

D. Agricultural Inputs

Farmyard manure (FYM) and artificial chemical fertilisers are the two main sources of added soil nutrients. FYM mainly comprises a mixture of animal excrement and vegetative matter like leaf litter, hay, and others that has been used as bedding by stall-fed animals. The amounts of FYM were estimated by farmers in terms of 'basket loads', thus the values reported are indicative not absolute. FYM continues to be the single most important source of soil nutrients and around 140,000t were applied to cereals and horticultural crops in the year 2000. Although important, it was not within the scope of the census to quantify the actual amount of excreta dispersed on the fields either directly by grazing animals or mixed with bedding material as FYM.

Unlike FYM, the use of chemical fertilisers is restricted mainly to crops with a higher rate of return. These include paddy, potato, chilli, and tree crops such as apples and oranges. Close to 30% of households reported having used some chemical fertilisers, with a total of 1800t applied in 2000, of which 1260t was applied to cereal crops. The recent strong emphasis on organic farming may see the use of fertilisers decline. The most common chemical fertilisers used are urea, suphala (compound fertiliser), and single superphosphate (SSP) although muriate of potash, calcium ammonium nitrate (CAN), bone meal, and borax are also applied in minor quantities.



The following maps and tables are presented in this section:

- D.1. Application of Chemical Fertiliser to Cereal Crops
- D.2. Application of Farmyard Manure (FYM) on Cereal Crops
- D.3. Farm Households Applying Chemical Fertilisers
- D.4. Farm Households Applying FYM and Chemical Fertilisers to Paddy
- D.5. Farm Households Applying FYM and Chemical Fertilisers to Maize
- D.6. Farm Households Applying FYM and Chemical Fertilisers to Potato
- D.7. Farm Households Applying FYM and Chemical Fertilisers to Chilli

Application of Chemical Fertiliser to Cereal Crops

The amount of chemical fertiliser used in Bhutan is generally low and application is mainly restricted to cash crops or crops with a higher yield of return. The three major types of chemical fertilisers used are urea, suphala (compound fertiliser), and SSP (single superphosphate). Table D.1 shows the total amount of chemical fertilisers applied to cereal crops (separately and together) in each district in 2000, with the districts listed in descending order of total chemical fertiliser applied. The map shows the districts ranked according to the total amount of fertilisers applied to cereals. The superimposed pie charts show the proportions applied to paddy, maize, and other cereal crops, and indicate differences in the total amount applied per district

Nationally, 1,262t of fertiliser was applied to cereal crops in 2000 of which about 720t was applied to maize, 420t to paddy, and 120t to other crops such as wheat, barley, millet and buckwheat. The greatest amounts were applied in Trashigang, both for paddy and maize and in total. Fertiliser application in Trashigang accounted for nearly 45% of the total amount applied to cereals in Bhutan, and 35% of the amount applied to maize. Very little fertiliser was applied to cereals in Gasa or Zhemgang.

Table D.1

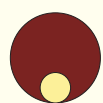
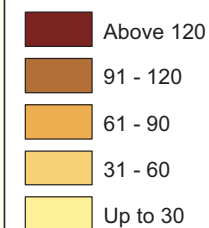
District	Quantity of Chemical Fertiliser Applied (t)				District	Quantity of Chemical Fertiliser Applied (t)			
	Paddy	Maize	Other	Total		Paddy	Maize	Other	Total
Trashigang	117.2	415.4	2.4	534.9	Sarpang	13.0	14.7	0.5	28.3
Trashi Yangtse	48.6	90.2	5.1	144.0	S/Jongkhar	0.5	11.3	0.3	12.2
Mongar	10.4	94.9	0.2	105.5	Trongsa	8.0	1.4	1.5	10.8
Punakha	85.9	0.7	10.7	97.4	Chhukha	1.4	1.1	5.6	8.1
Pemagatshel	1.0	63.2	0.5	64.7	Tsirang	5.5	1.3	0.3	7.0
Bumthang	0.1	0.7	60.3	61.1	Ha	0.2	0.1	5.2	5.4
Wangdue	38.9	0.4	13.3	52.6	Samtse	1.6	0.4	0.9	2.2
Paro	42.3	0.1	5.9	48.3	Dagana	0.9	0.5	0.0	1.4
Thimphu	33.4	0.9	9.7	44.0	Zhemgang	0.4	0.4	0.1	0.9
Lhuntse	10.7	21.1	1.3	33.1	Gasa	0.1	0.0	0.1	0.2
					Bhutan Total	420.1	718.8	123.2	1,262.1

Application of Chemical Fertiliser to Cereal Crops

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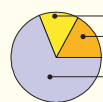
Total quantity applied
in tonnes



Max: 535 t (Trashigang)

