

KINGDOM OF THAILAND
MINISTRY OF COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

**ROAD DEVELOPMENT STUDY
IN THE NORTHEASTERN REGION
(PHASE II)**

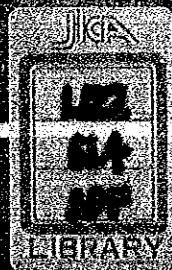
FINAL REPORT
APPENDICES
(VOLUME 2)

MINISTRY OF THAILAND
MINISTRY OF COMMUNICATIONS

ROAD DEVELOPMENT STUDY
IN THE NORTHEASTERN REGION PHASE II

FINAL REPORT
APPENDICES

JAPAN INTERNATIONAL
COOPERATION AGENCY



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MINISTRY OF COMMUNICATIONS
DEPARTMENT OF HIGHWAYS

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IN THE NORTHEASTERN REGION
(PHASE II)**

FINAL REPORT
APPENDICES
(VOLUME 2)

JULY, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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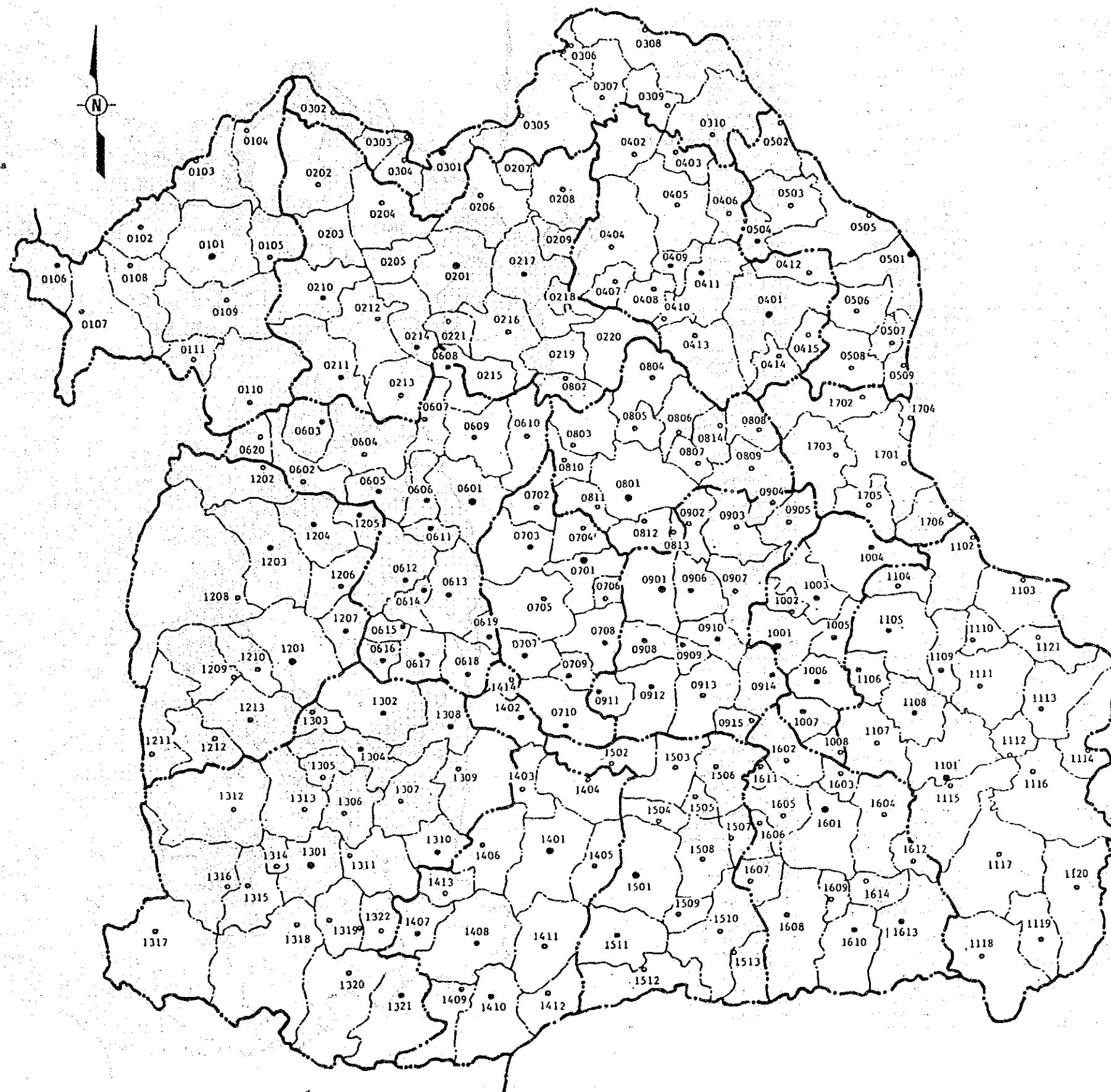
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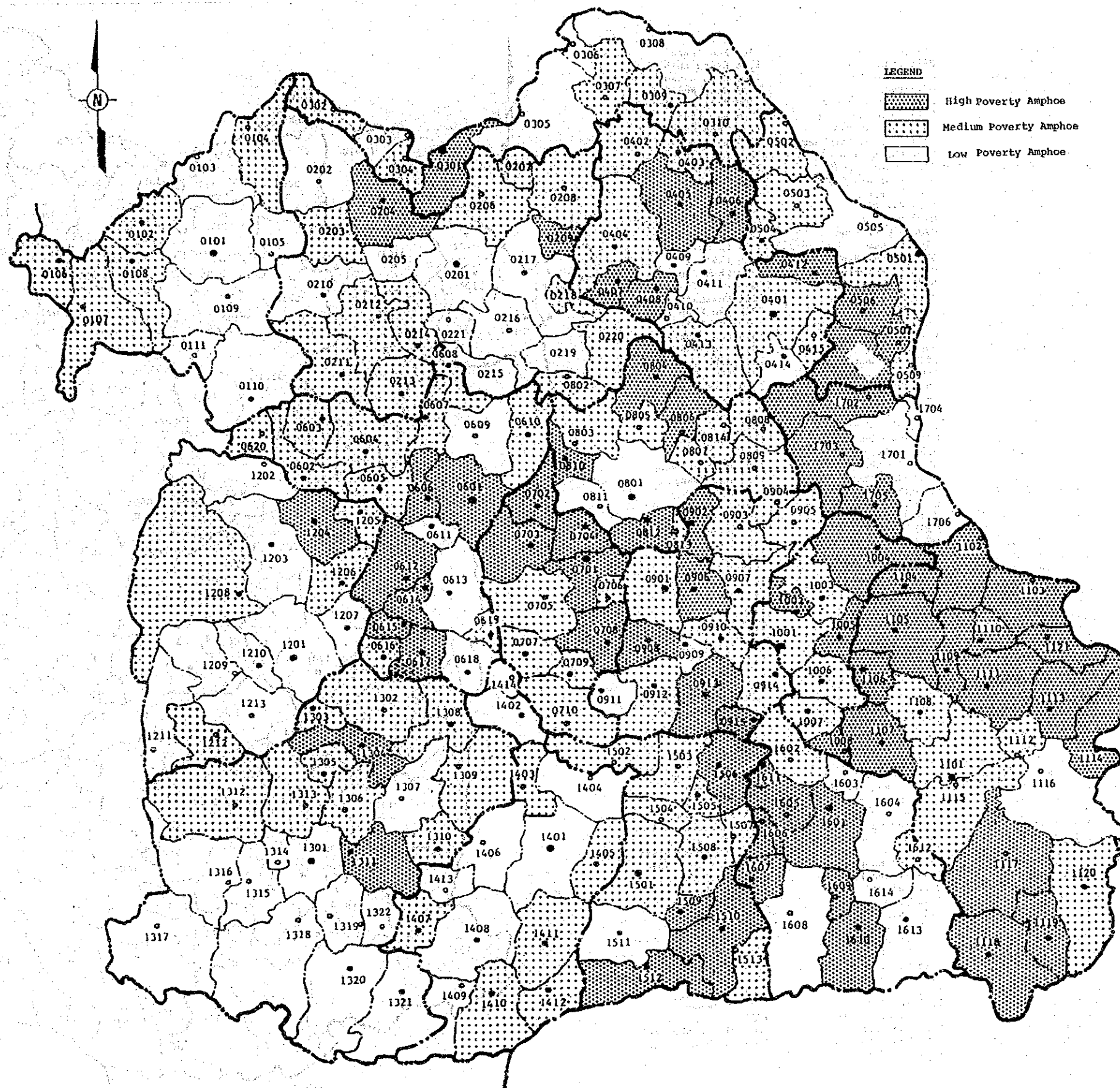
APPENDIX 2.2.1 CHANGWATS AND AMPHOES IN THE REGION

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| 0101 M. Loei | 0614 Chonnabot | 1205 Ban Thaen |
| 0102 Tha Li | 0615 Waeng Yai | 1206 Kaeng Khlo |
| 0103 Chiang Khan | 0616 Waeng Noi | 1207 Khon Sawan |
| 0104 Pak Chom | 0617 Phon | 1208 Nong Bua Daeng |
| 0105 Na Duang | 0618 Nong Song Hon | 1209 Nong Bua Rahueo |
| 0106 Na Haeo | 0619 Phouy Noi | 1210 Ban Khwao |
| 0107 Dan Sai | 0620 Phu Pha Man | 1211 Thap Satit |
| 0108 Phu Rua | 0701 M. Maha Satakham | 1212 Bamnet Narong |
| 0109 Wang Saphung | 0702 Chiang Yun | 1213 Chaturat |
| 0110 Phu Kradung | 0703 Kosum Phisai | 1301 M. Nakhon Ratchasima |
| 0111 Phu Luang | 0704 Kantharawichai | 1302 Bua Yai |
| 0201 M. Udon Thani | 0705 Borabu | 1303 Ban Luan |
| 0202 Nam Som | 0706 Kae Dam | 1304 Khong |
| 0203 Suwannakhuha | 0707 Na Chuak | 1305 Kham Sakae Saeng |
| 0204 Ban Phu | 0708 Wapi Pathum | 1306 Nong Sung |
| 0205 Kut Chap | 0709 Na Dum | 1307 Phimai |
| 0206 Phen | 0710 Phayakkhaphum Pisai | 1308 Prathai |
| 0207 Sang Khom | 0801 M. Kalasin | 1309 Chum Phuang |
| 0208 Ban Dung | 0802 Tha Khantho | 1310 Huai Thalaeng |
| 0209 Thung Fon | 0803 Nong Kung Si | 1311 Chakkara |
| 0210 Na Klang | 0804 Khom Muang | 1312 Dan Khun Thot |
| 0211 Si Bun Roang | 0805 Sahatsakhan | 1313 Non Thai |
| 0212 Nong Bua Lam Phu | 0806 Somdet | 1314 Kham Thalee So |
| 0213 Non Sang | 0807 Na Hon | 1315 Sung Noen |
| 0214 Nong Wua So | 0808 Khao Wong | 1316 Sikhiu |
| 0215 Non Sa-At | 0809 Kuchinarai | 1317 Pak Chong |
| 0216 Kumphawapi | 0810 Huai Mek | 1318 Pak Thong Chai |
| 0217 Nong Han | 0811 Yang Talat | 1319 Chok Chai |
| 0218 Chaiwan | 0812 Kamalasai | 1320 Khon Buri |
| 0219 Si That | 0813 Rong Kham | 1321 Soeng Sang |
| 0220 Wang Sam Mo | 0814 Huay Pung | 1322 Nong Bunmak |
| 0221 Nong Saeng | 0901 M. Roi Et | 1401 H. Buri Ram |
| 0301 M. Nong Khai | 0902 Pho Chai | 1402 Phutthaisong |
| 0302 Sangkhom | 0903 Phon Thong | 1403 Khu Muang |
| 0303 Si Chiang Mai | 0904 Muayawadee | 1404 Satuk |
| 0304 Tha Bo | 0905 Nong Phok | 1405 Krasang |
| 0305 Phon Phisai | 0906 Thawatchaburi | 1406 Lam Piai Mat |
| 0306 Pak Kad | 0907 Selaphum | 1407 Nong Ki |
| 0307 So Phisai | 0908 Chaturapak Pimun | 1408 Nang Rong |
| 0308 Bung Kan | 0909 Muang Suang | 1409 Pa khom |
| 0309 Phon Charoen | 0910 At Samat | 1410 Lahan Sai |
| 0310 Seka | 0911 Pathum Rat | 1411 Prakhon Chai |
| 0401 M. Sakhon Nakhon | 0912 Kaset Wisai | 1412 Ban Kruat |
| 0402 Ban Muang | 0913 Suwannaphum | 1413 Nong Hong |
| 0403 Kham Ta Kla | 0914 Phanom Phrai | 1414 Na Pho |
| 0404 Sawang Daen Din | 0915 Phon Sai | 1501 M. Surin |
| 0405 Wanon Niwat | 1001 M. Yasothon | 1502 Chumphon Buri |
| 0406 Akat Amnuai | 1002 Sai Mun | 1503 Tha Tum |
| 0407 Song Dao | 1003 Kut Chum | 1504 Chom Phra |
| 0408 Waritchaphum | 1004 Loeng Nok Tha | 1505 Sanom |
| 0409 Phang Khon | 1005 Pa Tiu | 1506 Rattanaaburi |
| 0410 Nikhom Nam Un | 1006 Kham Khuan Kaeo | 1507 Samrong Thap |
| 0411 Phanna Nikhom | 1007 Maha Chana Chai | 1508 Sikhoraphum |
| 0412 Kusuman | 1008 Kho Wang | 1509 Lamduan |
| 0413 Kut Bak | 1101 M. Ubon Ratchathani | 1510 Sangkha |
| 0414 Tao Koi | 1102 Chanuman | 1511 Prasat |
| 0415 Kok Sri Supan | 1103 Khemara | 1512 Kap Choeng |
| 0501 M. Nakhon Phanom | 1104 Senang Khanikhom | 1513 Bua Chet |
| 0502 Ban Phaeng | 1105 Amnat Charoen | 1601 M. Si Sa Ket |
| 0503 Si Songkhram | 1106 Hua Thaphan | 1602 Rasi Salai |
| 0504 Na Wa | 1107 Khuang Nai | 1603 Yang Chum Noi |
| 0505 Tha Uthen | 1108 Huang Samsip | 1604 Kanthararom |
| 0506 Pla Pak | 1109 Phana | 1605 Uthumphon Phisai |
| 0507 Renu Nakhon | 1110 Kut Kaopun | 1606 Huai Thap Than |
| 0508 Na Kae | 1111 Trakan Phutphon | 1607 Prang Ku |
| 0509 That Phanom | 1112 Taisum | 1608 Khukhan |
| 0601 M. Khon Kaen | 1113 Si Muang Mai | 1609 Phrai Bung |
| 0602 Chumphae | 1114 Khong Chiam | 1610 Khun Han |
| 0603 Si Chomphu | 1115 Warin Chamrap | 1611 Bung Boon |
| 0604 Phu Wiang | 1116 Pibun Mungsahan | 1612 Non Koon |
| 0605 Nong Rua | 1117 Det Udom | 1613 Kanthararak |
| 0606 Ban Fang | 1118 Nam Yun | 1614 Sri Pattana |
| 0607 Ubolratana | 1119 Na Chaiuei | 1701 Mukdahan |
| 0608 Kaosuankwang | 1120 Buntharik | 1702 Dong Luang |
| 0609 Nam Phong | 1121 Pho Sai | 1703 Khamcha-I |
| 0610 Kranuan | 1201 M. Chaiyaphum | 1704 Wan Yai |
| 0611 Phra Yun | 1202 Khon San | 1705 Nikhom Kham Soi |
| 0612 Mancha Khiri | 1203 Kaset Sombun | 1706 Don Tan |
| 0613 Ban Phai | 1204 Phu Khieo | |

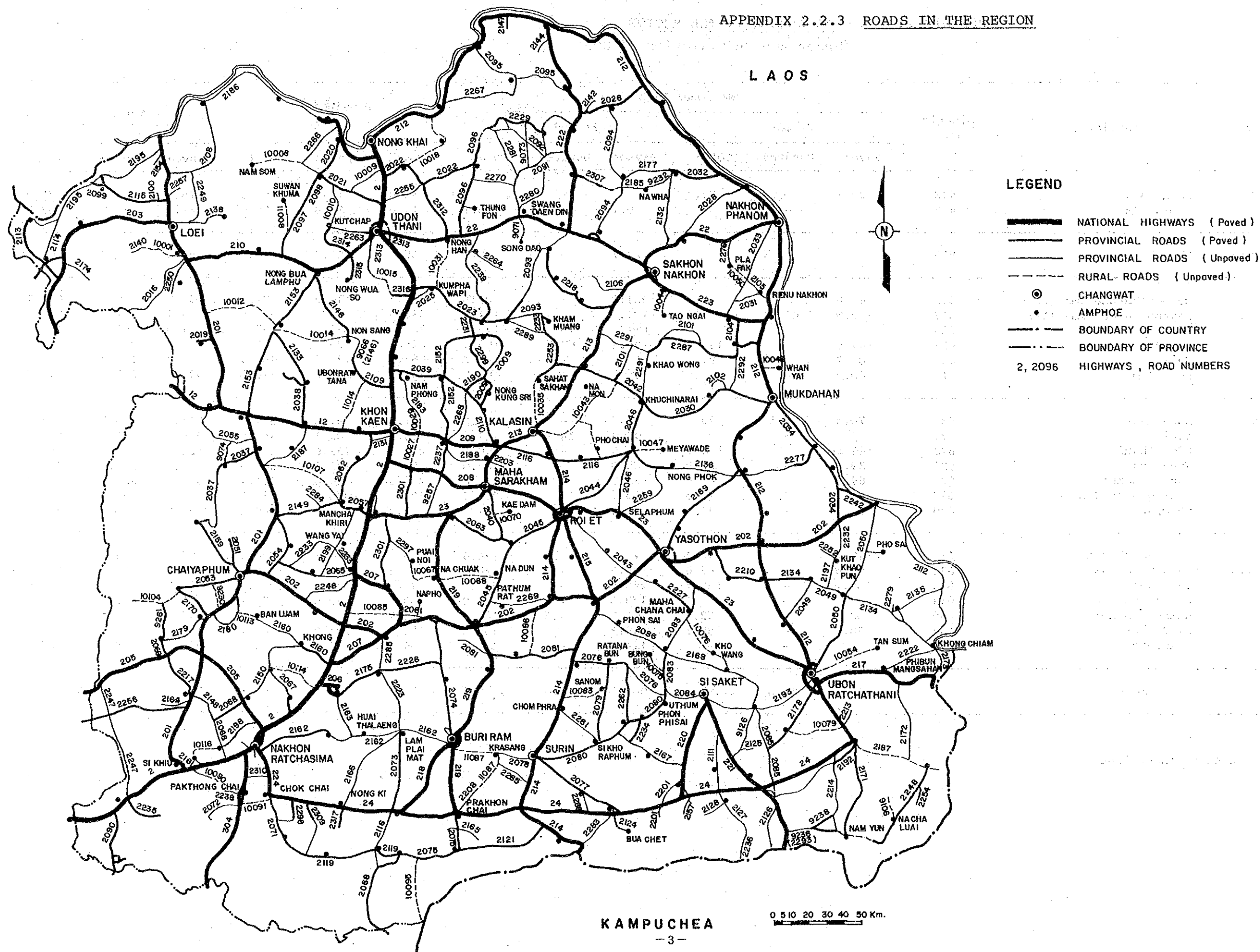


APPENDIX 2.2.2 POVERTY AMPHOES IN THE REGION

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|-----------------------|---------------------------|---------------------------|
| 0101 M. Loei | 0614 Chonnabot | 1205 Ban Thoen |
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| 0612 Mancha Khiri | 1203 Kaset Sombun | 1706 Don Tan |
| 0613 Ban Phai | 1204 Phu Khieo | |



APPENDIX 2.2.3 ROADS IN THE REGION



APPENDIX 2.2.4 ROAD LENGTH IN THE REGION
(Under the Jurisdiction of DOH)

Division	District	District Code	National Highways						Provincial Roads			Total		
			Primary			Secondary			Paved	Unpaved	Total	Paved	Unpaved	Total
			Paved	Unpaved	Total	Paved	Unpaved	Total						
LOP BURI	Sara Buri	432	22.7	-	22.7	-	-	-	52.9	-	52.9	75.6	-	75.6
	Lam Na Rai	435	-	-	-	46.1	-	46.1	17.0	33.9	50.9	63.1	33.9	97.0
PHITSANULOK	Rhetchabun	515	-	-	-	20.7	-	20.7	65.7	80.7	146.4	86.4	80.7	167.1
NAKHON RATCHASIMA	Nakhon Ratchasima (I)	611	85.0	-	85.0	201.8	-	201.8	245.4	136.5	381.9	532.2	136.5	668.7
	Nakhon Ratchasima (II)	612	135.0	45.0	180.0	111.1	-	111.1	290.3	66.5	356.8	536.4	111.5	647.9
	Chaiyaphum	613	-	-	-	198.2	-	198.2	208.8	56.5	265.3	407.0	56.5	463.5
	Ban Phai	614	144.4	-	144.4	96.4	69.8	166.2	245.9	229.9	475.8	486.7	299.7	786.4
	Surin	615	87.2	-	87.2	167.6	-	167.6	265.9	198.0	463.9	520.7	198.0	718.7
	Buri Ram	617	60.0	-	60.0	169.8	-	169.8	265.4	182.6	448.0	495.2	182.6	677.8
KHON KAEN	Khon Kaen	621	70.5	7.5	78.0	63.9	-	63.9	231.5	91.0	322.5	365.9	98.5	464.4
	Loei	622	-	-	-	198.9	18.1	217.0	145.5	303.1	448.6	344.4	321.2	665.6
	Udon Thani	623	146.1	-	146.1	90.6	-	90.6	287.7	232.6	520.3	524.4	232.6	757.0
	Nong Khai	624	39.5	-	39.5	180.0	-	180.0	84.2	123.1	207.3	303.7	123.1	426.8
	Sakhon Nakhon	625	84.6	-	84.6	138.6	-	138.6	200.5	220.6	421.1	423.7	220.6	644.3
	Sawang Daen Din	628	68.5	2.8	71.3	203.7	-	203.7	124.1	338.1	462.2	396.3	340.9	737.2
	Chumpae	629	98.3	-	98.3	81.2	-	81.2	160.4	-	160.4	339.9	0	339.9
UBON RATCHATHANI	Ubon Ratchathani	631	142.7	-	142.7	121.7	5.2	126.9	229.5	341.2	570.7	493.9	346.4	840.3
	Maha Sarakham	632	67.6	-	67.6	199.6	-	199.6	250.4	128.7	379.1	517.6	128.7	646.3
	Yasothon	633	156.7	-	156.7	248.8	-	248.8	175.4	96.7	272.1	580.9	96.7	677.6
	Amnat Charoen	634	-	-	-	173.5	1.4	174.9	32.3	439.6	471.9	205.8	441.0	646.8
	Nakhon Phanom	635	53.7	-	53.7	164.5	1.5	166.0	53.2	126.0	179.2	271.4	127.5	398.9
	Si Sa Ket	638	88.1	-	88.1	155.3	-	155.3	183.3	201.9	385.2	426.7	201.9	628.6
	Mukdahan	639	-	-	-	114.8	-	114.8	349.4	64.9	414.3	464.2	64.9	529.1
Total			1,527.9	55.3	1,583.2	3,080.0	96.0	3,176.0	4,029.1	3,577.5	7,606.6	8,637.0	3,728.8	12,365.8

