

GAPLEK, TIWUL AND GATOT AS STAPLE FOOD IN JAVANESE BARREN AREA

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ABSTRACT

Javanese's food consumption also affected by the area's characteristic. In some barren areas, such as Gunung Kidul, Trenggalek, and Wonogiri, Javanese people tend to consume cassava as their staple food. They turn the cassava into gaplek by drying the cassava under the sun, so the cassava can be stored and can be used in famine time. Javanese culture also influenced the way of gaplek consumption. Gaplek can be processed into tiwul and gatot. Tiwul made from chopped white gaplek that steamed, while gatot made from black brown moulded gaplek that sliced then steamed. The unique tiwul and gatot texture affected by the gelatinization process of gaplek's starch. Tiwul usually served as sweet snack by adding brown sugar and grated coconut flesh, or served as rice substitute by adding side dishes.

KEYWORDS: Barren Area, Gaplek, Gatot & Tiwul

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INTRODUCTION

There are several barren areas in Indonesia; one of them was the area of Gunung Kidul. The area of Gunung Kidul Regency was once, a dense forest before the 1800s. The deforestation process was massively done in the 1800s and structured, when the Dutch entered Java after forcing the breaking of the Gunung Kidul area partly into the Mangkunegaran Kingdom and the Yogyakarta Kingdom (Whitten et al., 1996). Deforestation undertaken is for conversion to gardens and agriculture, as stated by Whitten et al. (1996) that, from 1940 to 1950s there were coffee plantations in the region. During the Japanese colonialism, deforestation became increasingly uncontrolled. At that time, the wood needed for the need of war and conversion to the castor bean plant, but failed because they had not understood the biophysical conditions, in the area of Gunung Kidul, which is dominated by karst (Nibbering, 1991). From then on, Gunung Kidul became barren, arid and dry, even famous for poverty from 1940s to 1970s (Sunkar, 2008). This is also in line with the results of a study, by Roche et al (1984), in which about 40 percent of the total area is severely eroded and has extremely thin soil on untterraced hillsides, where only cassava and corn can be grown. The same barren areas are also found in Central and East Java in Madiun, Banjarnegara, Trenggalek and Wonogiri.

In addition to the problem of barren land, the community in 1960 to 1970 was a poor community. According to Roche et al (1984), the gross value of food crop output is smallest in Gunung Kidul, compared with Garut and Kediri, despite the large average farm size, because the soil is poor. Cassava sales amount to about a third of total gross family income in Kediri. Cassava's predominant role as a cash crop in these two region is evidenced by the high ratios of sales to total production. Sales are smallest in Gunung Kidul, where cassava is the major calorie source. The Gunung Kidul families are poor in both relative and absolute terms, in large part because

their land is poor. Because the soil is depleted, cassava plays a major role in farming and it becomes important food stuff, due to poverty. The welfare implications of increased cassava productivity could be substantial in Gunung Kidul. However, because, agroclimatic constraints are particularly binding in this area (Roche et al., 1984).

This condition certainly affects the food consumption of people in the barren area, by using cassava as their staple food. Javanese people in that area generally making cassava into *gaplek*, with the aim that can be stored longer. *Gaplek* is a thinly sun dried sliced cassava. *Gaplek* can be processed into *tiwul* or *gatot*. This review will explain the culture, method and science beyond *gaplek*, *tiwul* and *gatot*.

JAVANESE PERPECTIVE ABOUT *TIWUL* AND *GATOT*

Tiwul and *Gatot* is a cassava based traditional Javanese food. *Tiwul* can be considered as a rice substitute in Java specifically in barren or dry area where it's difficult to grow crops. *Gaplek*, the thinly sliced sun-dried cassava, can be stored for months and cooked for rice substitute as *tiwul* or *gatot*, when famine time comes.

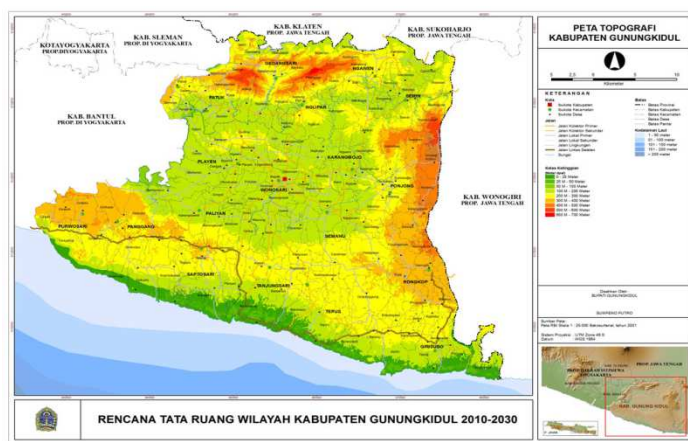


Figure 1: Topography of Gunung Kidul

Source: BAPPEDA Gunung Kidul, 2011 <http://bappeda.gunungkidulkab.go.id/publikasi/spasial/Peta-Topografi-.jpg>