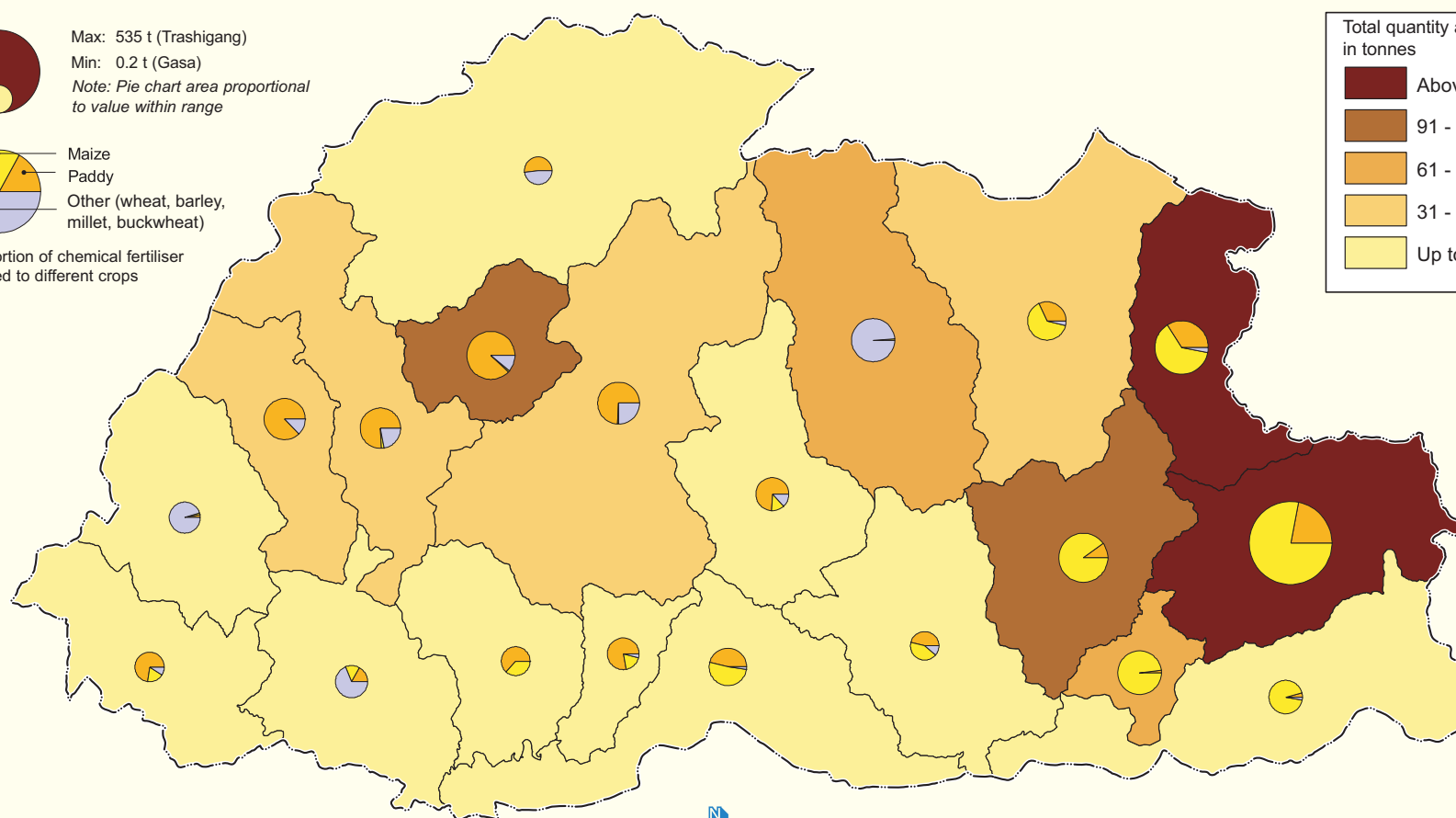
Min: 0.2 t (Gasa)

Note: Pie chart area proportional
to value within range



Maize
Paddy
Other (wheat, barley,
millet, buckwheat)

Proportion of chemical fertiliser
applied to different crops



Scale 1:1,500,000



Base Map: Department of Survey and Land Records,
Ministry of Agriculture

Data Source: RNR Statistics 2000, Ministry of Agriculture



PPD, MOA



Application of Farmyard Manure (FYM) to Cereal Crops

The traditional practice of using farmyard manure as a fertiliser continues all over Bhutan. In keeping with the government's policy of sustainable agricultural development and the emerging emphasis on organic farming, this practice is likely to continue to grow. The amount of FYM used was estimated by farmers in terms of 'headloads'. Thus the values shown are estimates rather than exact figures.

Table D.2 shows the total amount of FYM applied to cereal crops (separately and together) in each district in 2000, with the districts listed in descending order of total FYM applied. The map shows the districts ranked according to the total amount of FYM applied to cereals. The superimposed pie charts show the proportion applied to paddy, maize, and other cereal crops, and indicate differences in the total amount applied per district.

It is estimated that a total of 121,400t of FYM was applied to cereal cropland in the country as a whole, of which about 36% was applied to paddy, 46% to maize, and 18% to other crops, mostly wheat. The greatest amounts in total were applied in Trashigang, Mongar, and Punakha (each around 14% of the national total); with the greatest amounts applied to paddy in Punakha (13,000t), almost twice as much as in any other district; to maize in Trashigang and Mongar (more than 16,000t each); and to other cereal crops in Wangdue (over 5,000t).

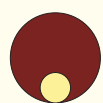
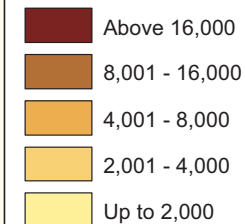
Table D.2

District	Quantity of FYM Applied (t)				District	Quantity of FYM Applied (t)			
	Paddy	Maize	Other	Total		Paddy	Maize	Other	Total
Trashigang	589	16,685	254	17,528	Ha	255	233	3,107	3,596
Mongar	242	16,625	31	16,899	Lhuntse	809	2,225	232	3,265
Punakha	13,050	333	2,876	16,258	Dagana	1,630	767	460	2,857
Wangdue	7,949	179	5,024	13,152	Samtse	949	1,450	372	2,772
Paro	7,826	23	2,917	10,765	Chhukha	1,041	543	1,067	2,651
Pemagatshel	72	6,421	386	6,879	Bumthang	0	34	1,664	1,698
Yangtse	1,105	3,566	945	5,616	Trongsa	802	87	792	1,681
Thimphu	4,193	94	1,107	5,394	Gasa	733	0	617	1,350
S/Jongkhar	261	3,799	110	4,170	Sarpang	523	379	68	969
Tsirang	1,614	1,739	289	3,642	Zhemgang	61	187	9	257
Bhutan Total						43,705	55,369.9	22,326.5	121,401

Application of Farmyard Manure (FYM) to Cereal Crops

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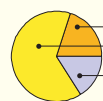
Total quantity applied in tonnes



Max: 17,528 t (Trashigang)