Note: As of November 1984

APPENDIX 2.4.1 FARM AND NON-FARM POPULATION

(Unit : thousand)

ITEM	1981			1982			1983			Growth-Rate (1981-83)	
	Total	Farm*	% Farm	Total	Farm*	% Farm	Total	Farm*	% Farm	Total	Form*
Whole Country	47,875	32,500	67.9	48,847	33,085	67.7	49,515	33,681	68.0	1.8	1.8
Northeastern Region (Total)	16,393	13,680	83.5	16,720	13,885	83.0	17,219	14,093	81.8	2.5	1.5
Related Changwat	789	667	84.5								
. Udon Thani	1,475	1,156	78.3	1,523	1,165	76.1	1,564	1,175	75.1	3.0	0.8
. Sakhon Nakhon	789	667	84.5	813	674	82.9	821	682	83.0	2.0	1.1
. Khon Kaen	1,385	1,106	79.9	1,421	1,110	78.1	1,463	1,115	76.2	2.8	0.4
. Roi Et	1,075	964	89.7	1,100	972	88.3	1,118	979	87.6	2.0	0.8
. Yasothon	464	401	86.4	472	403	85.4	475	405	85.3	1.2	0.5
. Ubon Ratchathani	1,590	1,373	86.4	1,648	1,402	85.1	1,684	1,431	85.0	2.9	2.1
. Chaiyaphum	871	751	86.2	891	768	86.1	903	784	86.9	1.8	2.2
. Nakhon Ratchasima	1,950	1,500	76.9	1,993	1,514	75.9	2,055	1,527	74.3	2.7	0.9
. Buri Ram	1,160	896	77.2	1,209	920	76.1	1,227	945	77.0	2.8	2.7
. Surin	1,066	970	91.0	1,085	995	91.7	1,120	1,021	91.2	2.5	2.6
. Si Sa Ket	1,103	1,019	92.4	1,130	1,036	91.7	1,151	1,054	91.6	2.2	1.7

* : Estimation based on 1979-81 data

Sources: Registration Division, Administration Department, Ministry of Interior
Office of Agricultural Economics, Ministry of Agriculture and Cooperatives

APPENDIX 2.4.2 TREND OF LAND USE CONDITION (1978-1981)

(Unit : thousand rai)





	Farm Holding			Paddy Land			Upland			Tree Crops, Vegetable and Flower			Idle, Grass, Housing and Other		
	1978	1979	1980/1981	1978	1979	1980/1981	1978	1979	1980/1981	1978	1979	1980/1981	1978	1979	1980/1981
Whole Country	116,441	117,603	121,294	73,270	72,857	73,523	23,759	25,257	27,385	10,773	11,358	11,712	8,639	8,131	8,674
Northeastern Region (Total)	49,148	49,564	51,708	35,402	35,540	36,183	9,257	9,766	10,736	542	532	623	3,948	3,726	4,167
Related Changwat															
. Udon Thani	4,406	4,513	4,718	3,050	3,165	3,183	785	909	1,156	35	51	51	536	388	328
. Sakon Nakhon	2,346	2,429	2,557	1,853	1,872	1,895	161	196	238	34	31	44	298	330	380
. Khon Kaen	4,061	4,110	4,160	2,830	2,890	2,815	1,043	1,041	1,053	32	29	27	156	150	265
. Roi Et	3,126	3,108	3,190	2,713	2,770	2,802	182	174	187	25	22	25	206	142	176
. Yasothon	1,554	1,556	1,598	1,253	1,222	1,170	177	204	261	10	19	31	114	121	136
. Ubon Ratchathani	5,088	4,988	5,182	4,169	3,856	3,978	369	363	484	68	52	52	482	717	668
. Chaiyaphum	2,955	2,835	2,868	1,791	1,699	1,619	708	830	883	39	39	40	417	267	326
. Nakhon Ratchasima	6,637	6,764	7,141	3,441	3,448	3,666	2,601	2,675	2,719	79	95	99	516	546	657
. Buri Ram	3,418	3,514	3,680	2,807	2,934	3,089	417	394	386	27	25	30	167	161	175
. Surin	3,208	3,163	3,190	2,908	2,874	2,837	174	172	190	29	28	39	97	89	124
. Si Sa Ket	3,062	3,107	3,230	2,612	2,638	2,685	295	336	400	32	35	50	123	98	97

Sources: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives

APPENDIX 2.4.3 LAND CAPABILITY IN REGION



LEGEND

-  Areas with soils suited for paddy
-  Areas with associations of upland and paddy soils
-  Areas with soils suited for upland crops
-  Areas with soils not generally suited for cultivated crops

Sources: Department of Land Development, MAC

APPENDIX 2.4.4 SOIL SALINITY DISTRIBUTION

SOIL SALINITY AFFECTED AREA BY CHANGWAT

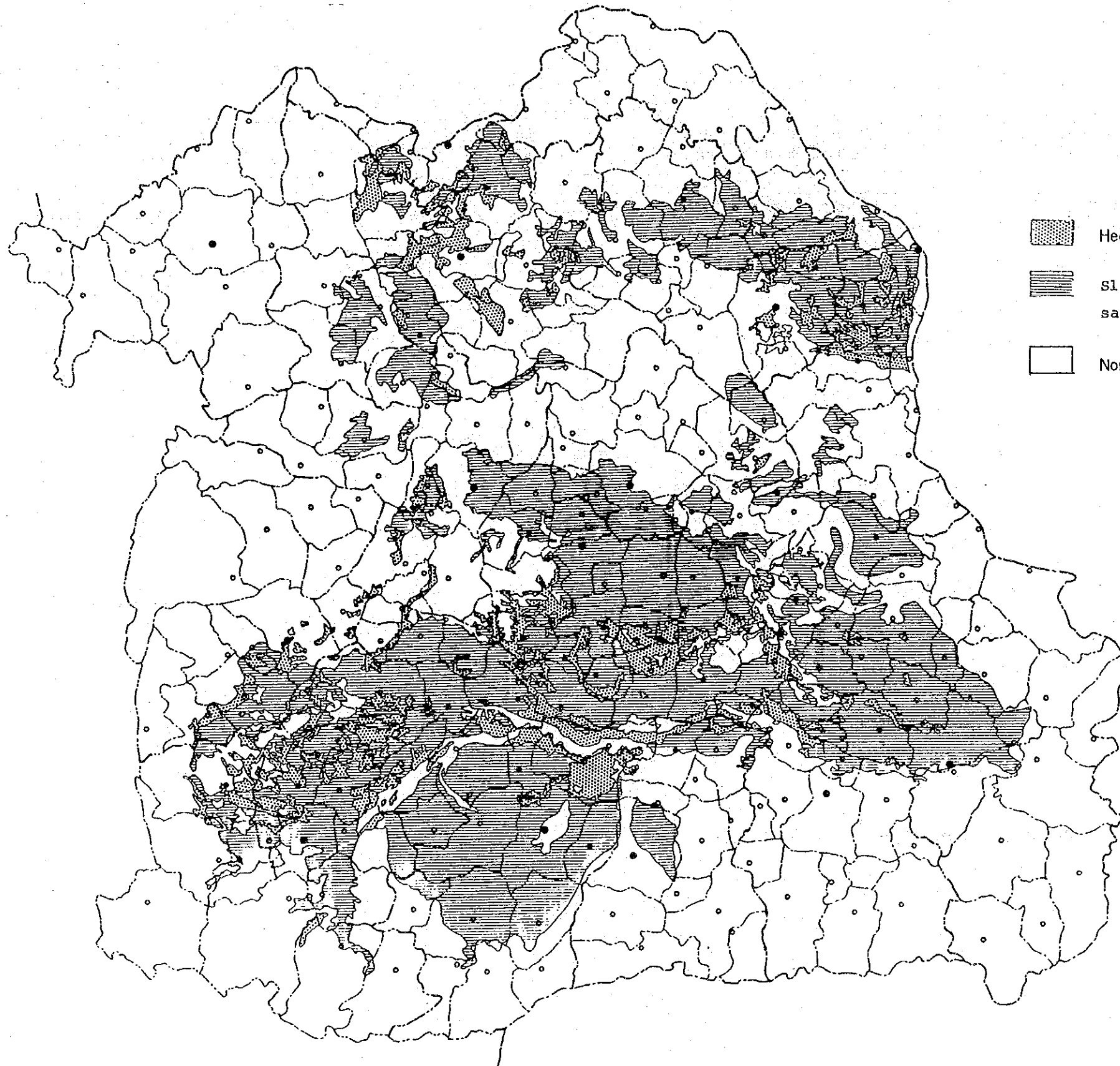
(Unit : thousand rai)

	Cultivated Area			Salinity Affected Area			Ratio (%)			
	Rice	Upland	Total	Over 8M ^{1/}	1 - 8M	Total	Salinity/Rice	Salinity/Total		
	(1)		(2)	(3)		(4)	(3)/(1)	(4)/(1)	(3)/(2)	(4)/(2)
Northeastern Region (Total)	35,886	10,434	46,325	5,283	30,482	35,765	14.7	84.9	11.4	77.2
Related Changwat										
. Udon Thani	3,184	965	4,149	860	1,825	2,685	27.0	84.3	20.7	64.7
. Sakhon Nakhon	1,927	234	2,161	223	2,150	2,373	11.6	123.1	10.3	109.8
. Khon Kaen	2,894	1,072	3,966	92	1,641	1,733	3.2	59.9	2.3	43.7
. Roi Et	2,785	197	3,196	670	2,930	3,600	24.1	129.3	21.0	112.6
. Yasothon	1,249	328	1,577	82	1,934	2,016	6.6	161.4	5.2	127.8
. Ubon Ratchathani	3,825	411	4,236	85	3,139	3,224	2.2	84.3	2.0	76.1
. Chaiyaphum	1,668	852	2,520	403	879	1,282	24.2	76.9	16.0	50.9
. Nakhon Ratchasima	3,552	2,829	6,381	1,041	5,083	6,124	29.3	172.4	16.3	96.0
. Buri Ram	2,925	418	3,343	476	3,902	4,378	16.3	149.7	14.2	131.0
. Surin	2,700	200	2,900	265	698	963	9.8	35.7	9.1	33.2
. Si Sa Ket	2,875	380	3,255	101	261	362	3.5	12.6	3.1	11.1




^{1/} : mmho/cm (1 mmho/cm = 0.64 g/l = 640 ppm)

Sources : "Salinity Affected Area" by Land Development Bureau, MAC, 1977

MAP OF SOIL SALINITY DISTRIBUTION



LEGEND

-  Heavy and moderately salt - affected area
-  Slightly salt-affected area and potential salt source area
-  Non - salt - affected area

APPENDIX 2.4.5 PLANTED AREA OF CROPS (1983/84)

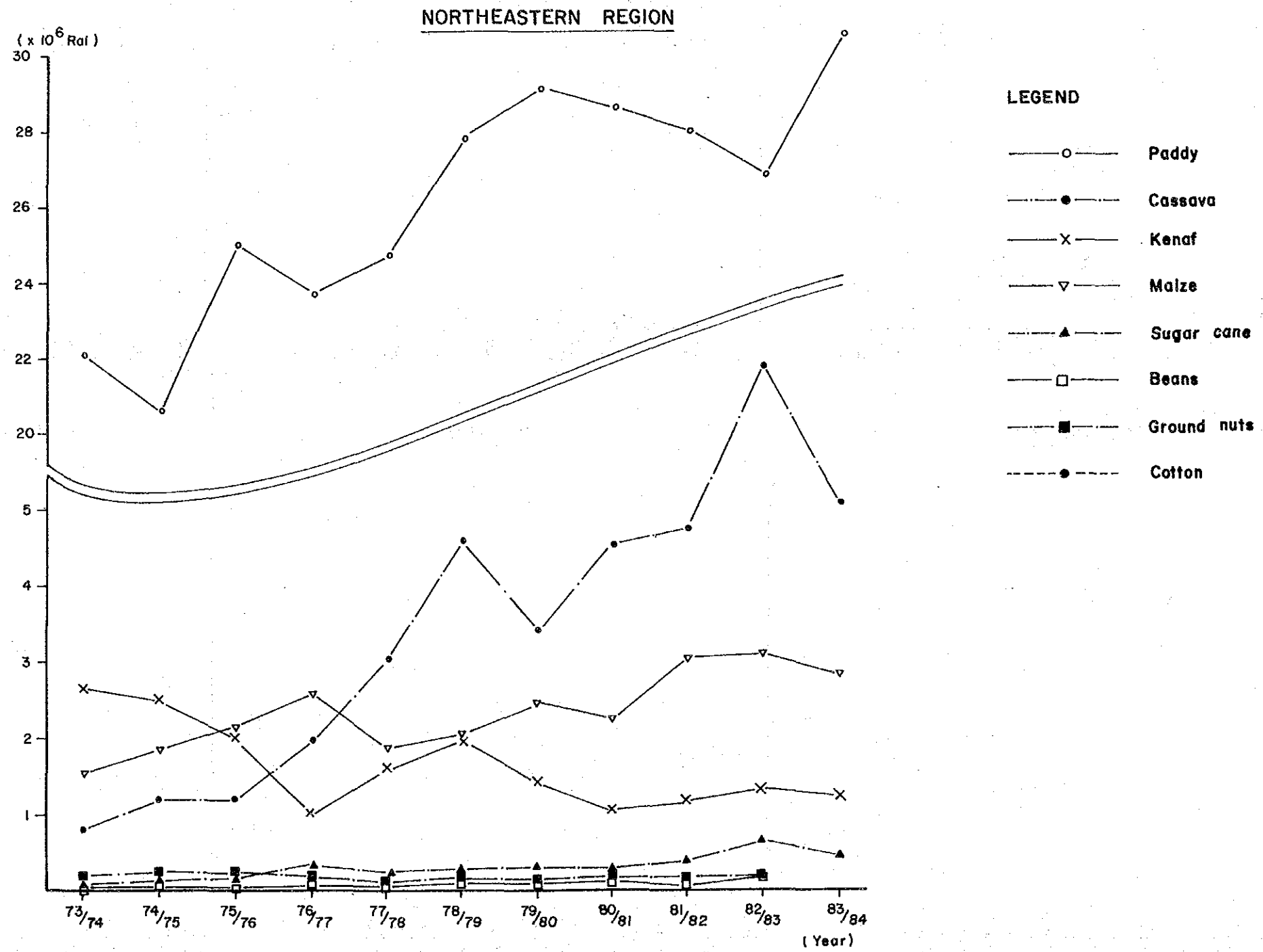
(Unit : thousand rai)

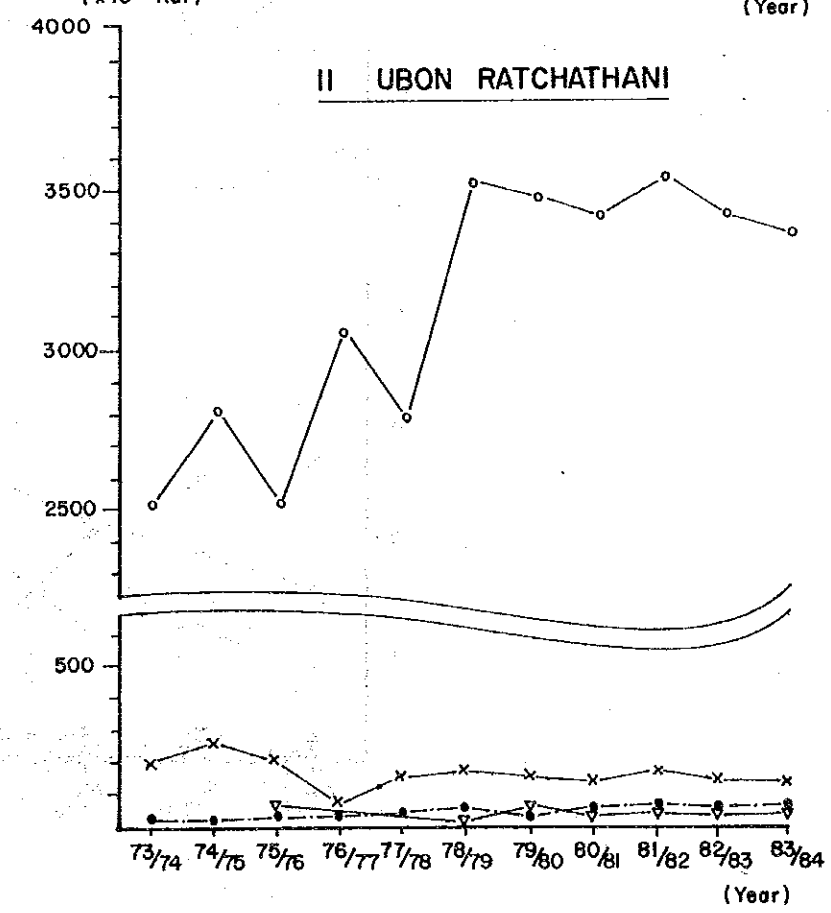
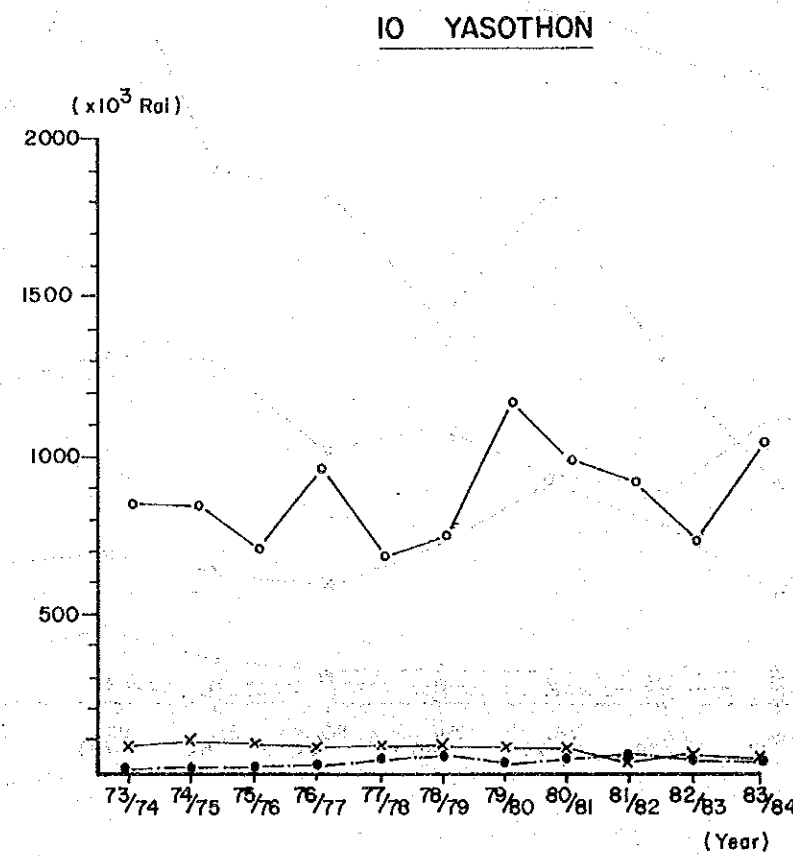
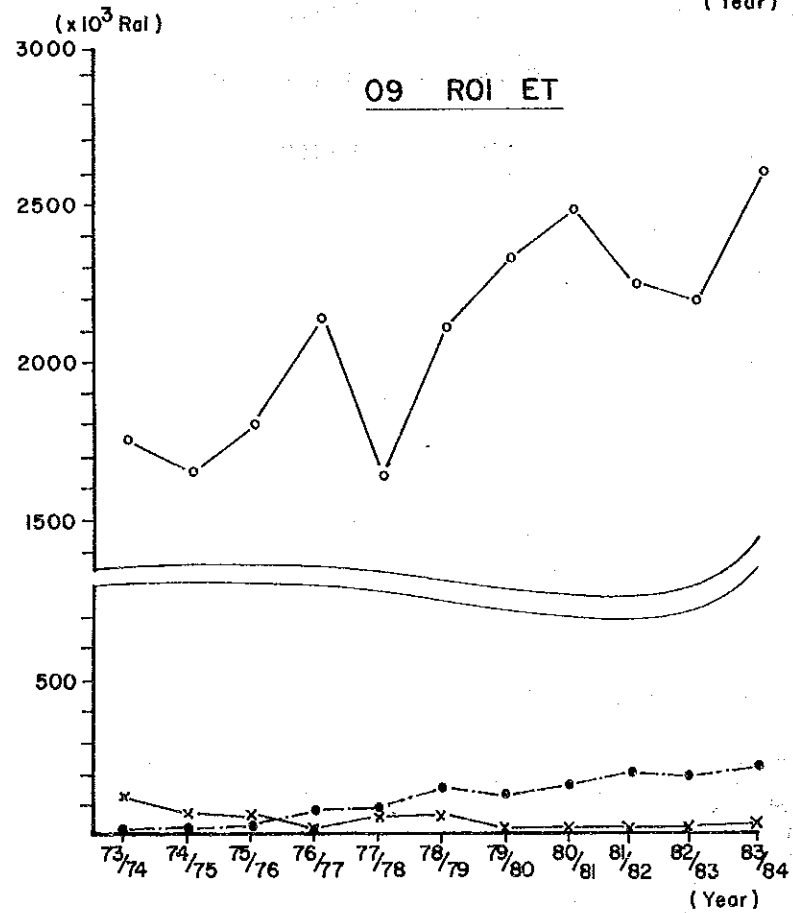
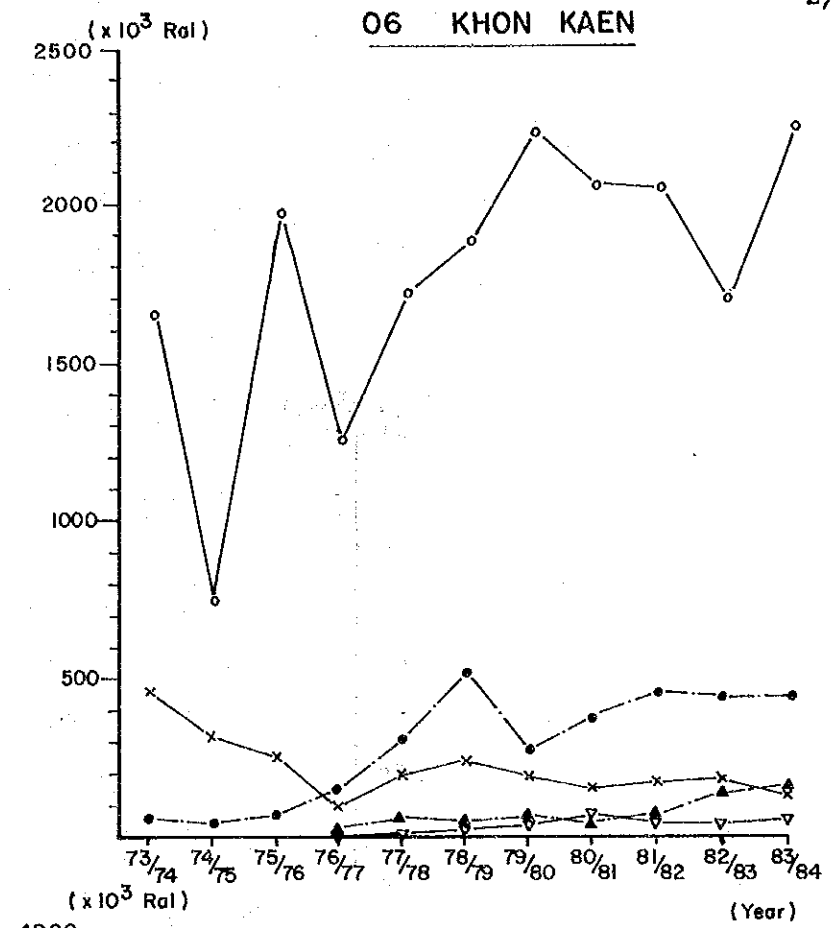
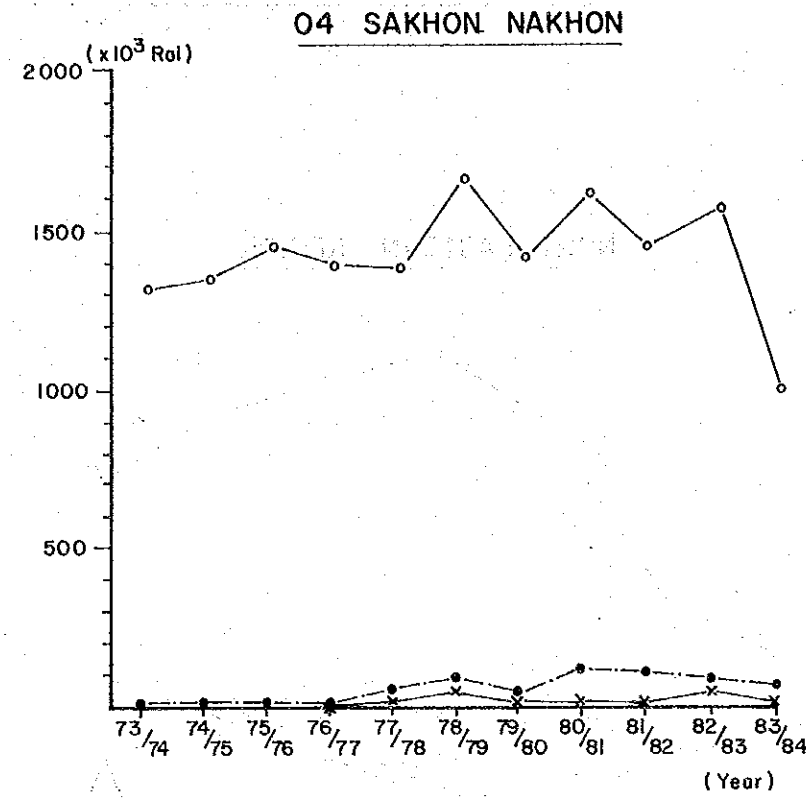
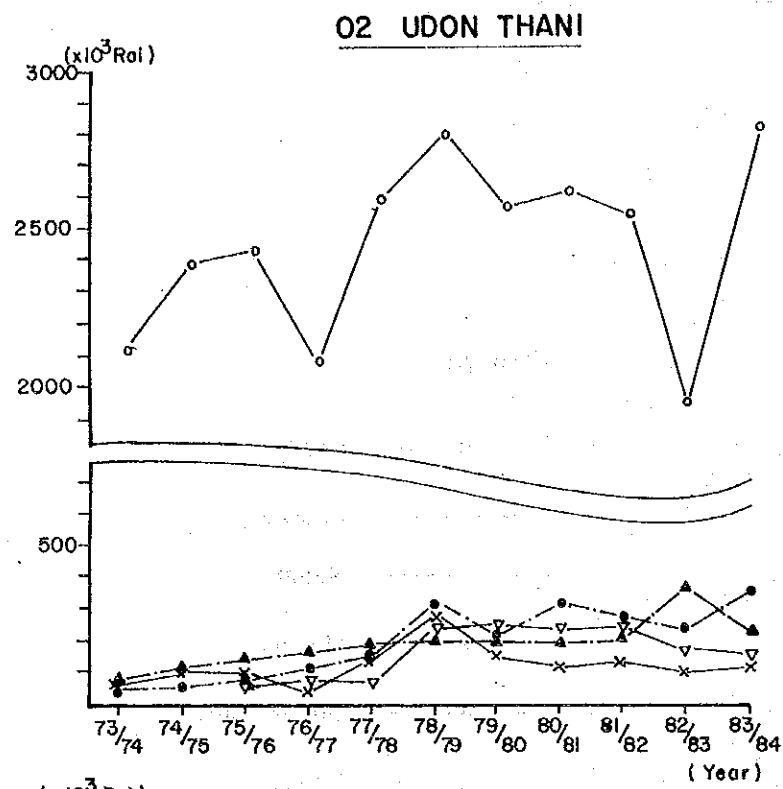
	Rice		Upland Crops										Upland Total	Total	Ratio of Upland (%)
	Total Rice	Glutinous Rice (%)	Maize	Sorghum	Mung beans	Soy beans	Ground nuts	Cassava	Sugar cane	Kenaf	Cotton	Others ^{1/}			
Whole Country	62,033	(38)	10,552	1,657	3,022	1,008	783	8,780	3,607	1,343	638	953	32,343	94,376	34.3
Northeastern Region (Total) ^{1/}	30,342	(62)	2,831	62	152	80	170	5,104	507	1,331	147	41	10,425	47,838	21.8
Related Changwat															
• Udon Thani	2,805	(84)	134	-	10	2	5	303	197	109	3	22	785	3,590	21.9
• Sakhon Nakhon	1,026	(84)	-	-	-	-	19	115	3	22	3	15	177	1,203	14.7
• Khon Kaen	2,299	(83)	52	-	53	7	6	427	137	120	-	1	803	3,151	25.5
• Roi Et	2,604	(55)	-	-	-	-	-	253	-	30	-	1	284	2,590	11.0
• Yasothon	1,008	(54)	-	-	-	-	3	38	6	83	-	-	130	1,138	11.4
• Ubon Ratchathani	3,397	(73)	12	-	1	-	3	72	-	135	5	1	229	3,626	6.3
• Chaiyaphum	1,618	(47)	223	31	38	-	8	368	36	320	4	7	1,035	2,653	39.0
• Nakhon Ratchasima	2,370	(14)	1,385	31	21	14	12	1,983	8	100	21	31	3,606	5,976	60.3
• Buri Ram	2,593	(1)	10	-	1	-	29	331	26	63	-	6	466	3,059	15.2
• Surin	3,114	(33)	-	-	1	-	5	36	-	83	-	6	131	3,245	4.0
• Si Sa Ket	1,803		171	-	1	-	17	33	-	88	-	-	310	2,113	14.7

