunachal Pradesh, Meghalaya, Sikkim and Tripura only. Area covered under oilseeds is 5.6%.

Pine apple and citrus are important fruits in Eastern Himalayan Region. These crops make heavy demand on natural resources and excessive use of pesticides. Crop diversification towards less perishable crops like black pepper, cinnamon, cashew nut and coconut is essential to earn foreign exchange and reduce pressure on creating additional infrastructural facilities. Improved technologies have been developed which are superior to the traditional practices in terms of productivity and profitability.

Table 2. Distribution of population, sex ratio, density, % decadal growth rate—2001

	Total population			Sex ratio (females/ 1,000 males)	Density/km ²	% Decadal growth	
	Persons	Males	Females			1981-91	1991-01
Arunachal Pradesh	10,97,968	5,79,941	5,18,027	901	13	36.83	27.00
Assam	2,66,55,528	1,37,77,037	1,28,78,491	932	340	24.24	18.92
Manipur*	23,88,634	12,07,338	11,81,296	978	107	29.29	30.02
Meghalaya	23,18,822	11,76,087	11,42,735	975	103	32.86	30.65
Mizoram	8,88,573	4,59,109	4,29,464	938	42	39.70	28.82
Nagaland*	19,88,636	10,41,686	9,46,950	909	120	56.08	64.41
Sikkim	5,40,851	2,88,484	2,52,367	875	76	28.47	33.06
Tripura	31,99,203	16,42,225	15,56,978	950	304	34.30	16.03
West Bengal	8,01,76,197	4,14,65,985	3,87,10,212	934	904	24.73	17.77
India*	1,02,88,30,774	53,22,63,021	49,65,67,753	933	324	23.86	21.56

Notes: (1) The percentage decadal growth of population of Assam in 1981 and Jammu and Kashmir in 1991 have been worked out by interpolation as 1981 census in Assam and 1991 census in Jammu and Kashmir could not be conducted owing to disturbed conditions. (2) *2001 census figures are provisional for Nagaland, Manipur and India.

Source: Census of India, 2001, Series-1, Registrar General and Census Commissioner, New Delhi.

Table 3. Livestock population in the Eastern Himalayan region ('000 nos.)

State	Cattle	Buffalo	Sheep	Goat	Pig	Mithun	Yak	Poultry
Arunachal Pradesh	213	12	163	76	223	98	25	764
Manipur	368	138	747	14	333	20	11	2,861
Meghalaya	207	29	550	26	188	–	28	1,419
Mizoram	82	4	49	1	82	1.5	12	691
Nagaland	248	9	151	–	306	13	–	978
Sikkim	30	4	173	11	31	–	–	252
Tripura	103	16	680	5	83	–	12	1,079
Total	1,251 (0.6)	212 (0.3)	2,513 (5.1)	133 (0.2)	1,246 (12.4)	133 (100)	88 (53.0)	8,044 (3.8)

Note: Figures within parentheses are per cent of all India population.

Source: GOI (1998c)

10. BRIEF SCENARIO OF ANIMAL HUSBANDRY SECTOR

The rearing of pig and poultry are more popular in the Eastern Himalayan Region. The brief scenario of animal husbandry sector in the zone is given in Table 3.

11. BRIEF SCENARIO FOR FISHERIES SECTOR

Aquaculture has vast potential in the eastern Himalayas. Fisheries resources of the region comprise of the tributaries of the Brahmaputra and Barak, the rivulets and streams and reservoirs, lakes, ponds and paddy fields. Resources for both warm and cold water fisheries are available in the region. These resources can be broadly classified into two categories namely riverine comprising rivers and streams and in land comprising reservoirs, lakes, beels, tanks and pounds. The extent of exploitation of aquatic resources of the region remains quite low.

12. IRRIGATED AREA AND SOURCES OF IRRIGATION

Irrigated area in the eastern Himalayan region is 23.42% as against 38% in India as a whole. The region has sizeable large surface and ground water resources mainly because of its locations in high rainfall areas with an extensive river system. But all the water resources cannot be utilized on account of these being inaccessible or non-reservable. The region has a total ground water potential of 855 mm excluding Sikkim. Agriculture in this region is largely carried out under rainfed condition.