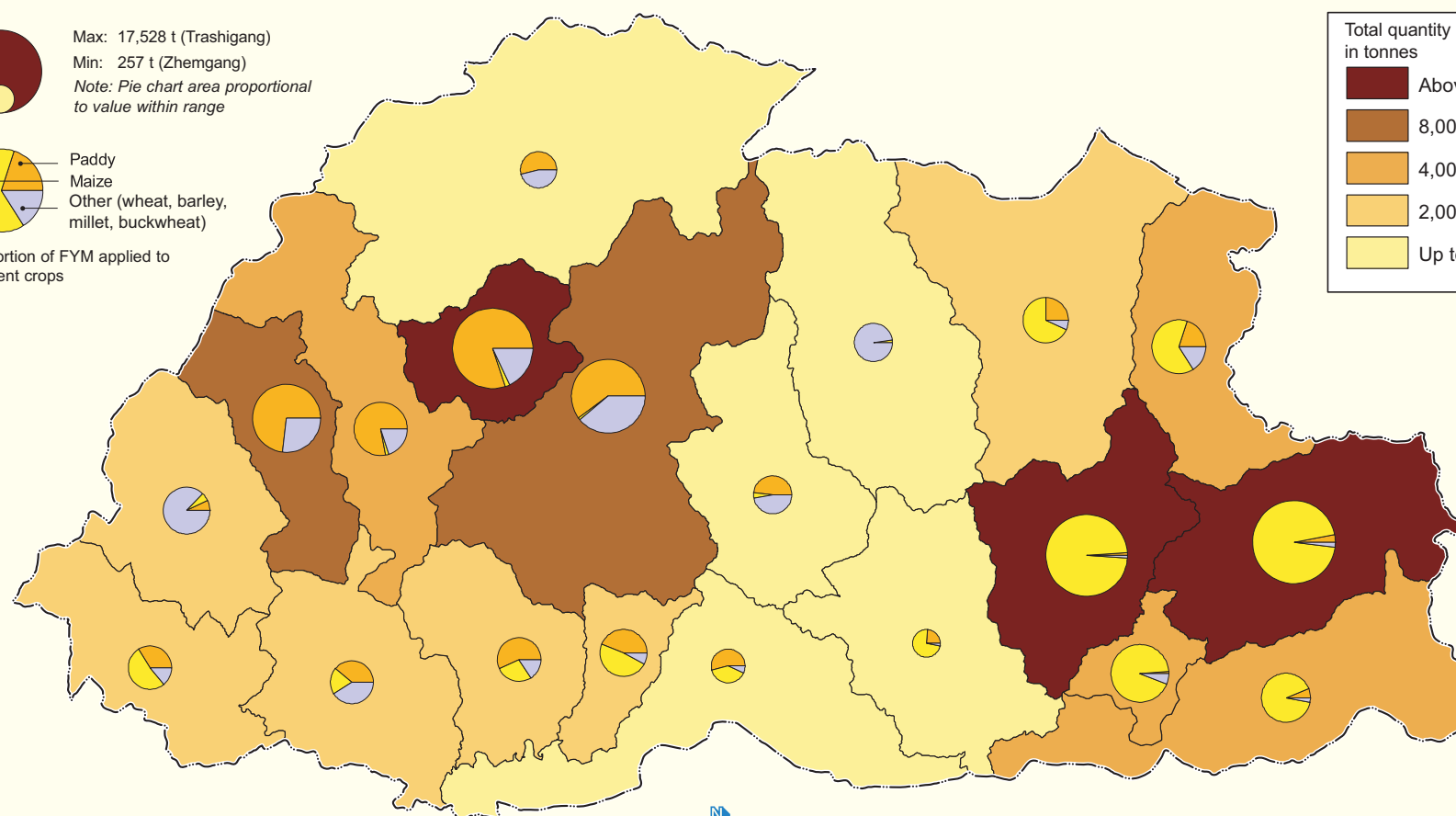
Min: 257 t (Zhemgang)

Note: Pie chart area proportional to value within range

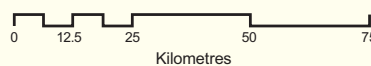


Paddy
Maize
Other (wheat, barley, millet, buckwheat)

Proportion of FYM applied to different crops



Scale 1:1,500,000



Base Map: Department of Survey and Land Records,
Ministry of Agriculture

Data Source: RNR Statistics 2000, Ministry of Agriculture



PPD, MOA



Farm Households Applying Chemical Fertilisers

The three major types of chemical fertilisers used in Bhutan are urea, suphala (compound fertiliser), and SSP (single super phosphate). Of these, urea is by far the most commonly used. Table D.3 shows the percentage of households applying each of the three types of fertiliser in each district in 2000, with the districts listed in descending order of urea use. The map shows the districts ranked according to the percentage of households applying urea. The superimposed bar charts show the percentage of households using each of the three types of fertiliser.

Trashigang had the greatest percentage of households applying urea is (76%), followed by Trashy Yangtse (59%). In all other districts, less than 50% of households used urea, and in eight districts (all the southern districts except Sarpang) less than 10%. Significantly more households applied Suphala in Bumthang (24%), Punakha (14%), and Thimphu (11%) than anywhere else in the country; and the only significant use of SSP was also in Bumthang (18%).

