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Ethnobotany of *Suweg (Amorphophallus Paeoniifolius* (Dennst.) Nicolson) in Darupono Village, Kendal District

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Abstract

Suweg (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) is a wild plant utilized by the community of Darupono village. In this context, the present research aimed to investigate the use of the *suweg* plant in Darupono Village, identify the specific plant organs used, explore its potential, and examine the cultivation methods employed in the village. The study adopted an exploratory, descriptive research design utilizing surveys, semi-structured interviews, and questionnaires to gather the supporting data. Correspondingly, data collection employed simple random techniques and snowball sampling. The findings revealed several potentials of the *suweg* plant, including its antidiabetic, antibacterial, and anticancer properties. Additionally, the plant could be processed into flour, a fundamental ingredient in noodle production. The people of Darupono Village consumed *suweg* in various forms, such as steamed, boiled, fried, and processed into chips, compote, and *oblok-oblok* (a traditional Javanese cuisine) using *suweg* leaves. Moreover, *suweg* was also used in traditional ceremonies held every seven months, known as *mitoni* in Javanese culture. The cultivation of *suweg* in Darupono Village involved several stages, including land preparation, seed preparation, planting, maintenance, and harvesting.

Keywords: Darupono Village, Ethnobotany, *Suweg*

Introduction

Indonesia is known for its exceptionally high biodiversity, primarily due to its tropical location and stable climate. According to Retnowati et al., (2019), Indonesia has approximately 31,750 plant species, including numerous wild plant varieties. One such plant commonly used by the Indonesian people is *Suweg (Amorphophallus Paeoniifolius* (Dennst.) Nicolson).

Suweg is widely distributed throughout Indonesia (Yuzammi et al., 2017), with significant populations on islands such as Java, Lombok, Sumatra, and Bali (Santosa et al., 2017). Classified as a member of the *Araceae* or taro family, *Suweg (Amorphophallus Paeoniifolius* (Dennst.) Nicolson) holds great importance for the Indonesian community due to its various benefits. It serves as a staple food source and is used medicinally to treat anemia (Singh et al., 2010).

The nutritional composition of *Suweg* tubers includes water, calories, protein, fat, carbohydrates, calcium, phosphorus, iron, and thiamine (Soetomo, 1997). Additionally, *Suweg* tubers contain approximately 18.44% starch (Utomo, 1997). However, it is worth noting that they also contain oxalate

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crystals, which can cause itching (Burkill, 1996). Various studies have investigated the chemical contents of *Suweg* leaves, including alkaloids, polyphenols, and steroids (Annisah & Muhtadi, 2021). Furthermore, research conducted by Gharib and Raib (2023) indicates that *Suweg* roots possess tonic properties and can alleviate stomach aches. The flavonoid content in *Suweg* is influenced by climate and geographical location, which can affect the type and concentration of flavonoids present (Iwashina et al., 2023).

Although ethnobotanical research on *Suweg* has been conducted in West Java by Mutaqin (2020) and in Semarang City by Wahidah (2022), no previous studies have explored it in Kendal Regency, particularly in Darupono Village. This village boasts favorable conditions for the growth of *Suweg*, with an optimal elevation ranging from 150 to 175 meters above sea level (Puspitasary & Lianah, 2017). Hence, conducting ethnobotanical research in this area is crucial to uncover the uses of *Suweg*, identify the plant parts utilized by the local community, explore the potential of *Suweg* in Darupono Village, and provide insights into *Suweg* cultivation practices in the region (Syafitri et al., 2014).

Research Method

Data collection

This research was an exploratory, descriptive study that employed survey methods, semi-structured interviews, and questionnaires. The data collection techniques included simple random and snowball sampling. In this regard, snowball sampling is a technique in which the initial sample size is small and gradually increases over time. Initially, one or two individuals were selected as participants. However, due to the researchers' perception that this sample size was insufficient or did not yield robust data, additional participants were acknowledged to possess a better understanding. Thus, they could complement the data provided by the initial participants (Sugiyono, 2018).

