

Overview of Agriculture in D.I.Yogyakarta
 – A Case of analysis of agricultural data by *Kecamatan* –

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1. Analyzed Area

D.I.Yogyakarta is situated at southern coast of the central part of Java Island. The end of north of this *propinsi* is Mt.Merapi. Progo River and Opak River lie in the western and eastern part of the slope of the mountain. The area between two rivers, from mountainside to the coast of Indian Ocean, is gentle slope. Yogyakarta City is located at the center of this area. The area to the east of Opak River and the west of Progo River is calcareous hill area where altitude is 100 – 500m, except for western coast.

D.I.Yogyakarta consists of Yogyakarta City and four *kabupatens*. Kab.Bantul is located at the fluvial plain at the south-central part of this *propinsi*. Kab.Sleman is situated at south slope of Mt.Merapi at the north-central part of this *provinsi*. These *kabupatens* are more densely populated in this *propinsi*. Kab.Kulonprogo and Kab.Gunung Kidul are hill area to the east of Opak River and the west of Progo River respectively.

Main roads in this *propinsi* radiated from Yogyakarta City to each *kabupaten*. Railway to other cities in Java runs from western coast, through Yogyakarta City, to Surakarta City.



Agricultural production of this *propinsi* accounts for a small percentage of total production of Java, because of the small area, 3,133km², accounts 2% of Java (Table 1). But various food crops as wetland and upland paddy, *palawija*, vegetables, fruits are produced in diverse land states as above. Then some crops as wetland and upland paddy and Shallot (*bawang merah*) are cultivated more intensively than in the other area in Java (Table 2).

Table 1. The Production of Main Food Crops in Java Island in 2003 (%)

	Padi Sawah	Padi Ladang	Kc Tanah	Kc Kedelai	Bawang Merah	Salak	Sawo
DKI Jakarta	0	0	0	0	0	0	1
Jawa Barat	31	32	17	4	20	28	31
Jawa Tengah	29	17	33	29	39	61	24
DI Yogyakarta	2	12	11	7	4	5	9
Jawa Timur	32	31	37	59	36	6	27
Banten	6	8	2	1	0	0	8

BPS: Statistik Indonesia 2004

**Table 2. Average Yield per Hectare of Main Food Crops
in Java Island and Total Indonesia in 2003 (Ton/Ha)**

	Padi Sawah	Padi Ladang	Kc Tanah	Kc Kedelai	Bawang Merah
DKI Jakarta	4.3	0	1.0	0	0
Jawa Barat	5.5	2.7	1.3	1.3	9.0
Jawa Tengah	5.4	3.1	1.2	1.5	8.4
DI Yogyakarta	5.6	3.5	0.8	1.0	10.4
Jawa Timur	5.4	3.6	1.2	1.3	9.1
Banten	5.1	2.9	1.3	1.3	5.4
Java Island	5.4	3.1	1.2	1.3	8.9
Indonesia	4.8	2.5	1.1	1.3	8.7

BPS: Statistik Indonesia 2004

2. Land Use Condition and Production Distribution of Main Crops

Analyzing land use and agricultural production in consideration of environmental condition contributes to appreciate the adequacy of agriculture and the potentiality of development in the area. In the case of analyzing agriculture, considerable condition is as follows: productive infrastructures like irrigation facility, transportation for crops like road and rail way, proximity to main market in addition to natural conditions including geomorphological and climatic condition. Average production per unit area is important as an index for agricultural production to evaluate agricultural intensiveness in the area besides production and harvested area of the crop. Then

economic indexes such as price of crops and productive cost are also significant to analyze agriculture in detail.

Small area statistics are effective in analyzing about the area as D.I.Yogyakarta where various types of cultivation are conducted in restricted area. Figure 1 shows land use in D.I.Yogyakarta by *kecamatan*. It is apparent from this figure that land use in D.I.Yogyakarta corresponds with geomorphological condition. In *kecamatan*s to the east of Opak River and the west to Progo River where are undulating and difficult to access water supply, upland and others including forest account for much of the land use. In central area of D.I.Yogyakarta, from south slope of Mt.Merapi to the coast of Indian Ocean, paddy field accounts for much of it. There is no paddy field and almost all of the land use is occupied by upland and others in eastern coastal area of Indian Ocean where geomorphological condition is the most severe for agricultural activities around the hill area. Then much of the land use of the area from the south to the southeast of Yogyakarta City is accounted by settlement. In this area, Population density is relatively high and the percentage of tertiary industry is high in the occupational structure by *kecamatan*. The Level of irrigation facility corresponds to land use condition. In central part of D.I.Yogyakarta between two rivers, much of irrigation facilities are technical or semi-technical irrigation. On the other hand, small technical irrigation and rain fed paddy field account for much of all irrigation facilities in eastern and western hill area (Figure 2). But the percentage of technical irrigation is higher on west shore of Progo River and in western coastal area of Indian Ocean rather than between two rivers. Therefore, it is inferred from above that intensive wetland paddy production with technical/semi-technical irrigation is conducted in central area between two rivers and around there and upland cropping is conducted in eastern and western hill areas.

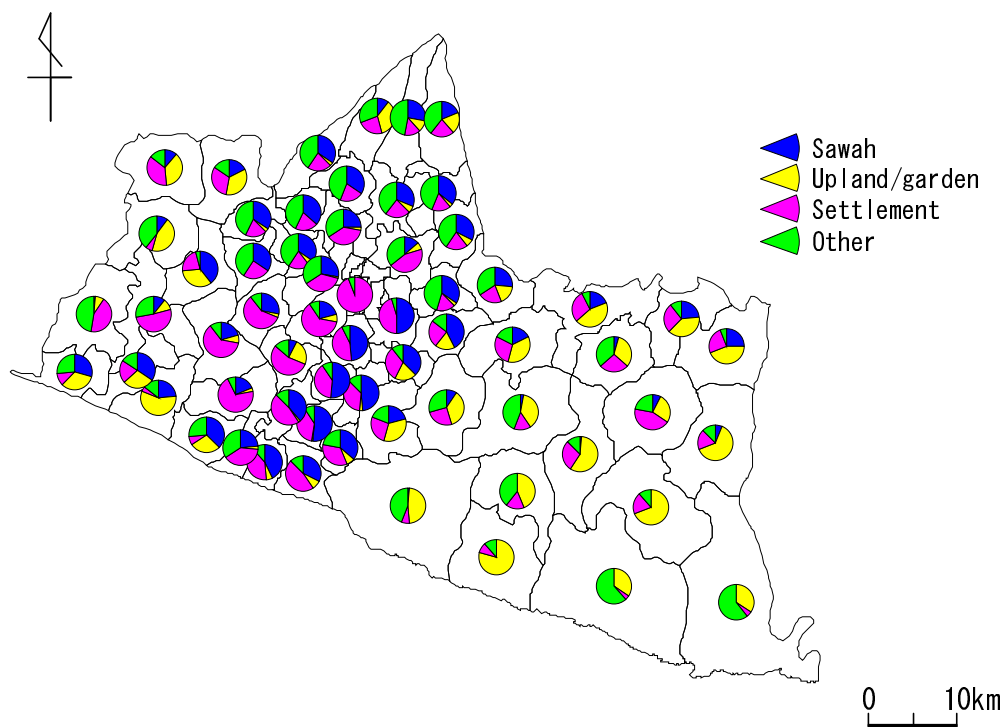


Figure 1. The Land Use in D.I.Yogyakarta by Kecamatan in 2003 (%)