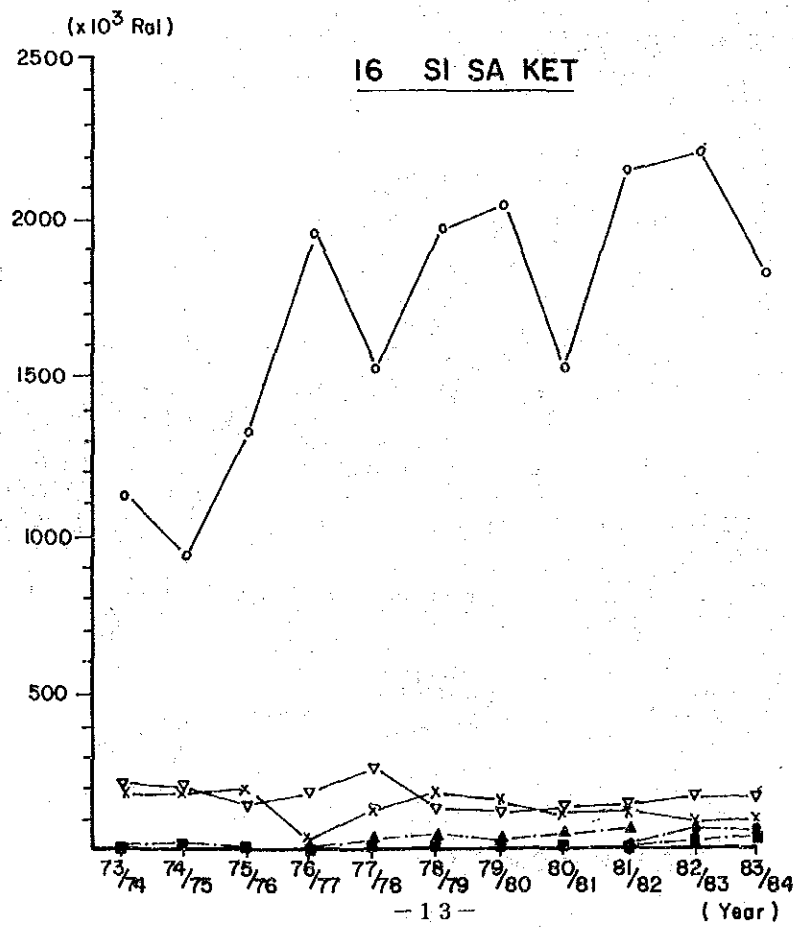
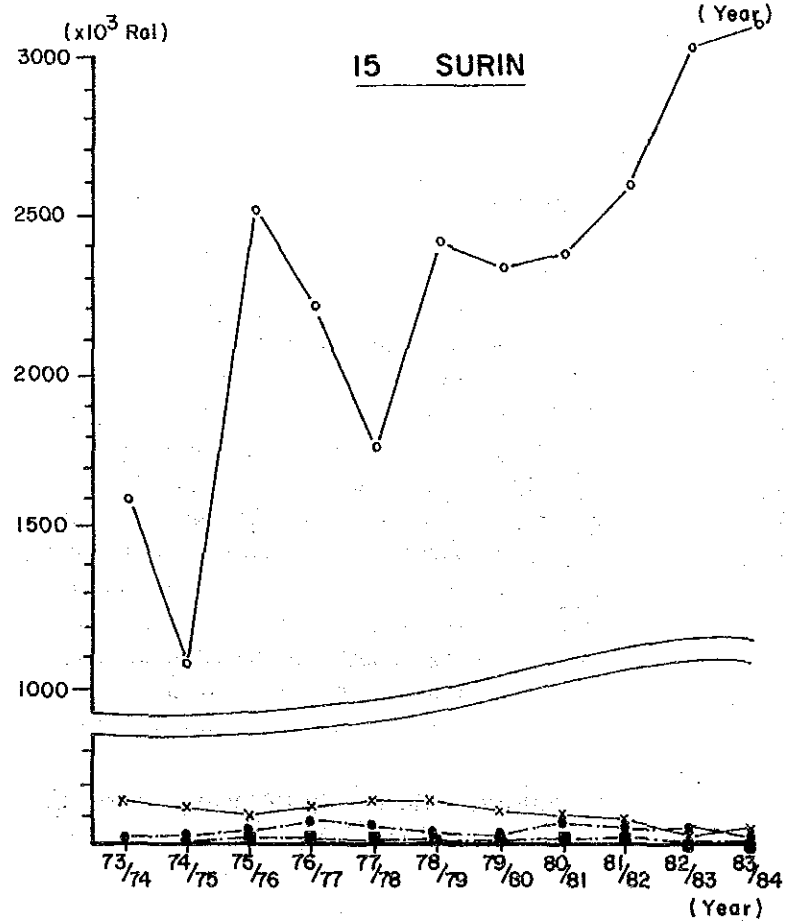
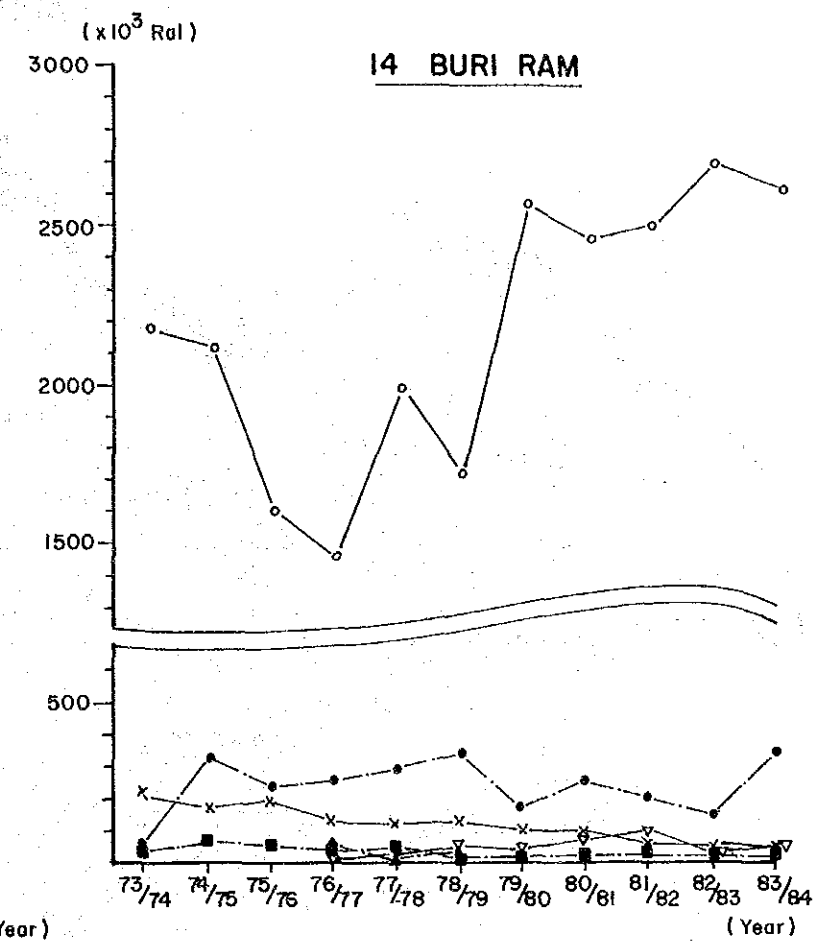
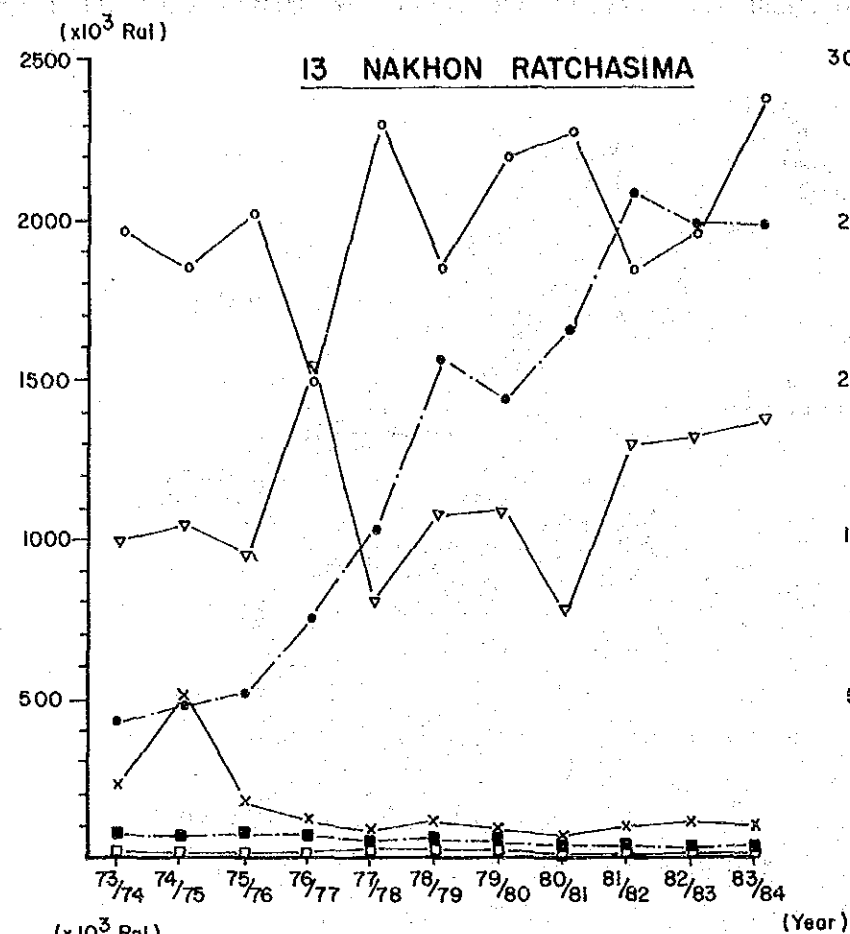
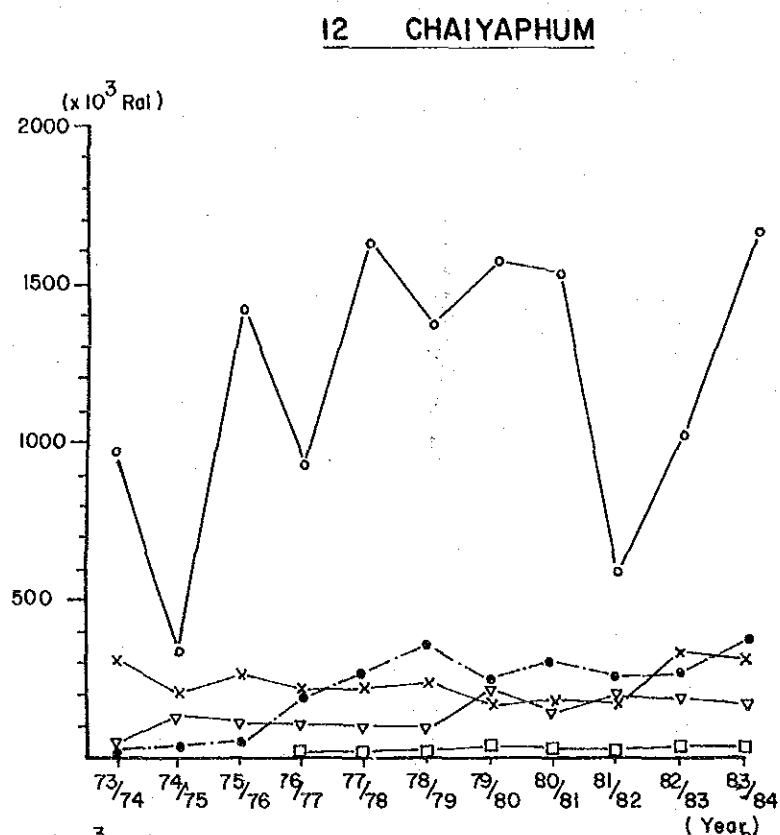
Note: ^{1/} Estimated

Sources: Agricultural Statistics, Ministry of Agriculture and Cooperatives

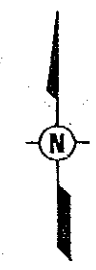
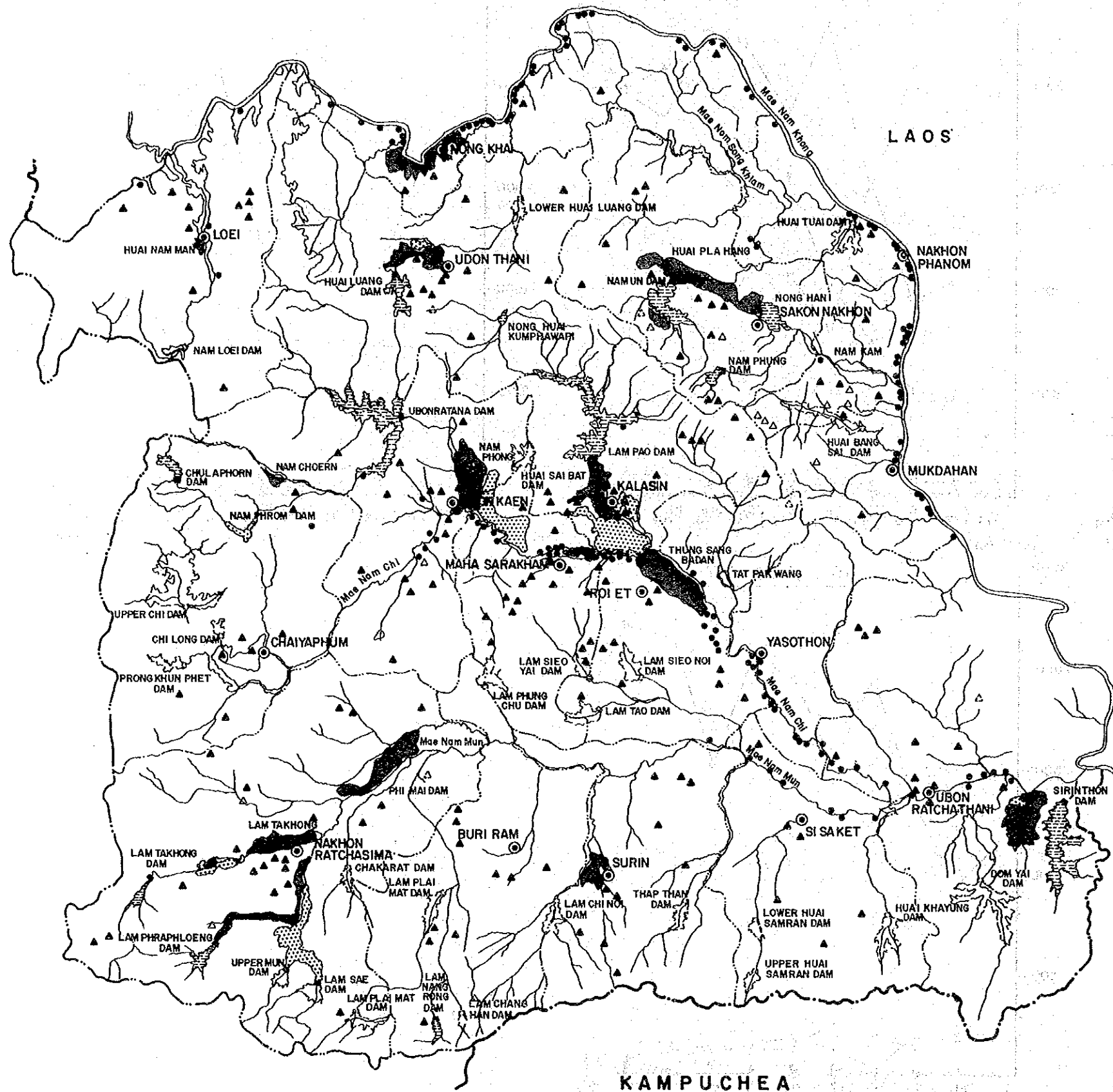
APPENDIX 2.4.7 IRRIGATION PROJECTS IN THE REGION







APPENDIX 2.4.7 IRRIGATION PROJECTS IN THE REGION



LEGEND

- ⊙ CHANGWAT
- INTERNATIONAL BOUNDARY
- - - CHANGWAT BOUNDARY
- ~ RIVER, HUAI
- ▬ STORAGE DAM COMPLETED AT THE END OF 1982
- ▬ STORAGE DAM UNDER CONSTRUCTION IN 1983
- ▬ STORAGE DAM TO BE CONSTRUCTED
- ▬ IRRIGABLE AREA COMPLETED AT THE END OF 1983
- ▬ IRRIGABLE AREA UNDER CONSTRUCTION IN 1983
- ▬ IRRIGABLE AREA TO BE CONSTRUCTED
- ▲ TANK COMPLETED AT THE END OF 1982
- △ TANK UNDER CONSTRUCTION IN 1983
- △ TANK TO BE CONSTRUCTED
- PUMPING IRRIGATION PROJECT (NEA)

SOURCE : ROYAL IRRIGATION DEPARTMENT
MAC. 1983.