Research location

This research was conducted in March 2023 in Darupono Village, South Kaliwungu District, Kendal Regency. The researchers employed direct interviews and questionnaires to enhance the data, particularly about communities that cultivated and utilized the *Suweg* plant *(Amorphophallus Paeoniifolius* (Dennst.) Nicolson).

Data analysis

The data incorporated in this study was categorized into primary and secondary data. Primary data was collected directly from the field through interviews with respondents, as well as through observation and data collection related to the utilization of *Suweg* plants in the Darupono area. The interview responses obtained from the respondents were processed through tabulation, coding, and subsequent calculation of percentage values. The questionnaire results obtained from the respondents were also subjected to similar stages. Secondary data included information on the general conditions of the research location and the community's socioeconomic and cultural data. Furthermore, additional data from relevant sources such as journals, articles, and books related to the *Suweg* plant were utilized to strengthen the existing data.

Figure 1. *Research Location*

Research Results and Discussion

Utilization of *suweg* (*Amorphophallus Paeoniifolius* (Dennst.) Nicolson)

The *suweg* plant is widely used as food by most Darupono Village residents. Based on observations, *suweg* tubers are commonly prepared by steaming or frying, while *suweg* leaves are used as a complementary vegetable. This traditional processing method has been passed down through generations in the Darupono Village community. It should be noted that not everyone follows this specific processing technique. Additionally, the people of Darupono Village have a special treatment process where they soak the *suweg* in salt water before cooking. This process helps reduce the presence of oxalate crystals in the *suweg* tubers (Mayangsari, 2010).

1. Utilization of *suweg* tubers by steaming and boiling

Observations conducted in Darupono Village revealed that most people use *suweg* tubers as food, and their preferred processing method is steaming. The process for steaming *suweg* tubers is as follows: First, ripe *suweg* tubers are selected and thoroughly washed to remove any soil residues. The tubers are then peeled until the skin is removed and cut into small pieces as needed. The cut tubers are washed again until clean, and they are soaked in salt water for several minutes to eliminate oxalate crystals that may cause itching when consumed. The tubers are then steamed or boiled over high heat for approximately 20-30 minutes. Boiling helps reduce the levels of oxalate crystals, making it more comfortable to eat (Chotimah, 2013). Finally, the suweg tubers are ready to be enjoyed as food or snacks by the people of Darupono Village.

2. Utilization of *suweg* tubers by frying

Observations carried out in Darupono Village indicated that people also use *suweg* tubers as food and process them by frying. The procedure is as follows: The cleaning process for *suweg* is the same as when steaming or boiling. The *suweg* tubers are then steamed over medium heat until they become slightly soft. Afterward, they are fried until fully cooked. Additional spices can be added according to taste preferences. The frying technique for *suweg* tubers has also been practiced in other areas, and some even use *suweg* tubers to make cakes or other fried foods.

3. Utilization of *suweg* tubers as chips

Observations in Darupono Village showed that the people used *suweg* tubers as food and made them into chips. The method for processing *suweg* tubers is as follows: The first step is to prepare the ripe *suweg*, then wash it thoroughly to remove any adhering soil. *Suweg* is peeled until the skin is gone. *Suweg* is cut small and thin. Wash the *suweg* tubers until they are clean, and soak them in salt water for a few minutes to remove the oxalate crystals so they do not cause an itchy feeling when eaten. *Suweg* tubers are soaked in seasoned water containing salt, stock, and pepper for several minutes. *Suweg* tubers are boiled over medium heat until slightly soft, then fried until cooked. Additional spices or broth are added to enhance the taste of the *suweg* chips.