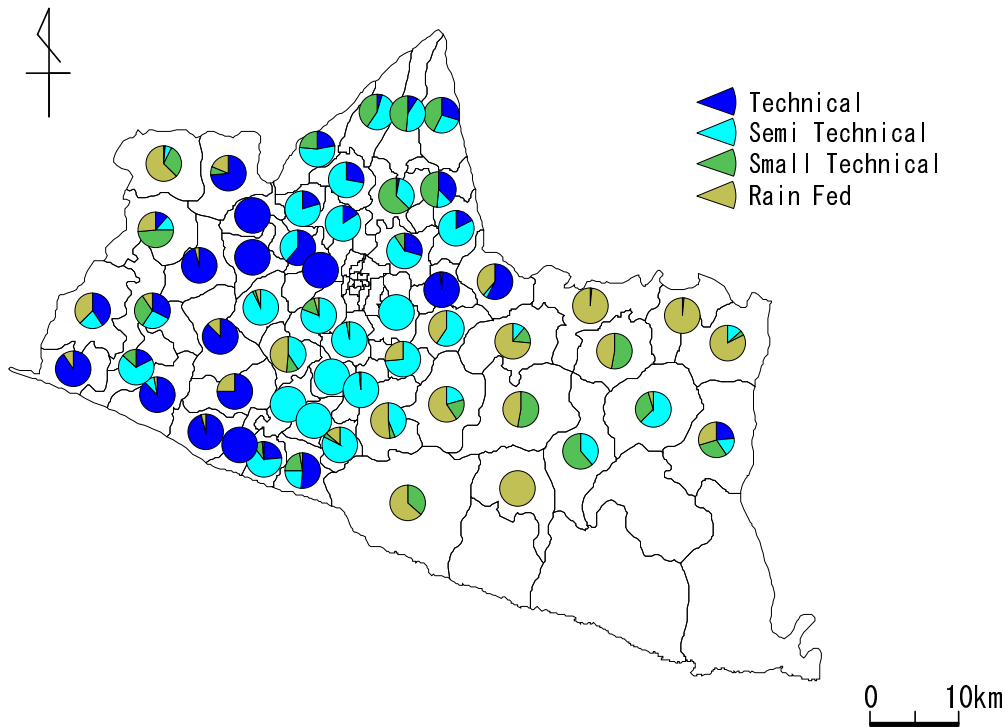


Figure 2. The Irrigation System in D.I.Yogyakarta by Kecamatan in 2003 (%)

Figure 3 shows the wetland and upland paddy production and irrigation system in D.I.Yogyakarta. It is clear from this figure that wetland paddy production is large in the area between two rivers and on the west shore of Progo River where technical irrigation system is laid. Moreover it is described that the cultivating of wetland paddy is intensive in the area, because paddy production per 1 ha is also large in the same area (Figure 4).

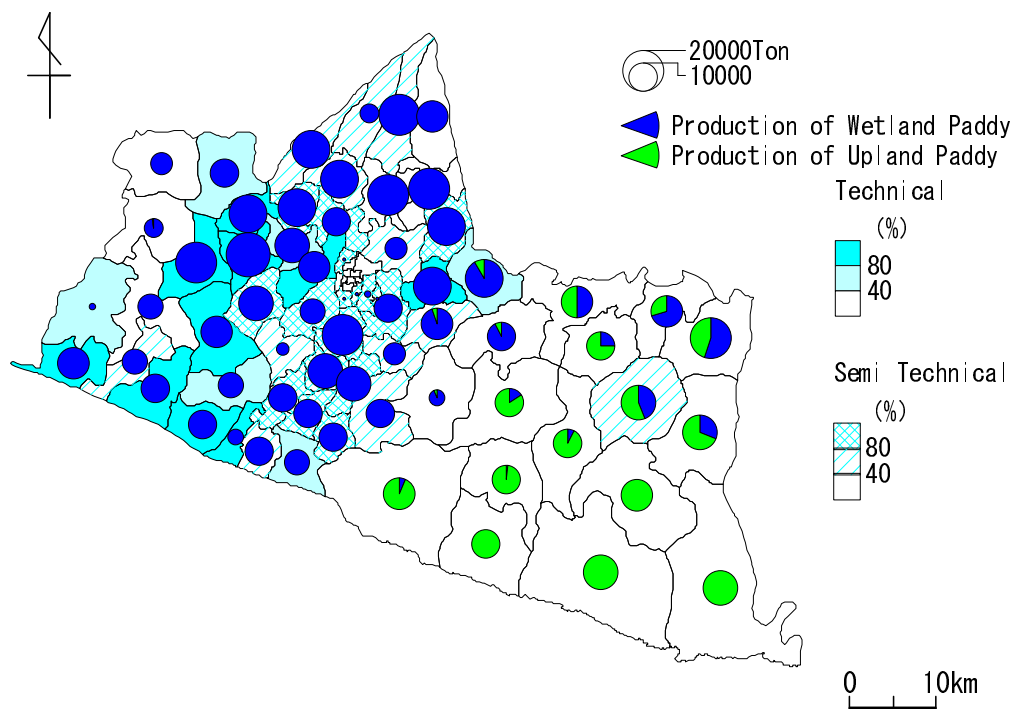


Figure 3. Paddy Production and Irrigation System in D.I.Yogyakarta by Kecamatan in 2003

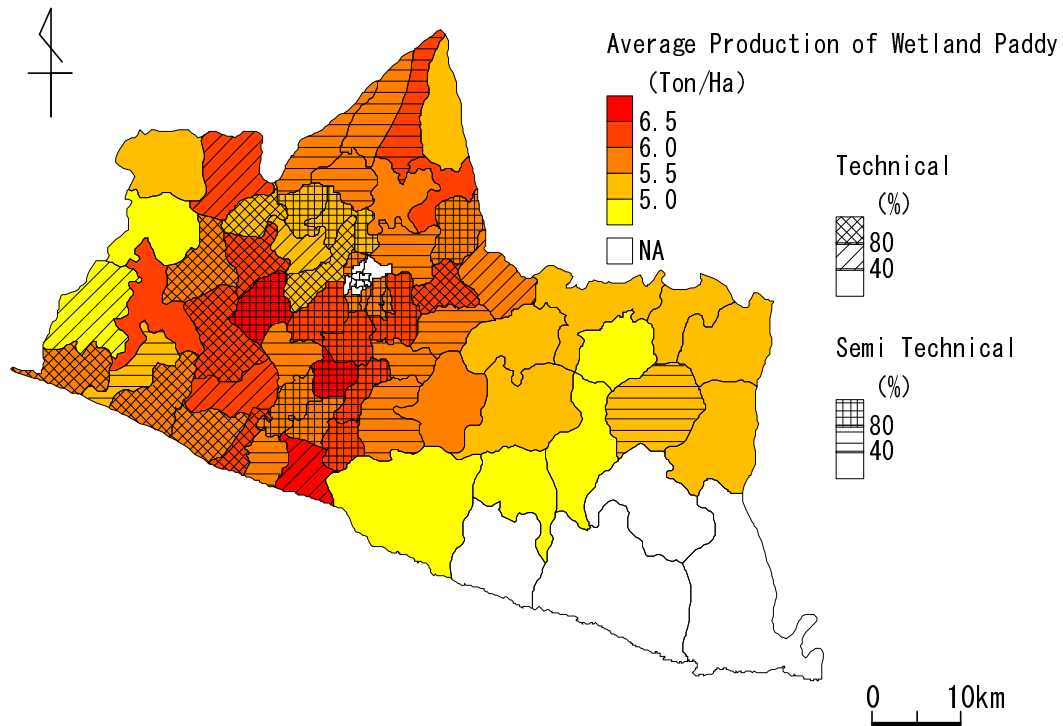


Figure 4. Average Production of Wetland Paddy and Irrigation System in D.I.Yogyakarta by Kecamatan in 2003

Then, how is production of other main crops distributed in D.I.Yogyakarta? In Indonesia, main upland crops like Cassava, Maize, Peanuts, Sweet potato and Soybeans are called as *Palawija*. One of them, Cassava is mainly produced in eastern hill area (Figure 5). Especially, the production is large in eastern coastal area of Indian Ocean where natural condition is severe. It is also produced in western hill area, but the production is smaller than in eastern hill area. Harvested area is also large in eastern hill area and a part of western hill area (Figure 6). But average production per 1 ha is large in south slope of Mt.Merapi than in hill area (Figure 7). Therefore it is inferred that the cultivation is more intensive in that area than in hill area. Maize and Peanuts are also mainly produced in eastern hill area and the cultivation is extensive (Figure 8, Figure 9).