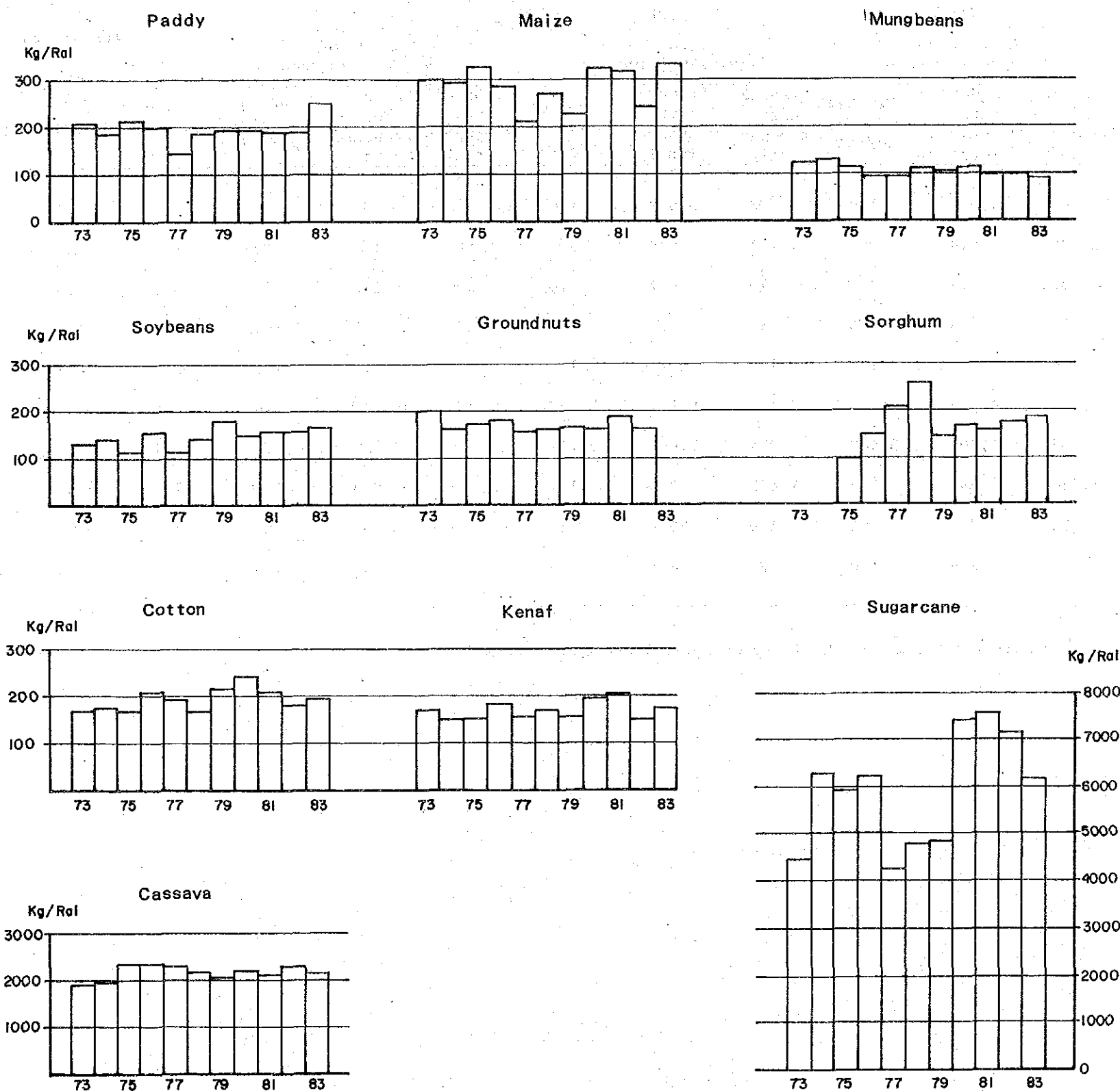
APPENDIX 2.4.8 PLANTED AREA AND PRODUCTION OF MAJOR CROPS IN REGION

	(1) Average of 1975/76 - 1977/78			(2) Average of 1978/79 - 1980/81			(3) Average of 1981/82 - 1983/84			Annual Growth Rate				Index of Yield of Region National Average = 100	
	Planted Area (thousand rai)	Produc- tion (thousand tons)	Average Yield (kg/rai)	Planted Area (thousand rai)	Produc- tion (thousand tons)	Average Yield (kg/rai)	Planted Area (thousand rai)	Produc- tion (thousand tons)	Average Yield (kg/rai)	Planted (2)/(1) %	Area (3)/(1) %	Production		1975/76 - 77/78 Average	1981/82 - 83/84 Average
												(2)/(1) %	(3)/(1) %		
Rice	24,491	4,510	184	28,503	5,599	196	28,392	5,948	209	5.2	2.5	7.5	4.7	68	71
Maize	2,170	614	283	2,251	534	237	3,002	892	297	1.2	5.5	-4.5	6.4	85	92
Mungbeans	37	3.7	100	79	8.7	110	124	11.3	91	28.8	22.3	33.0	20.5	110	97
Soybeans	31	4	129	35	5.3	151	58	9.2	159	4.1	11.0	9.8	14.9	71	98
Groundnuts	176	31	176	139	23	165	173	29.6	171	-7.6	-0.3	-9.5	-0.8	88	90
Cassava	1,905	4,657	2,445	4,172	8,887	2,130	4,794	10,442	2,178	29.9	16.6	24.0	14.4	103	96
Sugarcane	253	1,391	5,489	294	1,682	5,721	514	3,358	6,537	5.1	12.5	6.5	15.8	66	93
Kenaf	1,534	243	158	1,473	253	172	1,285	209	163	-1.3	-2.9	1.4	-2.5	87	97
Cotton	95	17.7	186	170	35.9	211	170	33.42	196	21.4	10.2	26.6	11.2	106	109
Sorghum	15	2.5	170	22	4.1	186	56	9.7	173	14.4	25.0	17.9	25.4	100	102

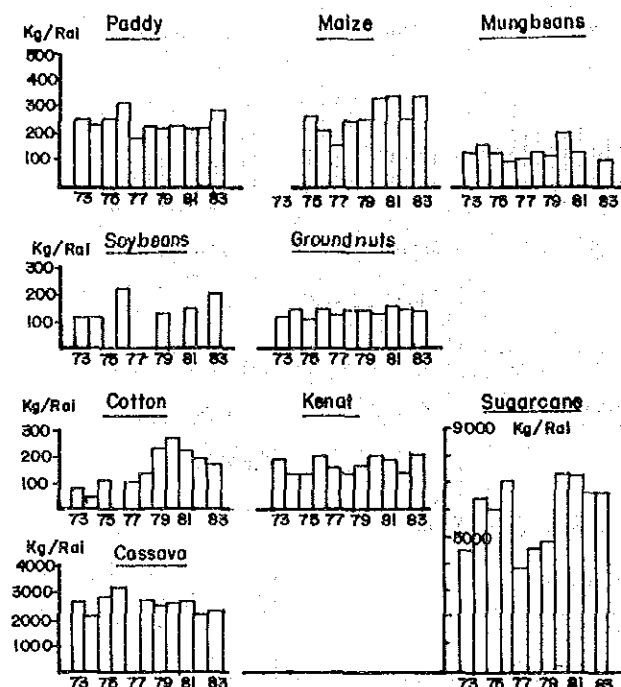
Sources: Office of Agricultural Economics, Ministry of Agriculture and Cooperatives

APPENDIX 2.4.9 TREND OF AVERAGE YIELD
(1973 / 74 - 1983 / 84)

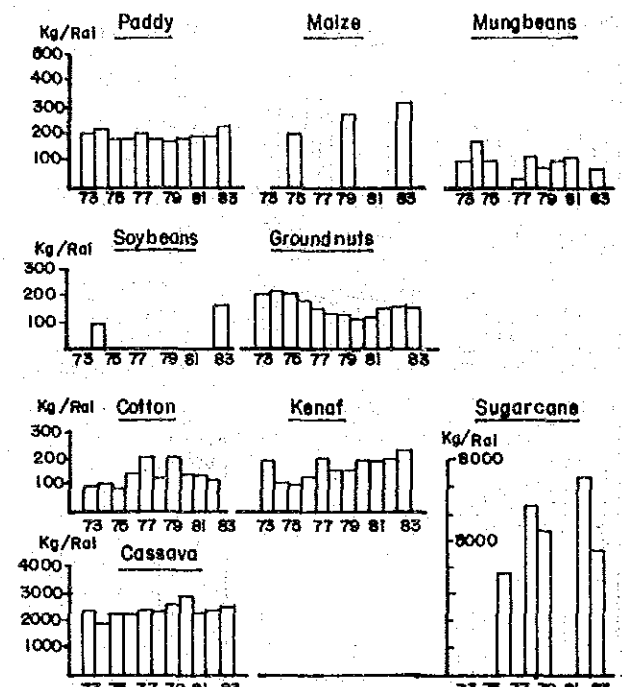
NORTHEASTERN REGION



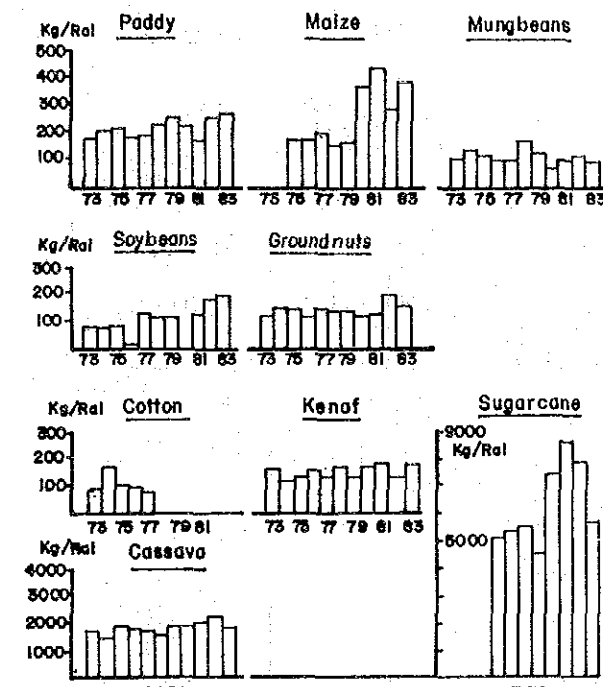
02 UDON THANI



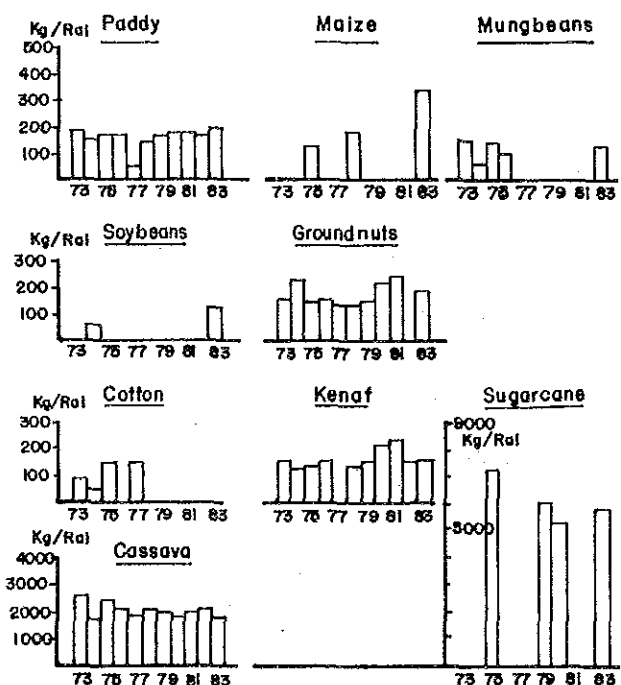
04 SAKHON NAKHON



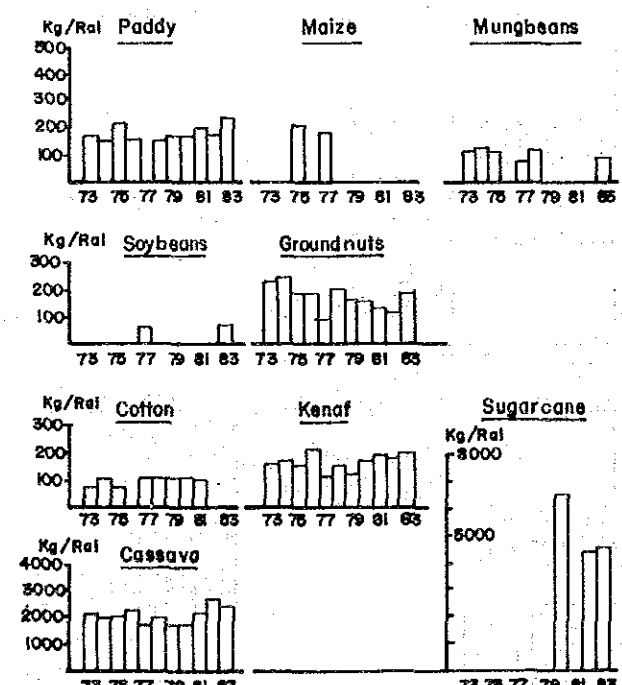
06 KHON KAEN



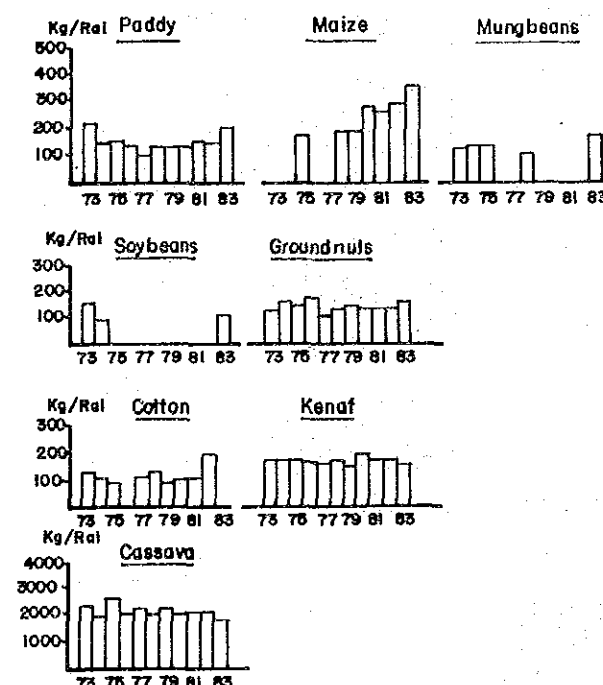
09 ROI ET



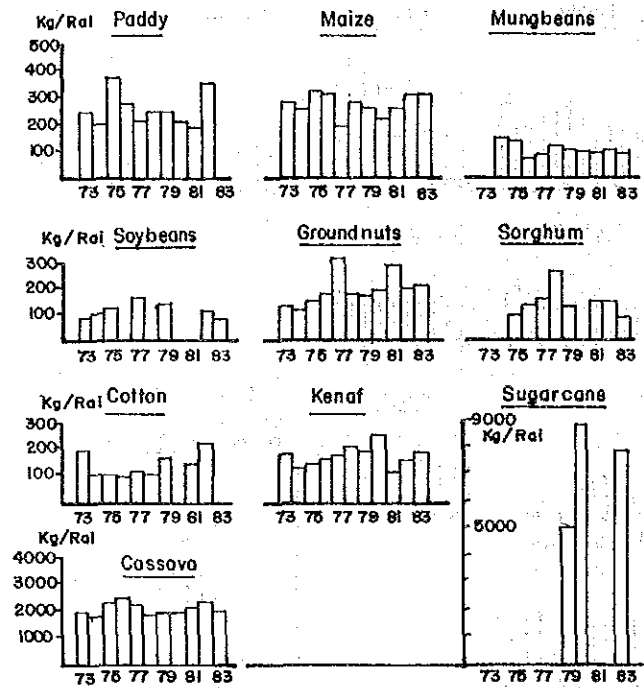
10 YASOTHON



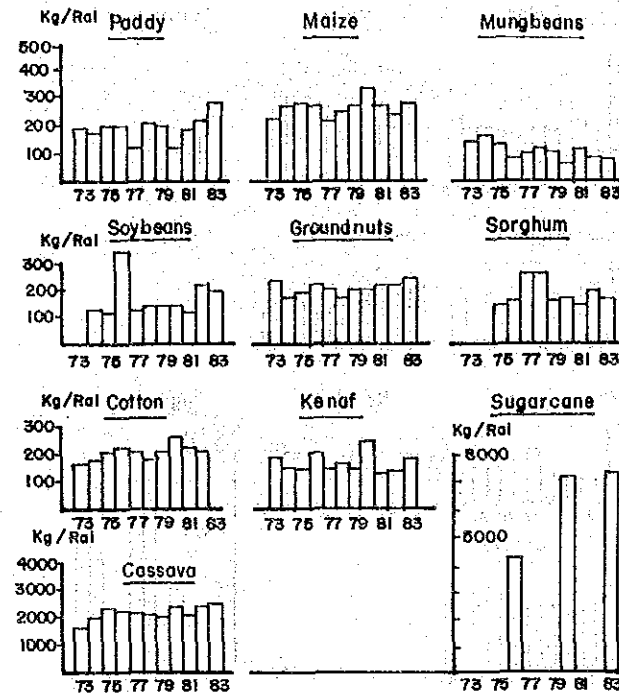
11 UBON RATCHATHANI



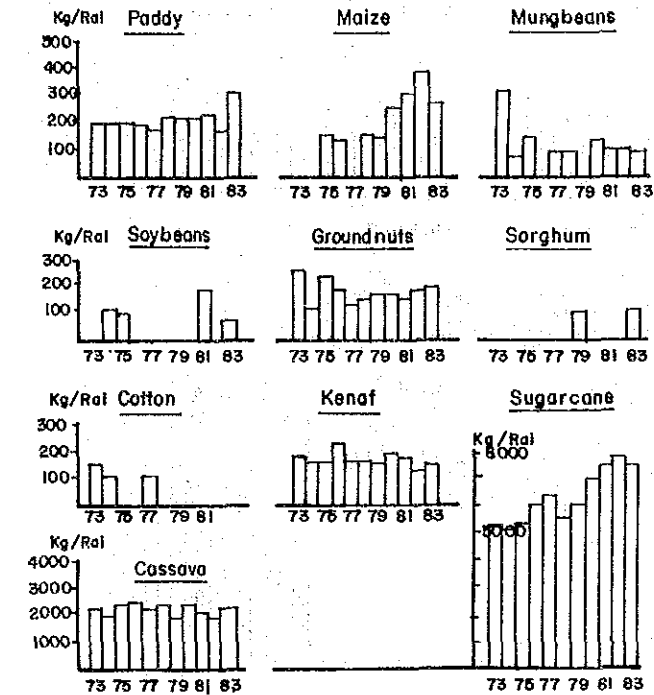
12 CHAIYAPHUM



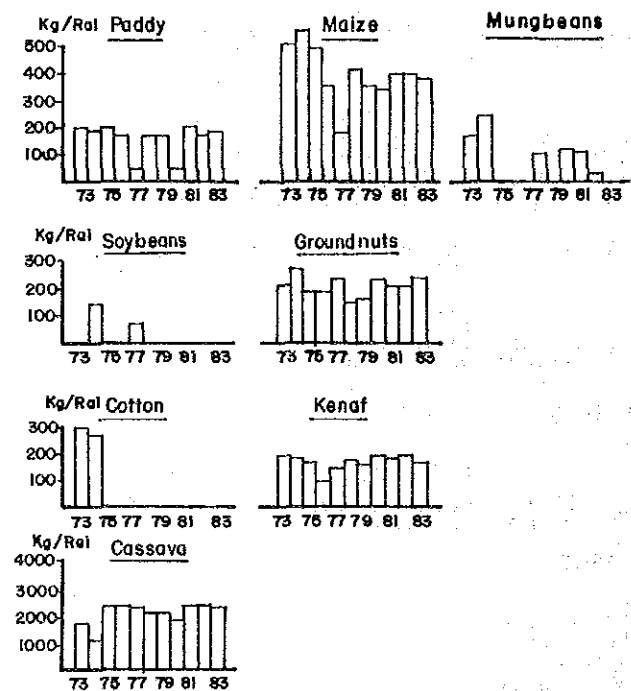
13 NAKHON RATCHASIMA



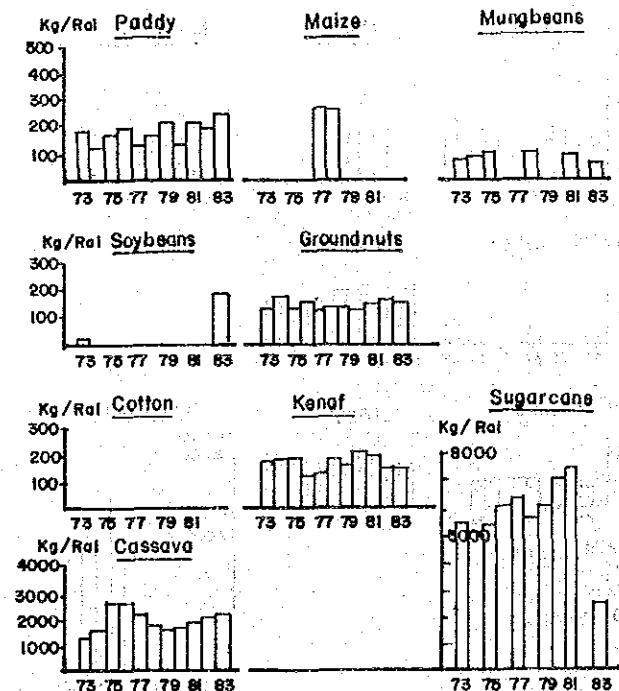
14 BURI RAM



16 SI SA KET



15 SURIN



APPENDIX 2.4.10 AGRO-INDUSTRY (LOCATION, NUMBER AND TOTAL PRODUCT)

(1983)