Processing *suweg* by frying it and turning it into chips is almost the same. The difference between the two is the size of the *suweg* tuber cutting. If fried, *suweg* is cut into larger pieces than for making chips. Meanwhile, *Suweg* chips are cut thinly to produce a crispy texture. They are very suitable as a snack because they are savory and delicious. The processing of *suweg* as chips is also a form of local wisdom in Darupono Village, as there is no existing data regarding the processing of *suweg* into chips in other areas.

4. Utilization of *suweg* tubers for *kolak* (compote)

Observations in Darupono Village showed that the people used *suweg* tubers as food and made them into compote. The method for processing *suweg* tubers is as follows: The first step is to prepare the ripe *suweg*, then wash it thoroughly to remove any adhering soil. *Suweg* is peeled until the skin is gone. *Suweg* is cut into small pieces as needed. Wash the *suweg* tubers until they are clean, and soak them in salt water for a few minutes to remove the oxalate

crystals so they do not cause an itchy feeling when eaten. Steam the *suweg* tubers over medium heat for 10-20 minutes until they become soft. Mix coconut milk, palm sugar water, and granulated sugar, then boil until it reaches boiling point. The cooked *suweg* is taken from the steamer and put into a pan containing coconut milk and sugar. Wait a few moments until it boils. *Suweg* compote is ready to be served.

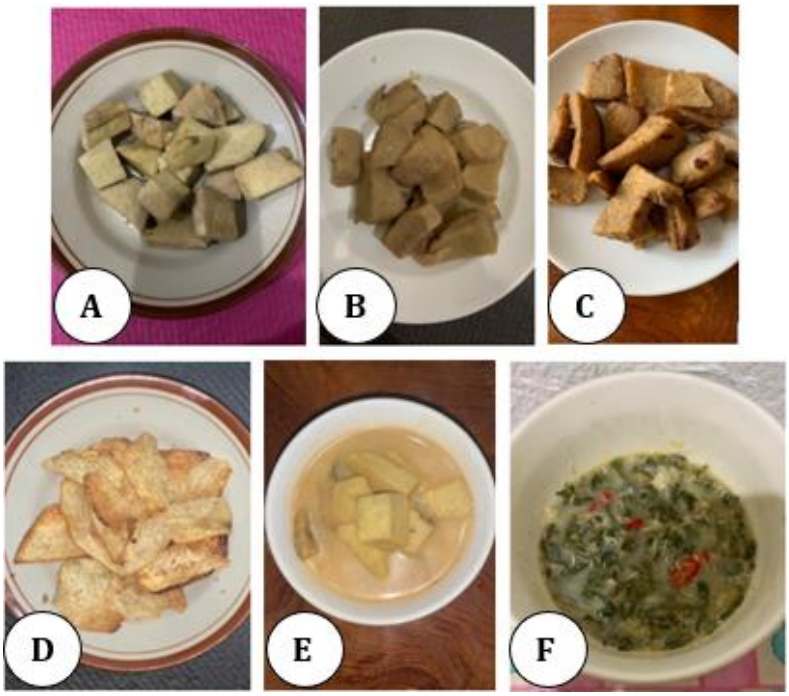
5. Utilization of *suweg* tubers for traditional ceremonies

Some people in Darupono Village use *suweg* tubers for traditional ceremonies. The specific ceremony referred to is the seven-month ceremony, known as *mitoni* in Javanese tradition. It is held to celebrate the pregnancy, reaching seven months. Its purpose is to ensure the health of both the expectant mother and the baby until they grow up. This event requires seven types of secondary crops, namely *suweg*, *gembili*, *galetug*, cassava, canna, peanuts, and sweet potatoes. These materials are chosen based on the belief that they will bring about a smooth delivery, as these secondary crops are easily harvested from the ground.