13. INFRASTRUCTURAL FACILITIES AVAILABLE IN THE ZONE

13.1 Metalled Road

Major impediment to development of the zone is in accessibility. Villages are dispersed and construction of road is difficult. Metalled road density of the region ranges between 0.07 km/km² in Arunachal and 0.04 km/km² in Tripura averaging around 1.2 km/1,000 population.

13.2 Rural electrification

Out of 38,769 villages in the region, 73% villages are electrified.

13.3 Important market for sale of agricultural produce and agricultural machinery

There are 668 rural markets in the region, 203 in Tripura, 181 in Manipur, 130 in Meghalaya, 93 in Nagaland, 76 in Mizoram and 5 in Arunachal Pradesh. Farm equipment market is not there. The owner of workshop himself does sales / marketing of the finished products during the weekly village markets or by supplying it to the retailers at the nearest cities.

13.4 Farm Equipment Manufacture

Mostly there are blacksmiths with traditional equipment who make hand tools and implements. Only few units in Manipur and Assam are large and have more than 75 sq.m floor area. State Government owned workshops have better facilities. Around 37% of the total units in Manipur have electric operated machines like portable grinding machine, drilling machine, arc welding

machine etc. Only one workshop in the Imphal West district and two private workshops along with two government workshops in Assam are well equipped with advanced machinery. Wooden charcoal is the only fuel used in most of the units. The ICAR has granted a revolving fund scheme 'Commercialization of Farm Tools and Machinery for Hill Agriculture' worth Rs 22.98 lakhs in which total 39 types of agricultural machinery and tools are being manufactured on demand from the farmers or organizations involved in agriculture production of the region.

In Assam majority of the manufacturing units/workshops are located in Kamrup, Barpetta, Golaghat, Jorhat districts. In Manipur manufacturing units are concentrated in two localities namely Wangkhei Thangjam Leirak of Imphal East District and Sagolband Thangjam Leirak of Imphal West District; Manipur Agro Industries Corporation Ltd. was set up in 1981. In Meghalaya majority of the units are located at Myllem, Sohryngkham and Smith village of East Khasi Hills district and at Ronkhon, Rongram, Ampati, Raajabala and Garobadha villages of Garo Hills districts.

Units manufacturing the items also carry out maintenance and repair of agricultural tools and implements. No specific infrastructure exists for sales and marketing.

13.5 Research and Extension Facilities

ICAR has ICAR Research Complex for NEH Region with Research Centre in each State of the region. It has Central Agricultural University in Imphal, Manipur with its constituents in every State. College of Agricultural Engineering and PHT have yet to come up in Gangtok (Sikkim). NRCs on Orchids, Yak and Mithun are located in the region. Research Centres of CSWCRTI and NBPGR are located in Shillong. Eastern Region Farm Mechanization Training and Testing Institute, (ERFMTTI) Biswanath Chariali, an institution of Ministry of Agriculture, Govt. of India, located at Assam, is also involved in training and testing activities. There are either one KVK existing or likely to be established in each district of NEH States. Assam has 10 KVKs. Every State has Department of Agriculture which addresses to mechanization. However, there is very little man power to look after the activities related to popularization of agricultural implements and machinery. Nationalized and regional rural banks though provide funding for agriculture and allied activities, norms are disabling. In Mizoram, the State government subsidizes purchase of tractors and power tillers as follows:

Tractor	: Rs 1.00 lakh per tractor
Power tiller	: Rs 60,000 or 50% which ever is less
Implements	: 50% with maximum of Rs 40,000 per implement.

14. AGRICULTURAL IMPLEMENTS BEING USED BY THE FARMERS

List of agricultural implements being used by the farmers and improved implements suggested for introduction is given in Table 4.

15. SWOT ANALYSIS OF MECHANIZATION PROGRAMME IN THE REGION

Strengths

- Craftsman workshops and repair centres at several locations in the region.
- Qualified human resources can be produced with the present network of ICAR Institutes and agricultural universities.
- Agri. Engineering Division at NEH Complex Barapani and network of Regional Research Centres NEH Research complex.
- Proposed college of Agricultural Engineering and PHT under CAU at Gangtok, Sikkim.

Weaknesses

- Politically too sensitive.
- Shifting cultivation may restrict the use of improved implements and machines.
- Size and shape of fields, terrain and accessivity not very conducive for mechanization.
- Mechanization in horticultural crops yet to take place.
- Extension infrastructure for TOT in engineering aspects lacking in the region.

