

Analysis of White Pepper Quality on Petaling 1 and Lampung Daun Kecil (LDK) Varieties at South Bangka

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Abstract—This The study of pepper quality at South Bangka in Bangka Belitung islands will build a high benefit for many sectors and considerations, primarily on mapping and development of pepper commodity in the future. This research was conducted to study the quality of Petaling 1 and Lampung Daun Kecil (LDK) varieties at South Bangka Regency, a cultivation outlook of pepper plants by farmers, and the principal variables that indicate the quality of pepper. Survey method was used for gaining samples through purposive random sampling. Research data was acquired from observing and measuring 54 pepper samples from 54 pepper farmers. Additional information related to the technical of pepper cultivation by farmers was obtained through interview. Data resulted, namely black berries, extraneous matter, light berries, content of moisture, volatile oil, and piperine, were analyzed by t test for two independent samples and principal component analysis. There was a significant difference on piperin level of the two varieties, but no for another variables. The six observed can be grouped into three factors. First factor consist of black berries, second factor was light berries, and third factor were extraneous matter, content of moisture, volatile oil, and piperine. Generally, Petaling 1 variety has a higher level on content of piperine than Lampung Daun Kecil (LDK). From all of observed variables, based on Good Agricultural Practice, farmers of Petaling 1 variety tend to apply standard procedure on cultivating their pepper plants instead of LDK farmers.

Keywords—Quality, White Pepper, South Bangka

I. INTRODUCTION

Pepper (*Piper nigrum* L.) is a type of spice plantation that plays an important role in the economy of farmers and as a source of foreign exchange. Bangka Belitung islands ranks first as a white pepper producing region with a cumulative contribution of 32.85% per year, with total white pepper production of 33,180 tons in 2016 [2]. South Bangka Regency is the highest white pepper production center of all regencies in the Province of Bangka Belitung islands, with Petaling 1 (PETALING 1) as the main variety cultivated.

The standardization of product quality becomes important for the major pepper producing countries like Indonesia. This is so that the production results can be accepted by consumers, which in turn has an impact on the high competitiveness of pepper prices. Technical barriers to trade, namely the incompatibility of quality with the expected specifications, still occur. One effort that can be done is the application of standardized cultivation rules like GAP.

GAP (Good Agriculture Practice) is a guide that includes the implementation of environmentally friendly technologies, health care and improvement of workers' welfare, prevention of OPT transmission and traceability principles (a product can be traced back from the market to the garden) [7]. According to [8] the implementation of good pepper GAP can produce high-quality pepper according to international standards.

Analysis of the quality of white pepper in South Bangka Regency is conducted to describe of white pepper quality at South Bangka, especially for Petaling 1 and LDK varieties as cultivated at most. The quality was described by six observed variables, namely black berries, extraneous matter, light berries, content of moisture, volatile oil, and piperine. This research will inform about the quality differences between Petaling 1 and LDK varieties, and grouping the six observed variables into a number of factor that less than six. It also aims to determine the level of quality of white pepper based on the Indonesian National Standard. The data obtained are expected to be used as a reference in the step of improving the processing method and the application of the pepper quality management system at the farm level so that the pepper is produced in accordance with export standards and consistent.

II. METHOD

The materials were samples of white pepper i.e. Petaling 1 and LDK varieties. All samples were gained through survey method by purposive multistage sampling. There were fifty five responden. All samples come from 54 farmers at three subdistrict or nine villages. From each village was taken 6 farmers, respectively three are Petaling 1 farmers and another are LDK farmers. Three subdistricts were Air Gegas, Tukak Sadai, and Payung. These three subdistricts were chosen based on criteria that they are the most widely subdistricts cultivating Petaling 1 and LDK varieties and the highest production at 2016 (Table 1).