Table D.3

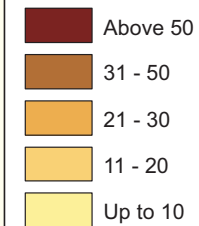
Districts	Urea	Suphala	SSP	Districts	Urea	Suphala	SSP
Trashigang	76	2	0	Sarpang	17	5	0
Trashy Yangtse	59	1	0	Trongsa	14	4	2
Pemagatshel	46	1	0	Ha	7	4	2
Bumthang	45	24	18	S/Jongkhar	5	0	0
Punakha	43	14	2	Tsirang	3	1	0
Thimphu	40	11	3	Samtse	2	1	0
Mongar	33	1	0	Gasa	2	0	0
Paro	33	4	4	Chhukha	2	3	0
Wangdue	27	6	2	Dagana	1	0	0
Lhuntse	24	0	0	Zhemgang	1	0	0
				Average*	27.5	2.6	1
* Simple averages, not weighted							

Farm Households Applying Chemical Fertilisers

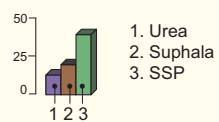
D3

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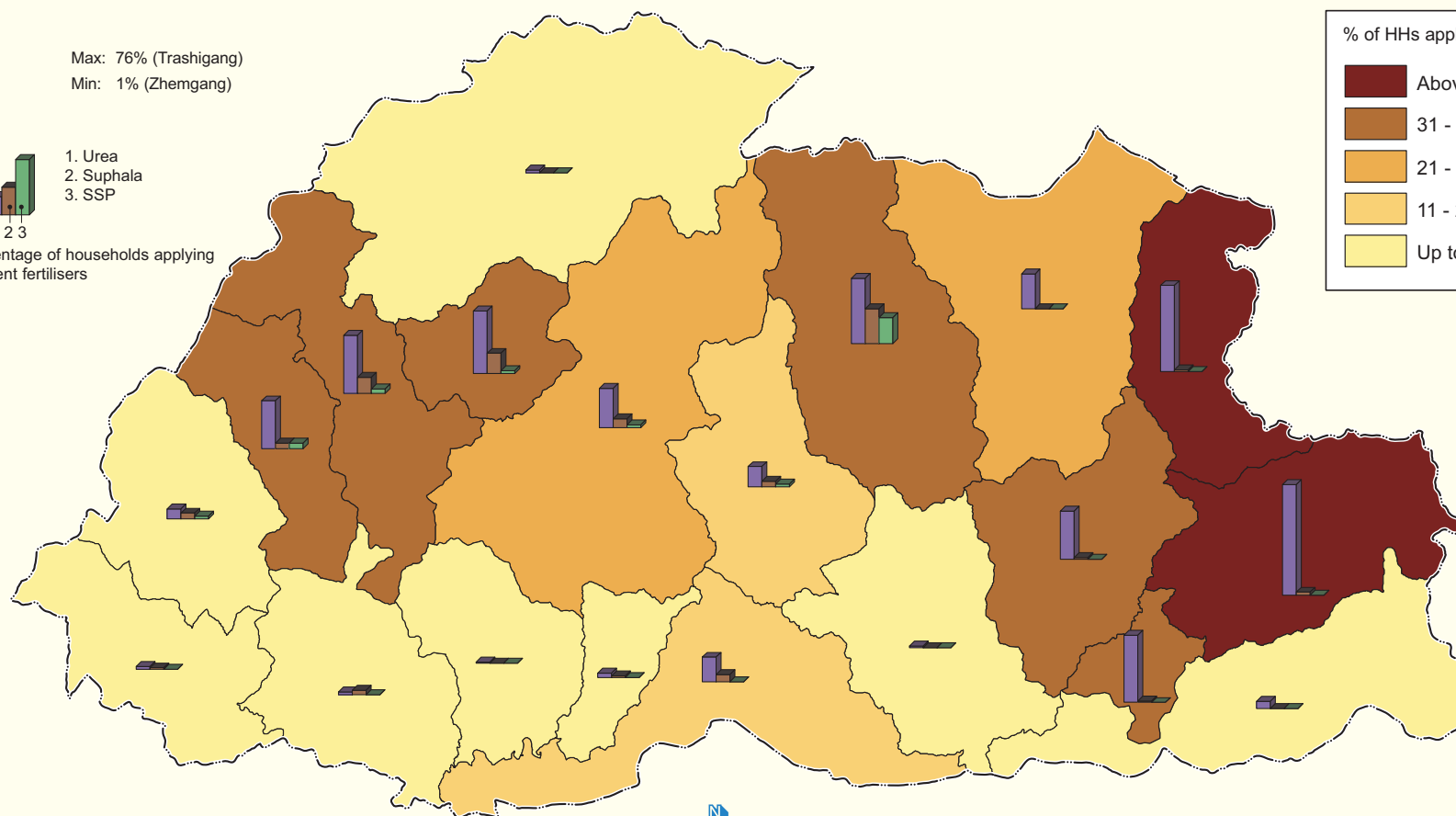
% of HHs applying urea



Max: 76% (Trashigang)
Min: 1% (Zhemgang)



Percentage of households applying different fertilisers



Scale 1:1,500,000



Base Map: Department of Survey and Land Records,
Ministry of Agriculture
Data Source: RNR Statistics 2000, Ministry of Agriculture



PPD, MOA



Farm Households Applying FYM and Chemical Fertilisers to Paddy

Table D.4 shows the percentage of households growing paddy who applied FYM or chemical fertiliser to the crop in 2000, with the districts listed in descending order of application of at least one or other type of fertiliser. Some households applied both FYM and chemical fertiliser, but the number of these, and the total percentage of farmers who applied any type of fertiliser, cannot be ascertained from the census data. The map shows the districts ranked according to the total production of paddy (see Table B8 and map) and the superimposed bar charts the percentage of producer households applying FYM or chemical fertiliser to the crop.

More than 90% of the farm households growing paddy in Gasa, Punakha, Paro, and Thimphu applied FYM, none in Bumthang (where little paddy is grown), and only 4% in Zhemgang. A little more than half of paddy farmers in Punakha, Thimphu, Trashigang, and Yangtse applied chemical fertilisers, but far fewer elsewhere.