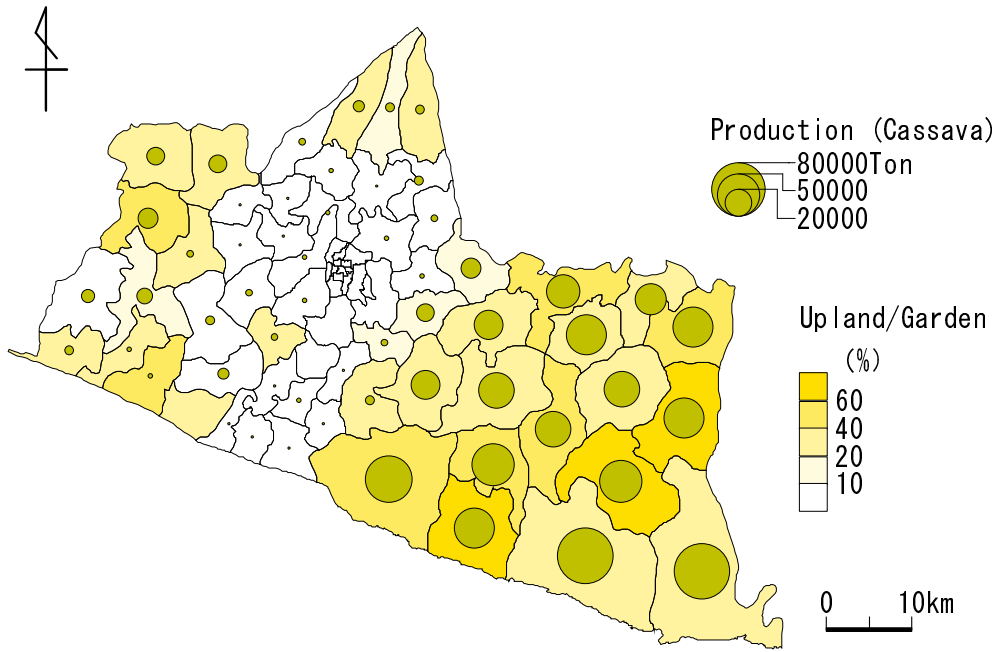


Figure 5. Production of Cassava and the Proportion of Upland/Garden to Total Land Use in D.I.Yogyakarta in 2003

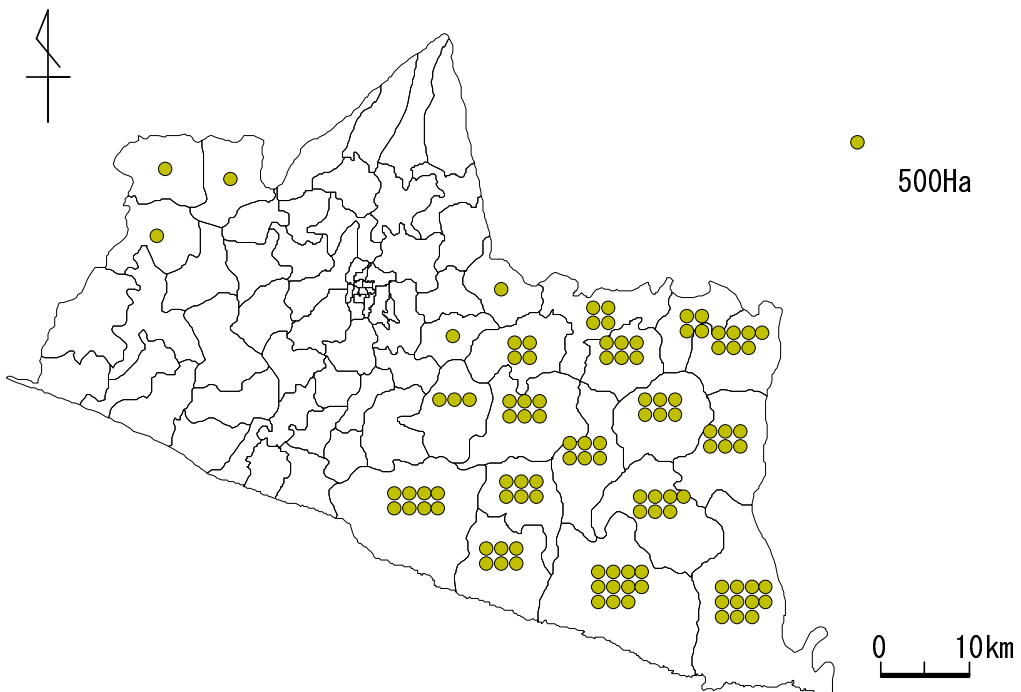


Figure 6. Harvested Area of Cassava in D.I.Yogyakarta in 2003

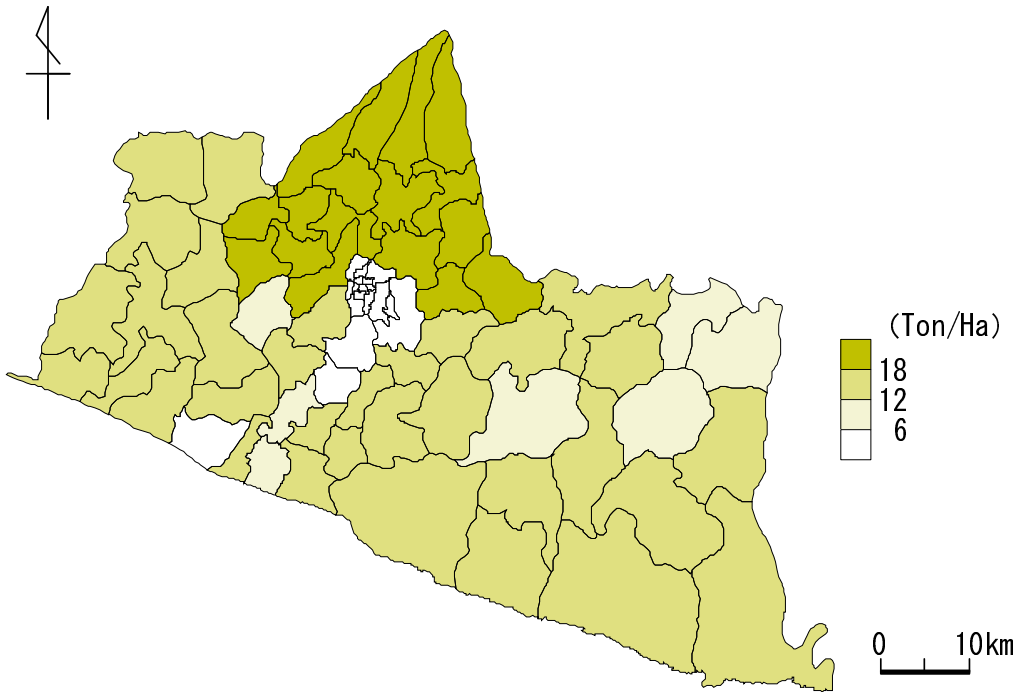


Figure 7. Average Production of Cassava in D.I.Yogyakarta in 2003 (Ton/Ha)