TABLE 1. PLANTED AREA AND PEPPER PRODUCTION AT SEVEN SUBDISTRICTS AT SOUTH BANGKA

District	Planted Area (hectare)	Production (tons)
Air Gegas	6.986,25	11.150
Tukak Sadai	2.590,00	4.501
Payung	2.827,50	3.239

Pulau Besar	1.678,50	1.591
Simpang Rimba	1.380,00	2.080
Toboali	730,12	1.350
Lepar Pongok	76,89	510

Source: Office of agriculture, plantation, and animal husbandry, South Bangka (2017)

TABLE 2. PLANTED AREA AND PEPPER PRODUCTION AT VILLAGE S AT THREE SUBDISTRICTS

Subdistrict	Village	Planted Area (hectare)	Production (tons)
Air Gegas	Nyelanding	810	348,30
	Nangka	600	258,00
	Air Gegas	512	220,16
Tukak Sadai	Pasir Putih	215	224,00
	Tiram	152	138,00
	Bukit Terap	144	123,00
Payung	Ranggung	310	231,00
	Irat	248	186,00
	Bedengung	237	176,00

Source: Central Bureau of Statistics (2017)

Determinatio n of the chosen villages from three subdistricts was carried out by considerations that these villages were dominant on widely of planted area and have the highest pepper harvest.It can be seen at Table 2 as follow.

The next step was determine six farmers, respectively three farmers for Petaling 1 and LDK, from each villages. The criteria of determination were i) farmers have been cultivated pepper plant at least five years, ii) it has been harvested at 2016, iii) has minimum 0,5 hectare of planted area of pepper. There were collected twenty seven samples of Petaling 1 and so did LDK. All samples were tested at Laboratory of Sertification and Quality Control, Office of Industry and Trade, Bangka Belitung. There were six variables observed, namely content of moisture, light berries, black berries, extraneous matter, piperine, and volatile oil.Incremental information about white pepper cultivation by farmers was gained through interview.

III. RESULTS AND DISCUSSION

Based on t test analysis (Table 3) there was not difference between Petaling 1 and LDK variety on all observed variables except on piperine content.

TABLE 3. THE DIFFERENCE BETWEEN PETALING 1 AND LDK VARIETY BASED ON T TEST

Variable	p-value
Black berries	0,533 ^{ns}
Extraneous matter	0,343 ^{ns}
Light berries	0,340 ^{ns}
Content of moisture	0,833 ^{ns}
Content of volatile oil	0,489 ^{ns}
Content of piperine	0,007*

Note: ns = not significant difference

*= significant difference

TABLE 4. MEANS OF OBSERVED VARIABLES ON PETALING 1 AND LDK VARIETY

Variable	Variety	
	Petaling	LDK
Black berries	1,3955 ^{II}	1,5473 ^{II}
Extraneous matter	1,3546 ^{II}	1,1332 ^{II}
Light berries	1,6411 ^{II}	2,0946 ^{nf}
Content of moisture	11,6807 ⁱ	11,6174 ⁱ
Content of volatile oil	2,7801 ⁱ	2,7038 ⁱ
Content of piperine	5,4167 ⁱ	4,7758 ⁱ

Noted: *= fulfill first Indonesia National Standard, IPC, ASTA, ESA, and ISO

ⁱ = fulfill ASTA, ESA, and ISO

^{II} = fulfill second Indonesia National Standard

^{nf} = not fulfill all standard

Factor analysis grouped six observed variables into three factors either for Petaling or LDK variety. First factor consist of black berries, Second factor was light berries, and third factor were extraneous matter, content of moisture, volatile oil, and piperine. Data of quality standard of Petaling 1 and LDK varieties based on six observed variables was showed at Table 4.

Table 4 showed that Petaling 1 and LDK varieties, respectively, all observed variables fulfill all of the standard i.e. Indonesia National Standard, International Pepper Community (IPC), ASTA, ESA, and ISO, except on light berries variable which did not fulfill all of standard.

