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AGRICULTURE DEVELOPMENT IN ARUNACHAL PRADESH

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Agriculture is a dominant economic activity in the State, as a main source of earning livelihood. Nearly 71.26 per cent of the workers are cultivators and 2.49 per cent as agricultural labourers making together about three-fourth of total workers engaged in agriculture and its allied activities. Primary sector contributes 51.5 per cent of SDP at current prices in 1985-86 (quick estimate). It points towards the dominant role played by agriculture as the most important economic activity in the State.

Arunachal has a total geographical area of 83743 sq. km. and is inhabited by about 6.32 lakh people. The State presents an unique geographical area in the sense that the altitude varies from 135 metre to more than 4000 metres and climate therefore, ranges from tropical plains to temperate hills. High rainfall and humidity, acidic soil and low temperature during winter are characteristic features which have effect on agriculture. Lack of adequate infrastructure such as road communication, irrigation, market, etc. also affect agriculture. Another predominant character of agriculture is the practice of jhuming, on age-old system of farming.

SHIFTING CULTIVATION: A BRIEF NOTE

It is a well known fact that the shifting cultivation is widely practised in the hills of the State. Because of the primitive mode of cultivation most of the farmers are below the threshold level of

production providing little opportunity to efficient use of some of the resources with cost effectiveness.

According to the Task Force Report (1983) on Shifting Cultivation, the minimum area under *jhum* cultivation at one time or other is 2,100 sq. km. with an annual area of 700 sq. m. About 54,000 families eke out their living from such a wasteful method of cultivation. The fallow period has shrunken to 3-10 years due to increasing pressure of population, which does not give sufficient time for the recovery of soil fertility. There is no desire to do enduring improvements on the plot of *jhum* land because operation is abandoned in favour of follow period and cultivator's ownership ceases afterwards on that plot. Further continuity of *jhum* cultivation in the State on mild to steep hill slopes causes forest destruction and acceleration of soil erosion and consequently the entire eco-system becomes unstable.

AGRICULTURE UNDER THE PLANS

In pre-independence days the development of agriculture was almost negligible. But now there is a well-organised Department of Agriculture and a research centre of ICAR in the State. The North-Eastern Council since its inception has also taken a large number of projects to sustain and develop agriculture.

It was the First Plan when the Agriculture could receive priority place to enhance the foodgrains production and replacement of shifting cultivation by settled farming. The investment in the First Plan under the agriculture and allied sector was Rs. 55.63 lakhs which has increased several times to Rs. 8410.00 lakhs in the Seventh Plan, i.e., 21.03 per cent of the total plan outlay. There is a marginal decline in percentage share of agriculture sector in Seventh Plan as compared to Sixth Plan of 22.33 per cent.

During the first four plans the agriculture planning was limited to introduce permanent cultivation in some areas and simultaneously improvement of shifting cultivation on scientific lines. As a result, the foodgrains production increased to 90 thousand tonnes by the end of Fourth Plan. Self-sufficiency in foodgrains production was the main objective in the next two plans along with development of area for permanent cultivation. Intensive agriculture was taken up in selected areas. Horticulture was promoted by bringing more area under temperate and citrus fruits plantation and also under commercial crops like cardamon, pepper, tea and coffee.

AREA, PRODUCTION AND PRODUCTIVITY

Total cropped area in the State in 1983-84 (forecast data) is reported as 177 thousand hectares while the net sown area is 118 thousand hectares. The area sown more than once is 59 thousand hectares. Thus the State has only a small percentage of 2.0 per cent under the plough. The net irrigated area is only 22 thousand hectares, i.e., 18.6 per cent of the net cultivated area as against 46.4 per cent in Manipur, 29.7 per cent in Nagaland, 26.4 per cent in Meghalaya and 22.1 per cent for the region as a whole.

Rice is the most important staple food crop covering 116.50 thousand hectares out of the total 182.00 thousand hectares approximately under food crops in 1987-88. Maize and millet are the next important food crops covering an area of 30.45 thousand hectares and 36.15 thousand hectares respectively. Wheat is a recent introduction and its area has increased considerably to 5900 hectares in 1987-88. Potato, Oilseeds, rapeseed, mustard and sesamum, ginger, chillies, sugarcane, sweet potato, tobacco, topioca are the other important crops of the State, though covering lesser area. Of these crops, potato and sugarcane are showing quite impressive prospects of production.