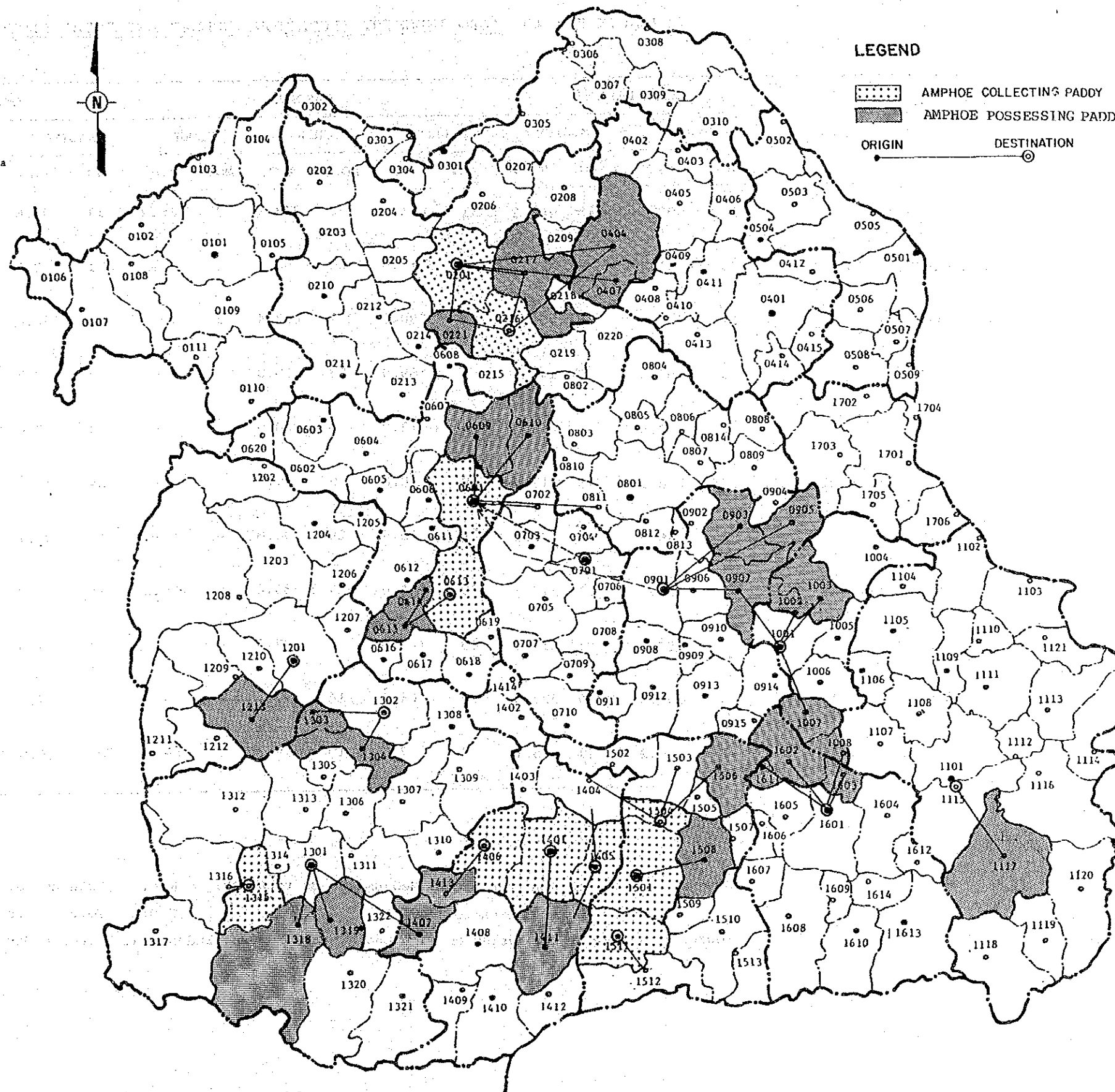
CHANGWAT	RICE MILL ^{1/}				CASSAVA						KENAF				SUGAR			
	BIG		MEDIUM		PELLET		CHIP		FLOUR		BALING		TEXTILE		BROWN		REFINERY	
	NO.	T.P.	NO.	T.P.	NO.	T.P.	NO.	T.P.	NO.	T.P.	NO.	T.P.	NO.	T.P.	NO.	T.P.	NO.	T.P.
02 UDON THANI	11	390.5	15	303.2	33	601.8	160	248.2	1	18.2	11	43.6	1	N.A.	2	133.9	2	65.4
04 SAKHON NAKHON	3	131.4	6	73.6	3	17.9	60	50.2	-	-	1	3.5	-	-	-	-	-	-
06 KHON KAEN	12	487.6	18	368.5	64	780.3	207	663.4	1	10.9	45	120.0	2	N.A.	1	150.0	1	75.0
09 ROI ET	3	102.2	8	149.5	8	169.0	83	70.0	-	-	5	7.5	-	-	-	-	-	-
10 YASOTHON	1	32.8	4	58.3	4	12.0	8	20.0	-	-	3	2.4	-	-	-	-	-	-
11 UBON RATCHATHANI	7	278.9	13	217.0	39	38.0	6	9.2	-	-	24	17.1	2	N.A.	-	-	1	29.9
12 CHAIYAPHUM	1	36.5	7	138.3	14	55.4	26	35.8	-	-	11	45.7	-	-	-	-	-	-
13 NAKHON RATCHASIMA	12	459.9	21	317.3	119	4,846.6	517	3,735.4	10	178.2	21	37.8	5	N.A.	-	-	-	-
14 BURI RAM	5	189.8	31	514.9	19	100.0	93	82.9	-	-	2	1.3	-	-	1	40.3	2	160.0
15 SURIN	8	299.3	27	427.0	12	204.3	14	17.1	-	-	7	2.7	2	N.A.	-	-	-	-
16 SI SA KET	1	29.2	11	175.1	4	7.6	19	18.3	1	-	16	150.0	-	-	-	-	-	-

Note: ^{1/} : Big (80 tons/day), Medium (30-80 tons/day) N.A. : Date not available
 No. : Number of Factories T.P. : Total Product (thousand tons/year)

Source: Number of Factories on each Changwat 1978-1983, Industrial Economic Division, Ministry of Industry

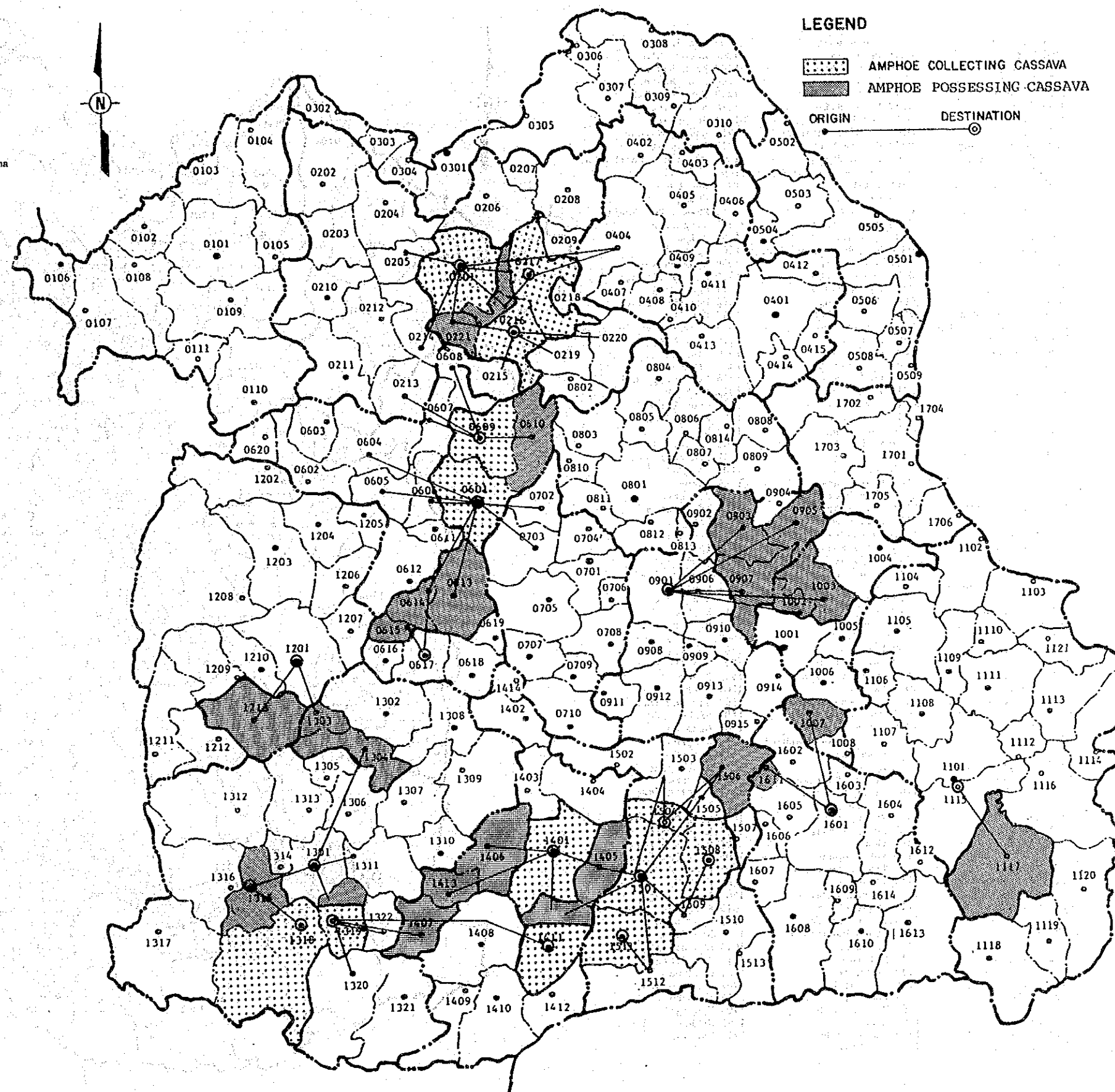
COMMODITY FLOW OF RICE

- | | | |
|-----------------------|---------------------------|---------------------------|
| 0101 M. Loei | 0614 Chonnabot | 1205 Ban Thaeu |
| 0102 Tha Li | 0615 Waeng Yai | 1206 Kaeng Khlo |
| 0103 Chiang Khan | 0616 Waeng Noi | 1207 Khon Sawen |
| 0104 Pak Chom | 0617 Phon | 1208 Nong Bua Daeng |
| 0105 Na Duang | 0618 Nong Song Hon | 1209 Nong Bua Rahueo |
| 0106 Na Haeo | 0619 Phouy Noi | 1210 Ban Khwao |
| 0107 Dan Sai | 0620 Phu Pha Man | 1211 Thop Satit |
| 0108 Phu Rua | 0701 M. Maha Satakham | 1212 Bamnet Narong |
| 0109 Wang Saphung | 0702 Chiang Yun | 1213 Chattrurat |
| 0110 Phu Kradung | 0703 Kosum Phisai | 1301 M. Nakhon Ratchasima |
| 0111 Phu Luang | 0704 Kantharawichai | 1302 Bua Yai |
| 0201 M. Udon Thani | 0705 Borabu | 1303 Ban Luam |
| 0202 Nam Som | 0706 Kae Dam | 1304 Khong |
| 0203 Suwannakhuha | 0707 Na Chuak | 1305 Kham Sakae Saeng |
| 0204 Ban Phu | 0708 Wapi Pathum | 1306 Nong Sung |
| 0205 Kut Chap | 0709 Na Dum | 1307 Phimai |
| 0206 Phen | 0710 Phayakkhaphum Pitsai | 1308 Prathai |
| 0207 Sang Khom | 0801 M. Kalasin | 1309 Chum Phuang |
| 0208 Ban Dung | 0802 Tha Khantho | 1310 Huai Thalaeng |
| 0209 Thung Fon | 0803 Nong Kung Si | 1311 Chakkarakaj |
| 0210 Na Klang | 0804 Khom Muang | 1312 Dan Khun Thot |
| 0211 Si Bun Ruang | 0805 Sahatsakhan | 1313 Non Thai |
| 0212 Nong Bua Lam Phu | 0806 Somdet | 1314 Kham Thalsee So |
| 0213 Non Sang | 0807 Na Mon | 1315 Sung Noen |
| 0214 Nong Wu So | 0808 Khao Wong | 1316 Sikhui |
| 0215 Non Sa-At | 0809 Kuchinarai | 1317 Pak Chong |
| 0216 Kumphawapi | 0810 Huai Mek | 1318 Pak Thong Chai |
| 0217 Nong Han | 0811 Yang Talat | 1319 Chok Chai |
| 0218 Chaiwan | 0812 Kamalasai | 1320 Khon Buri |
| 0219 Si That | 0813 Rong Kham | 1321 Soeng Sang |
| 0220 Wang Sam Mo | 0814 Huay Pung | 1322 Nong Bunmek |
| 0221 Nong Saeng | 0901 M. Roi Et | 1401 H. Buri Ram |
| 0301 M. Nong Khai | 0902 Pho Chai | 1402 Phutthaisong |
| 0302 Sangkhom | 0903 Phon Thong | 1403 Khu Muang |
| 0303 Si Chiang Mai | 0904 Muayawadee | 1404 Satuk |
| 0304 Tha Bo | 0905 Nong Phok | 1405 Krasang |
| 0305 Phon Phisai | 0906 Thavatchaburi | 1406 Lam Plai Mat |
| 0306 Pak Kad | 0907 Selaphum | 1407 Nong Ki |
| 0307 So Phisai | 0908 Chaturapak Pimun | 1408 Nang Rong |
| 0308 Bung Kan | 0909 Muang Suang | 1409 Pa khom |
| 0309 Phon Charoen | 0910 At Samat | 1410 Lahan Sai |
| 0310 Seka | 0911 Pathum Rat | 1411 Prakhon Chai |
| 0401 M. Sakhon Nakhon | 0912 Kaset Wisai | 1412 Ban Kruat |
| 0402 Ban Muang | 0913 Suwannaphum | 1413 Nong Hong |
| 0403 Kham Ta Kla | 0914 Phanom Phrai | 1414 Na Pho |
| 0404 Sawang Daen Din | 0915 Phon Sai | 1501 M. Surin |
| 0405 Wanon Niwat | 1001 M. Yasothon | 1502 Chumphon Buri |
| 0406 Akat Amnua | 1002 Sai Mun | 1503 Tha Tum |
| 0407 Song Dao | 1003 Kut Chum | 1504 Chom Phra |
| 0408 Waritchaphum | 1004 Loeng Nok Tha | 1505 Sanom |
| 0409 Phang Khon | 1005 Pa Tiu | 1506 Rattanaaburi |
| 0410 Nakhon Nam Un | 1006 Kham Khuan Kaeo | 1507 Samrong Thap |
| 0411 Phanna Nakhom | 1007 Maha Chana Chai | 1508 Sikhoraphum |
| 0412 Kusuman | 1008 Kho Wang | 1509 Lamduan |
| 0413 Kut Bak | 1101 M. Ubon Ratchathani | 1510 Sangkha |
| 0414 Tao Koi | 1102 Chanuman | 1511 Prasat |
| 0415 Kok Sri Supan | 1103 Khemaraj | 1512 Kap Choeng |
| 0501 M. Nakhon Phanom | 1104 Senang Khanikhom | 1513 Bua Chet |
| 0502 Ban Phaeng | 1105 Amnat Charoen | 1601 M. Si Sa Ket |
| 0503 Si Songkhram | 1106 Hua Thaphan | 1602 Rasi Salai |
| 0504 Na Wa | 1107 Khuang Nai | 1603 Yang Chum Noi |
| 0505 Tha Uthen | 1108 Muang Samsip | 1604 Kanthararom |
| 0506 Pla Pak | 1109 Phana | 1605 Uthumpon Phisai |
| 0507 Renu Nakhon | 1110 Kut Kaopun | 1606 Huai Thap Than |
| 0508 Na Kae | 1111 Trakan Phutphon | 1607 Prang Ku |
| 0509 That Phanom | 1112 Taisum | 1608 Khukhan |
| 0601 M. Khon Kaen | 1113 Si Muang Mai | 1609 Phrai Bung |
| 0602 Chumphae | 1114 Khong Chiam | 1610 Khun Han |
| 0603 Si Chomphu | 1115 Warin Chamrap | 1611 Bung Boon |
| 0604 Phu Wiang | 1116 Pibun Mungsahan | 1612 Non Koon |
| 0605 Nong Rua | 1117 Det Udom | 1613 Kanthararak |
| 0606 Ban Fang | 1118 Nam Yun | 1614 Sri Pattana |
| 0607 Ubolratana | 1119 Na Chaiwai | 1701 Mukdahan |
| 0608 Kaosuankwang | 1120 Buntharik | 1702 Dong Luang |
| 0609 Nam Phong | 1121 Pho Sai | 1703 Khancho-i |
| 0610 Kranuan | 1201 M. Chalyaphum | 1704 Wan Yai |
| 0611 Phra Yun | 1202 Khon San | 1705 Nakhon Kham Soi |
| 0612 Mancha Khiri | 1203 Kaset Sombun | 1706 Don Tan |
| 0613 Ban Phai | 1204 Phu Khieo | |