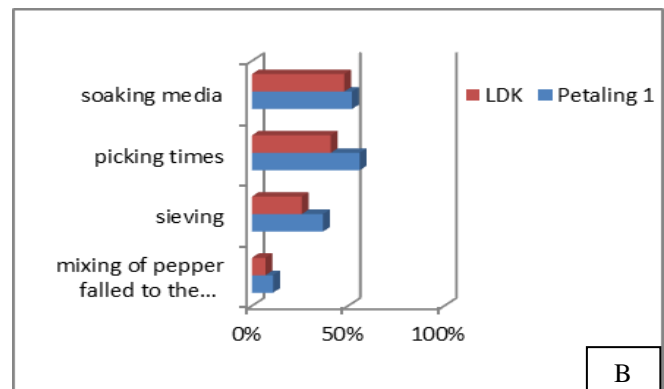
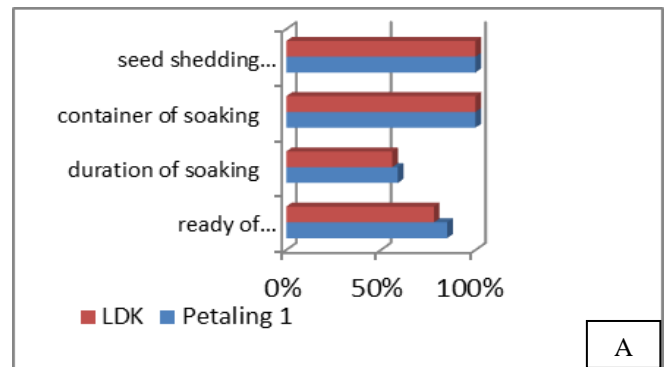


Fig. 1. Comparison between Petaling 1 and LDK on some variables of harvesting handling

Generally, there were three groups of farmers i.e. i) farmers understood and implemented the SOP, ii) farmers understood but didn't implement the SOP, and iii) farmers didn't understand of post harvesting. Petaling 1 farmers mostly understood and implement the standard operational procedure (SOP) of pepper after harvest. Petaling 1 farmers relatively have a good understanding on some activities of post harvest handling (Fig.1) that is i) pepper ready of harvesting, ii) picking times, iii) mixing between pepper fallen to the ground and picked pepper, iv) soaking media, v) duration of soaking, and vi) seed shedding from pepper skin. On others two activities indicated that either on understanding of container of soaking or the value on material of buffer drying, farmers have the same level of understanding and implementation.

Petaling 1 farmers understood about picking times was not more than 56%, whereas the number of farmers who understood but didn't carried out SOP was high enough, reached 37%. It remained 7% were the farmers who didn't understand about picking times. LDK farmers have the different data that the most bigger proportion was the farmers who understood but didn't implement SOP, namely 52%. The rest was 41% farmers understood picking times and carried out SOP, and 7 % farmers didn't understand at all.

Harvesting handling on mixing of pepper fallen to the ground and picked pepper at most didn't known by farmers. As much 78% Petaling 1 farmers and 81% LDK farmers didn't know how to separate pepper fallen to the ground and picked pepper. All of farmers, either Petaling 1 or LDK farmers 100% understood of using a container of soaking and used it during soaking time. On using of soaking media, Petaling 1 farmers, as much 52% used water flow as soaking media. This number is not too different with LDK farmers namely 48%. The remain was the farmers from Petaling 1 and LDK that understood about using of water flow but they didn't do.

As like soaking media, duration of soaking also indicated the proportion which similar with it. There were 59% of Petaling 1 farmers who understood and implemented the duration of soaking, and 56% were LDK farmers. Respectively 41% and 44% are the proportion of farmers of Petaling 1 and LDK which understood but didn't implement SOP about it. 100% of Petaling 1 and LDK farmers did the seed shedding from skin according to SOP. But most of them didn't understood of using drying buffer, each proportion hit to 78% and 74%.

The test results showed that the percentage of content of piperine of Petaling 1 and LDK varieties of 5.4167% and 4.7758% (ASTA quality min.4%). Followed by the p value of $0.007 < 0.05$ which showed that Petaling 1 varieties were significantly different from LDK varieties (table 3). This value indicates that the variety affects the variable piperine levels. [1] stated that differences in leaf surface area are thought to be the main factors for differences in piperine levels in both varieties. Leaf surface area affects the light capture capacity.