If we see the cropping pattern in different districts of the State we note that rice is the most important food crop and the largest area under the crop is in Lower Subansiri District followed by Tirap, East Siang and Lohit. Maize is another important crop. Lower Subansiri District ranks first both in terms of area and production of maize. East Siang, Dibang Valley, Lohit and Tirap are the other Districts with largest area under maize crop in the State. Wheat cultivation is gaining importance and the area has increased considerably especially in two districts, viz., Tawang and West Kameng. Wheat cultivation has become the first crop in Tawang and maize crop in West Kameng district. Millet is produced in larger areas in East Siang, Tirap, Lower Subansiri, and West Siang districts. Large areas under pulses and oilseeds production are in Lohit and Tirap districts as compared to others. East Siang district alone produces about 30 per cent of total oilseeds production in the State.

The level of food production has gone up from 1.22 lakh tonnes in 1979-80 to 1.94 lakh tonnes in 1987-88. The pulses production was limited to 2.45 thousand tonnes and of oilseeds 12.43 thousand tonnes in 1986-87. Of the foodgrains cereals form an overwhelming proportion of the total production.

The district-wise area and production of three important food crops is shown in the table below.

TABLE 27.1

Cropped Area and Production of Foodgrains in Arunachal Pradesh

District	*Year*	*Rice*		*Wheat*		*Maize*	
		Area	*Production*	*Area*	*Production*	*Area*	*Production*
Tawang	1984-85	1429	1527	2818	4907	518	595
	1986-77	*	*	*	*	*	*
	1987-88	1635	1380	2950	5350	790	950
West Kameng	1984-85	1526	1575	261	440	3485	3866
	1986-77*	2655	2900	4575	6052	4220	5240
	1987-88	1060	1242	1818	1916	3650	4395
East Kameng	1984-85	6967	7667	45	82	838	990
	1986-77	6050	6290	30	77	1150	1180
	1987-88	6100	7788	55	80	1150	1035
Lower Subansiri	1984-85	26951	28648	32	54	6670	7612
	1986-77	27554	28050	36	60	7085	8140
	1987-88	27000	28950	36	83	7100	8240
Upper Subansiri	1984-85	2488	3200	18	37	902	1257
	1986-77	4858	4235	12	12	870	998
	1987-88	4875	4264	15	20	900	1020
West Siang	1984-85	10975	20704	-	-	1890	2203
	1986-77	11950	12580	30	60	2470	2620
	1987-88	11980	14980	60	105	2500	3040
East Siang	1984-85	16555	18329	240	438	3438	4084
	1986-77	18750	19840	420	500	3830	4020
	1987-88	18775	21560	475	675	3920	4539
Dibang Valley	1984-85	8140	8473	31	50	4302	4802
	1986-77	10980	11200	110	120	3880	5158
	1987-88	11000	11094	120	130	3960	6200
Lohit	1984-85	13234	14217	126	221	3637	4196
	1986-77	13930	14920	175	260	3720	4510
	1987-88	13950	17012	250	500	3800	5061
Tirap**	1984-85	11667	13222	223	394	2376	2999
	1986-77	19283	25085	234	259	2775	3134
	1987-88	19525	25730	124	141	2670	3150
Arunanchal Pradesh	1984-85	108032	117562	3794	6623	28056	32604
	1986-77	116010	125100	5622	7400	30000	35000
	1987-88	116500	134000	5900	9000	30450	36630

Area—in hectares, Production—in metric tonnes.

**includes Changlang District.

Source: Statistical Pocket Book, Arunachal Pradesh, 1985 and 1988.

The soil and climatic conditions of Arunachal Pradesh are found to be conducive for horticultural development. Till the end of Fifth Plan horticulture plantation was in formative stage but during the period of Sixth Plan it has progressed significantly due to high priority given to this programme. As a result, the area under horticulture has increased to 9511 hectares in 1985-86, i.e., 4816 hectares under temperate fruits and 4695 hectares under sub-tropical fruits. Out of all fruits, apples and pine apples together constitute about two-third of the total horticultural production. The apple production was 8500 tonnes in 1985-86 and of pine apple 6400 tonnes, pears 450 tonnes, oranges 2114 tonnes and other fruits (banana, jack fruits, etc.) 4871 tonnes as against respective figures of 1260 tonnes, 572 tonnes, 164 tonnes, 645 tonnes and 4585 tonnes in 1980-81. The production of apple declines considerably to 6310 tonnes and of pine apples 5997 tonnes in 1987-88 but in case of pears it has gone up to 934 tonnes and of oranges 3715 tonnes in the same year. From the above it appears that there is a good scope of marketing these products in and outside the State.