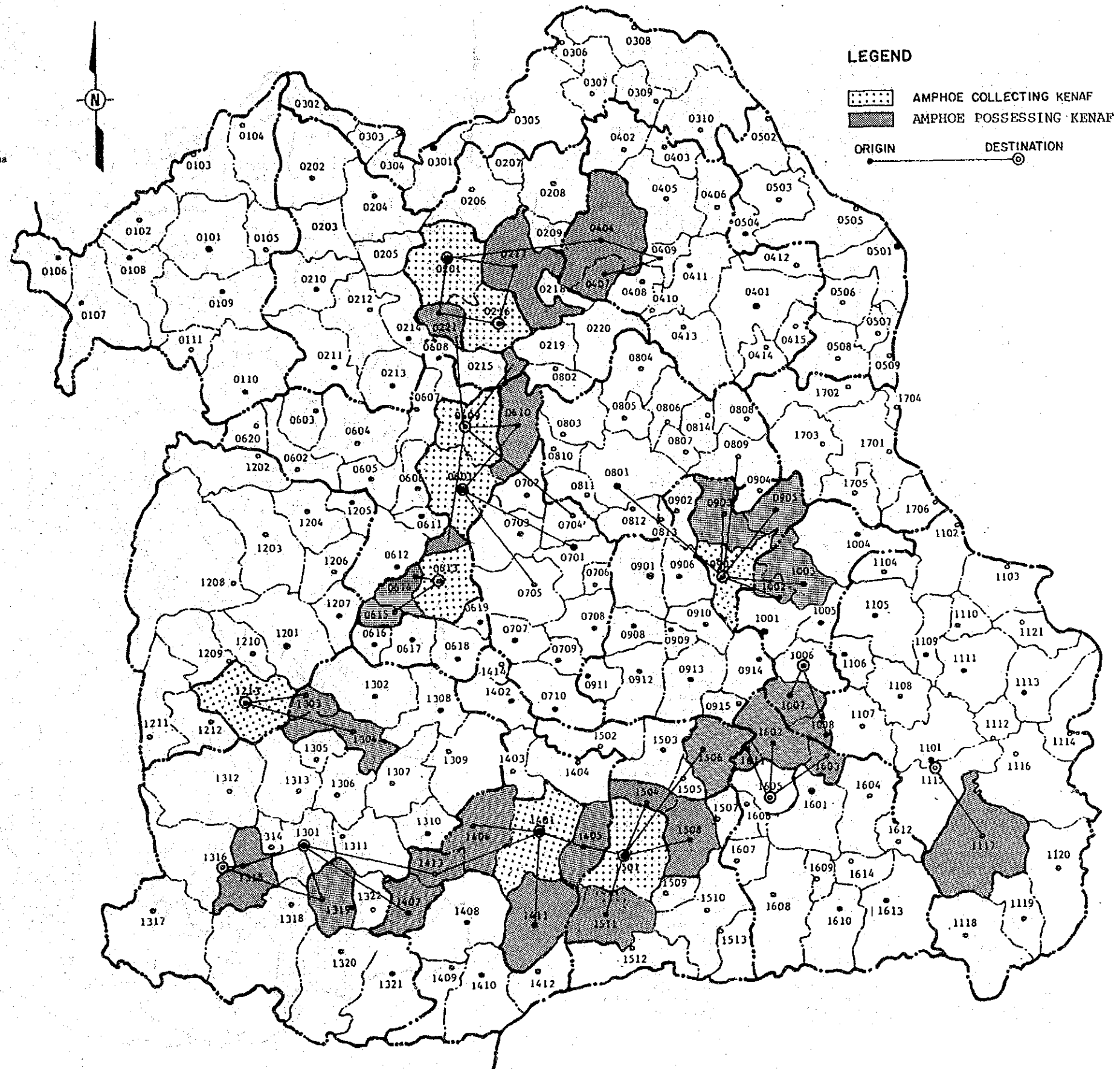
COMMODITY FLOW OF CASSAVA

- | | | |
|-----------------------|---------------------------|---------------------------|
| 0101 M. Loei | 0614 Chonnabot | 1205 Ban Thaeu |
| 0102 Tha Li | 0615 Waeng Yai | 1206 Kaeng Khlo |
| 0103 Chiang Khan | 0616 Waeng Noi | 1207 Khon Sawan |
| 0104 Pak Chom | 0617 Phon | 1208 Nong Bua Daeng |
| 0105 Na Duang | 0618 Nong Song Hon | 1209 Nong Bua Rahueo |
| 0106 Na Haeo | 0619 Phouy Noi | 1210 Ban Khwao |
| 0107 Dan Sai | 0620 Phu Pha Man | 1211 Thep Satit |
| 0108 Phu Rua | 0701 M. Maha Satakhom | 1212 Bamnet Narong |
| 0109 Wang Saphung | 0702 Chiang Yun | 1213 Chaturat |
| 0110 Phu Kradung | 0703 Kosum Phisai | 1301 M. Nakhon Ratchasima |
| 0111 Phu Luang | 0704 Kantharawichai | 1302 Bua Yai |
| 0201 M. Udon Thani | 0705 Borabu | 1303 Ban Luam |
| 0202 Nam Som | 0706 Kae Dam | 1304 Khong |
| 0203 Suwannakhuha | 0707 Na Chuak | 1305 Kham Sakae Saeng |
| 0204 Ban Phu | 0708 Wapi Pathum | 1306 Nong Sung |
| 0205 Kut Chap | 0709 Na Dum | 1307 Phimai |
| 0206 Phen | 0710 Phayakkhaphum Phisai | 1308 Prathai |
| 0207 Sang Khom | 0801 M. Kalasin | 1309 Chum Phuang |
| 0208 Ban Dung | 0802 Tha Khantho | 1310 Huai Thaleang |
| 0209 Thung Fon | 0803 Nong Kung Si | 1311 Chakkara |
| 0210 Na Klang | 0804 Khom Muang | 1312 Dan Khun Thot |
| 0211 Si Bun Ruang | 0805 Sahatsakhon | 1313 Non Thai |
| 0212 Nong Bua Lam Phu | 0806 Somdet | 1314 Kham Thalee So |
| 0213 Non Sang | 0807 Na Non | 1315 Sung Noen |
| 0214 Nong Wua So | 0808 Khao Wong | 1316 Sikhiu |
| 0215 Non Sa-At | 0809 Kuchinarai | 1317 Pak Chong |
| 0216 Kumphawapi | 0810 Husi Mek | 1318 Pak Thong Chai |
| 0217 Nong Han | 0811 Yang Talat | 1319 Chok Chai |
| 0218 Chaiwan | 0812 Kamalasai | 1320 Khon Buri |
| 0219 Si That | 0813 Rong Kham | 1321 Soeng Sang |
| 0220 Wang Sam Mo | 0814 Huay Pung | 1322 Nong Bunmak |
| 0221 Nong Saeng | 0901 M. Roi Et | 1401 M. Buri Ram |
| 0301 M. Nong Khai | 0902 Pho Chai | 1402 Phutthaisong |
| 0302 Sangkhom | 0903 Phon Thong | 1403 Khu Muang |
| 0303 Si Chiang Mai | 0904 Muayawadee | 1404 Satuk |
| 0304 Tha Bo | 0905 Nong Phok | 1405 Krasaeng |
| 0305 Phon Phisai | 0906 Thawatchaburi | 1406 Lam Phai Mat |
| 0306 Pak Kad | 0907 Selaphum | 1407 Nong Ki |
| 0307 So Phisai | 0908 Chaturapak Pimun | 1408 Nang Rong |
| 0308 Bung Kan | 0909 Muang Suang | 1409 Pa khom |
| 0309 Phon Charoen | 0910 At Samat | 1410 Lahan Sai |
| 0310 Seka | 0911 Pathum Rat | 1411 Prakhon Chai |
| 0401 M. Sakhon Nakhon | 0912 Kaset Wisai | 1412 Ban Krut |
| 0402 Ban Huang | 0913 Suwannaphum | 1413 Nong Hong |
| 0403 Kham Ta Kla | 0914 Phanom Phrai | 1414 Na Pho |
| 0404 Sawang Daen Din | 0915 Phon Sai | 1501 M. Surin |
| 0405 Wanon Niwat | 1001 M. Yasothon | 1502 Chumphon Buri |
| 0406 Akat Amnuai | 1002 Sai Mun | 1503 Tha Tum |
| 0407 Song Dao | 1003 Kut Chum | 1504 Chom Phra |
| 0408 Waritchaphum | 1004 Loeng Nok Tha | 1505 Sanom |
| 0409 Phang Khon | 1005 Pa Tiu | 1506 Rattanaaburi |
| 0410 Nikhom Nam Un | 1006 Kham Khuan Kaeo | 1507 Samrong Thap |
| 0411 Phanna Nikhom | 1007 Maha Chana Chai | 1508 Sikhoraphum |
| 0412 Kusuman | 1008 Kho Wang | 1509 Lamduan |
| 0413 Kut Bak | 1101 M. Ubon Ratchathani | 1510 Sangkha |
| 0414 Tao Koi | 1102 Chanuman | 1511 Prasat |
| 0415 Kok Sri Supan | 1103 Khemara | 1512 Kap Choeng |
| 0501 M. Nakhon Phanom | 1104 Senang Khanikhom | 1513 Bua Chet |
| 0502 Ban Phaeng | 1105 Amnat Charoen | 1601 M. Si Sa Ket |
| 0503 Si Songkhram | 1106 Hua Thaphan | 1602 Rasi Salai |
| 0504 Na Wa | 1107 Khuang Nai | 1603 Yang Chum Noi |
| 0505 Tha Uthen | 1108 Muang Samsip | 1604 Kanthararom |
| 0506 Pla Pak | 1109 Phana | 1605 Uthumphon Phisai |
| 0507 Renu Nakhon | 1110 Kut Kaopun | 1606 Huai Thap Than |
| 0508 Na Kae | 1111 Trakan Phutphon | 1607 Prang Ku |
| 0509 That Phanom | 1112 Taisum | 1608 Khukhan |
| 0601 M. Khon Kaen | 1113 Si Huang Mai | 1609 Phrai Bung |
| 0602 Chumphae | 1114 Khong Chiam | 1610 Khun Han |
| 0603 Si Chomphu | 1115 Warin Chamrap | 1611 Bung Boon |
| 0604 Phu Wiang | 1116 Pibun Hungsahan | 1612 Non Koon |
| 0605 Nong Rua | 1117 Det Udom | 1613 Kantharak |
| 0606 Ban Fang | 1118 Nam Yun | 1614 Sri Pattana |
| 0607 Ubolratana | 1119 Na Chaiyai | 1701 Mukdahan |
| 0608 Kaosuankwang | 1120 Buntharik | 1702 Dong Luang |
| 0609 Nam Phong | 1121 Pho Sai | 1703 Khamcha-I |
| 0610 Kranuan | 1201 M. Chaiyaphum | 1704 Wan Yai |
| 0611 Phra Yun | 1202 Khon Sen | 1705 Nikhom Kham Soi |
| 0612 Mancha Khiri | 1203 Kaset Sombun | 1706 Don Tan |
| 0613 Ban Phai | 1204 Phu Khiao | |



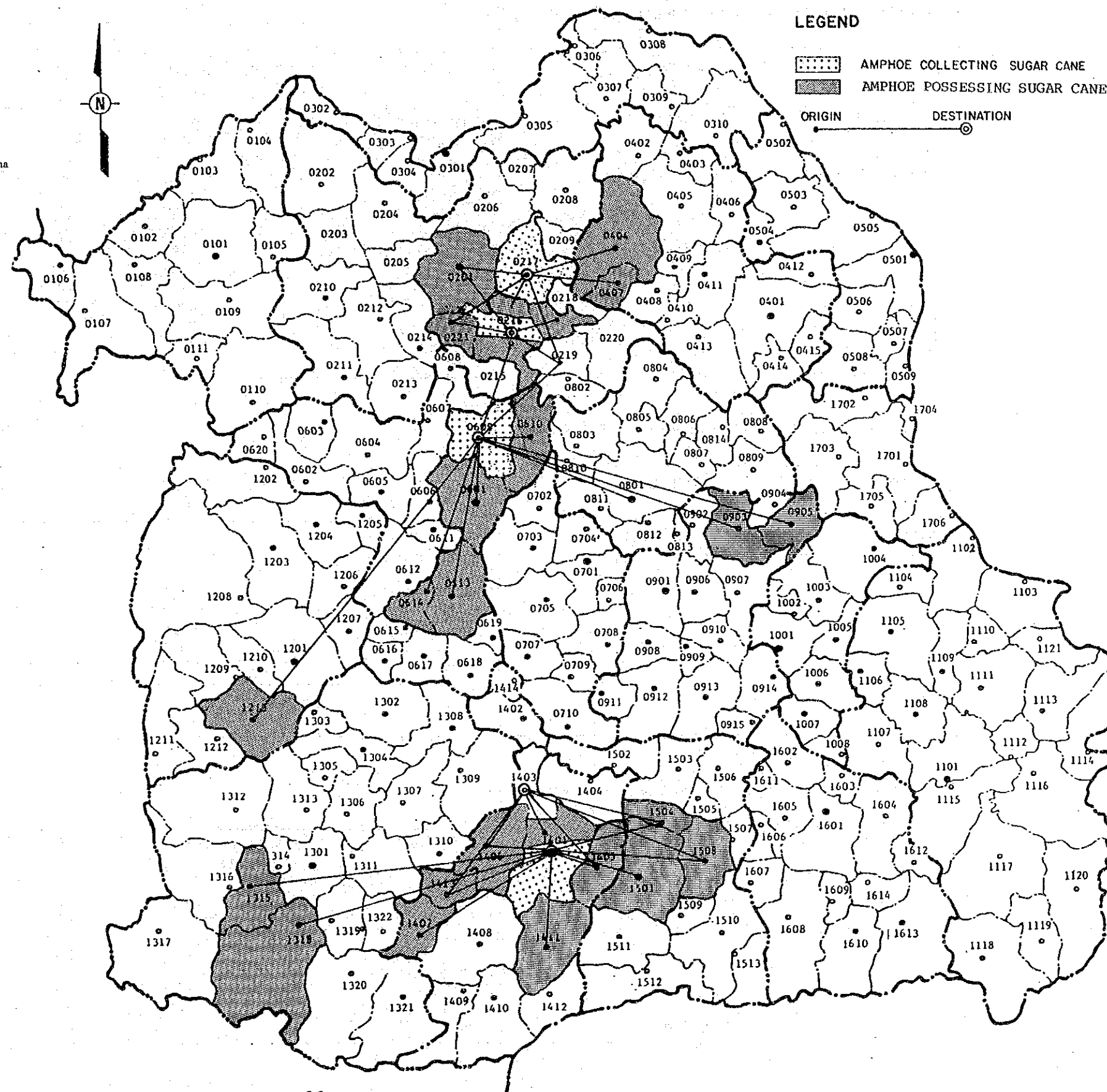
COMMODITY FLOW OF KENAF

- | | | |
|-----------------------|---------------------------|---------------------------|
| 0101 M. Loei | 0614 Chonnabot | 1205 Ban Thae |
| 0102 Tha Li | 0615 Waeng Yai | 1206 Kaeng Khio |
| 0103 Chiang Khan | 0616 Waeng Noi | 1207 Khon Sawan |
| 0104 Pak Chom | 0617 Phon | 1208 Nong Bua Daeng |
| 0105 Na Duang | 0618 Nong Song Hon | 1209 Nong Bua Rahueo |
| 0106 Na Haeo | 0619 Phouy Noi | 1210 Ban Khwao |
| 0107 Dan Sai | 0620 Phu Pha Man | 1211 Thep Satit |
| 0108 Phu Rua | 0701 M. Maha Satakham | 1212 Bamnet Narong |
| 0109 Wang Saphung | 0702 Chiang Yun | 1213 Chatturat |
| 0110 Phu Kradung | 0703 Kosum Phisai | 1301 M. Nakhon Ratchasima |
| 0111 Phu Luang | 0704 Kantharawichai | 1302 Bua Yai |
| 0201 N. Udon Thani | 0705 Borabu | 1303 Ban Lum |
| 0202 Nam Som | 0706 Kae Dam | 1304 Khong |
| 0203 Suwannakhuha | 0707 Na Chuak | 1305 Kham Sakae Saeng |
| 0204 Ban Phu | 0708 Wapi Pathum | 1306 Nong Sung |
| 0205 Kut Chap | 0709 Na Dum | 1307 Phimai |
| 0206 Phen | 0710 Phayakkhaphum Pissai | 1308 Prathai |
| 0207 Sang Khom | 0801 M. Kalasin | 1309 Chum Phuang |
| 0208 Ban Dung | 0802 Tha Khantho | 1310 Huai Thalaeng |
| 0209 Thung Fon | 0803 Nong Kung Si | 1311 Chakkarakaj |
| 0210 Na Klang | 0804 Khom Muang | 1312 Dan Khun Thot |
| 0211 Si Bun Ruang | 0805 Sahatsakhan | 1313 Non Thai |
| 0212 Nong Bua Lam Phu | 0806 Somdet | 1314 Kham Thalaee So |
| 0213 Non Sang | 0807 Na Mon | 1315 Sung Noen |
| 0214 Nong Wu So | 0808 Khao Wong | 1316 Sikhiu |
| 0215 Non Sa-At | 0809 Kuchinarai | 1317 Pak Chong |
| 0216 Kumphawapi | 0810 Huai Mek | 1318 Pak Thong Chai |
| 0217 Nong Han | 0811 Yang Talat | 1319 Chok Chai |
| 0218 Chaiwan | 0812 Kamsasai | 1320 Khon Buri |
| 0219 Si That | 0813 Rong Kham | 1321 Soeng Sang |
| 0220 Wang Sam Mo | 0814 Huay Pung | 1322 Nong Bunsak |
| 0221 Nong Saeng | 0901 M. Roi Et | 1401 H. Buri Ram |
| 0301 M. Nong Khai | 0902 Pho Chai | 1402 Phutthaisong |
| 0302 Sangkhom | 0903 Phon Thong | 1403 Khu Muang |
| 0303 Si Chiang Mai | 0904 Muayawadee | 1404 Satuk |
| 0304 Tha Bo | 0905 Nong Phok | 1405 Krasang |
| 0305 Phon Phisai | 0906 Thawatchaburi | 1406 Lam Plai Mat |
| 0306 Pak Kad | 0907 Selaphum | 1407 Nong Ki |
| 0307 So Phisai | 0908 Chaturapak Pimun | 1408 Nang Rong |
| 0308 Bung Kan | 0909 Muang Suang | 1409 Pa khom |
| 0309 Phon Charoen | 0910 At Samat | 1410 Lahan Sai |
| 0310 Seka | 0911 Pathum Rat | 1411 Prakhon Chai |
| 0401 M. Sakhon Nakhon | 0912 Kaset Wisai | 1412 Ban Kruat |
| 0402 Ban Huang | 0913 Suwannaphum | 1413 Nong Hong |
| 0403 Kham Ta Kla | 0914 Phanom Phrai | 1414 Na Pho |
| 0404 Sawang Daen Din | 0915 Phon Sai | 1501 M. Surin |
| 0405 Wanon Niwat | 1001 M. Yasothon | 1502 Chumphon Buri |
| 0406 Akat Amnuai | 1002 Sai Hun | 1503 Tha Tum |
| 0407 Song Dao | 1003 Kut Chum | 1504 Chom Phra |
| 0408 Waritthaphum | 1004 Loeng Nok Tha | 1505 Sanom |
| 0409 Phang Khon | 1005 Pa Tiu | 1506 Rattanaaburi |
| 0410 Nakhom Nam Un | 1006 Kham Khuan Keo | 1507 Samrong Thap |
| 0411 Phanna Nakhom | 1007 Maha Chana Chai | 1508 Sikhoraphum |
| 0412 Kusuman | 1008 Kho Wang | 1509 Lamduan |
| 0413 Kut Bak | 1101 M. Ubon Ratchathani | 1510 Sangkha |
| 0414 Tao Koi | 1102 Chanuman | 1511 Prasat |
| 0415 Kok Sri Supan | 1103 Khemaraj | 1512 Kap Choeng |
| 0501 M. Nakhon Phanom | 1104 Senang Khanikhom | 1513 Bua Chet |
| 0502 Ban Phaeng | 1105 Amnat Charoen | 1601 M. Si Sa Ket |
| 0503 Si Songkhram | 1106 Hua Thaphan | 1602 Rasi Salai |
| 0504 Na Wa | 1107 Khuang Nai | 1603 Yang Chum Noi |
| 0505 Tha Uthen | 1108 Muang Samsip | 1604 Kanthararom |
| 0506 Pla Pak | 1109 Phana | 1605 Uthumphon Phisai |
| 0507 Renu Nakhon | 1110 Kut Kaopun | 1606 Huai Thap Than |
| 0508 Na Kae | 1111 Trakan Phutphon | 1607 Prang Ku |
| 0509 That Phanom | 1112 Taisum | 1608 Khukhan |
| 0601 M. Khon Kaen | 1113 Si Muang Mai | 1609 Phrai Bung |
| 0602 Chumphae | 1114 Khong Chiam | 1610 Khun Han |
| 0603 Si Chomphu | 1115 Warin Chamrap | 1611 Bung Boon |
| 0604 Phu Wiang | 1116 Pibun Mungsahan | 1612 Non Koon |
| 0605 Nong Rua | 1117 Det Udom | 1613 Kanthararak |
| 0606 Ban Fang | 1118 Nam Yun | 1614 Sri Pattana |
| 0607 Ubolratana | 1119 Na Chaiyai | 1701 Mukdahan |
| 0608 Kaosuankwang | 1120 Buntharik | 1702 Dong Luang |
| 0609 Nam Phong | 1121 Pho Sai | 1703 Khamcha-I |
| 0610 Kranuan | 1201 M. Chaiyaphum | 1704 Wan Yai |
| 0611 Phra Yun | 1202 Khon San | 1705 Nakhom Kham Soi |
| 0612 Hancha Khiri | 1203 Kaset Sombun | 1706 Don Tan |
| 0613 Ban Phai | 1204 Phu Khieo | |



COMMODITY FLOW OF SUGAR CANE

- | | | |
|-----------------------|--------------------------|---------------------------|
| 0101 M. Loei | 0614 Chonnabot | 1205 Ban Thae |
| 0102 Tha Li | 0615 Waeng Yai | 1206 Kaeng Khio |
| 0103 Chiang Khan | 0616 Waeng Noi | 1207 Khon Sawan |
| 0104 Pak Chom | 0617 Phon | 1208 Nong Bua Daeng |
| 0105 Na Duang | 0618 Nong Song Hon | 1209 Nong Bua Raueo |
| 0106 Na Haeo | 0619 Phouy Noi | 1210 Ban Khwao |
| 0107 Dan Sai | 0620 Phu Pha Man | 1211 Thep Satit |
| 0108 Phu Rua | 0701 M. Maha Satakhom | 1212 Bamnet Narong |
| 0109 Wang Saphung | 0702 Chiang Yun | 1213 Chatturat |
| 0110 Phu Kradung | 0703 Kosum Phisai | 1301 M. Nakhon Ratchasima |
| 0111 Phu Luang | 0704 Kantharawichai | 1302 Bua Yai |
| 0201 M. Udon Thani | 0705 Borabu | 1303 Ban Luam |
| 0202 Nam Som | 0706 Kae Dam | 1304 Khong |
| 0203 Suwannakhuha | 0707 Na Chuak | 1305 Kham Sakae Saeng |
| 0204 Ban Phu | 0708 Wapi Pathum | 1306 Nong Sung |
| 0205 Kut Chap | 0709 Na Dum | 1307 Phumai |
| 0206 Phen | 0710 Phayakkhaphum Pisai | 1308 Prathai |
| 0207 Sang Khom | 0801 M. Kalasin | 1309 Chum Phuang |
| 0208 Ban Dung | 0802 Tha Khantho | 1310 Huai Thalaeng |
| 0209 Thung Fon | 0803 Nong Kung Si | 1311 Chakkara |
| 0210 Na Klang | 0804 Khom Muang | 1312 Dan Khun Thot |
| 0211 Si Bun Ruang | 0805 Sahatsakhan | 1313 Non Thai |
| 0212 Nong Bua Lam Phu | 0806 Somdet | 1314 Kham Thalee So |
| 0213 Non Sang | 0807 Na Mon | 1315 Sung Noen |
| 0214 Nong Wua So | 0808 Khao Wong | 1316 Sikhio |
| 0215 Non Sa-At | 0809 Kuchinarai | 1317 Pak Chong |
| 0216 Kumphawapi | 0810 Huai Mek | 1318 Pak Thong Chai |
| 0217 Nong Han | 0811 Yang Talat | 1319 Chok Chai |
| 0218 Chaiwan | 0812 Kamalasai | 1320 Khon Buri |
| 0219 Si That | 0813 Rong Kham | 1321 Soeng Sang |
| 0220 Wang Sam Mo | 0814 Huay Pung | 1322 Nong Bunmak |
| 0221 Nong Saeng | 0901 M. Roi Et | 1401 M. Buri Ram |
| 0301 M. Nong Khai | 0902 Pho Chai | 1402 Phutthaisong |
| 0302 Sangkhom | 0903 Phon Thong | 1403 Khu Muang |
| 0303 Si Chiang Mai | 0904 Muayawadee | 1404 Satuk |
| 0304 Tha Bo | 0905 Nong Phok | 1405 Krasang |
| 0305 Phon Phisai | 0906 Thawatchaburi | 1406 Lam Piai Mat |
| 0306 Pak Kad | 0907 Selaphum | 1407 Nong Ki |
| 0307 So Phisai | 0908 Chaturapak Pimun | 1408 Nang Rong |
| 0308 Bung Kan | 0909 Muang Suang | 1409 Pa khom |
| 0309 Phon Charoen | 0910 At Samat | 1410 Lahan Sai |
| 0310 Seka | 0911 Pathum Rat | 1411 Prakhon Chai |
| 0401 M. Sakon Nakhon | 0912 Kaset Wisai | 1412 Ban Kruat |
| 0402 Ban Muang | 0913 Suwannaphum | 1413 Nong Hong |
| 0403 Kham Ta Kia | 0914 Phanom Phrai | 1414 Na Pho |
| 0404 Sawang Daen Din | 0915 Phon Sai | 1501 M. Surin |
| 0405 Nanon Niwat | 1001 M. Yasothon | 1502 Chumphon Buri |
| 0406 Akat Amnuai | 1002 Sai Mun | 1503 Tha Tum |
| 0407 Song Dao | 1003 Kut Chum | 1504 Chom Phra |
| 0408 Waritchaphum | 1004 Loeng Nok Tha | 1505 Sanom |
| 0409 Phang Khon | 1005 Pa Tiu | 1506 Rattanaaburi |
| 0410 Nikhom Nam Un | 1006 Kham Khuan Kaeo | 1507 Samrong Thap |
| 0411 Phanna Nikhom | 1007 Maha Chana Chai | 1508 Sikhoraphum |
| 0412 Kusuman | 1008 Kho Wang | 1509 Lamduan |
| 0413 Kut Bak | 1101 M. Ubon Ratchathani | 1510 Sangkha |
| 0414 Tao Koi | 1102 Chanuman | 1511 Prasat |
| 0415 Kok Sri Supan | 1103 Khemara | 1512 Kap Choeng |
| 0501 M. Nakhon Phanom | 1104 Senang Khanikhom | 1513 Bua Chet |
| 0502 Ban Phaeng | 1105 Amnat Charoen | 1601 M. Si Sa Ket |
| 0503 Si Songkhram | 1106 Hua Thaphan | 1602 Rasi Saisai |
| 0504 Na Wa | 1107 Khuang Nai | 1603 Yang Chum Noi |
| 0505 Tha Uthen | 1108 Muang Samsip | 1604 Kanthararom |
| 0506 Plo Pak | 1109 Phana | 1605 Uthumphon Phisai |
| 0507 Renu Nakhon | 1110 Kut Kaopun | 1606 Huai Thap Than |
| 0508 Na Kae | 1111 Trakan Phutphon | 1607 Prang Ku |
| 0509 That Phanom | 1112 Taisum | 1608 Khukhan |
| 0601 M. Khon Kaen | 1113 Si Muang Mai | 1609 Phrai Bung |
| 0602 Chumphae | 1114 Khong Chiam | 1610 Khun Han |
| 0603 Si Chomphu | 1115 Warin Chamrap | 1611 Bung Boon |
| 0604 Phu Wiang | 1116 Pibun Mungsahan | 1612 Non Koon |
| 0605 Nong Rua | 1117 Det Udom | 1613 Kanthararak |
| 0606 Ban Fang | 1118 Nam Yun | 1614 Sri Pattana |
| 0607 Ubolratana | 1119 Na Chaiwai | 1701 Mukdahan |
| 0608 Kaosuankwang | 1120 Buntharik | 1702 Dong Luang |
| 0609 Nam Phong | 1121 Pho Sai | 1703 Khamcha-I |
| 0610 Kranuan | 1201 M. Chaiyaphum | 1704 Wan Yai |
| 0611 Phra Yun | 1202 Khon San | 1705 Nikhom Kham Soi |
| 0612 Mancha Khiri | 1203 Kaset Sombun | 1706 Don Tan |
| 0613 Ban Phai | 1204 Phu Khieo | |



APPENDIX 3.1.1 POPULATION IN INFLUENCE AREAS

APPENDIX 3.1.1

1/6

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-1

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA			
					1983	1988	1994	2002
12 CHAIYAPHUM	13 CHATTURAT	08 TA NOEN	8563	10	856	865	873	881
		09 KAHAD	4681	30	1404	1418	1431	1445
13 NAKHON RATCHASIMA	03 BAN LUAM	01 BAN LUAM	6417	100	6417	6481	6540	6603
		02 WANG PHO	3657	100	3657	3694	3727	3763
	04 KHONG	03 KHOK KRA BUANG	5640	70	3948	3988	4024	4062
		04 CHO RAKA	4652	40	1861	1879	1896	1915
		01 MUANG KHONG	18446	20	3689	3726	3760	3796
		06 NONG MANAO	6141	80	4913	4962	5007	5055
		07 NONG BUA	5012	60	3007	3037	3065	3094
		08 NONG TENG	5061	70	3543	3578	3611	3645
TOTAL					33295	33630	33933	34260
					(0.20)	(0.15)	(0.12)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-4