6. Utilization of *suweg* leaves as *oblok-oblok*

Observations in Darupono Village showed that the people used *suweg* leaves as food and made them into *oblok-oblok* (a traditional Javanese cuisine). This processing technique is a local wisdom of the Darupono Village community that has been passed down over generations. Moreover, no data has been found regarding the use of *suweg* leaves as *oblok-oblok* in other areas. The procedure involved in this technique is as follows: Prepare the ingredients, namely young *suweg* leaves, cayenne pepper, garlic, shallots, candlenuts, salt, sugar, flavorings, coconut milk, and salted fish. *Suweg* leaves are cut into small pieces. Cayenne pepper, garlic, shallots, and candlenuts are crushed. The finely ground spices are sautéed until fragrant, and the coconut milk solution is added. Add flavorings, salt, and sugar to taste. Put the *suweg* leaves into the pan and stir until evenly distributed. Add the salted fish and stir until evenly mixed. The *oblok-oblok* made from *suweg* leaves is now ready to be served. This kind of *oblok-oblok* tastes almost similar to the one usually made from cassava leaves. Additionally, it is usually enjoyed with rice and other side dishes.

Figure 2. *Utilization of Suweg: (a) Steamed; (b) Boiled; (c) Fried; (d) Chips; (e) Kolak (Compote); (f) Oblok-Oblok*



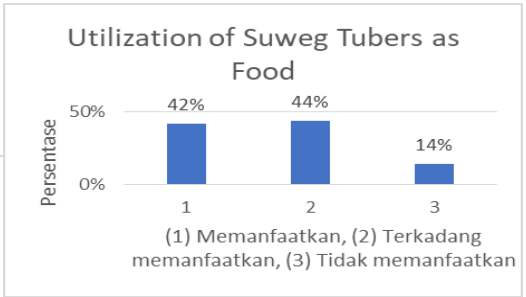
Parts of *suweg* plant organs (*Amorphophallus Paeoniifolius* (Dennst.) Nicolson) used by the Darupono Village community

1. Tuber

Figure 3. *Suweg Tuber*

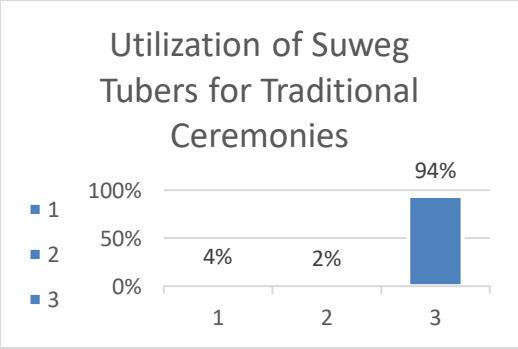
Suweg tubers are used as food by the community. In an interview with Mrs. Karyati, a resident of Darupono Village, she mentioned that *suweg* tubers have a chewy texture and provide a feeling of fullness when consumed. Besides being a food source, the people of Darupono Village are aware of the medicinal properties of *suweg* tubers, including their ability to prevent diabetes. It is due to the high carbohydrate content of *suweg* tubers, which ranges from 80% to 85% (Kriswidarti, 1980). Additionally, *suweg* tubers contain approximately 15.09% dietary fiber and 18.44% starch.

Figure 4. *Chart: Utilization of Suweg Tubers as Food*



Based on data collected from 50 respondents, it was found that 42% of the people in Darupono Village used *suweg* tubers as a food source. Additionally, 44% of respondents occasionally consumed *suweg* tubers as food, while 14% did not use *suweg* tubers for this purpose.

Figure 5. *Chart: Utilization of Suweg Tubers in Traditional Ceremonies*

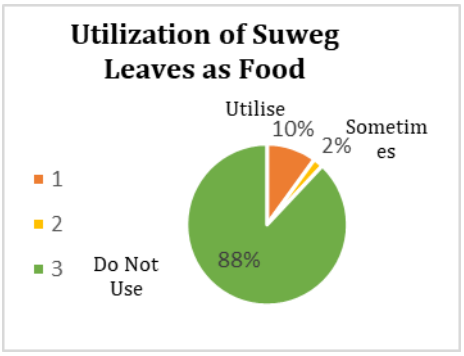


The data collected from 50 individuals indicates that 4% of the respondents used *suweg* tubers for traditional ceremonies. Another 2% of respondents occasionally utilized *suweg* tubers for this purpose, while the remaining 94% did not use *suweg* tubers in traditional ceremonies.