The more leaf surface area, the more plants can optimize the capture of light energy for photosynthesis.

Carbohydrates produced in photosynthesis are converted into proteins, fats, nucleic acids and other organic molecules while the energy produced is used to form secondary metabolites. [8] states that light also has an influence on cell growth and development in culture, including the formation of secondary metabolites. Each plant produces secondary metabolites of different types, in this case the secondary metabolites produced by pepper plants are piperine (alkaloids).

The average sample shows that the seed percentage is low Petaling 1 varieties and LDK varieties with values of 1.6411% and 2.0946% respectively. 2.0946%, so that it is classified into quality pepper II based on SNI, ASTA, ESA, IPC and ISO. Seed percentage is light. Likewise with other quality variables such as black berries and extraneous matter.

The awareness of pepper farmers in South Bangka regency towards the implementation of Good Agricultural Practices (GAP) is still lack. This can be seen from the percentage of knowledge data and the application of post-harvest SOP by farmers in South Bangka which shows that it is still not optimum in the types of important post-harvest pepper handling. Among other things, soaking containers, soaking time and how to dry the pepper.

Dirt (extraneous materials) in white pepper are other ingredients besides pepper, both from pepper plants such as stalks, skin, leaves and other materials such as grains, soil, rocks, and sand [3]. Based on the results of the study, Petaling 1 varieties were not significantly different from LDK varieties on variable levels of extraneous matter (p value $0.343 < 0.05$). These results indicate that the difference in varieties does not affect the seed level lightly. The average value of the two varieties showed a very small difference with the percentage of Petaling 1 and LDK varieties respectively at 1.3546%, 1.1332%. It is known that the level of understanding and application of cultivator farmers in both varieties regarding variables related to washing and the environment has almost the same percentage value, but the sufficiently high level of understanding of farmers who do not implement SOP causes the quality produced in the variables of extraneous matter does not meet the SNI quality standards I.

Based on interviews, farmers who did not apply SOP did less than 10 days of pepper immersion. Too short immersion causes the skin and flesh of the pepper fruit not to be completely released from the seeds. Sifting is also not done after threshing the fruit from the stalk so that the small, immature pepper seeds and broiled pepper are not separate. Besides that the washing process that is not accurate or less clean also triggers the high level of extraneous matter produced. [4] states that washing is one of the activities that need to be considered to reduce the high level of extraneous matter.

Environmental factors that are not considered to be the cause of high levels of extraneous matter. More than 70% of farmers do not understand and do not pay attention to the importance of a good drying process. Observations on white pepper samples, found grains of sand and small stones incorporated in the sample. According to [5] the process of

post-harvest pepper handling must be done hygienically, avoiding the spread of pepper on the ground without base or drying on the roadside.

The non-fulfillment of quality standard I in the variable extraneous matter is also influenced by farmers who do not clean the pepper from foreign objects before the pepper is pepper seeds. These materials can affect the quality of dried pepper, besides sieving must be done and then separated to be dried in a separate place. The less optimum immersion time caused by soaking media and soaking time causes the optimum peeling of pepper skin. The skin that is still left behind will behind will cause black pepper. This was also worsened by the lack of concern of farmers in drying the pepper after the washing process which contributed to the decline in the quality of white pepper from south Bangka. The skin that is still left behind will cause the pepper black. This was also worsened by the lack of concern of farmers in drying the pepper after the washing process which contributed to the decline in the quality of white pepper from south Bangka.

IV. CONCLUSION

There was not significant difference between Petaling 1 and LDK varieties on all variables except content of piperine. Pepper quality at South Bangka, generally fulfill all standard, i.e. second quality of Indonesia Standard Indonesia, ASTA, ESA, IPC, and ISO, except on light berries. Pepper harvest handling at South Bangka, on some variables still not appropriate with GAP (Good handling Practice) for pepper.

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