Table D.4

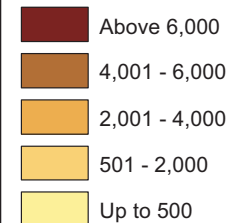
District	FYM	Chemical Fertiliser	District	FYM	Chemical Fertiliser
Gasa	99	5	Dagana	35	1
Punakha	94	59	Trongsa	33	18
Paro	94	47	Lhuntse	31	17
Thimphu	90	59	Samtse	25	3
Wangdue	85	37	Mongar	6	21
Trashigang	10	56	Pemagatshel	13	18
Yangtse	31	51	Sarpang	12	16
Ha	51	14	S/Jongkhar	14	2
Tsirang	44	5	Bumthang	0	5
Chhukha	42	2	Zhemgang	4	1
			Average*	41	22
* Simple averages, not weighted					

Farm Households Applying FYM and Chemical Fertilisers to Paddy

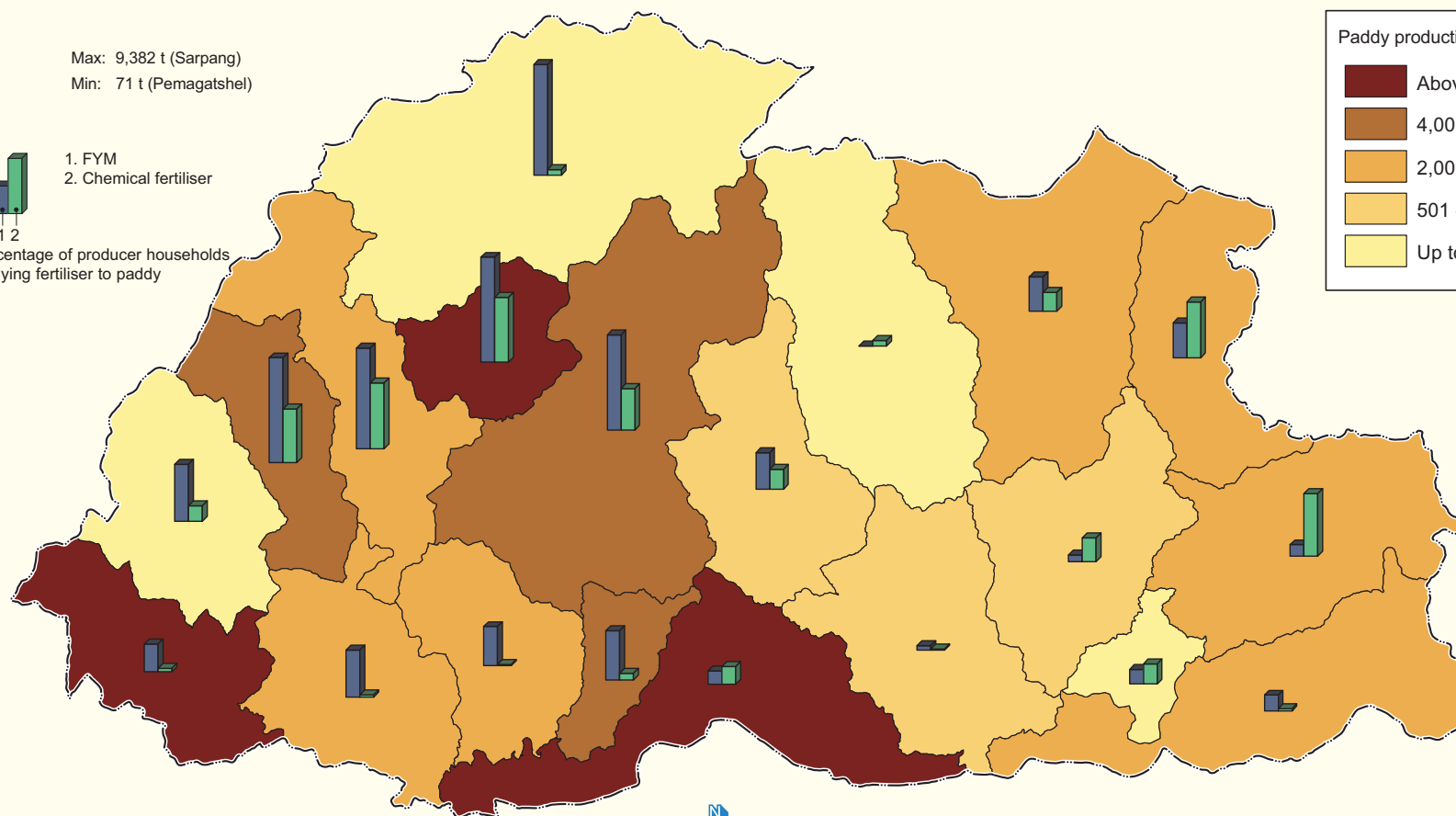
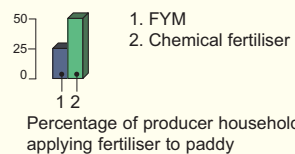
D 4

LEGEND

Paddy production in tonnes



Max: 9,382 t (Sarpang)
Min: 71 t (Pemagatshel)



Scale 1:1,500,000



Base Map: Department of Survey and Land Records,
Ministry of Agriculture
Data Source: RNR Statistics 2000, Ministry of Agriculture



PPD, MOA



Farm Households Applying FYM and Chemical Fertilisers to Maize

Table D.5 shows the percentage of households growing maize who applied FYM or chemical fertiliser to the crop in 2000, with the districts listed in descending order of application of at least one or other type of fertiliser. Some households applied both FYM and chemical fertiliser, but the number of these, and the total percentage of farmers who applied any type of fertiliser, cannot be ascertained from the census data. The map shows the districts ranked according to the total production of maize (see Table B9 and map) and the superimposed bar charts show the percentage of producer households applying FYM or chemical fertiliser to the crop.

Around three-quarters of all maize growing households in Pemagatshel, Trashigang, Trashy Yangtse, and Mongar applied FYM to the crop, but only around 10% in Sarpang, Zhemgang, and Trongsa. Between a half and three-quarters of all maize growing households in Trashigang, Trashy Yangtse, and Pemagatshel applied chemical fertilisers, but far fewer elsewhere.