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA						
					1983	1988	1994	2002			
06 KHON KAEN	13 BAN PHAI	06 PHOENG YAI	7328	30	2198	2348	2510	2714			
		14 CHONNABOT	7982	50	3991	4068	4134	4202			
	15 WAENG YAI		02 KUT PIA KHOM	10261	40	4104	4184	4251	4321		
			03 WANG SAENG	6947	10	695	708	720	731		
			04 HUAI KAE	5683	100	5683	5793	5886	5983		
			05 BAN TAEN	9201	30	2760	2814	2859	2906		
			01 KHON CHIM	4304	75	3228	3228	3228	3228		
			04 WAENG YAI	4395	100	4395	4395	4395	4395		
			TOTAL					27055	27537	27983	28480
								(0.35)	(0.27)	(0.22)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-5

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA						
					1983	1988	1994	2002			
06 KHON KAEN	01 MUANG KHON KAEN	03 KHOK SI	12444	65	8089	9063	10166	11583			
		09 NAM PHONG	13912	70	9738	10253	10801	11478			
	10 KRANUAN		02 WANG CHAI	8903	70	6232	6562	6912	7345		
			04 BUA YAI	6790	30	2037	2145	2259	2401		
			07 BAN KHAM	8506	60	5104	5373	5661	6015		
			09 SAI MUN	6108	20	1222	1286	1355	1440		
			10 THA KRASERM	7073	100	7073	7447	7845	8336		
			04 BAN NON	9281	10	928	978	1030	1095		
			TOTAL					40422	43107	46029	49693
								(1.29)	(1.10)	(0.96)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-7

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA			
					1983	1988	1994	2002
02 UDON THANI	01 MUANG UDON THANI	05 BAN TAD	23879	60	14327	14862	15425	16092
		15 NONG HAI	7303	55	4017	4166	4324	4511
		11 NADI	9616	50	4808	4987	5176	5400
	21 NONG SAENG	16 BAN CHAN	20128	10	2013	2088	2167	2261
		01 NONG SAENG	8313	45	3741	4316	4982	5839
		02 SAENG SWANG	13638	15	2046	2360	2724	3193
TOTAL					30951	32780	34800	37296
					(1.15)	(1.00)	(0.87)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-8

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA			
					1983	1988	1994	2002
02 UDON THANI	16 KUMPHAWAPI	01 THUM TAI	18233	40	7293	8350	9571	11140
		03 WIANG KHAM	6139	10	614	703	806	938
		07 HUAY KOENG	16540	80	13232	15150	17364	20211
TOTAL					21139	24203	27741	32288
					(2.74)	(2.30)	(1.92)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-9

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA					
					1983	1988	1994	2002		
02 UDON THANI	16 KUMPHAWAPI	03 WIANG KHAM	6139	5	307	351	403	469		
		04 CHAE LAE	9682	40	3873	4434	5082	5915		
		05 UM JAN	6014	20	1203	1377	1578	1837		
		17 NONG HAN	01 NONG HAN	19687	40	7875	8224	8600	9054	
			02 NONG MEK	11954	20	2391	2497	2611	2749	
	03 KHOK SAI	03 KHOK SAI	6811	60	4087	4268	4463	4698		
		04 BAN CHIT	7239	5	362	378	395	416		
		05 PHANG NGU	10218	90	9196	9604	10043	10573		
		TOTAL					29293	31134	33176	35712
							(1.23)	(1.06)	(0.92)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-12

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA			
					1983	1988	1994	2002
04 SAKHON NAKHON	04 SAWANG DAEN DIN	01 SAWANG DAEN DIN	16973	30	5092	5092	5092	5092
		06 NONG LUANG	5923	5	296	296	296	296
		11 SAI MUN	6213	10	621	621	621	621
		17 BAN TAI	6553	10	655	655	655	655
	07 SONG DAO	01 SONG DAO	5588	90	5029	5242	5413	5613
		03 WATTANA	4242	40	1697	1769	1826	1894
		04 PHATUM WAPI	4323	40	1729	1803	1861	1930
TOTAL					15120 (0.47)	15478 (0.31)	15765 (0.26)	16101

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-19

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA				
					1983	1988	1994	2002	
09 ROI ET	03 PHONG THONG	11 PHROM SAWAN	4782	80	3826	4055	4309	4622	
		05 NONG PHOK	04 KHOK PHO	4361	10	436	471	510	560
			06 NONG KHUN YAI	10230	60	6138	6629	7182	7877
	07 SELAPHUM	07 ROB MUANG	6287	5	314	339	368	403	
		01 KLANG	15372	20	3074	3230	3399	3605	
		03 MUANG PHRAI	11012	30	3304	3471	3652	3874	
		05 NA MUANG	8251	10	825	867	912	968	
		06 WANG LUANG	7169	60	4301	4519	4755	5044	
		09 PHO THONG	13671	80	10937	11490	12091	12826	
		10 PHN NGEN	11064	70	7745	8136	8562	9083	
	13 LAO NOI	4476	90	4028	4232	4454	4724		
	10 YASOTHON	02 SAI MUN	04 NA WIENG	3712	50	1856	1912	1970	2036
		03 KUT CHUM	07 PHON NGAM	7828	20	1566	1666	1777	1915
TOTAL					48350 (1.08)	51016 (0.93)	53941 (0.81)	57538	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-24

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA			
					1983	1988	1994	2002
11 UBON RATCHATHANI	17 DET UDOM	02 NA SUANG	11843	30	3553	4097	4726	5536
		03 NA YIA	13459	50	6730	7760	8951	10485
		05 NA RUANG	5545	10	555	639	738	864
TOTAL					10837 (2.89)	12497 (2.41)	14415 (2.00)	16885

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-25

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA			
					1983	1988	1994	2002
10 YASOTHON	07 MAHA CHANA CHAI	01 FA YAD	8351	50	4176	4354	4546	4777
		04 PHU HEE	4040	60	2424	2528	2639	2773
		10 SONG YANG	4000	100	4000	4171	4355	4576
	08 KHO WANG	01 FA HUAN	5060	10	506	530	556	587
		02 KUD NAM SAI	8339	70	5837	6112	6409	6770
		03 NAM OM	4924	100	4924	5155	5406	5711
		04 KHO WANG	6612	95	6281	6577	6897	7285
16 SI SA KET	02 RASI SALAI	11 PHAI	8805	10	881	938	1001	1080
	03 YANG CHUM NOI	04 NON KOON	4693	10	469	518	573	644
TOTAL					29498	30882	32383	34203
					(0.92)	(0.79)	(0.69)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-26

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA			
					1983	1988	1994	2002
15 SURIN	06 RATTANABURI	02 THAT	9815	70	6871	7294	7763	8345
		11 BIRD	6932	70	4852	5152	5483	5894
16 SI SA KET	05 UTHUMPON PHISAI	06 KHAM	8378	60	5027	5168	5311	5473
		07 NONG HAI	7690	20	1538	1581	1625	1674
		09 TA KORN	8646	10	865	889	913	941
		19 DOD	5123	100	5123	5267	5413	5577
		20 NONG MA	3886	100	3886	3995	4106	4231
		21 SUEW	6968	100	6968	7164	7362	7586
	11 BUNG BOON	02 POA	4382	50	2191	2430	2704	3053
TOTAL					37320	38942	40680	42774
					(0.85)	(0.73)	(0.63)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-27

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA			
					1983	1988	1994	2002
15 SURIN	01 MUANG SURIN	08 TA KUK	12448	20	2490	2634	2792	2988
		15 BUNG	5061	5	253	268	284	304
	04 CHOM PHRA	01 CHOM PHRA	10052	30	3016	3182	3364	3588
		04 BU KRANG	7357	100	7357	7762	8207	8754
		06 BAN PHUE	4895	60	2937	3099	3276	3495
	08 SIKHORAPHUM	05 TAE	12826	90	11543	12485	13546	14883
		06 NONG BUA	10670	40	4268	4616	5008	5503
		09 NONG KWAW	8791	30	2637	2852	3095	3400
		12 KWAW YAI	5792	50	2896	3132	3398	3734
TOTAL					37397	40030	42971	46648
					(1.37)	(1.19)	(1.03)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-29

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA				
					1983	1988	1994	2002	
14 BURI RAM	05 KRASANG	01 KRASANG	12288	30	3686	4027	4413	4902	
		03 SONG CHAN	7896	5	395	431	473	525	
		04 SUNG NOEN	04 SUNG NOEN	7619	90	6857	7490	8209	9119
			08 BAN PRUE	6272	90	5645	6166	6757	7506
	11 PRAKHON CHAI	01 PRAKHON CHAI	01 PRAKHON CHAI	16730	20	3346	3560	3797	4093
			02 SALAENG TONE	16038	10	1604	1706	1820	1962
		03 BAN SAI	03 BAN SAI	11679	20	2336	2485	2651	2857
			04 CHAN DUM	10689	90	9620	10235	10918	11767
		09 KHOK KAMIN	5696	95	5411	5757	6141	6619	
		12 PA CHAN	6650	30	1995	2123	2264	2440	
	13 SA DAO	5927	100	5927	6306	6727	7250		
	14 PHAI SAN	10235	5	512	544	581	626		
	15 SURIN	01 MUANG SURIN 11 PRASART	13 SAWAI	13125	30	3938	4165	4416	4726
			05 TUNG MON	0	0	0	0	0	0
TOTAL					51271	54997	59167	64391	
					(1.41)	(1.23)	(1.06)		

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-31

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA				
					1983	1988	1994	2002	
14 BURI RAM	06 LAM PLAI MAT	06 NONG KRATING	5642	25	1411	1799	2253	2844	
		14 PHATHAI RIN	6891	95	6546	8349	10458	13202	
	07 NONG KI	01 NONG KI	20796	10	2080	2103	2121	2134	
		02 YEI PRASAT	9910	80	7928	8019	8086	8134	
	13 K.A.NONG HONG	03 MUANG PHAI	03 MUANG PHAI	9818	50	4909	4965	5007	5037
			01 THAI SAMAKEE	12005	70	8404	9264	10244	11491
		02 HUAY HIN	12098	85	10283	11336	12535	14061	
	03 SRA KEAW	14601	70	10221	11267	12459	13976		
	TOTAL					51781	57101	63164	70879
						(1.98)	(1.70)	(1.45)	

POPULATION WITHIN AREA OF INFLUENCE : ROUTE IM-33

CHANGWAT	AMPHOE	TAMBON	POPULATION IN 1983	%	POPULATION IN INFLUENCE AREA				
					1983	1988	1994	2002	
13 NAKHON RATCHASIMA	15 SUNG NOEN	01 SUNG NOEN	8404	10	840	868	897	931	
		07 MA KLUA MAI	4670	40	1868	1930	1994	2069	
		08 MA KLUA KAO	7675	30	2303	2379	2458	2550	
		10 NONG TAKAI	4160	70	2912	3008	3108	3225	
	18 PAK THONG CHAI	01 MUANG PAK	18475	30	5543	6005	6528	7188	
		02 TA KHU	10080	50	5040	5461	5936	6536	
		03 KHOK THAI	3961	50	1981	2146	2333	2568	
	19 CHOK CHAI	01 KRATOK	12739	10	1279	1468	1687	1969	
		02 PLAB PLA	7409	60	4445	5104	5864	6843	
	TOTAL					26210	28369	30805	33877
						(1.60)	(1.38)	(1.20)	

APPENDIX 3.1.2 SALINITY AFFECTED AREA BY AMPHOE

Changwat	Amphoe	(A) Total Area (km ²)	(B) 1/ Salinity Affected Area (km ²)	B/A (%)	Changwat	Amphoe	(A) Total Area (km ²)	(B) 1/ Salinity Affected Area (km ²)	B/A (%)
02 UDON THANI	01 M. Udon Thani	1,081	240.9	22.3	13 NAKHON RATCHASIMA	03 Ban Luam	233	25.0	10.7
	16 Kumphawapi	1,308	367.4	28.1		04 Khong	914	274.4	30.0
	17 Nong Han	1,538	152.2	9.9		15 Sung Noen	1,187	-	-
	21 Nong Saeng	651	-	-		18 Pak Thong Chai	2,460	127.3	5.2
04 SAKHON NAKHON	04 Sawang Daen Din	1,372	-	-		19 Chok Chai	1,004	-	-
	07 Song Dao	356	-	-	14 BURI RAM				
06 KHON KAEN	01 M. Khon Kaen	1,112	26.5	2.4		05 Krasang	599	5.2	0.1
	09 Nam Phong	824	-	-		06 Lam Plai Mat	805	-	-
	10 Kranuan	436	-	-		07 Nong Ki	385	-	-
	13 Ban Phai	810	-	-		11 Prakhon Chai	1,631	-	-
	14 Chonnabot	291	6.9	2.4		13 Nong Hong	343	-	-
	15 Waeng Yai	226	-	-	15 SURIN				
09 ROI ET	03 Phon Thong	780	17.7	2.3		01 M. Surin	1,278	-	-
	05 Nong Phok	450	-	-		04 Chom Phra	429	-	-
	07 Selaphum	741	31.5	4.3		06 Rattanaaburi	491	28.5	5.8
10 YASOTHON	02 Sai Mun	940	25.0	4.6		08 Sikhoraphum	562	-	-
	03 Kut Chum	264	-	-		11 Prasat	909	-	-
	07 Maha Chana Chai	455	10.2	2.2	16 SI SA KET				
	08 Kho Wang	150	20.0	13.3		02 Rasi Salai	714	149.9	21.0
11 UBON RATCHATHANI	17 Det Udom	1,853	-	-		03 Yang Chum Noi	660	-	-
12 CHAIYAPHUM	13 Chatturat	1,204	252.8	21.0		05 Uthumphon Phisai	612	-	-
						11 Bung Boon	50	-	-

Note: 1/ : More than 8 mmho/cm (1 mmho/cm = 0.64 g/l = 640 ppm)

Source: Land Development Department

APPENDIX 3.1.3 CULTIVATED AREA BY TAMBON, AMPHOE AND ROUTE

(1983)

(Unit : thousand rai)

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total
IM - 1 Chaiyaphum	Chatturat	Ta Noen	2.94	4.50	7.44
		Kahad	1.88	0.19	2.07
		(Total)	4.82	4.69	9.51
Nakhon Ratchasima	Ban Luam	Ban Luam	13.00	0.37	13.37
		Wang Pho	7.13	4.32	11.45
		Khok Kra Buang	35.00	25.33	60.33
		Cho Raba	4.31	4.13	8.44
		(Total)	59.44	34.12	93.56
Khong	Muang Khong	Muang Khong	7.56	0.63	8.19
		Nong Manao	19.50	7.88	27.38
		Nong Bua	11.69	5.32	17.01
		Nong Teng	8.19	2.38	10.57
		(Total)	46.94	16.21	63.15
(TOTAL IM - 1)			111.20	55.02	166.22

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total	
IM - 4 Khon Kaen	Ban Phai	Phoey Yai	6.94	-	6.94	
		Chonnabot	10.50	0.40	10.90	
		Kut Pia Khem	20.19	0.44	20.63	
		Wang Saeng	5.31	-	5.31	
		Kuay Kae	21.63	-	21.63	
	Waeng Yai	Bon Taen	Bon Taen	14.13	-	14.13
			(Total)	71.76	0.84	72.60
			Non Chim	50.00	-	50.00
			Waeng Yai	9.00	-	9.00
			(Total)	59.00	-	59.00
(TOTAL IM - 4)			137.70	0.84	138.54	

APPENDIX 3.1.3 CULTIVATED AREA BY TAMBON, AMPHOE AND ROUTE

(1983) (๒๕๒๖)

(Unit : thousand rai)

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total
IM - 5	M. Khon Kaen	Khok Si	30.50	-	30.50
Khon Kaen	Nam Phong	Nam Phong	7.12	1.31	8.43
		Wang Chai	6.19	1.06	7.25
		Bua Yai	8.00	-	8.00
		Bua Kham	11.81	-	11.81
		Sai Mun	6.50	-	6.50
		Tha Kraserm	26.38	-	26.38
		(Total)	66.00	2.37	68.37
Kranuan		Ban Non	5.63	-	5.63
		(TOTAL IM-5)	102.13	2.37	104.50
IM - 7					
Udon Thani	M. Udon Thani	Ban Tad	8.37	20.88	29.25
		Hong Hai	5.88	11.50	17.38
		Ban Chan	1.25	-	1.25
		Nadi	4.75	-	4.75
		(Total)	20.25	32.38	52.63
Nong Saeng		Nong Saeng	23.62	21.93	45.55
		Soeng Swang	6.19	4.76	10.95
		(Total)	29.81	26.69	56.50
(TOTAL IM - 7)			50.06	59.07	109.13

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total
IM - 8					
Udon Thani	Kumphawapi	Thum Tai	11.00	-	11.00
		Wrang Kham	2.96	-	2.96
		Huay Koeng	18.05	8.24	26.29
		(TOTAL IM - 8)	32.01	8.24	40.25
IM - 9					
Udon Thani	Kumphawapi	Wang Kham	0.69	-	0.69
		Chae Lae	10.00	7.25	17.25
		Um Jan	3.00	-	3.00
		(Total)	13.69	7.25	20.94
		Nong Kan		Nong Han	18.25
Nong Mek	3.31			2.76	6.07
Khok Sai	11.31			6.68	17.99
Ban Chit	0.81			-	0.81
Phang Ngu	37.94			1.25	39.19
(Total)	71.62	15.39	87.01		
(TOTAL IM - 9)			85.31	22.64	107.95

APPENDIX 3.1.3 CULTIVATED AREA BY TAMBON, AMPHOE AND ROUTE

(1983)

(Unit : thousand rai)

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total	Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total
IM - 12						IM - 19					
Sakhon Nakhon	Sawang Daen Din	Sawang Daen Din	14.18	3.87	18.05	Roi Et	Phon Thong	Phrom Sawan	16.75	4.19	20.94
		Nong Luang	1.19	0.25	1.44		Nong Phok	Khok Pho	-	0.75	0.75
		Sai Mun	6.94	0.56	7.50			Nong Khun Yai	5.63	21.31	26.94
		Ban Tai	0.94	4.75	5.69			Rob Muang	-	0.86	0.86
		(Total)	23.25	9.43	32.68			(Total)	5.63	22.92	28.55
	Song Dao	Song Dao	14.94	12.06	27.00		Selaphum	Klang	3.00	-	3.00
		Wattana	5.62	7.31	12.93			Muang Phrai	10.56	1.62	12.18
		Phatum Wapi	4.25	8.44	12.69			Na Muang	7.56	-	7.56
		(Total)	24.81	27.81	52.62			Wang Luang	9.31	1.81	11.12
		(TOTAL IM-12)	48.06	37.24	85.30			Pho Thong	29.31	18.56	47.87
								Phu Ngen	11.63	15.19	26.82
								Lao Noi	7.56	5.30	12.86
								(Total)	78.93	42.48	121.41
						Yasothon	Sai Mun	Na Wieng	4.19	5.06	9.25
							Kut Chum	Phon Ngam	3.44	6.43	9.87
								(Total)	7.63	11.49	19.12
								(TOTAL IM - 19)	108.94	81.08	190.02

APPENDIX 3.1.3 CULTIVATED AREA BY TAMBON, AMPHOE AND ROUTE

(1983)

(Unit : thousand rai)

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total
IM - 24					
Ubon Ratchathani	Det Udom	Na Suang	15.19	1.69	16.88
		Na Yia	34.31	2.94	37.25
		Na Ruang	3.94	-	3.94
		(TOTAL IM-24)	53.44	4.63	58.07
IM - 25					
Yasothon	Maha Chana	Fa Yad	10.38	2.44	12.82
		Phu Hee	14.31	0.60	14.91
		Song Yang	8.44	1.82	10.26
		(Total)	33.13	4.86	37.99
		Kho Wang	Fa Huan	1.37	-
	Kud Nam Sai	13.69	-	13.69	
	Nam Om	23.13	2.25	25.38	
	Kho Wang	19.50	2.81	22.31	
	(Total)	57.69	5.06	62.75	
	Si Sa Ket	Rasi Salai Yang Chum Noi	Phai	4.00	-
Non Koon			1.93	-	1.93
(Total)			5.93	-	5.93
(TOTAL IM-25)	96.75	9.92	106.67		

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total	
IM - 26						
Surin	Rattana Buri	That	18.88	-	18.88	
		Bird	10.94	-	10.94	
		(Total)	29.82	-	29.82	
Si Sa Ket	Uthumphon Phisai	Khan	12.06	-	12.06	
		Nong Hai	3.62	-	3.62	
		Ta Karn	7.44	-	7.44	
		Dod	19.19	-	19.19	
		Nong Ma	12.94	-	12.94	
		Suew	18.00	2.25	20.25	
	(Total)	75.25	2.25	77.50		
	K.A. Bung Boon	Pon		6.44	1.48	7.92
			(TOTAL IM-26)	111.51	3.73	115.24

APPENDIX 3.1.3 CULTIVATED AREA BY TAMBON, AMPHOE AND ROUTE

(1983)

(Unit : thousand rai)

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total
IM - 27					
Surin	M. Surin	Ta Kuk	10.38	-	10.38
		Bung	2.56	-	2.56
		(Total)	12.94	-	12.94
	Chom Phra	Chom Phra	12.38	-	12.38
		Bu Krang	20.25	-	20.25
		Ban Phue	14.31	0.25	14.56
		(Total)	46.94	0.25	47.19
	Sikhoraphum	Tae	34.88	-	34.88
		Nong Bua	9.62	0.75	10.37
		Nong Kwaw	7.19	-	7.19
		Kwaw Yai	11.00	-	11.00
		(Total)	62.69	0.75	63.44
		(TOTAL IM-27)	122.57	1.00	123.57

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total	
IM - 29						
Buri Ram	Krasang	Krasang	10.85	-	10.85	
		Song Chan	1.26	-	1.26	
		Sung Noen	25.67	-	25.67	
		Ban Prue	21.90	-	21.90	
		(Total)	59.68	-	59.68	
	Prakhon Chai	Prakhon Chai	6.98	-	6.98	
		Salaeng Tone	3.49	-	3.49	
		Ban Sai	6.98	-	6.98	
		Chan Dum	26.16	-	26.16	
		Khok Kamin	24.50	-	24.50	
		Pa Chan	11.44	-	11.44	
		Sa Dao	26.15	-	26.15	
		Phai Son	2.62	-	2.62	
		(Total)	108.32	-	108.32	
		Surin	M. Surin	Sawai	7.36	-
Prasart	Tung Mon			4.65	-	4.65
	(TOTAL IM-29)			180.01	-	180.01

APPENDIX 3.1.3 CULTIVATED AREA BY TAMBON, AMPHOE AND ROUTE

(1983)

(Unit : thousand rai)