Opportunities

- Ample scope for introducing improved hand tools, implements and machineries, a demand of the farmers of the region.
- Processing and value addition through post-harvest engineering management can help the people to meet their needs at least cost and create more jobs and income in marketing their surpluses with proper PHT and on-farm value addition.
- Tradition of custom servicing and hiring of costly machineries good prospects for educated qualified youth.
- Mechanization will reduce drudgery to farm

Table 4. Agricultural implements being used by the farmers and improved implements suggested

Operation	Implements being used		Improved implements suggested for introduction
	Traditional	Improved	
Seedbed preparation			
Ploughing	Khasi spade; local plough	Khasi spade, power tiller; tractor; MB plough	12.5 cm MB plough; Power tiller; 10 cm light ridger plough; Tractor mounted attachments
Harrowing	Peg tooth harrow	Disc harrow (offset); power tiller	Peg tooth puddler; Comb harrow; ANGRAU animal-drawn puddler
Shallow cultivation	–	–	3 tines cultivator
Clod crushing	Local plough	–	–
Land levelling	Leveller	–	–
Planking	–	–	–
Seeding/planting			
Sowing	Dibbler	–	Metallic dibbling stick; Bardi seed drill; CIAE seed drill; Pre-germinated paddy seed drill; Seed-cum- fert. Drill
Planting	–	–	Manual and self-propelled mechanical rice transplanter; Semi-automatic vegetable transplanter; Sugarcane cutter planter
Weeding and hoeing			
Weeding	Khasi spade (small)	–	8 cm weeder ; Wheel hoe with showel and V-blade
Interculture	-do-; hand fork	–	V-blade hand hoe; CIAE low cost weeder
Bund/furrow making	Khasi spade	–	Bullock drawn and tractor operated bund/border former
Spraying and dusting			
For field crops	–	–	Hand rocking sprayer; Foot sprayer; Hand compressed sprayer; Knapsack sprayer; Power sprayer
For tall crops	–	–	
For trees/shrubs	–	–	
Irrigation			
Water lifting	Swing bucket	Shallow tube wells	Diesel and electric pumping sets; Foot pumps; Diaphragm pumps
Application	–	–	Drips; Sprinklers
Harvesting/digging/ uprooting			
Threshing/shelling	Sickle	–	Serrated sickle; Fruit Harvester; Orchard ladder; Walking type vertical conveyer reaper
Maize Sheller	Maize Sheller	Pedal operated paddy threshers	Tubular maize sheller; Power operated drum paddy thresher; Axial flow power thresher; Multicrop thresher
Winnowing/cleaning/ grading			
Straw Management			Manual and power operated winnowing fan; Grain precleaner; Fruit grader
Reaping			
Incorporating in soil			Auxillary engine operated bush/grass cutter Shredding with Tractor mounted shredder and incorporation with MB plough; Retrieval composting and vermin-composting
Baling			Baler
Densifying	Manual		Feed block making machine
Stubble shaving	–	–	Power tiller, TM stubble shaver
Any other operation			Recirculatory drier
Not listed above			
Milling of cereals, pulses and oilseeds	Counter poise foot pounder	Huller	Mini Grain Mill; Mini Rice mill; Mini Dal Mill; Mini oil Expeller
Cutting trees	Dao		Auxillary Engine operated Disc and Chain Saw
Chaff cutting	Dao		Manual and power operated chaff cutter
Horticultural tools	Dao, knife		Horticultural tools
Stubble shaving	–	–	Power tiller, TM stubble shaver

workers, a necessity to keep educated youth interested in agriculture. may provide opportunity to reduce load on human labour.

- Good scope of surface covered cultivation and mechanization therein.

Threats

- Reduced production, productivity and quality if mechanization not introduced systematically.
- Exodus to urban areas if agriculture is not made attractive through mechanization programmes, resulting in shortage of labour and drain on skills/entrepreneurship.
- Weak rural economy making the people for political exploitation.