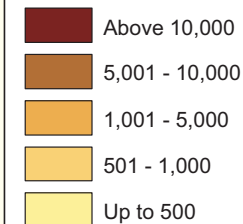
Table D.5

District	FYM	Fertilisers	District	FYM	Fertilisers
Pemagatshel	77	47	S/Jongkhar	35	5
Trashigang	73	75	Samtse	34	2
Trashy Yangtse	73	54	Paro	29	5
Mongar	72	31	Wangdue	25	3
Ha	65	2	Chhukha	25	1
Lhuntse	62	18	Dagana	25	0
Thimphu	55	15	Sarpang	10	17
Tsirang	43	1	Trongsa	12	6
Bumthang	36	31	Zhemgang	11	0
Punakha	34	6	Gasa	NA ⁺	NA ⁺
			Average*	48	25
* Simple averages, not weighted; ⁺ not applicable as no maize grown					

Farm Households Applying FYM and Chemical Fertilisers to Maize

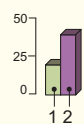
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Total maize production
in tonnes



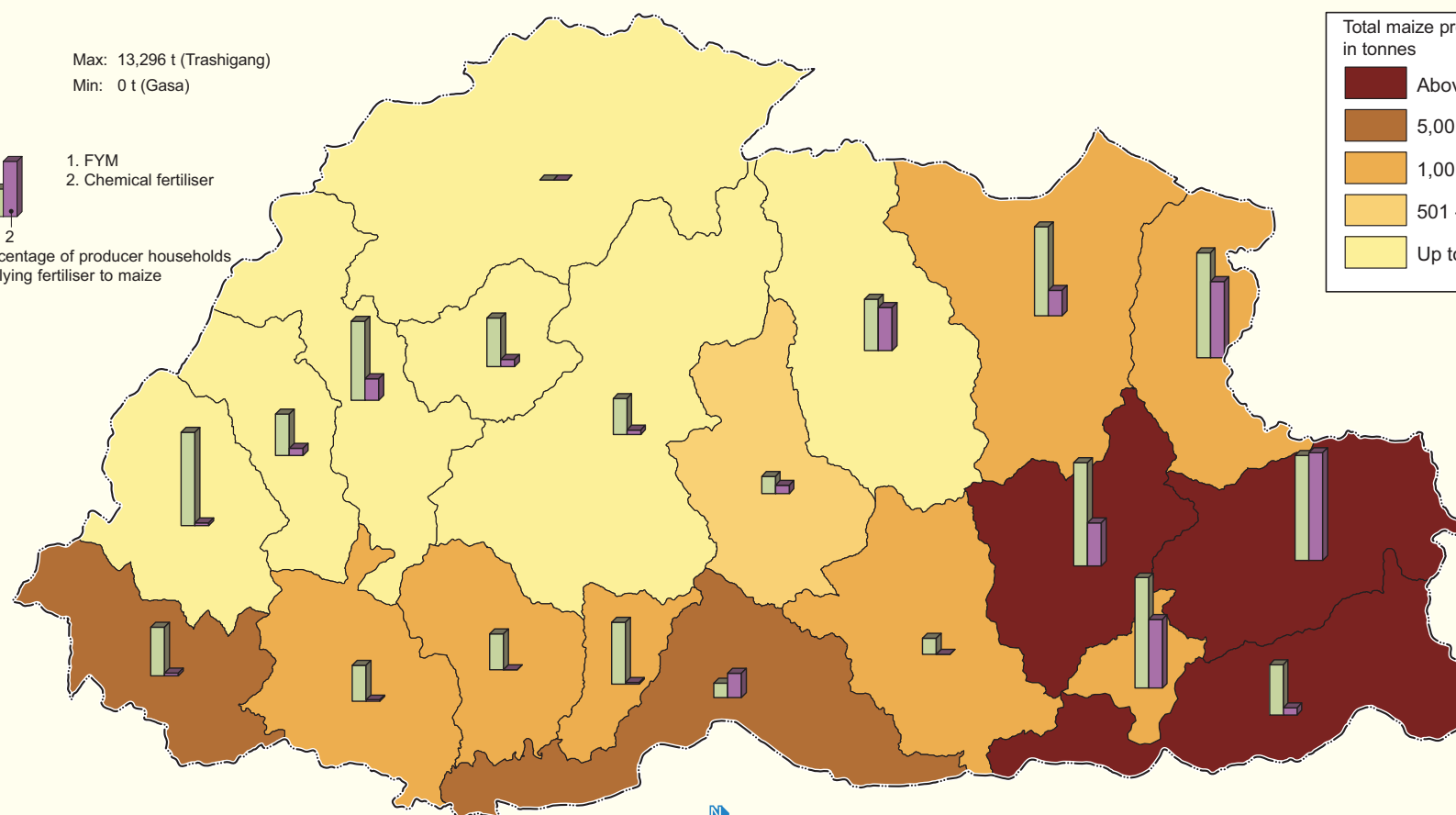
Max: 13,296 t (Trashigang)

Min: 0 t (Gasa)

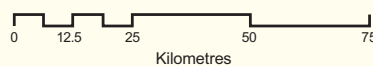


1. FYM
2. Chemical fertiliser

Percentage of producer households
applying fertiliser to maize



Scale 1:1,500,000



Base Map: Department of Survey and Land Records,
Ministry of Agriculture

Data Source: RNR Statistics 2000, Ministry of Agriculture



PPD, MOA



Farm Households Applying FYM and Chemical Fertilisers to Potato

Table D.6 shows the percentage of households growing potato who applied FYM or chemical fertiliser to the crop in 2000, with the districts listed in descending order of application of at least one or other type of fertiliser. Some households applied both FYM and chemical fertiliser, but the number of these, and the total percentage of farmers who applied any type of fertiliser, cannot be ascertained from the census data. The map shows the districts ranked according to total production of potato (see Table B11 and map) and the superimposed bar charts the percentage of producer households applying FYM or chemical fertiliser to the crop.