Yield rate of crop is the primary indicator of agricultural growth. Arunachal has not yet attained the level of productivity as compared to other States of India. Low productivity is mainly because of poor economic resources and infrastructural facilities and predominance of traditional pattern of agriculture. Table 27.2 shows the yield rate of foodgrains of North-Eastern States.

It may be mentioned here that there are differences in the data of area and production given by the Directorate of Economics and statistics, government of Arunachal Pradesh and of the North-Eastern Council. For comparative analysis of the States in the region we are using the data published by the NEC in Basic Statistics of North-Eastern Region while for Districts of the State, the data use is based on information provided in the Statistical Hand Books of Arunachal.

From the table it is evident that the yield rate of food crops in Arunachal Pradesh is lower than Assam, Manipur, Meghalaya and Tripura and even than the all India average. However, it is higher than the other two hilly States viz., Mizoram and Nagaland. Similar is the case for the yield rate of rice.

Of course, the yield rate in rice in Mizoram was higher than Arunachal Pradesh in 1972-73 but afterwards it has shown a lower rate. Nagaland has also crossed the yield rate figure of Arunachal in 1983-84. The yield rate of maize in Arunachal is considerably high (except Manipur in the region) reflecting towards the immense potentiality of

this crop in the State.

TABLE 27.2

Area, Production and Yield of Foodgrains in North-East and India

Arunachal Pradesh	A	59.3	118.4	140.7	148.2	161.6	161.6
	P	52.0	123.0	147.1	155.7	173.0	173.0
	Y	877	1013	1045	1051	1071	1071
Assam	A	2299.5	2456.3	2561.8	2584.8	2644.1	2726.9
	P	2396.3	2452.1	2773.3	2726.6	2670.5	3030.5
	Y	1042	998	1083	1055	1011	1111
Manipur	A	160.9	197.6	167.9	170.0	172.8	170.3
	P	174.4	321.2	230.1	267.1	345.2	347.1
	Y	1084	1625	1371	1571	1998	2038
Meghalaya	A	115.4	128.6	134.7	198.4	138.7	138.9
	P	120.2	148.5	153.6	163.2	159.9	169.0
	Y	1042	1155	1140	1179	1153	1152
Mizoram	A	76.0	79.2	67.7	53.9	54.0	55.5
	P	73.2	52.7	51.8	42.9	47.0	51.4
	Y	963	665	788	796	870	926
Nagaland	A	92.5	90.3	131.7	136.6	147.7	147.9
	P	53.7	85.3	122.6	144.5	123.8	152.2
	Y	581	945	931	1058	838	1029
Tripura	A	285.1	311.2	303.5	294.7	273.8	288.4
	P	185.6	174.9	428.1	408.2	378.8	395.4
	Y	651	1205	1411	1385	1383	1371
Total	A	3088.7	3381.6	3506.0	3526.1	3592.7	36 89.5
	P	3055.4	3354.7	3906.6	3908.2	3898.8	4309.6
	Y	969	1051	1114	1108	1085	1168
All India	A	119277.4	127514.8	125095.1	130348.7	126672.9	127061.8
	P	97026.3	126406.8	126958.7	151542.9	125538.7	150469.0
	Y	813	991	1035	1163	1149	1184

A—Area in '000 hectares, P—Production in '000 tonnes, Y—Yield in Kgs per hectare.
Source: Basic Statistics of North-Eastern Region, 1982 and 1987.

An analysis of District-wise yield rate of different food crops in Arunachal shows wide fluctuations over the years as shown in the Table 27.3. There are wide difference in the yield rate of different food crops, pulses and oilseeds. The yield rate of rice has reduced considerably

TABLE 27.3

Production (MT) per Hect. of Three Important Crops in Arunachal Pradesh in Different Years

(Yield Rate = Mt/hect.)

District	*Rice*			*Wheat*			*Maize*		
	1984-85	*1986-87*	*1987-88*	*1984-85*	*1986-87*	*1987-88*	*1984-85*	*1986-87*	*1987-88*
Tawang	1.07	1.16	0.84	1.74	1.59	1.81	1.15	1.22	1.20
West Kameng	1.03	1.11	1.17	1.69	1.06	1.06	1.11	1.11	1.20
East Kameng	1.10	1.03	1.28	1.82	2.56	1.45	1.18	1.02	0.90
Lower Subansiri	1.06	1.01	1.05	1.69	1.66	2.30	1.14	1.15	1.16
Upper Subansiri	1.29	0.87	0.87	2.06	1.00	1.33	1.39	1.14	1.12
West Siang	1.09	1.05	1.27	-	2.00	1.75	1.17	1.06	1.21
East Siang	1.11	1.05	1.15	1.83	1.19	1.42	1.19	1.04	1.16
Dibang Valley	1.04	1.02	1.00	1.61	1.09	1.08	1.12	1.33	131
Lohit	1.07	1.07	1.22	1.75	1.48	2.00	1.15	1.21	1.33
Tirap (including Changlang)	1.13	1.30	1.32	1.77	1.10	1.14	1.26	1.13	1.18
Total in Arunachal Pradesh	1.09	1.07	1.15	1.75	1.32	1.08	1.16	1.17	1.20