2. Leaves

The use of *suweg* leaves in Darupono Village is a local wisdom that needs to be preserved. Until now, there has been no data regarding the usage of those leaves, either as food or other ingredients, apart from the people of Darupono Village. Additionally, *suweg* leaves are believed to prevent cancer, maintain body metabolism, and improve reproductive function (Bhawani et al., 2010). Thus, the people of Darupono Village use them as food, specifically as *oblok-oblok*. This information is supported by Figure 6.

Figure 6. *Chart: Utilization of Suweg Leaves as Food*



Based on data collected from 50 respondents, 10% of people used *suweg* leaves as food, 2% occasionally used them as food but not frequently, while the remaining 88% did not use them as food. In this regard, the community used *suweg* leaves as a vegetable, particularly in preparing *oblok-oblok*.

Potential of *suweg* plants (*Amorphophallus Paeoniifolius* (Dennst.) Nicolson) in Darupono Village

1. Preventing Diabetes

Diabetes mellitus, also known as diabetes, is caused by a lack of insulin. The pancreas, which produces insulin, fails to produce enough for the body to process carbohydrates optimally (Askandar, 1986). The *suweg* plant contains antidiabetogenic compounds, phytochemicals, and nutrients that can be used as an alternative diet for type 2 diabetes patients (Rahman et al., 2021). *Suweg* has a good nutritional content,

including protein, calcium, fiber, carbohydrates, and fat, making it suitable as a staple food. The starch content of *suweg* tubers is relatively high at 88.5%, with a glycemic index of 51/100 grams, indicating a moderate index level (Rahman, 2020).

Research by Lianah et al., (2018) indicates that the active ingredients in *suweg* tubers can reduce blood sugar levels. This effect is attributed to bioactive compounds such as Water-Soluble Polysaccharides (PLA) and dietary fiber. Accordingly, PLA can retain water and form a thick liquid during digestion, slowing down food emptying in the stomach and hampering the mixing of food with digestive enzymes. As a result, the absorption of amino acids and fatty acids is reduced (Nainggolan, 2005). Dietary fiber, resistant to enzymatic hydrolysis in human digestion, can also lower blood glucose levels. Soluble dietary fiber can be fermented and affect the body's biochemical reactions, while insoluble fiber passes through the digestive tract and reaches the large intestine.

2. Antibacterial Properties

Suweg tubers have been found to contain butanoic acid, 3-methyl-, as confirmed by GCMS (Gas Chromatography-Mass Spectrometry) analysis conducted by Wahidah (2022). Butanoic acid, 3-methyl-, exhibits antibacterial activity (Budayatin et al., 2021). Additionally, *suweg* tubers have been discovered to contain Allocysthathionine, a compound with analgesic, anti-inflammatory, antifungal, and antibacterial properties (Rubaye et al., 2018).

3. Reducing Cholesterol Levels

Cholesterol is a fat in the bloodstream that resides in body cells. At the right levels, it is necessary and beneficial for the body, including the formation of steroid hormones. However, if the levels is excessive, it will result in several diseases, including coronary heart disease and stroke. Approximately 70% of cholesterol is produced in the liver, while the rest is from food synthesis (Anies, 2015). The content of *suweg* tubers is 25% to 30% glucomannan, which consists of the polysaccharides mannose and glucose (Kasno, 2007). Glucomannan is a hemicellulose-type polysaccharide consisting of galactose, glucose, and mannose chains. Its functional properties include reducing cholesterol and blood sugar levels, improving digestive function and immunity, and helping with weight loss (Zhang et al., 2002). Furthermore, Dey et al. (2020) stated that *suweg* tubers were identified using thin-layer chromatography as containing betulinic acid and β-sitosterol, which are helpful in treating constipation.