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total
IM - 31					
Buri Ram	Lam Plai Mat	Nong Krating	4.25	1.25	5.50
		Phathai Rin	32.75	2.25	35.00
		(Total)	37.00	3.50	40.50
Nong Ki	Nong Ki	Nong Ki	6.94	-	6.94
		Yei Prasat	39.18	4.50	43.68
		Muang Phai	14.19	10.38	24.57
		(Total)	60.31	14.88	75.19
K.A. Nong Hong	K.A. Nong Hong	Thai Samakee	45.75	2.62	48.37
		Huay Hin	49.94	7.50	57.44
		Sra Keaw	37.12	-	37.12
		(Total)	132.81	10.12	142.93
(TOTAL IM-31)			230.12	28.50	258.62

Route No. Changwat	Amphoe	Tambon	Paddy Field	Upland Field	Total
IM - 33					
Nakhon Ratchasima	Sung Noen	Sung Noen	1.66	3.99	5.65
		Ma Klua Mai	0.98	12.75	13.73
		Ma Klua Kau	17.54	2.21	19.75
		Nong Takai	4.27	20.64	24.91
(Total)			24.46	39.60	64.06
Pak Thong Chai	Pak Thong Chai	Muang Pak	3.23	5.51	8.74
		Khok Thai	4.27	2.99	7.26
		Taku	1.04	16.98	18.02
		(Total)	8.54	25.48	34.02
Chok Chai	Chok Chai	Kratok	0.53	-	0.53
		Plab Pla	4.34	4.39	8.73
		(Total)	4.87	4.39	9.26
(TOTAL IM-33)			37.87	69.47	107.34

APPENDIX 3.1.4 PLANTED AREA BY ROUTE

(1983)

(Unit : thousand rai)

ROUTE NO.	PADDY	UPLAND CROPS									TOTAL	TOTAL
		MAIZE	SORGHUM	BEANS	GROUND NUTS	CASSAVA	KENAF	SUGAR CANE	COTTON	CASTOR BEANS		
IM-1	92.74	2.06	0.77	0.27	0.05	13.29	9.92	-	5.33	10.67	42.36	135.10
IM-4	85.37	0.39	-	-	-	0.39	-	-	-	-	0.78	86.15
IM-5	74.04	-	-	-	-	-	-	1.85	-	-	1.85	75.89
IM-7	39.90	0.01	-	0.05	0.16	11.34	2.91	15.65	-	-	30.12	70.02
IM-8	25.64	-	-	-	-	0.02	0.26	7.23	-	-	7.51	33.15
IM-9	58.35	-	-	0.18	0.09	5.07	3.59	7.33	-	-	16.26	74.61
IM-12	47.10	2.73	-	0.48	-	20.50	3.07	5.99	-	-	32.77	79.87
IM-19	91.07	0.64	-	0.94	1.27	45.70	22.48	-	-	-	71.03	162.10
IM-24	52.91	0.18	-	0.47	-	0.16	1.59	-	-	-	2.40	55.31
IM-25	92.02	-	-	-	-	-	8.52	-	-	-	8.52	100.54
IM-26	107.83	-	-	-	-	-	2.61	-	-	-	2.61	110.44
IM-27	115.22	0.07	-	0.30	-	-	0.02	-	-	-	0.39	115.61
IM-29	156.43	-	-	-	-	-	-	-	-	-	-	156.43
IM-31	226.21	2.07	-	2.18	0.12	7.19	1.48	0.07	-	-	13.11	239.32
IM-33	27.19	9.28	0.22	0.67	1.06	26.18	0.13	-	0.51	0.76	38.82	66.02

APPENDIX 3.1.5 AVERAGE CROP YIELD BY ROUTE

(1983)

(UNIT : KG / RAI)

ROUTE NO.	PADDY	UPLAND CROPS								
		MAIZE	SORGHUM	BEANS	GROUND NUTS	CASSAVA	KENAF	SUGAR CANE	COTTON	CASTOR BEANS
IM-1	258.4	336.8	185.0	128.5	205.0	1,967.4	211.8	-	218.1	120.0
IM-4	287.3	310.0	-	-	-	1,750.0	-	-	-	-
IM-5	269.0	-	-	-	-	-	-	8,000.0	-	-
IM-7	251.8	247.0	-	166.0	210.9	2,805.0	225.3	7,129.0	-	-
IM-8	246.8	-	-	-	-	2,062.5	202.5	7,296.0	-	-
IM-9	270.8	-	-	120.8	230.0	2,031.2	213.2	6,731.0	-	-
IM-12	278.5	350.0	-	150.0	-	2,328.8	214.3	4,961.4	-	-
IM-19	319.1	479.7	-	139.3	193.4	2,062.3	212.4	-	-	-
IM-24	257.5	312.5	-	150.0	-	2,250.0	180.0	-	-	-
IM-25	289.1	-	-	-	-	-	200.0	-	-	-
IM-26	292.5	-	-	-	-	-	200.0	-	-	-
IM-27	265.5	209.2	-	115.0	-	-	180.0	-	-	-
IM-29	268.9	-	-	-	-	-	-	-	-	-
IM-31	266.0	324.1	-	125.2	174.1	1,996.4	220.5	5,879.2	-	-
IM-33	275.7	322.9	258.1	123.4	227.1	2,118.6	280.5	-	218.1	133.0

APPENDIX 3.1.6 CROP PRODUCTION AMOUNT BY ROUTE

(1983)

(UNIT : TON)

ROUTE NO.	PADDY	UPLAND CROPS									TOTAL	TOTAL
		MAIZE	SORGHUM	BEANS	GROUND NUTS	CASSAVA	KENAF	SUGAR CANE	COTTON	CASTOR BEANS		
IM-1	23,964	694	142	35	10	26,147	2,101	-	1,162	1,280	31,572	55,536
IM-4	24,527	121	-	-	-	683	-	-	-	-	803	25,330
IM-5	19,917	-	-	-	-	-	-	14,800	-	-	14,800	34,717
IM-7	10,047	1	-	8	34	31,809	656	111,569	-	-	144,076	154,123
IM-8	6,328	-	-	-	-	41	53	52,750	-	-	52,844	59,172
IM-9	15,801	-	-	22	21	10,298	765	49,338	-	-	60,444	76,245
IM-12	13,117	956	-	72	-	47,740	658	29,719	-	-	79,145	92,262
IM-19	29,060	307	-	131	246	94,247	4,775	-	-	-	99,705	128,766
IM-24	13,624	56	-	70	-	360	286	-	-	-	773	14,397
IM-25	26,603	-	-	-	-	-	1,704	-	-	-	1,704	28,307
IM-26	31,540	-	-	-	-	-	522	-	-	-	522	32,062
IM-27	30,591	15	-	35	-	-	4	-	-	-	53	30,644
IM-29	42,064	-	-	-	-	-	-	-	-	-	-	42,064
IM-31	60,172	671	-	273	21	14,354	326	412	-	-	16,057	76,229
IM-33	7,497	2,997	57	83	241	55,471	36	-	111	102	59,098	66,595

APPENDIX 3.2.1 COMPARISON OF TRAFFIC FORECAST METHODOLOGY

JICA Method

Base Year Traffic	Vehicle Type	Traffic Movement in Base Year	Growth Rate	Future Traffic	ADT
1. Established based on synthetic analysis of traffic counts by the study team and DOH. 2. Adjusted by seasonal factors. 3. In case of new construction routes, present traffic volume was estimated by the model developed from O/D survey data.	1. Passenger <u>Type</u> <u>Occupancy^{1/}</u> P/C 3.0 persons P/P 3.8 L/B 14.5 M/B 20.6 H/B 38.7	1. Passenger Movement in terms of persons was calculated by multiplying the number of passenger vehicles by occupancy rate by vehicle type and then summing up.	1. Passenger a) Estimated based on the growth rates of: . Population . Per capita income . Transportation price b) Elasticity Income and transportation price elasticities were applied for the estimation.	1. Passenger movement a) Normal traffic Multiplying passenger movement in base year by the passenger growth rate, b) Induced traffic Multiplying "normal traffic" by the "induced traffic" ratio which was assumed as 15% based on DOH data.	1. Passenger Estimated applying the average occupancy and traffic composition to passenger movement.
	2. Freight <u>Type</u> <u>Average Load^{1/}</u> P/T 0.6 tons 4/T 0.74 6/T 2.17 10/T 8.61	2. Freight Movement in terms of tons was calculated by multiplying the number of freight vehicles by average load by vehicle type and then summing up.	b) Elasticity Income and transportation price elasticities were applied for the estimation. Income elasticity was obtained from the home interview survey.	c) Developed traffic Multiplying "normal and induced traffic" by developed ratio which was estimated based on the planted area in "with and without" case.	2. Freight Estimated applying the average load and traffic composition to freight movement.
			2. Freight Established based on the following movement: a) Non-agricultural freight Estimated by the correlation model between passenger movement and freight based on roadside interview results.	3. Motorcycle Estimated by the model established based on an analysis of the relationship between motorcycle volume and ADT.	
			b) Agricultural freight Estimated based on the future crop production obtained from the agricultural development study.	a) Non-agricultural Estimated based on the growth rate which was derived from the model.	
				b) Agricultural freight Quoted from the agricultural development study.	

^{1/} Occupancy rates and average loads were estimated based on the roadside interview survey conducted by the study team.

Study of Rural Roads May 1981

Base Year Traffic	Vehicle Type	Transportation		Future Traffic	
		Movement in Base Year	Growth Rate	Future Movement	ADT
Estimated based on:	1. Passenger	1. Generation of Passenger Movement.		1. Estimated future population, income and crop production by applying growth rated by Changwat.	1. ADTs were estimated using same method as base year.
. Transportation movement	a) Occupancy Share	a) Classification of passengers		2. Estimated by models applying future population, income and crop production by Changwat.	2. Generated and developed traffic were calculated by subtracting normal from total.
. Occupancy rate by vehicle type for passengers	. Heavy bus 34 [5 %	. Bus		3. In case of "with project", development model was applied for estimation of population, income and crop production.	
. Average load	. Light bus 9 [95 %	. Motorcycle, pickup and car			
	. Motor cycle 1.5	b) Trips (T) was estimated based on:			
	. pickup 5 [70 %	. Expenditure for transportation (E)*			
	. Car 4.5 [30 %	. Average trip length (L)			
	b) Motorcycle, pickup and car passengers were estimated using a linear model.	. Average cost per km (C)			
	2. Freight	. $T = E / (CxL)$.			
		. Divided by 365 and multiplied by 3/8			
		2. Freight movement			
		a) Basis is agricultural production by kind.			
		b) Added to back hauls and 10% of non-agricultural supplies.			
		c) Divided by 365 and multiplied by 3/8.			
		* "Socio-economic Survey 1975-76"			

Table 4-B

Crop	Pickup		Trucks	
	%	Av. load	%	Av. load
Rice	20	1.5	20	-
Rubber	50	1.5	-	-
Cassava	-	-	100	9
Sugarcane	-	-	100	14
Tobacco	20	1.5	80	6
All others	80	1.5	20	5

Road Feasibility Study Project October 1982

Base Year Traffic	Vehicle Type	Transportation Movement in Base Year	Future Traffic	
			Growth Rate	Future Movement ADT
<p>1. Weekly ADTs were assumed by applying adjustment factor to 3-day counts.</p> <p>2. Annual ADTs were calculated combining weekly ADTs and agricultural traffic.</p>	<p>10 Types:</p> <ul style="list-style-type: none"> . Motorcycles . Passenger cars and taxis . Light trucks . Medium trucks . Heavy trucks . Light buses . Medium buses . Agricultural light trucks . Agricultural medium trucks . Agricultural heavy trucks 	<p>Traffic movements were explained in terms of number of vehicles.</p>	<p>1. Passenger car, light truck and light bus Growth rate = $P + eU$</p> <p>P: Population growth rate U: Per capita GPP growth rate e: 1.33 which is income elasticity outside Bangkok based on data for 1975-1979</p> <p>2. Medium bus Growth rate = $P+eU$ P,U: As above e : 1.0 national value</p> <p>3. Motorcycle Derived based on the trend of motorcycle registrations and motorcycle traffic.</p> <p>4. Medium and Heavy Trucks Growth rate = GPP Growth Rate.</p>	<p>1. Normal traffic was calculated by applying the growth rates to AADTS.</p> <p>2. Generated traffic rates considering change of road surface condition were established:</p> <ul style="list-style-type: none"> . Passenger car 50% . Light trucks and all buses 20% . Motorcycles, medium and heavy trucks 0% <p>3. Development traffic was limited.</p> <p>4. Diverted traffic was estimated based on O/D survey data.</p>

Feasibility Study and Detailed Engineering Design for Provincial Road Improvement, October 1982

Base Year Traffic	Vehicle Type	Transportation Movement in Base Year	Future Traffic	
			Growth Rate	Future Movement ADT
<p>1. ADT were calculated based on:</p> <ul style="list-style-type: none"> . Results of traffic survey . Seasonal adjustment factors by subregion which were established for passenger and freight vehicles (based on DOH data). 	<p>1. Passenger</p> <ul style="list-style-type: none"> . Motorcycles . Passenger cars & taxis . Light buses . Heavy buses . Light trucks <p>2. Freight</p> <ul style="list-style-type: none"> . Medium trucks . Heavy trucks <p>3. Occupancy rate for all vehicle types were estimated and also average load and empty car rates for vehicles which were used for freight transportation.</p>	<p>1. Passenger</p> <p>a) Affecting factors</p> <ul style="list-style-type: none"> . Population . Per capita income . Transportation price <p>b) Elasticity</p> <ul style="list-style-type: none"> . Income elasticity of demand for transportation services (based on "Socio-economic Survey 1975-1976") $ep = 15.02 \times Y^{-0.295}$ $ev = 113.2 \times Y^{-0.443}$ <p>Where, ep: Income elasticity of public transportation</p> <p>ev: Income elasticity of vehicle ownership</p> <p>Y : Income</p> <p>c) Modification of elasticities was assumed based on:</p> <ul style="list-style-type: none"> . Between light bus and heavy bus . Between automobile and motorcycle <p>d) Price elasticities were established by purpose of trip;</p> <ul style="list-style-type: none"> . Work/business = -0.15 . Other trip = -0.40 <p>2. Freight</p> <p>a) Growth rate of GPP was applied</p> <p>b) Future traffic mix of medium and heavy trucks was modified, using average load and empty rate by type of vehicle.</p>	<p>1. ADTs were estimated by multiplying "base year traffic" by growth rates and modified by traffic mix.</p> <p>2. Generated traffic was estimated by applying price elasticities of -0.15 and -0.40 for work/business and social/recreational trips, respectively.</p> <p>3. Developed traffic was not included.</p> <p>4. Forecast for new construction:</p> <ul style="list-style-type: none"> . Estimate income level . Estimate expenditure for transportation based on income level applying equation below: $\text{Adjustment factor} = 94.15 \times Y^{-0.46}$ <p>Y : Per capita income</p>	

Highway Sector Project, February 1983

Base Year Traffic	Vehicle Type	Transportation Movement in Base Year	Growth Rate	Future Traffic Future Movement	ADT																						
<p>1. Established based on traffic counts.</p> <p>2. Applied adjustment factors of:</p> <ul style="list-style-type: none"> . Weekly factors . Seasonal factors <p>3. Diversion traffic was estimated based on O/D survey results.</p>	<p>1. For traffic counts: . Same as PRI study</p> <p>2. For forecasting: . Medium and heavy trucks were combined into one category.</p>		<p>1. For cars, medium/heavy trucks, light and heavy buses:</p> <p>a) Equation</p> $\text{Annual growth rate factor} = 0.5 \left[\left(1 + \frac{P}{100}\right) \times \left(1 + \frac{G}{100}\right)^a + \left(1 + \frac{p}{100}\right) \times \left(1 + \frac{g}{100}\right)^a \right]$ <p>where,</p> <ul style="list-style-type: none"> P: National population growth rate G: Real GDP per capita growth rate p: Provincial population growth rate g: Real GPP per capita growth rate a: Income elasticity <p>b) Elasticity</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th rowspan="2">Vehicle Type</th> <th colspan="3">Value of a</th> </tr> <tr> <th>1981-85</th> <th>1985-90</th> <th>1990-99</th> </tr> </thead> <tbody> <tr> <td>Cars</td> <td>1.3</td> <td>1.7</td> <td>2.0</td> </tr> <tr> <td>Medium/heavy trucks</td> <td>1.2</td> <td>1.2</td> <td>1.2</td> </tr> <tr> <td>Light buses</td> <td>0.8</td> <td>0.8</td> <td>0.8</td> </tr> <tr> <td>Heavy buses</td> <td>0.5</td> <td>0.5</td> <td>0.5</td> </tr> </tbody> </table>	Vehicle Type	Value of a			1981-85	1985-90	1990-99	Cars	1.3	1.7	2.0	Medium/heavy trucks	1.2	1.2	1.2	Light buses	0.8	0.8	0.8	Heavy buses	0.5	0.5	0.5	<p>1. ADTs were estimated by multiplying "base year traffic" by growth rate by Changwat by vehicle type.</p>
Vehicle Type	Value of a																										
	1981-85	1985-90	1990-99																								
Cars	1.3	1.7	2.0																								
Medium/heavy trucks	1.2	1.2	1.2																								
Light buses	0.8	0.8	0.8																								
Heavy buses	0.5	0.5	0.5																								
			<p>2. For light trucks: average of cars and medium/heavy trucks.</p>																								
			<p>3. For motorcycles: national annual average growth rates of 9.0, 5.0 and 3.0%, respectively were used for the forecasting periods, adjusted only for the difference in population growth rate between Changwat and the Kingdom.</p>																								

Second Provincial Road Project, April 1984

Base Year Traffic	Vehicle Type	Transportation Movement in Base Year	Future Traffic																																
			Growth Rate	Future Movement ADT																															
Base year ADT was developed in accordance with their count data:	Same as "PRI" Study		1. For ADTs																																
Group A - Annual census data			a) Equation	Same as "HSP" Study																															
Group B - Combination of census and supplementary count data			Same as "HSP" Study																																
Group C - Combination of census and short term traffic counts taken during the reconnaissance and inventory surveys.			b) Elasticity																																
			<table border="1"> <thead> <tr> <th rowspan="2">Vehicle Type</th> <th colspan="3">Value of a</th> </tr> <tr> <th>1982-86</th> <th>1986-91</th> <th>1991-2000</th> </tr> </thead> <tbody> <tr> <td>Cars</td> <td>1.5</td> <td>1.7</td> <td>1.9</td> </tr> <tr> <td>Light Trucks</td> <td>1.8</td> <td>1.5</td> <td>1.2</td> </tr> <tr> <td>Medium Trucks</td> <td>1.0</td> <td>0.8</td> <td>0.8</td> </tr> <tr> <td>Heavy Trucks</td> <td>0.8</td> <td>0.8</td> <td>0.5</td> </tr> <tr> <td>Light Buses</td> <td>1.0</td> <td>0.8</td> <td>0.5</td> </tr> <tr> <td>Heavy Buses</td> <td>0.8</td> <td>0.5</td> <td>0.5</td> </tr> </tbody> </table>		Vehicle Type	Value of a			1982-86	1986-91	1991-2000	Cars	1.5	1.7	1.9	Light Trucks	1.8	1.5	1.2	Medium Trucks	1.0	0.8	0.8	Heavy Trucks	0.8	0.8	0.5	Light Buses	1.0	0.8	0.5	Heavy Buses	0.8	0.5	0.5
Vehicle Type	Value of a																																		
	1982-86	1986-91	1991-2000																																
Cars	1.5	1.7	1.9																																
Light Trucks	1.8	1.5	1.2																																
Medium Trucks	1.0	0.8	0.8																																
Heavy Trucks	0.8	0.8	0.5																																
Light Buses	1.0	0.8	0.5																																
Heavy Buses	0.8	0.5	0.5																																
			2. For Motorcycle																																
			Growth rates were 12.0, 7.0, and 4.0%, respectively, for the forecasting periods adjusted by the difference between the population growth rate of Changwat/Region and the Kingdom in the period.																																

APPENDIX 3.2.3 O/D SURVEY FORMS


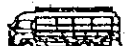
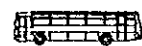
THE ROAD DEVELOPMENT STUDY IN NORTHEASTERN REGION (PHASE II)

Location.....Interview.....Date.....Time.....Direction.....

Vehicle Type		Question Spec.	General Questions	
Private and Public Vehicles	Taxi	For All Vehicle Types	1. Mark.....Model.....Engine Size..... cc or hp Age..... 2. Fuel Type A. Diesel B. Regular C. Premium D. Gas 3. Origin of this trip (Village Tambon Amphoe Changwat) [] ----- 4. Destination of this trip (Village Tambon Amphoe Changwat) [] ----- 5. Number of trips using this route per day/week/month..... 6. Number of passengers including driver.....	
	Private Car, Jeep, Van			
	Pickup or smaller			
Trucks	Pickup Truck or smaller	For Trucks or other Vehicles Carrying Goods		Questions for Particular Vehicle
	4-wheel Truck bigger than Pickup			7. Registration Type Private/Passenger/Truck
	6-wheel Truck			8. Empty Weight.....tons Legal Loading Capacity..... tons Legal Total Weight.....tons
	10-wheel Truck		9. Loaded Weight tons	
	Trailer Truck		10. Loaded Volume m ³	
			<input type="checkbox"/> Empty truck <input type="checkbox"/> 1/4 truck <input type="checkbox"/> 1/2 truck <input type="checkbox"/> 3/4 truck <input type="checkbox"/> Full <input type="checkbox"/> 1/4 over <input type="checkbox"/> 1/2 over	
			11. Commodity Type <input type="checkbox"/> Rice <input type="checkbox"/> Maize <input type="checkbox"/> Sugarcane <input type="checkbox"/> Cassava <input type="checkbox"/> Beans <input type="checkbox"/> Cotton <input type="checkbox"/> Tobacco <input type="checkbox"/> Fishery Products <input type="checkbox"/> Livestock <input type="checkbox"/> Agricultural Products <input type="checkbox"/> Forestry Products <input type="checkbox"/> Other Industrial Products <input type="checkbox"/> Mine <input type="checkbox"/> Fuel or Gas <input type="checkbox"/> Groceries <input type="checkbox"/> Housing Necessities <input type="checkbox"/> Passengers <input type="checkbox"/> Others.....	

ROAD DEVELOPMENT STUDY IN THE NORTHEASTERN REGION (PHASE II)

PASSENGER O/D SURVEY FORM

BUS TYPE	GENERAL DETAILS
 Light Bus (Pickup or smaller)	Interview Location.....Direction..... Interview Date.....Time..... Mark.....Model..... Engine Capacity..... cc or hp Vehicle Age.....years Type of Fuel: <input type="checkbox"/> Diesel <input type="checkbox"/> Regular <input type="checkbox"/> Super <input type="checkbox"/> Gas
 Medium Bus (4 Wheel larger than Pickup or 6 Wheel)	
 Heavy Bus	

Bus Details

Origin (Village, Tambon, Amphoe, Changwat)

Destination (Village, Tambon, Amphoe, Changwat)

Legal Passenger Capacity

Number of Passengers during the Interview (including Driver) ...

Passenger Details

No.	ORIGIN			DESTINATION		
	(Tambon	Amphoe	Changwat)	(Tambon	Amphoe	Changwat)
1.						
2.						
3.						
4.						

Passenger Details (Cont.)

No.	ORIGIN			DESTINATION		
	(Tambon	Amphoe	Changwat)	(Tambon	Amphoe	Changwat)
5.						
6.						
7.						
8.						
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13.						
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