Note: Yield Rate for Tawang and West Kameng in 1986-87 has been taken from Statistical Abstract, Arunachal Pradesh, 1987.
Source: Statistical Pocket Book, Arunachal Pradesh, 1985 and 1988.

in Tawang and Lower Subansiri whereas East Kameng District has shown a declining trend in case of maize crop during the period 1984-85 to 1987-88. Perhaps it is due to extension of cultivation either to submarginal lands or adoption of improved technology is nominal.

There appears a positive correlation in the area and production of different food crops. The percentage increase in area remain as follows: 24.58 per cent for rice, 21.91 per cent for maize, 45.28 per cent for millet and 40.01 per cent for wheat during the period of five years from 1982-83 to 1987-88. At the same time the percentage increase in production was recorded as 37.53 per cent for rice, 29.89 per cent for maize and 112.87 per cent for wheat, the largest increase in productivity of wheat crop. It may denoted here that the millet productions has recorded a negative rate of 17.32 per cent during the same period, though the area has increased. The increase in wheat production has shown a promising scope for cultivation in the State. The area under pulses, oilseeds, sugarcane and potato has also increased considerably and thereby the production. Other possible factors for increase in production are supply of inputs like technology, manures and fertilizers, tools and implements, HYV seeds and plant protection measures, etc. But the major role has been played by the increase in acreage and the area under HYV varieties.

The area under high-yielding varieties has marked an increase from 5448 hectares in 1978-79 to 10386 hectares in 1981-82. A relationship between the area and yield under HYV crops shows a positive trend. For example, 9.76 per cent area under HYV rice crop (of the total area) contributed 14.38 per cent of total rice production, 17.0 per cent area of HYV wheat crop provided 23.5 per cent of production, 1.82 per cent area of HYV maize crop shared 2.25 per cent of total maize production in 1986-87. It points towards extention of wheat crop in the State because of increased output. For other crops there does not seem proper management to ensure the quality of seeds. Untimely and inadequate supply of seeds add to the sorrow of the farmers.

The availability of HYV seeds alone is not a sufficient ground for increasing food production unless the needed irrigation facilities, timely applicability of required dose of chemical fertilizer and pesticides are also made possible.

IRRIGATION

It is rather unfortunate that the area under irrigation in the State is

extremely low. Expansion of irrigational facilities was neglected in the earlier Plan periods. The necessity of adequate irrigation was highly felt only after the introduction of HYV seeds in the mid-sixties. As compared to the national average of 28 per cent (net irrigated area to net cultivated area) the region has only 22.5 per cent. In Arunachal Pradesh the net irrigated area has been reduced from 24 thousand hectares in 1976-77 to 22 thousand hectares in 1983-84. This may be due to some difference in data collection or the base. The percentage of net irrigated area to the net cultivated area has also come down from 21.4 per cent to 18-65 per cent during the same period. In Nagaland, the percentage of irrigated area was 36.8 per cent and in Meghalaya 25.9 per cent (in 1981-82).

The topography of Arunachal Pradesh does not provide much scope for developing large or medium scale irrigation projects. The Planning Commission has approved only one medium irrigation project at Dambuk during the Sixth Plan period. The foothills of the State offer good scope for gravity irrigation channels, lift irrigation, ground water exploitation, etc. The total potential of minor irrigation is assessed to be 2.66 lakh hectares, i.e., 1.66 lakh hectare under surface water, and 1.00 lakh hectare under ground water. At present, the irrigation facility is being extended mainly by utilising surface water. According to the sources of Rural Works Department 50.5 thousand hectares of land have been brought under assured irrigation by the end of March 1986.

Rural electrification is considered to be another important factor for accelerating agricultural development. In Arunachal the percentage of villages electrified was 27.72 per cent as against 78.44 per cent in Nagaland, 62.05 per cent in Assam and 67.76 per cent for all India average in 1985-86. The utilisation of Electricity for energisation of pump sets is absent in Arunachal. In other words, the use of electricity to the agriculture sector in the State is totally absent as against 2 units in Manipur, 3 units in Tripura and 25 units for the country as a whole in 1983-84.