4. Anticancer Properties

Cancer is the most deadly disease in the world. Its prevalence in Indonesia at all ages in 2013 was approximately 347,792 people, or 1.4%. Cancer can be caused by excessive free radicals received by the body, inhibiting DNA production because the initiation of free radicals in mitochondria causes the production of Reactive Oxygen Species (ROS), which affect DNA synthesis and gene expression (Kemenkes RI, 2015). Cancer can occur because mutations caused by free radicals last too long. Free radicals take electrons that DNA needs, causing changes in the DNA structure, and mutants are ultimately formed (Werdhasari, 2014).

Nonetheless, cancer can be prevented by adding or consuming antioxidants. Humans can produce antioxidants that fight free radicals naturally but in reasonable amounts and not excessively. If free radicals enter the body in excessively, additional intake is needed to ward them off. In this context, *suweg* contains antibacterial, antifungal, and cytotoxic flavonoids, which can potentially treat cancer (Khan et al., 2007). *Suweg* leaves also contain polyphenols and steroids, which have potential as cancer, cardiovascular, and neurodegenerative medications (Cvitanović et al., 2018).

5. Production of Flour and Noodles

One of the potential uses of *suweg* tubers is *suweg* flour. Apart from being used as a food source, processing *suweg* as flour can support the community's economy if bought and sold. *Suweg* meets the criteria for use as flour because it contains protein, ash, water, and starch (Dwikandana et al., 2018). According to research by Dwikandana et al., (2018), after carrying out the process of making *suweg* flour, the following results were obtained: *suweg* tuber flour has a brownish-white color, a strong *suweg* aroma, and a smooth texture. There are also several contents of *suweg* tuber flour (per 100 grams), including water (11.98%), ash (4.32%), protein (5.44%), fat (1.80%), carbohydrates (76.42%), starch (56.07%), and calories (343.7886 kcal).

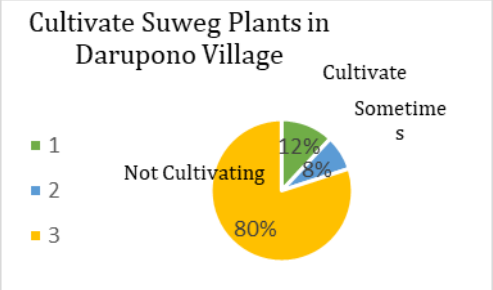
The derivative product of *suweg* flour is *suweg* noodles. The basic ingredients required for making the flour, which will be further processed into noodles, include *suweg* tubers, water, and sodium metabisulfite (1,000 ppm). The ingredients used in making *suweg* noodles are wheat flour, *suweg* flour, salt, water, soda ash, and tapioca flour. The process of making dry noodles from *suweg* involves mixing wheat flour, *suweg* flour, salt, soda ash, and water. Knead the mixture for 10-20 minutes, then shape the dough into sheets before cutting them into noodle strands. The noodles are then steamed for 12 minutes to become wet noodles and dried using a cabinet dryer at a temperature of 60°C for 1.5 hours, followed by an additional hour at a temperature of 70°C. Finally, the noodles are cooled before becoming the final product, dry noodles (Soleh, 2011).

This research has limitations since the researchers did not directly test the mentioned potentials. The researchers acknowledge these limitations due to several obstacles, such as time constraints and technical challenges in conducting the tests above. Therefore, the solution was to gather information from various sources, including scientific journals and relevant books.

Cultivation of *suweg* plants (*Amorphophallus Paeoniifolius* (Dennst.) Nicolson) in Darupono Village

Suweg is a plant belonging to the *Araceae* family that grows wild in Indonesia. Currently, it is not a commercial crop, so it has not been cultivated using specific methods. In the yards of the residents of Darupono Village, *suweg* grows by itself without deliberate planting, although a few village residents intentionally plant it.