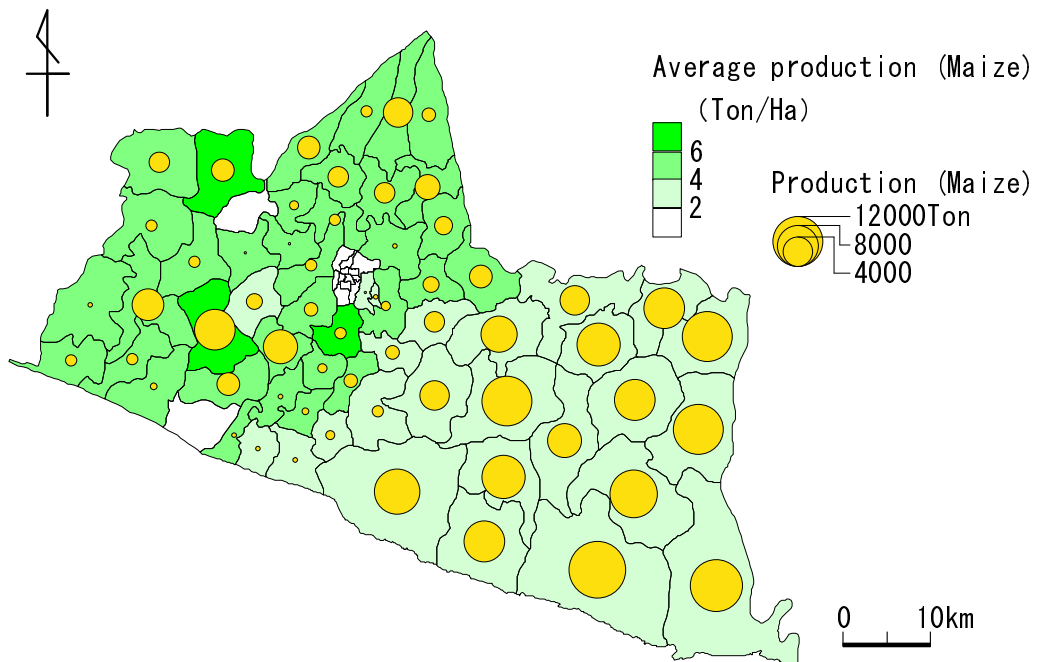


Figure 8. Production and Average Production of Maize in D.I.Yogyakarta in 2003

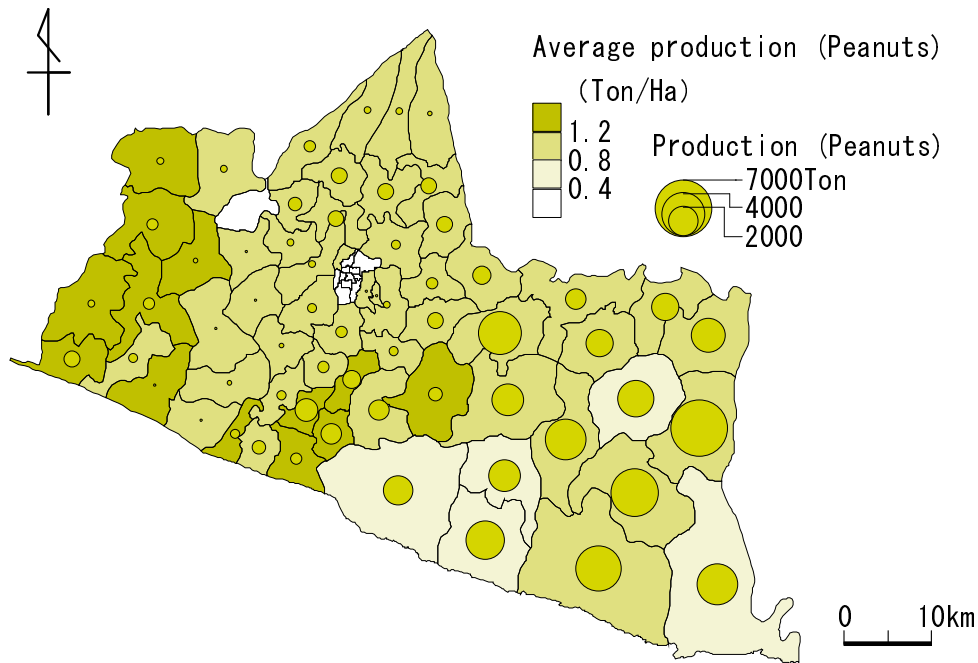


Figure 9. Production and Average Production of Peanuts in D.I.Yogyakarta in 2003

Production distribution of Sweet potato and Soybeans are different from of Cassava. Sweet potato is more produced in south slope of Mt.Merapi where climate is colder and drainage is better than other area (Figure 10).

Production of Soybeans is predominant in eastern hill area. But it is larger in the inland area than in the coastal area where natural condition is more severe. Then production of soybeans is relatively larger and intensive in wetland paddy field area between two rivers. This is supposed because Soybeans are cultivated as a secondary crop in paddy field which is more intensively managed than upland (Figure 11).

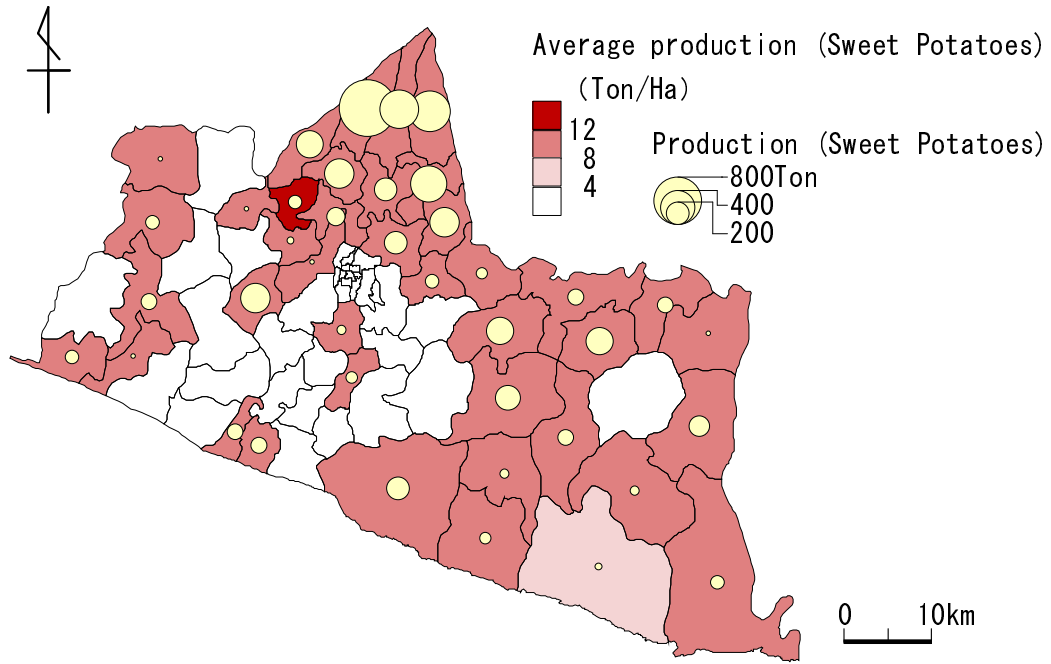


Figure 10. Production and Average Production of Sweet Potatoes in D.I.Yogyakarta in 2003

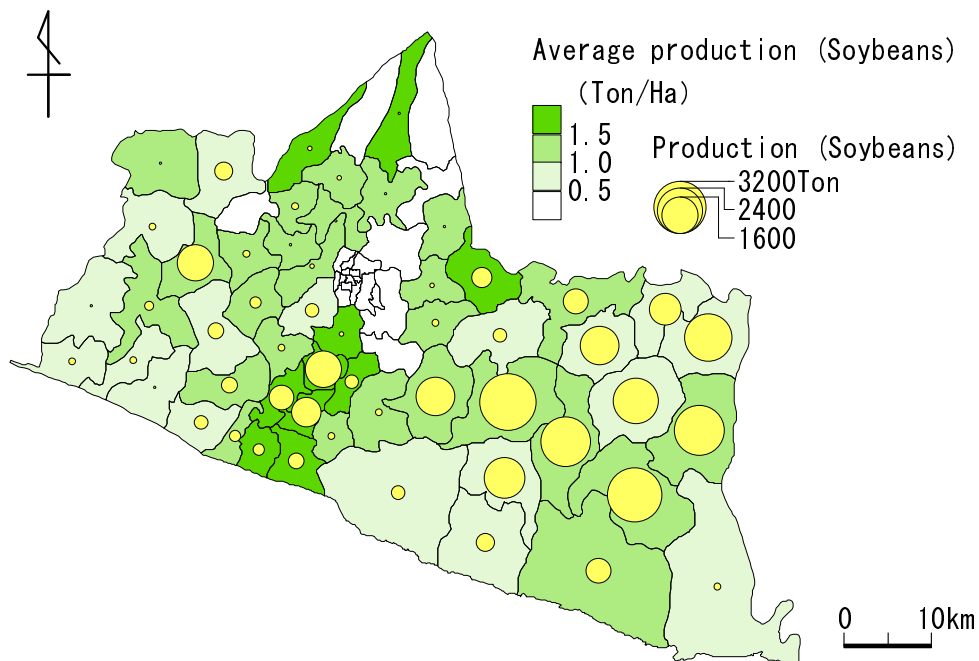


Figure 11. Production and Average Production of Soybeans in D.I.Yogyakarta in 2003

The production distribution of vegetables has a tendency. Much of vegetables like long beans (*Kacang panjang*), mustard green (*Sawi*), tomato, eggplant (*Terong*) and cucumber (*Ketimun*) are intensively produced in south slope of Mt.Merapi (Figure 12). Then they are also harvested in

inland part of eastern hill area where is less undulating and with better water supply than coastal part of that. Especially, the production of spinach (*Bayam*) is more in the area than in south slope of Mt.Merapi (Figure 13). The most productive *kecamatan* in eastern hill area is Kc.Playen. One of the reasons is assumed that Kc.Playen is situated between Wonosari Town, the prefectural capital, and Yogyakarta City, so that it has an advantage over other *kecamatan*s in the area in the distribution of vegetables.