Use of Fertiliser

The fertilizer consumption in Arunachal has shown a rising trend from 130 tonnes in 1984-85 to 190 tonnes in 1986-87 but the consumption of plant nutrient per hectare of gross cropped area is very low. Fertilizer consumption in the country is about 30 kg. N.P. and kg./ha. (6:2:1) while it is only about 3 kg./ha in the north eastern region. In case of Arunachal Pradesh the fertilizer consumption is the

lowest, i.e., 1 kg/ha in 1984-85 as against 18.27 kg/ha in Manipur, 13.88 kg/ha in Meghalaya, 4.16 kg/ha in Assam and 1.65 kg/ha in Nagaland. Thus, there is a great scope to intensify the use of fertilizer in the soil of this region.

Land Ownership

In most hilly areas (including Arunachal) of North-East India land is owned by the community as a whole. Individual ownership of land is recognised in certain areas, but such ownership is usually confined to valley lands and terraced lands with settled farming system or continuous cultivation, homestead lands surrounding the residential houses. Short fallow land used for growing commercial crops like potato, vegetable crops, etc. by burn method of *jhuming* are also recognised as private lands. Long fallow land with open burning system of shifting cultivation are under communal ownership. For this type of cultivation, each village operates in a particular demarcated area and the chief/village headman/gaonbura has the power to distribute the land for cultivation to individual families.

Due to non-fixity of tenurial rights, the farmers usually have very little attachment to the land they operate. They do not take interest in the improvement of the land for future use. A tendency of improvement of land in the form of upkeep of soil fertility and the level of technology, etc. is noticed in areas where land is privately owned. As a result, the productivity of land in general under private ownership is more than that under the two types of shifting cultivation. By honouring the *jhumia's* rights over land under *jhuming* we can encourage them to go for agri-pestoral, horti-pestoral and silvi-pestoral practices.

SELF-SUFFICIENCY IN FOODGRAINS

The Working Group on development of North-Eastern region (1985) has outlined the strategy for agricultural development with the primary object of making the region generally self-sufficient. This is urgent and important from view point of huge cost involved in transportation and subsidisation of foodgrains. The claim of attaining self-sufficiency in foodgrains by the state government does not seem correct in light of large amount of imported foodgrains annually by the FCI from other parts of the country to supply through the public distribution system. It may be noted here that a good amount of rice

production produced locally and supplied from the shops is diverted to prepare rice bear locally known as *Apung*. The fast increasing rate of population also add to the gravity of the problem of additional production.

All this require additional production through significant improvement in productivity and increase in cropping intensity.

Cropping intensity increase is feasible if larger effort is made to create additional irrigation potential in the region. With the increased area under irrigation it may not only be possible to increase the cropping intensity, but also the productivity since the yield rates are found to be higher in irrigated areas. Productivity improvement may also be achieved through shifting of production functions so as to increase the productivity of resources already in use and, even more, important through developing substitute forms of inputs. Intensive research work on economic usage of various inputs and updating of technology are also urgently called for with a view to obtaining improvement in productivity.

CROP MANAGEMENT

Trials conducted in farmer's field in North-Eastern region and even elsewhere in the country have shown that better crop management practices are superior to even fertilizer use for higher yield. Such low monetary input technology will be of immense help for the small and marginal farmers. Higher yields can never be attained without proper crop management even if other inputs such as fertilizer, water and chamicals are use adequately. Raising of healthy seedlings, timely sowing, transplanting, maintenance of optimum plant population per unit area with appropriate seed rate/spacing, weeding and timely harvesting are important aspects of crop management. Although optimum plant population will only lead to desirable number of panicles for grain yield, yet the time of sowing/transplanting influences the number of panicles, percentage of sterility, etc. Even the time of harvesting affects the amount of crop obtained.

EXTENSION PROGRAMMES

There is a big gap between the appropriate technologies available and the level of adoption by the farmers. Public policies, service to the farmers and technology must be moulded in a proper manner to achieve

the desired result. Service to farmers, through proper extension programmes with adequate emphasis on the socio-economic constraints, must be strengthened, if farmers have to use proper technology.

Lastly, assessing land resources through surveys, delineation of shifting cultivation zones, scientific land use and land reform policy, strengthening infrastructural facilities for better input supply and better marketing facilities coupled with appropriate institutional resources will go a long way in accelerating the pace of economic development in Arunahcal Pradesh.