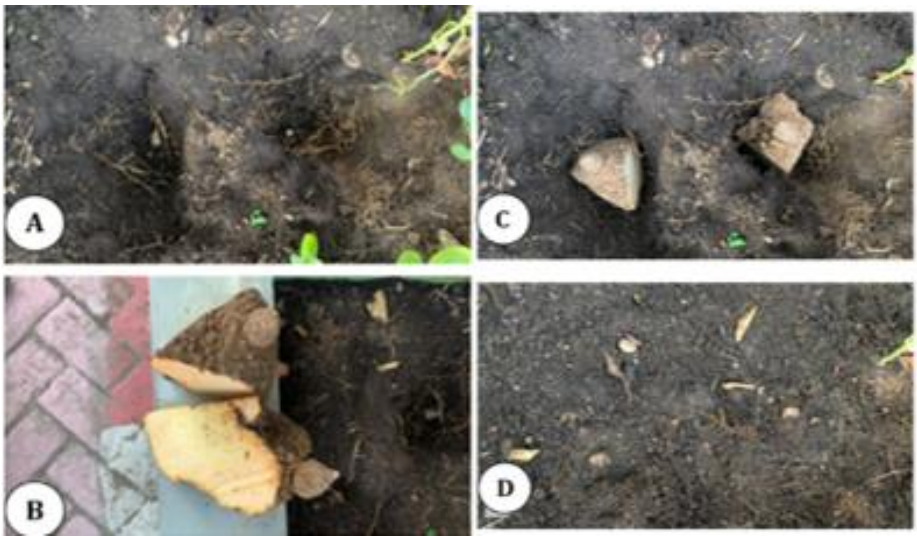
Figure 7. *Chart: Suweg Cultivation in Darupono Village*



Based on the diagram above, 12% of people cultivated *suweg* intentionally, 8% cultivated it occasionally, and 80% did not cultivate it. The *suweg* cultivation process involves several stages: land preparation, seed preparation, planting, maintenance, and harvesting. During the land preparation stage, residents of Darupono Village use hoes or shovels to make shallow holes for planting *suweg* tubers. The holes are then filled with compost up to a quarter of their depth.

Next, the seeds are prepared. The residents usually use tubers to plant *suweg*. The tubers are cut into several parts and inserted into the prepared holes. After inserting the tubers, the holes are covered with soil that is not too thick and watered. During the maintenance process, the *suweg* plants are watered every morning and evening, except when it rains. Fertilization is also carried out during this stage to accelerate the growth of *suweg*, characterized by the emergence of flower buds at the beginning of the rainy season (Lingga, 2007). *Suweg* tubers can be harvested when the leaves and stems dry and rot, indicating that the *suweg* is ripe. Accordingly, the harvest period for *suweg* is typically around 5-6 months (Agroekoteknologi, 2013).

Figure 8. *Suweg Cultivation Process*



Notes: (a) Land preparation: Digging holes in the ground; (b) Seed preparation: Preparing pieces of tubers that will have shoots; (c) Tubers cultivation: Planting the tubers in the prepared soil holes; (d) Covering tubers with soil. (Source: Research Documentation, 2023).

Conclusion

The *suweg* plant in Darupono Village has diverse potential. Its tubers can prevent diabetes, reduce cholesterol levels, and exhibit anti-cancer properties. Additionally, *suweg* can be processed into flour and noodles. The people of Darupono Village utilize *suweg* in various ways, such as steaming, frying, boiling, and processing it into compote, chips, and *oblok-oblok* (a traditional Javanese cuisine). Furthermore, *suweg* holds significance in traditional ceremonies. The commonly utilized parts are the tubers and leaves, which serve both culinary and ceremonial purposes. Some villagers cultivate *suweg* by planting tubers and following stages such as land preparation, seed preparation, planting, maintenance, and harvesting.

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