Substitution of Shallot Using Small Size Onion: Result of an Introductory MinisSurvey on Quality in the Market

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Abstract. Indonesian farmers cultivate shallot but onion is often imported to fulfil the needs of customers. Shallot is often used for cooking in Indonesian cuisine because of its spicy flavour. However, the price of shallot fluctuates a great deal and is sometimes very high. Although many efforts have been introduced to control the price, the results of desktop study show that there is an overlap in the size code for small size onion (<5mm) and large shallot. As the two products are physically very similar, a mini market survey confirms that traders often sell small size onion as shallots as the price of small onion is very cheap compared to shallot.

1. Introduction

Onion (Allium cepa L) is widely used by most people in developed countries as a spice for cooking. Similarly shallot (Allium ascalonicum) is also used as a spice in Indonesia and some Asian and African countries. While onion is considered to be domesticated, there are still several wild varieties of shallot cultivated in Indonesia, such as ‘bawang dayak’ which is mainly used for traditional medicine [1].

Even though shallot is only used as a spice in Indonesia, it has become an important commodity, since high prices are indicative of a high rate of inflation. The price of shallot is also used by consumers as a reference price for other food commodities.

Many studies of prices for shallot have been done but the most important are on price regulation and control and supply chain actors and markert efficiency. The Ministry of Trade has sought to establish a price ceiling of IDR 25,700 per kg and a floor price of IDR 11,935 per kg for floor price [2]. It has also been recommended to use imports to control price, with particular reference to the harvesting time[3].

In a supply chain study of shallot in Majalengka, the results identified several opportunities for improvement [4]. In another study of the supply chain actors in Medan, North Sumatra, in both Medan Marelan and Samosir there were seven actors in the supply chain channel whilst in Simalungun there were 8 actors in the supply chain channel [5]. There are also wide fluctuations in the price. For reasons as yet unknown, prices sometimes drop to as low as IDR 5000 per kg which is well below the breakeven price for farmers.

While many studies have been conducted on the fluctuating prices of shallot, very few studies have been undertaken on the quality of shallot and comparing it to other substitute products like onion. Most physical characteristics of both shallot and onion are published in the form of standards [6,7,8].
However, there are few publications that compare the two commodities, or look at the introduction of new varieties which could change the price equilibrium.

The aim of this study was to develop a sound knowledge of the quality of shallot and onion by using a desk top study and a mini quality survey in the market around Jabodetabek (Jakarta, Bogor, Tangerang and Bekasi).

2. Method
Two activities have been done in this study: first was a desk study from scientific publications and ministerial rules and decrees; the second approach was a mini market survey on quality. A survey was done from June to September 2017 in three regions of South Jakarta (represent south region), South Tangerang (represent west region), and Tambun (represent east region). In South Jakarta, interviews were undertaken in the Central Fruit and Vegetable markets, Hypermart Manggarai and Tebet traditional market. In Tanah Tinggi South Tangerang, a supermarket in BSD and a traditional market in South Tangerang. In east Jakarta, interviews were conducted at the Tambun Central Fruit and Vegetable market, Hypermart Bekasi and Tambun traditional market. If available, a 3 kg sample was taken and brought to the laboratory of ICAPRD (Indonesian Center for Agriculture Postharvest Research and Development). The samples were weighed (g), and measurements taken of the diameters both longitudinal and transversal (in mm).

3. Results and Discussion

3.1 Desk Study

3.1.1. Physiology and quality of shallot
Onion and shallots were originated from central and Eastern Asia. Both of them belong to the one family of Allium. Onion are cultivated from seed, whilst shallot are cultivated from vegetative material [9].

Several varieties are produced by the Indonesian Vegetable Research Institute in Lembang, West Java. The appearance of the varieties are represented in (Figure 1) [10].

![Figure 1](https://example.com/figure1.png)

Figure 1. Photograph of some varieties collection of Indonesian Vegetable Research Institute (copy with permission) [11].

The transversal diameter of shallot cv. Sembrani is > 3.0 cm, which is the biggest among the varieties (Table 1). Sembrani has been widely distributed to farmers thus, we expect to find this variety in the
market. Sembrani, Katumi and Mentes also have a small number of small annexed bulb. Thus they are very similar to onion [10].