Around three-quarters of all potato growing households in Ha, Paro, Wangdue, and Chhukha applied FYM to the crop, but less than 20% in Samdrup Jongkhar, Lhuntse, and Sarpang. More than half of all potato growing households in Paro, Wangdue, Bumthang, and Chhukha applied chemical fertilisers, but fewer elsewhere.

Table D.6

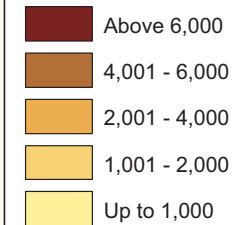
District	FYM	Fertiliser	District	FYM	Fertiliser
Ha	82	48	Punakha	37	19
Paro	81	65	Samtse	37	3
Wangdue	75	64	Gasa	37	0
Chhukha	73	59	Dagana	36	1
Thimphu	68	48	Mongar	35	5
Bumthang	61	64	Trashigang	33	11
Pemagatshel	63	47	Zhemgang	20	2
Trongsa	59	44	Sarpang	17	2
Tsirang	45	1	Lhuntse	15	3
Trashigang	39	44	S/Jongkhar	14	3
			Average*	49	35
* Simple averages, not weighted					

Farm Households Applying FYM and Chemical Fertilisers to Potato

D 6

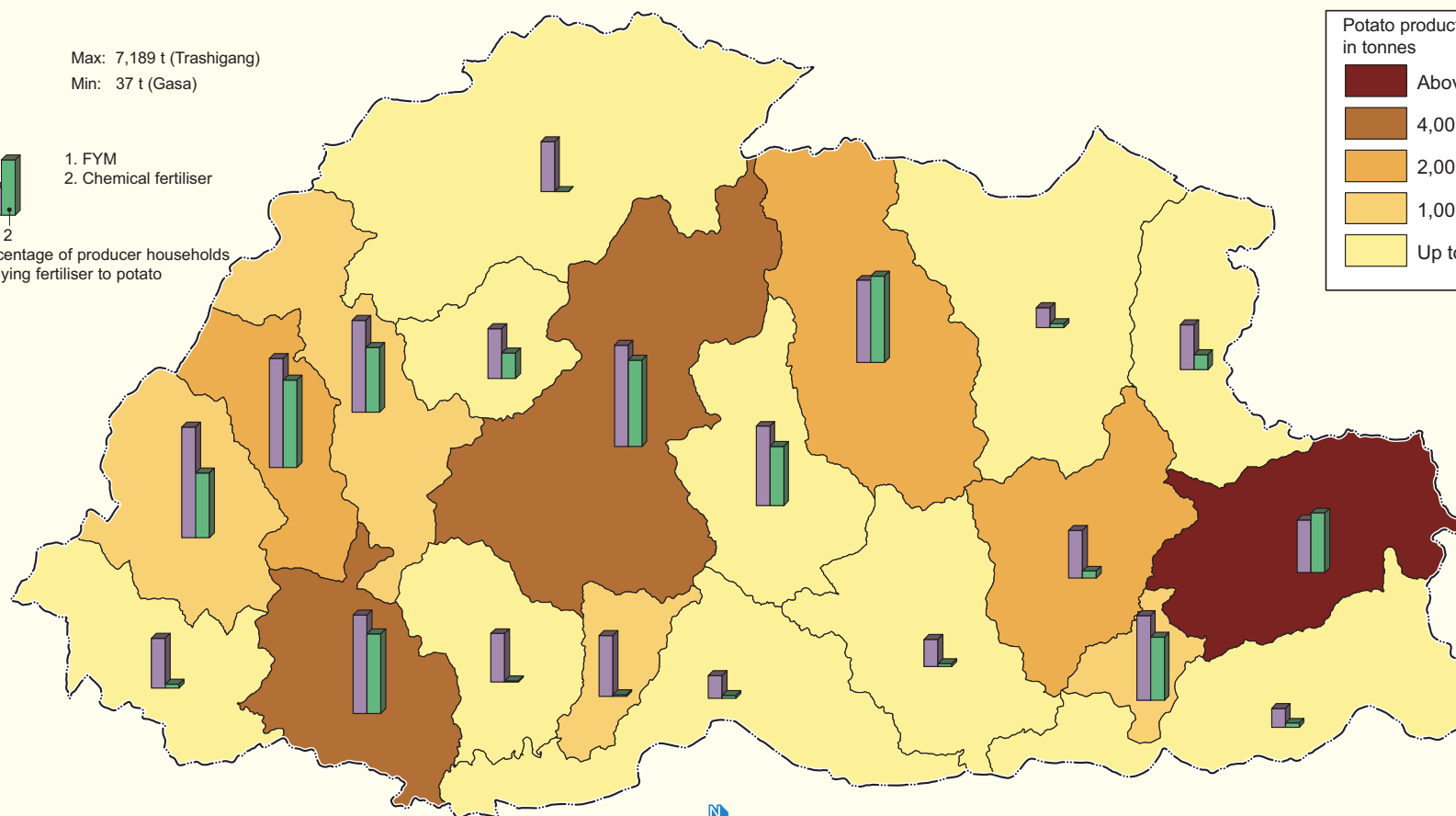
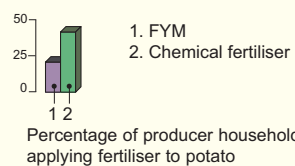
LEGEND

Potato production
in tonnes



Max: 7,189 t (Trashigang)

Min: 37 t (Gasa)



Scale 1:1,500,000



Base Map: Department of Survey and Land Records,
Ministry of Agriculture
Data Source: RNR Statistics 2000, Ministry of Agriculture



PPD, MOA



Farm Households Applying FYM and Chemical Fertilisers to Chilli

Table D.7 shows the percentage of households growing chilli who applied FYM or chemical fertiliser to the crop in 2000, with the districts listed in descending order of application of at least one or other type of fertiliser. Some households applied both FYM and chemical fertiliser, but the number of these, and the total percentage of farmers who applied any type of fertiliser, cannot be ascertained from the census data. The map shows the districts ranked according to the total production of chilli (see Table B11 and map) and the superimposed bar charts the percentage of producer households applying FYM or chemical fertiliser to the crop.