From the point of view of Javanese people, *tiwul* is a kind of simple yet easy to cook dish that can help them in the hard time. The Javanese used to do everything in modestly, so they processed the cassava into *tiwul* modestly. From the Javanese culture's point of view, having meal is a kind of manners they usually do, so there's no need to prepare the food in fancy ways. In olden days, Javanese people utilize everything they could find in their own yard to survive from starving. They don't go to forest to hunt or fishing to fulfil their needs. They use cassava that can be found in their yard to make *tiwul*. At first, they sliced the cassava and sundried it, to preserve it. Then the sun-dried cassava, called *gaplek* chopped into coarse powder, and mixed with water then steamed. The steamed *gaplek* flour called *tiwul*, and can be eaten sweet or salty.

Some dry area of Java still eating *tiwul* as their staple food in the present time, also as snack for tea time in others area. *Tiwul* also served as *tumpeng*, a cone-shaped rice dish like mountain that served at *syukuran*, a thanksgiving event as a form of gratitude to God for the successful crops. Sometimes, *tiwul* served at Keraton to important guest as a nostalgic snack.

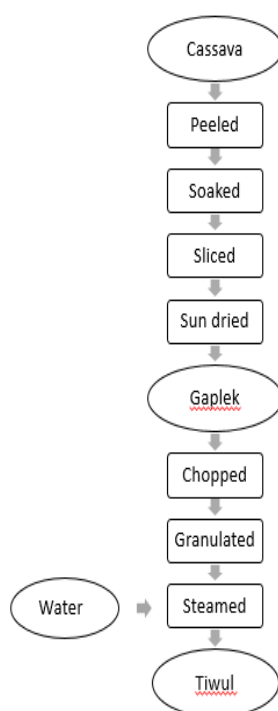


Figure 2: Flowchart Process of *Tiwul* Making from Cassava

METHOD OF MAKING GAPLEK

There are several steps to make *gaplek*, the sun-dried cassava. First, the cassava's skin is peeled, then the peeled cassava is soaked in water for several hours. The aim of the soaking step is to reduce the hydrogen cyanide compound that is naturally contained in the cassava. Hydrogen cyanide is a kind of compound that gives a bitter taste. High amounts of hydrogen cyanides mean a more bitter taste, and vice versa. According to the research, hydrogen cyanide is a toxic compound that can lead to death if eaten in numerous amounts. Hydrogen cyanide has high solubility in water and is also volatile due to heat, so when cassava is soaked in water, the reaction of anion cyanide (CN^-) occurs. The reaction of hydrogen cyanides and water forms hydronium and anion cyanide, as can be seen below.

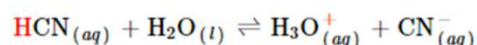


Figure 3: Reaction of HCN with H_2O

The next step of making *gaplek* is the sun-drying process. The soaked cassavas are drained and then arranged in flat bamboo boards, then dried under the sun for several days. After the drying process, *gaplek* can be stored in a warehouse for months or cooked into *Tiwul*, by pounding the *gaplek* into powder and then steaming after mixing with some water.



Figure 4: Gaplek

METHOD OF MAKING *TIWUL* AND *GATOT*

The difference between *tiwul* and *gatot* derived from the *gaplek*'s type used. White *gaplek* could be made into *tiwul*, while *molody* and black-brown *gaplek* made into *gatot*. The *molody* and black cassava is caused by the appearance of fermented fungus. In the beginning, *gaplek* is stored during the humid and mildewy rainy season. *Gaplek* used for the making of *gatot* should be soaked first to provide a chewy texture.

Traditionally, *gaplek* that will be processed into *tiwul* must be made into flour by chopping. The tool to pound *gaplek* called *lumpang*, in the form of mortar and pestle, which is also used to mash rice, corn, and other agricultural products. The mortars are usually made of wood or stone. The shape of a rectangle is, measuring about 80 cm x 0.70 cm x 60 cm, with a hole in the centre of a circle with about 30 cm in diameter. The hole depth is about 30 cm, with the diameter getting smaller. Pestle is a heavy and hard wood with a diameter of 10 cm, length 2 m, and a handle in the middle of the pestle.

Gaplek that has been pounded, will be sifted by using *tampah*. *Tampah* is a bamboo webbing that is dense and smooth, arranged into a circle with a diameter of 70 cm. The process of sifting cassava flour requires high skills. At first, pounded *gaplek* was placed in *tampah*. Then, the *tampah* is shaken repeatedly in circular motion, until rough cassava collected in the middle, so can be taken to be pounded again. *Tampah* is shaken up and down very quickly, until the *gaplek* flour accumulates below and moves toward the back. While the grains are still roughly above and move forward which is then poured into another container to be pounded again. This process is done continuously until obtained fine *gaplek* flour. Furthermore, this fine cassava flour is watered, until it is clotted and re-crushed manually. This process is still done in *tampah*. The coarse *gaplek* grain crushed by hand, until the whole flour turn into fine granulated flour, then it ready to be steamed.