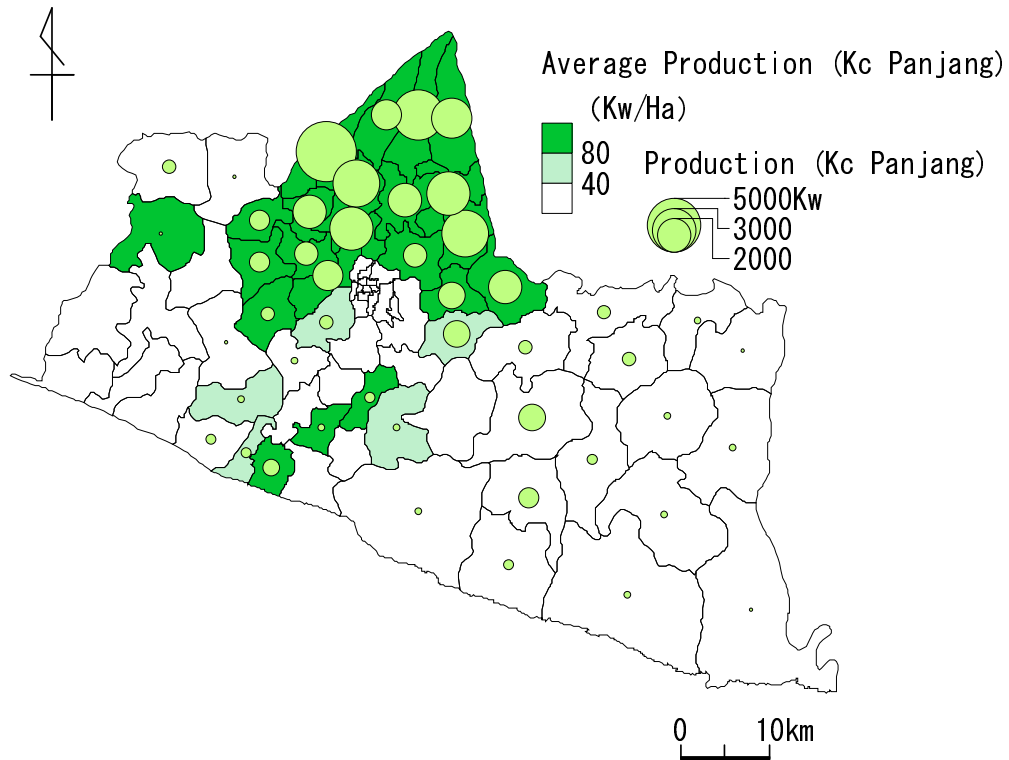


Figure 12. Production and Average Production of Long Beans (*Kc. Panjang*) in D.I. Yogyakarta in 2003

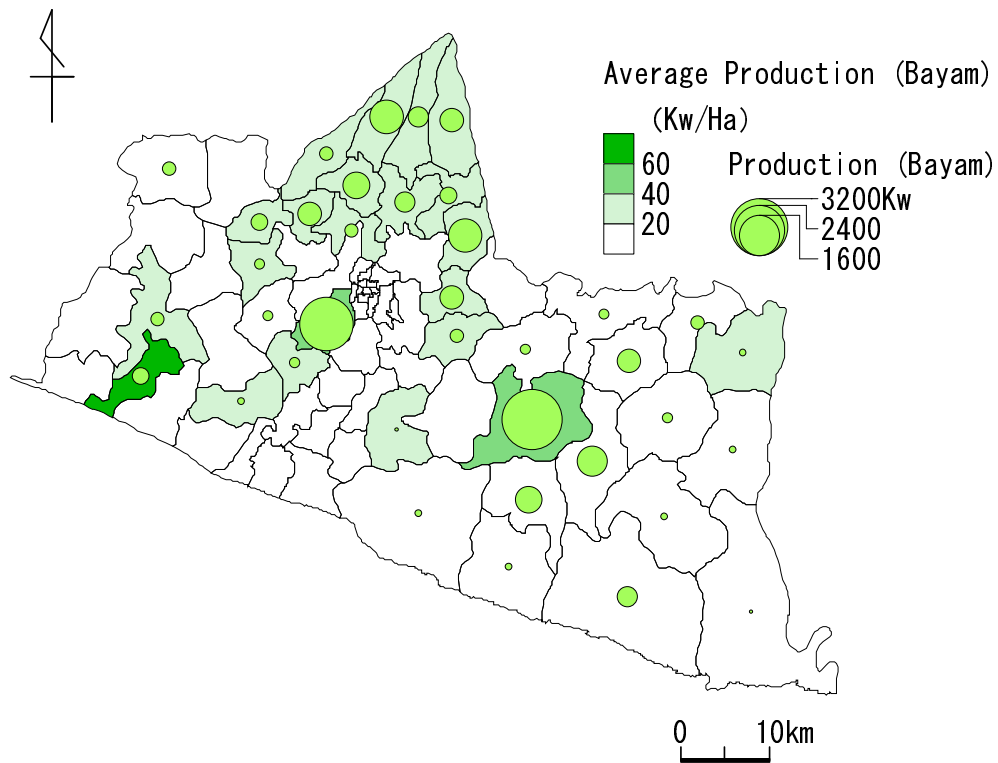


Figure 13. Production and Average Production of Spinach (*Bayam*) in D.I. Yogyakarta in 2003

The production distribution of Shallot (*Bawang merah*) and Chili (*Cabe*) is different from other vegetables. They are produced heavily in specific area. Shallot is a main crop which the production of Yogyakarta accounts for 10.4% of all production of Java. But much of them are produced in two *kecamatan*s at the central part of the coastal area of Indian Ocean (Figure 14). Main producer of Chili is also the coastal area of Indian Ocean (Figure 15).