16. STRATEGY FOR AGRICULTURAL MECHANIZATION

Agriculture in the Eastern Himalayan region is still traditional one. Largely the agricultural operations are labour intensive and performed manually. Though existing tools evolved locally perform well but they give low output and involve excessive drudgery. Use of mechanical power is very limited. There is need to introduce improved farm equipment in the existing farming systems in selective manner and improve their availability. Tractors and power tillers are already in great demand in Manipur and Assam. With proper soil moisture conservation and some irrigation this region can produce most *rabi* crops because of its mild winter and freedom from floods. This will require extensive mechanization. Keeping in view the above, following strategy is suggested:

16.1 Farm Power

1. The North Eastern Hills region should progressively adopt to power farming for timeliness and precision in field operations to increase agricultural productivity and reduce costs through efficient use of costly inputs of seed, fertilizer, plant protection chemicals, water, machinery etc. as well as conservation of natural resources.
2. For increasing cropping intensity, availability of farm power for mobile and stationary farm operations should be increased from the present level of about 0.17 kW/ha to about 0.70 kW/ha in Arunachal Pradesh; from 1.044 kW/ha to about 2.50 kW/ha in Manipur; from 1.072 kW/ha to 2.5 kW/ha in Meghalaya; from 0.576 kW/ha to 2.00 kW/ha in Mizoram; from 0.336 kW/ha to 1.5 kW/

ha in Nagaland and from 0.739 kW/ha to 2.5 kW/ha in Tripura, by 2020. For stationary farm operations, adequate electrical energy should be provided. If grid power availability is not assured, decentralized power generation using locally available materials should be developed.

16.2 Improved Agricultural Implements and Machinery for Crop Production

3. Rice-wheat cropping system is a strong proposition to provide food and feed security in the region, hence priorities should be given to these crops by adopting improved varieties, high doses of fertilizers and precision equipment for proper placement of inputs.
4. Periodic use of sub-soilers and equipment for deep tillage for breaking hardpan and eradication of perennial weeds is desirable.
5. For efficiency and economy in tillage and sowing/planting/transplanting operations, large scale adoption of rotavators, conservation tillage technologies (zero till drills, strip till drills, roto-drills, till-plant machines, raised bed planters, ridger seeder etc.) and promotion of precision drills, planters and transplanters should be given high priorities. Presently mechanization of rice transplanting and planting of sugarcane, cotton and many other crops is at very low level. Suitable machines will have to be introduced and popularized. Electronic devices for identifying gaps and counting seeds/seedlings in planters/transplanters will be relevant to optimize productivity.
6. For timely and efficient plant protection, Aero-blast sprayers, orchard sprayers and electro-static spraying equipment are required to be introduced.
7. Improved harvesting equipment like serrated sickles, fruit pluckers, vertical conveyor reaper and combines should be introduced.
8. To overcome drudgery in threshing of wheat, rice, millets, pulses and oil seeds crops power threshers should be popularized.
9. For increasing production and productivity rain water harvesting, conservation, storage, efficient conveyance and applications use of plastic pipes, laser land leveling and use of sprinklers and drip irrigation systems should be intensively promoted.
10. Power operated trenchers, angle dozers, drudgers, buck scrapers and other earth moving machinery should be introduced for making farm ponds, bunds, farm roads, drainage channels etc.

11. For rational use of human and animal energy, improved, efficient and ergonomically designed hand tools and matching animal operated equipment for different operations like seed bed preparation, sowing/planting, weeding/interculture etc. should be promoted and popularized.
12. Improved animal drawn equipment for preparing puddled seedbed, power tillers, rotavators and light harvesting machines for paddy should be introduced through demonstration and financial incentives.

16.3 Mechanization of Horticultural Crops

13. For fruit crops mechanization equipment for pit making, transplanting of saplings, pruning, spraying in tall crops, harvesting of fruits etc. need to be identified/imported/developed, introduced and popularized.
14. For vegetable crop mechanization equipment for seed-bed preparation, planting, transplanting of seedlings, interculture, irrigation, spraying, picking/digging has to be identified/developed and introduced.
15. Modern manual and power operated garden tools and equipment will have to be introduced and popularized for floriculture, landscape and ornamental horticulture.
16. Plasticulture has good scope in the region demanding intensive R&D and extension efforts especially in greenhouses, low and high tunnels, plastic mulching, micro irrigation etc.

16.4 Feeds and Fodders

17. Equipment for harvesting of fodder crops, making silage, straw baling, feed blocks, feed pellets will be required to be introduced and popularized in future.

16.5 Biomass Management

18. To support organic farming equipment for mechanized composting, green manuring, handling, transport and application of manure in the field in liquid and solid forms will be required. Such equipment will be required to be imported/developed and introduced.