Just over half of all chilli growing households in Paro, Pemagatshel, and Thimphu applied FYM to the crop, but only 20% or less in half of the districts, with the least in Samtse (11%).

Table D.7

District	FYM	Fertiliser	District	FYM	Fertiliser
Paro	57	17	Ha	20	4
Pemagatshel	55	8	Tsirang	20	1
Thimphu	50	16	Mongar	17	7
Trongsa	33	6	Zhemgang	17	0
Chhukha	31	11	Trashigang	16	7
Bumthang	29	11	Dagana	16	0
Gasa	29	2	Lhuntse	15	6
Yangtse	27	15	S/Jongkhar	13	3
Wangdue	24	3	Sarpang	12	4
Punakha	23	7	Samtse	11	3
			Average*	27	7
* Simple averages, not weighted					

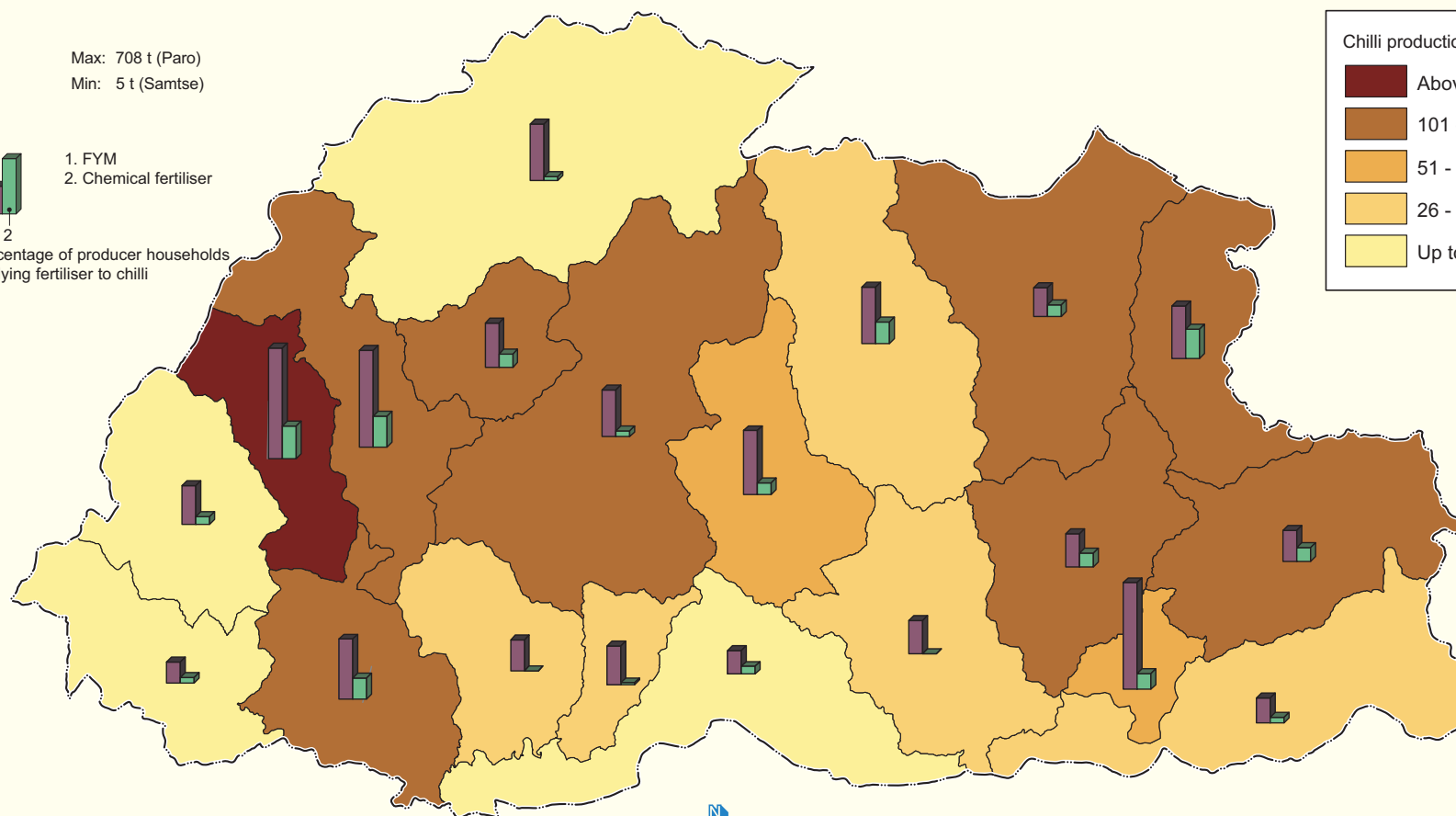
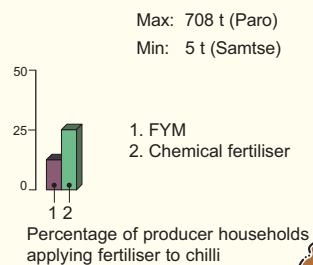
Farm Households Applying FYM and Chemical Fertilisers to Chilli

D7

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Chilli production in tonnes

- Above 500
- 101 - 500
- 51 - 100
- 26 - 50
- Up to 25



Scale 1:1,500,000



Base Map: Department of Survey and Land Records,
Ministry of Agriculture
Data Source: RNR Statistics 2000, Ministry of Agriculture



PPD, MOA