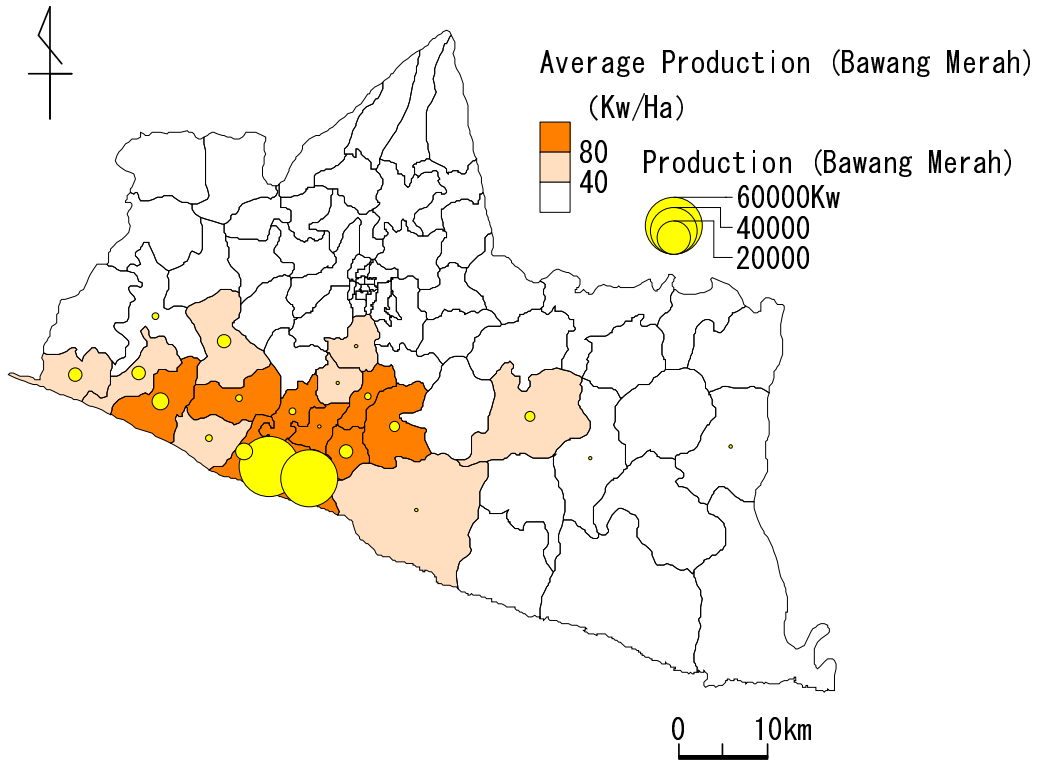


Figure 14. Production and Average Production of Shallot (*Bawang Merah*) in D.I.Yogyakarta in 2003

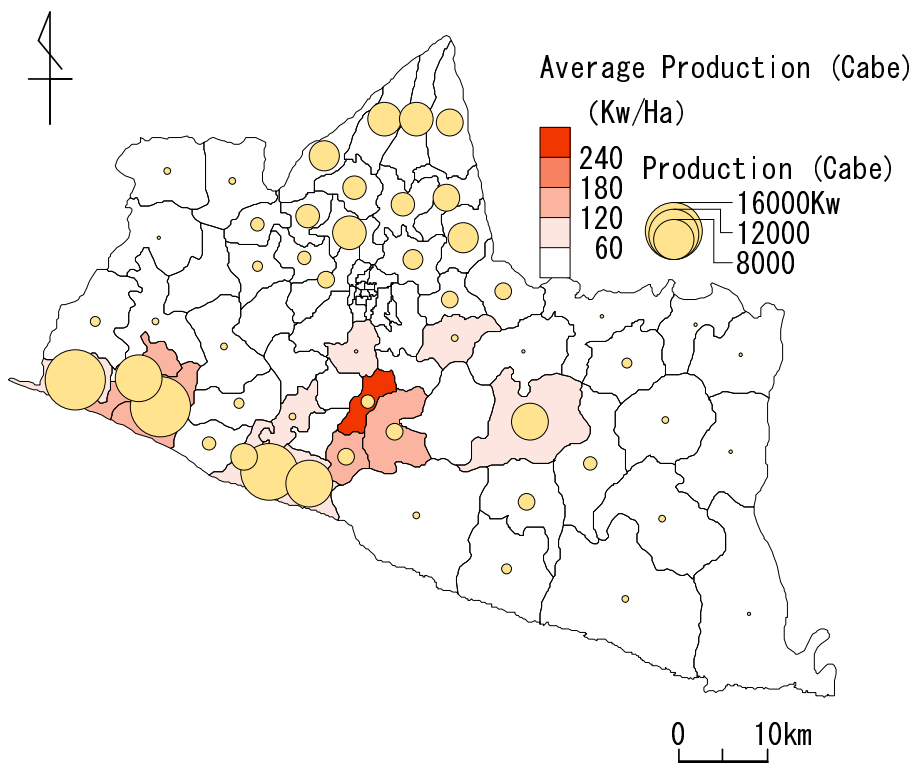


Figure 15. Production and Average Production of Chili (*Cabe*) in D.I.Yogyakarta in 2003

In the case of fruits, the producing places have little relation to the geomorphological conditions (Figure 16, Figure 17). But there is a tendency that production of fruits is less in the coastal part of

eastern hill area and from the central to the coastal part between two rivers, and larger in the inland part of eastern hill area and the northern part of western hill area than in the other area. Then *Rambutan* (nomenclature: *Nephelium lappaceum*) and *Salak* (nomenclature: *Salacca edulis*, *Salacca zalacca*.) which are the main crops in D.I.Yogyakarta are produced in specific area. The producing place of *Rambutan* is south slope of Mt.Merapi and of *Salak* is two *kecamatan* in mountainous area of Mt.Merapi (Figure 18, Figure 19).

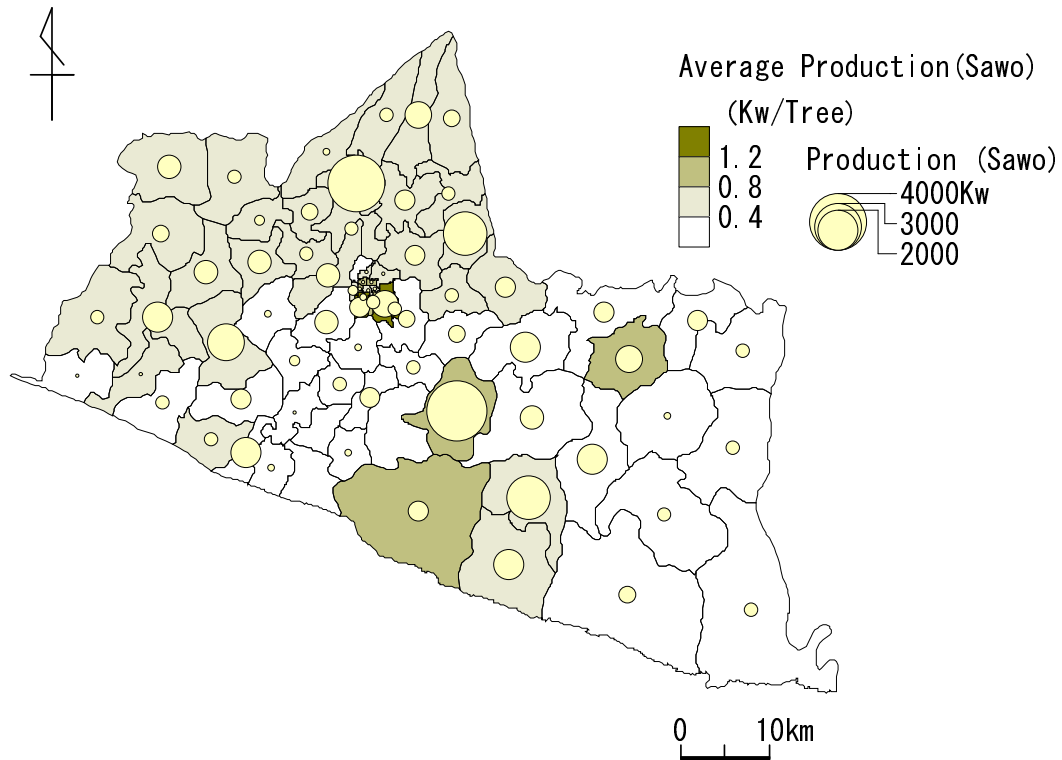


Figure 16. Production and Average Production of Sawo (*Manilkara kauki* Dub, *Manilkara spp.*) in D.I.Yogyakarta in 2003