In steaming, starch granules in *gaplek* flour will swell and absorb water easily. This process is often called gelatinization. Gelatinization depends on the starch constituent in a food ingredient. Starch is the main component forming *tiwul* texture, that is sticky and clotted. The main components of starch are amylose and amylopectin. The difference between amylose and amylopectin is the structure and the branched chains. Amylose has smaller structure and no branched chains meanwhile, amylopectin has bigger structure and highly branched chains. Cassava starch contains 17% of amylose and 83% of amylopectin. In steaming process, amylopectin stretches and the hydrogen bond get cut off. The higher temperature, the more hydrogen bond that is cut off (or disconnected) and it allows more water to be absorbed into the starch granules (Charles et al., 2005). In this process, the amylose molecules are released into the water phase that covers the granules so that the starch granules structure becomes unfold and makes more water absorbed. This reaction caused the granules swollen and the granules' volume increased. Water molecule will make hydrogen bond with sugar hydroxyl group from amylose and amylopectin. Free water outside granules will be reduced, and the released amylose will increase. This mechanism explains the texture of the *tiwul* made after the steaming process of *gaplek* flour. From the research that has been done by Immaningsih (2012), *gaplek* flour will be perfectly gelatinated in temperature 69,59 °C. *Gaplek* flour has more viscosity and fastest time to gelatinized than any other flour. Faster gelatinization is caused by the higher amylopectin in *gaplek* flour that make *tiwul* swollen faster.

Tiwul can be saved in long time after steamed, by redrying the *tiwul* itself. To cook the dried *tiwul* into *tiwul* again, the dried *tiwul* need to be soaked in water to fasten the steaming process. High quality *gaplek* flour has clean white

colour and unique scents. Low quality *gaplek* flour has dark brown colour, caused by soil after the unclean washing process. Some low quality *gaplek* also has grey colour which caused by the formation of moulds because of incomplete drying process. *Gaplek* flour will change colour into light brown after steamed. *Tiwul* will have the aromatic scent, sweet taste, and the soft texture. *Tiwul* can be served with some brown sugar and grated coconut flesh as sweet snack, or as rice substitutes, by serving *tiwul* with some side dish, such as chicken, tempeh, tofu, or *sambal*.



Figure 5: Tiwul

Gatot is made from the low quality *gaplek*, that have grey or black colour. The moulded *gaplek*, first soaked in water for 24 hours, then sliced into smaller pieces. The soaked black *gaplek* then steamed to gelatinize the starch. Then the steamed *gatot* served with some sugar, salt, and grated coconut flesh. *Gatot* usually consumed as sweet snack in tea time.

NUTRITIONAL VALUE OF TIWUL

Tiwul has similar nutritional value as rice. Rice is well-known as Indonesian staple food, that rich in carbohydrate and provides high energy. In 100 gram of white rice, there are 2,1 gram of protein, 0,1 gram of fat, 65-70 gram of carbohydrate, less than 1 gram of sugar, and other vitamins and minerals, such as 0,5 milligram of iron. While in 100 gram of *Tiwul*, there are 1,5 gram of protein, 0,7 gram of fat, 80 gram of carbohydrate, 1-2 gram sugar, and various vitamins and mineral such as 1,9 milligram of iron (Djuwardi, 2009). The nutritional value perspective, *Tiwul* has a higher carbohydrate content than white rice, but has higher content of fat, sugar, and iron. We can say that *Tiwul* can be used as rice substitutes because it has similar nutritional value as white rice.

Table 1: Nutritional value of Tiwul

Nutrition Content per 100 gr	Tiwul	Rice
Protein (g)	1,5	2,1
Carbohydrate (g)	80	65-70
Fat (g)	0,7	0,1
Ash (g)	3	3
Iron (mg)	1,9	0,5

CONCLUSIONS

Tiwul and *gatot* usually consumed as staple food in barren Javanese area until now, because the soil characteristic that dry and arid. *Tiwul* and *gatot* made from sun-dried cassava called *gaplek*. *Tiwul* is simple yet easy dish that can be cooked in famine time. From the Javanese people's perspective, *tiwul* is a simple dish. This perspective affected by Javanese culture that very simple in living. *Tiwul* and *gatot*, especially *tiwul* can be substitute for rice for Javanese people in barren area. It is because, *tiwul* has a higher carbohydrate content than rice, and also higher in fat, sugar, and iron.

Tiwul can be consumed as a sweet snack or as rice substitute by adding side dish. To summarize, *tiwul* and *gatot* can be consumed as staple food in Javanese barren area because, its nutritional value that similar to white rice.

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