16.6 On-farm Post Harvest Technology

19. Post harvest equipment and technology are needed for cleaning, grading, drying, cooling, evaporative cooling, storage, cold storage and

handling of farm produce to improve their quality and shelf-life. Cold chains for transport of perishable products like fruits, vegetables, milk and milk products, fish, meat etc. are needed to reduce losses and meet customer requirements.

20. Agro-processing activities should be promoted in the production catchments to reduce losses, to have primary processed products for local use, minimize transport cost and to increase income and employment opportunities in rural areas.
21. Considering the transport distances between the region and the rest of the Country, transit storage facilities should be created in the region for horticultural products.
22. The harvest of both 'Aush' and 'Sali' crops of paddy is done in wet season. This requires extensive facilities for paddy drying to prevent qualitative damages.

16.7 Infrastructural Improvements

23. Testing facilities for agricultural machinery and agro-products for quality control should be created in the region and manufacturers, processors and experts should be helped in improving the quality of their products.
24. Agricultural Engineering Colleges located in this region should adequately be strengthened in their testing facilities and they should be approved for testing of certain types of agricultural machinery and quality certification of agro-products.
25. For creating awareness amongst the farmers and entrepreneurs of the region Display Centres of Improved Agricultural Machinery be established in this region with working prototypes, full information and video clippings. An experienced agricultural engineer should man this center. Centres should organize regular awareness programmes through print and electronic media.
26. For providing information to the farmers, modern IT based information centers be established by Development Departments at important places.
27. Farm machinery exhibitions and demonstrations should be organized at important places in the region every year for the benefit of farmers.
28. Facilities should be created for training of trainers, farmers, drivers/operators, mechanics, and manufacturers to support the agricultural mechanization programmes both in public and private sectors.
29. Training programmes should be organized for the entrepreneurs in manufacture/running of

custom service centres/Agri-clinics/repair and maintenance workshops and providing contract services for different farm operations.

30. Quality manufacturers should be encouraged, given incentives and bulk orders placed on them of equipment to be promoted.
31. A mechanism should be put in place to collect and document information, annually, about the production and sale of different types of agricultural machinery in the State, on the pattern on which crop production and yield data are being collected.
32. To give benefit of improved high capacity agricultural machinery to small and marginal farmers, custom services of agricultural machinery by private entrepreneurs should be encouraged and promoted. They should be given incentives and long-term loans on concessional rate of interests.
33. Visits of selected groups of progressive farmers and manufacturers should be organized to other States/countries where they can see the modern farms manufacturers. Periodically teams of Research Engineers/Scientists, manufacturers, policy makers should be sent to National/International Farm Machinery Shows to identify potential machinery for introduction in the region/State/Indian conditions for future adoption and popularization.

16.8 Institutional Framework

34. A Farm Mechanization Development Council, under the Chairmanship of Minister of Agriculture be setup at the State/Regional level to plan, guide, review and monitor the programmes related to agricultural mechanization in the State. This council should be represented by the officials of the Department of Agriculture, Agricultural

Engineering, Animal Husbandry, Horticulture, Fisheries, Irrigation, Industries, manufacturers of agricultural machinery, leading banks, Agro-industries Corporation, State Planning Boards, ICAR Institute(s) in the region, State Agricultural University and progressive farmers. This council should meet twice a year.

35. There is a strong need for creating a separate Directorate of Agricultural Engineering in each State or a wing of agricultural engineering in development department to plan, execute, review, and monitor various programmes related to agricultural mechanization and on-farm post harvest activities in the State.
36. Research, development and testing facilities in agricultural engineering in ICAR Research Complex for NEH Region, College of Agricultural Engineering and PHT (Central Agricultural University) and Assam Agricultural University and their stations/centers should be upgraded both in terms of man power and physical facilities.

16.9 Policy Issues

37. To encourage agricultural mechanization on sound footing there should be a Regional/State Policy for Agricultural Mechanization.
38. For efficient use of stationary farm power units and equipment, the electricity to the farmers should be provided at subsidized rates but not free.
39. To encourage the owner of farm machinery to insure their farm equipment and to provide an insurance cover to the farm labour, group insurance scheme for equipment like tractors, power tillers combines threshers etc. should be started at the premium rate of 0.5% or less of the machine value insured.

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