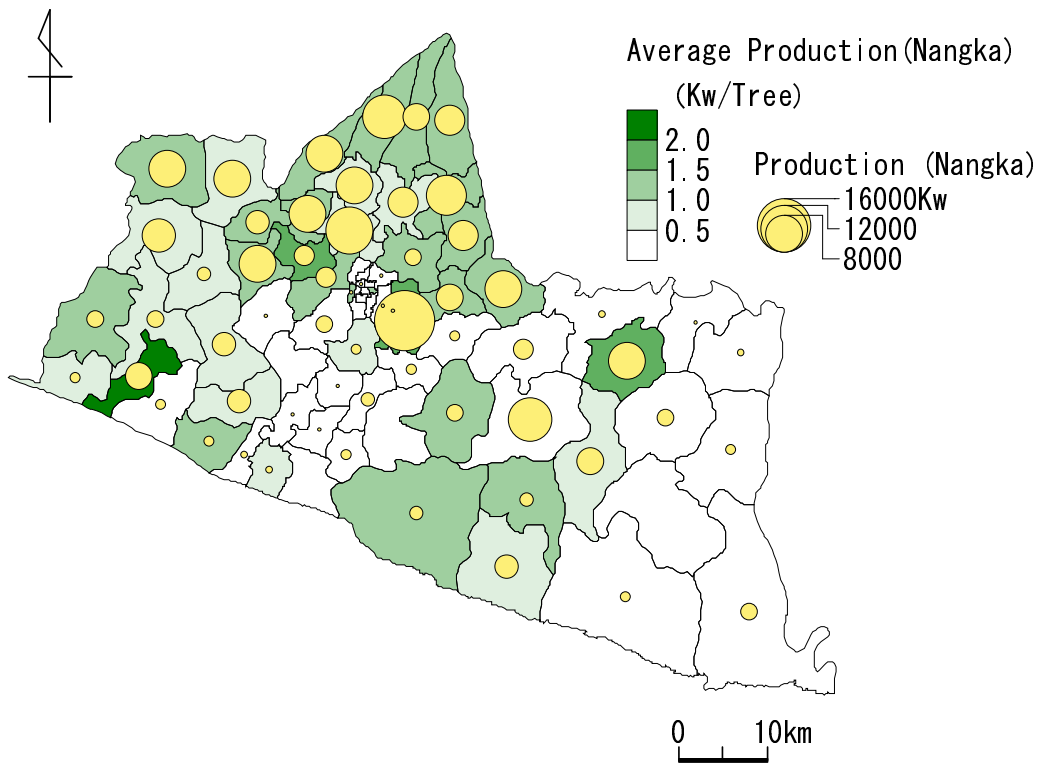


Figure 17. Production and Average Production of Jackfruit (*Nangka*) in D.I.Yogyakarta in 2003

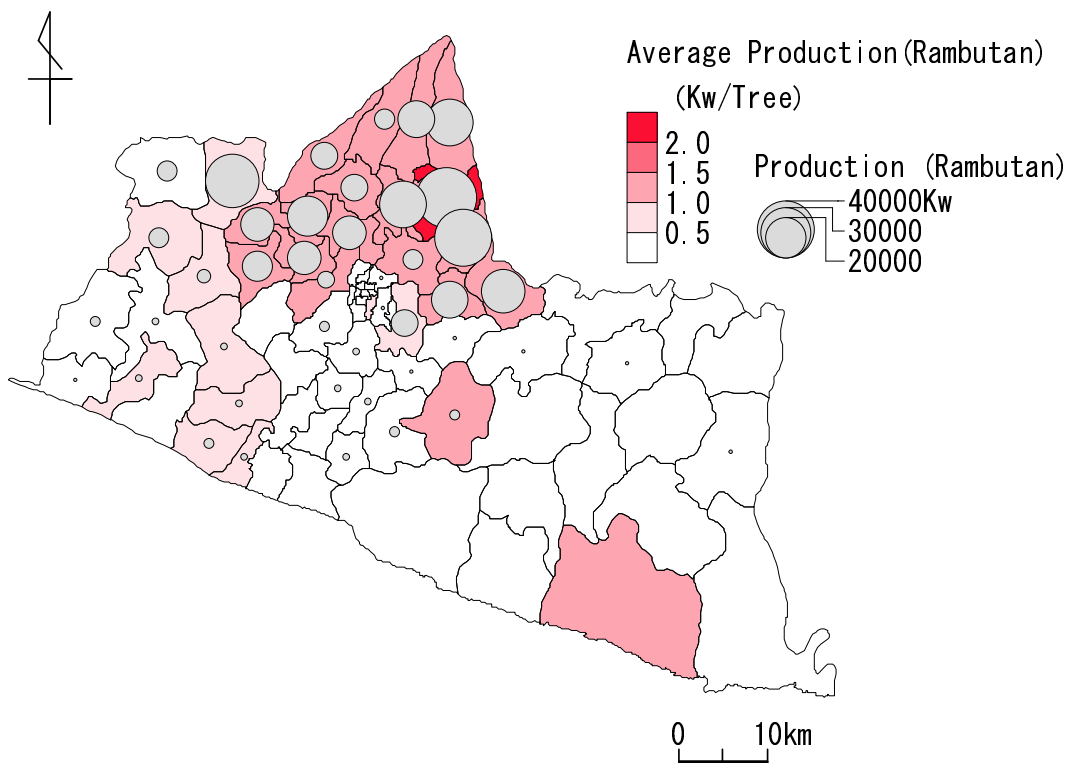


Figure 18. Production and Average Production of *Rambutan* in D.I.Yogyakarta in 2003

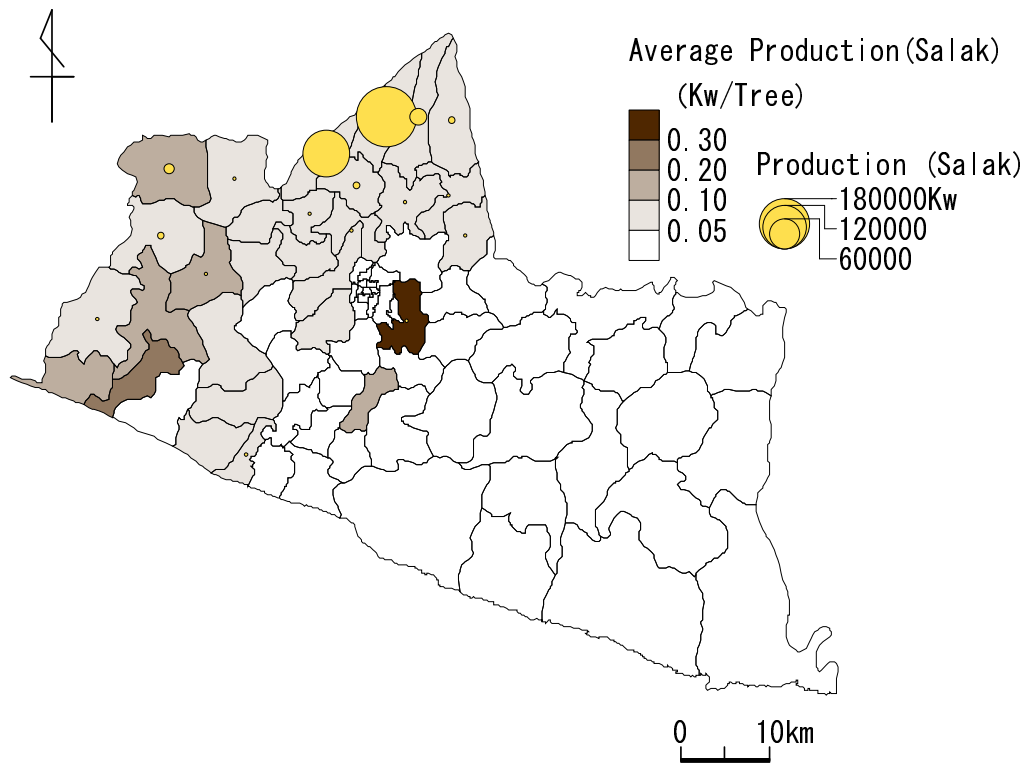


Figure 19. Production and Average Production of *Salak* in D.I.Yogyakarta in 2003

As described above, Agriculture in D.I.Yogyakarta corresponds to the environmental condition, especially geomorphological condition in each area. In simple summary, wetland paddy, vegetables and some kinds of fruits are intensively cultivated in south slope of Mt.Merapi with relatively cold climate. On the plain between two rivers, wetland paddy and the secondary crops like soybeans are intensively cultivated with good water supply. Much of the western hill area is used for upland with bad water supply and produces *palawija* and fruits. In western coastal plain of Indian Ocean, wetland paddy and some kinds of vegetables like chili are cultivated. Almost all of eastern hill area is used for upland and others including forest and widely produces upland paddy in addition to *palawija*. Then northern and central parts of eastern hill area where is better water supply in hill area extensively produce wetland paddy and vegetable/fruit respectively. On the other hand, in coastal part of eastern hill area where natural condition is severe and accessibility is bad for agriculture, there is no main crops except *palawija* and upland paddy and the cultivating is extensive.

Table 3 shows producer price of main crops in D.I.Yogyakarta. The Producer price of *Palawija* is generally lower than of vegetables and some kinds of fruits such as *Salak* and *Rambutan*. Therefore it is inferred that agricultural productivity is low in hill area where mainly produce *palawija*, especially coastal part of eastern hill area. But average area of cultivating land by agricultural household is larger in hill area than in other areas (Table 4). This suggests that agricultural households compensate agricultural extensiveness with size of cultivating land in part. However it is necessary to examine production cost in order to prove the inference as above.

Table 3. Producer Price of Main Crops in D.I.Yogyakarta in 2003 (Rp/kg)

Crop	Producer Price	Crop	Producer Price
Maize	1,113	Ketimun	7,982
Cassava	457	Kc Panjang	1,530
Sweet Potatoes	621	Cabe	4,244
Peanuts	5,841	Bawang Merah	4,176
Soybeans	2,538	Sawo	1,259

BPS: Statistik Harga Produsen 1999-2004

Table 4. Average Area of Cultivating land by Agricultural Household in D.I.Yogyakarta in 2003 (m²)

Kabupaten/Kota	Sawah	Others	Total
Kulon Progo	926	2,370	3,296
Bantul	925	798	1,722
Gunung Kidul	418	3,688	4,106
Sleman	1,125	523	1,648
Kota Yogyakarta	391	294	685
DI Yogyakarta	792	2,011	2,803

BPS: Sensus Pertanian 2003,
Hasil Pendaftaran Rurah Tangga Propinsi Yogyakarta

3. Relation between agriculture and demographical feature in D.I.Yogyakarta

There are some relations between agricultural and demographical features in D.I.Yogyakarta. Figure 20 shows structure of occupation in D.I.Yogyakarta by *kecamatan*. In this figure, agriculture accounts for three fifth and over in hill area, especially in coastal part of eastern hill area, where cultivation is extensive and less productive. On the other hand, Manufacture and the other including tertiary industry account for high rates in structure of occupation in the area between two rivers and western coastal area where crops like rice are produced intensively. Therefore hill area is described as poorer area where employment opportunities are lack except for agriculture and agricultural productivity is low. As figure 21, sex ratio in hill area places disproportionate weight on female. It is inferred from above that male work force flows out from this area for migrant work.

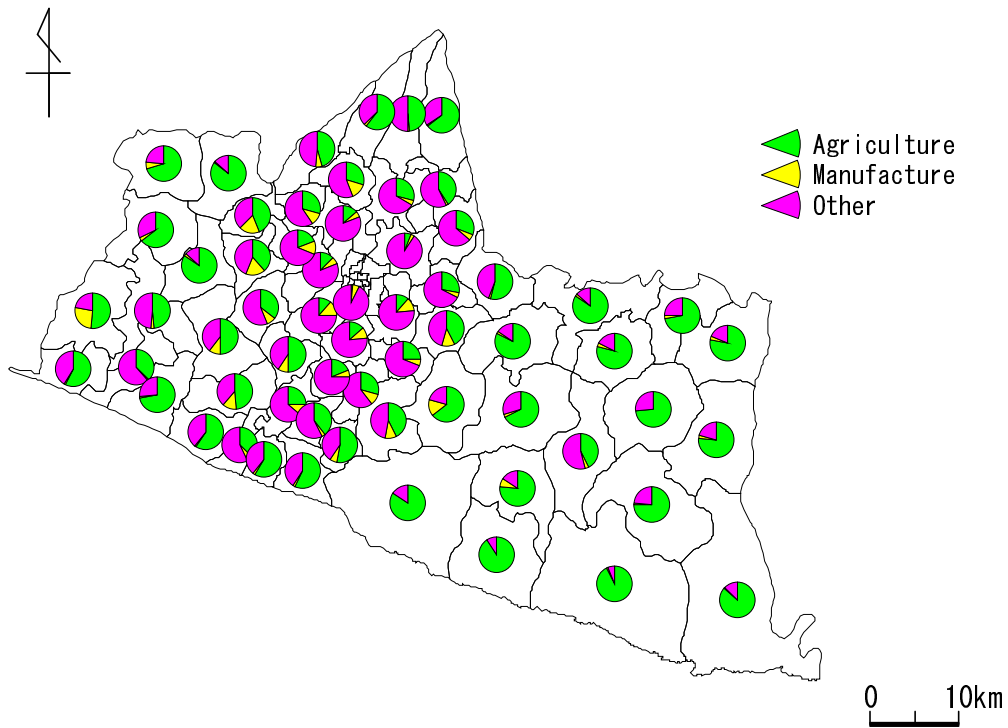


Figure 20. Structure of Occupation in D.I.Yogyakarta in 2003

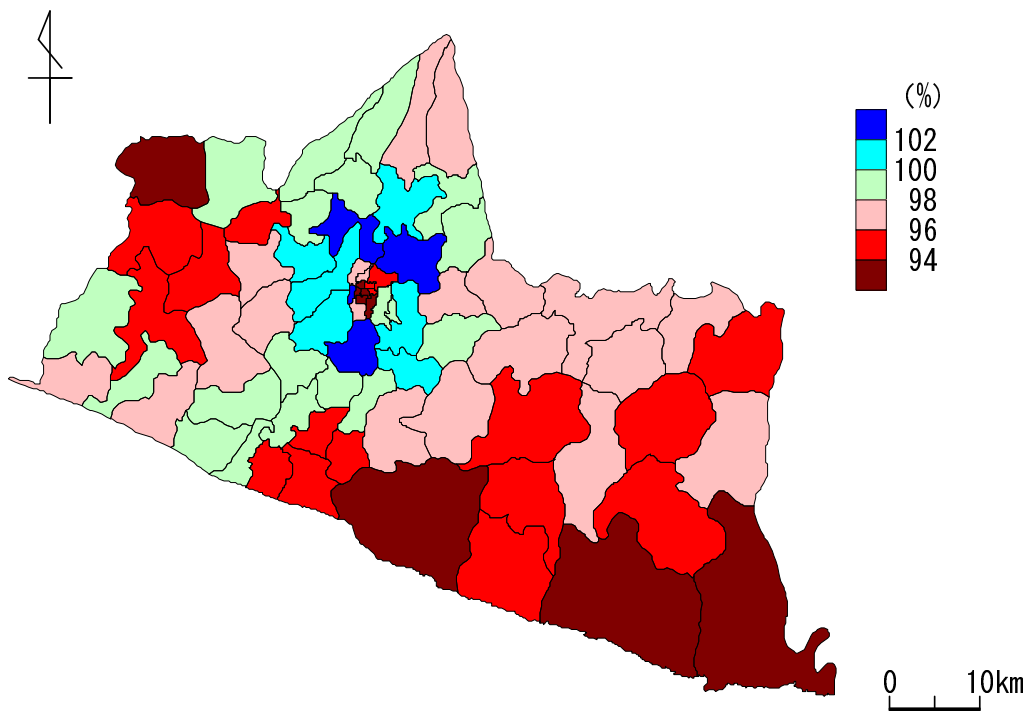


Figure 21. Sex Ratio in D.I.Yogyakarta in 2003

As mentioned above, Analyzing land use and agricultural production on account of environmental condition such as geomorphological condition, proximity to main market and traffic network contributes to appreciate the adequacy of agriculture in the area. Examination of demographical indexes enables analysts such as researchers and local administrators to consider

characteristics of rural area from many directions. Analysis like this can be conducted by Excel. But GIS software facilitates examination of spatial factors.

References

BPS (2004): Sensus Pertanian 2003, Hasil Pendaftaran Rumah Tangga Propinsi Yogyakarta.

BPS (2005): Statistik Indonesia 2004.

BPS Kab.Bantul (2004): Dalam Angka Kab.Bantul.

BPS Kab.Gunung Kidul (2004): Dalam Angka Kab.Gunung Kidul.

BPS Kab.Kulonprogo (2004): Dalam Angka Kab.Kulonprogo.

BPS Kab.Sleman (2004): Dalam Angka Kab.Sleman.

BPS (2000): digital data of Population Census 2000.