Table 1. Physical characteristics of some varieties collection of Indonesian Vegetable Research Institute

| Varieties   | Weight (x±sd) (g) | Transversal diameter (mm) (x±sd) | Longitudinal diameter (mm) (x±sd) |
|-------------|-------------------|----------------------------------|----------------------------------|
| Pikatan     | 2.68±0.2          | 1.60±0.2                         | 2.50±0.1                         |
| Pancasona   | 3.55±0.1          | 1.80±0.1                         | 2.45±0.1                         |
| Katumi      | 4.16±0.2          | 1.85±0.1                         | 2.27±0.1                         |
| Trisula     | 4.22±0.1          | 1.75±0.1                         | 2.95±0.1                         |
| Majalok Lembang | 3.99±0.1      | 1.90±0.1                         | 2.73±0.2                         |
| Kuning      | 6.04±0.1          | 2.02±0.1                         | 2.35±0.2                         |
| Kramat dua  | 4.11±0.1          | 1.82±0.1                         | 2.54±0.1                         |
| Mentes      | 2.35±0.1          | 1.35±0.1                         | 2.27±0.1                         |
| Sembrani    | 12.59±0.1         | 3.08±0.2                         | 2.85±0.1                         |

*Data have been taken from [11] with permission

Local red shallot have a volatile characteristic sharp smell and savoury aroma, and are slightly spicy. The volatile compound is included into the alliin compound. The content of the sulphur with trisulfide component is greater than that of disulfide in the volatile shallot compound [11]. Unlike shallots, onions have a sweet taste: the disulfide is greater than the trisulfide [12]. Aldehyde compounds in onion when exposed to prolonged heating can cause unpleasant odours (off flavor). The unique characteristics of disulphide and tri sulphide can be used to distinguish between shallot and onion, if the analyses and tools being used are appropriate.

3.1.2. Standard for shallot and onion

The Indonesian National Standard (SNI) for shallot is SNI Shallot 3159-2013. Shallot is from Allium cepa var. ascalonicum. The grade size is: grade 1: >2.5 cm diameter; grade 2: 2.2-2.5 cm; grade 3: 1.5-2 cm [6]. ASEAN shallot standard is ASEAN Stan 14:2009. The grade size is: grade 1: >30 mm, grade 2: 25-<30, grade 3: 20-25 mm, grade 4: 10-<20mm [7].

As Indonesia does not produce onion, the ASEAN standard for onion is Allium cepa L species. The ASEAN Stan 23:2011 Onion with the grade as follows: Size code:1. >9 cm, 2. >7 – 9 cm, 3. >5 – 7 cm, 4. 3-5 cm [8].

If there are shallots larger than 3 cm and onions smaller than 5 cm, there is a potential for consumer confusion, since they are derived from the one family. Under the Kenyan onion standard (Allium cepa L), the smallest size is 10 mm [13]. In onion standard for East African onion is Allium cepa L, size minimal also 10 mm [14]. The Thai standard indicates that shallot is family of Allicae, from species Allium ascalonicum L. The size codes for shallot is 1. >3.0 cm, 2. >2.5-3.0 cm, 3. 2.0-2.5 cm, 4. 1-2 cm [15]. The codex Alimentarius is still proposing a standard for onion and shallot in their meeting in July 2018 [16].

3.1.3. Import regulation

Import regulation into Indonesia for horticulture produce stipulate that product mat only enter through 4 ports in Indonesia such as Sukarno Hatta in Jakarta by air, Belawan in Medan by sea, Tanjung Perak Surabaya by sea, and Sukarno Hatta in Makassar by sea [17]. Many recommend change to only two ports: Bitung or Batam to replace Makassar [18].

Import of horticulture produce through the WEB site of the Trade Ministry (Ina Trade), is referred to the WEB site of Ministry of Agriculture, to develop a RIPH (rekomendasi impor produk hortikultura/recommendation for import of horticulture produce), which is born by Directorate General for Horticulture[19]. After both the USA and New Zealand appealed to the WTO, there has been a
change in the regulations: 30/M-DAG/PER/-5/2017, importation of horticulture produce; Ministry of Trade regulation 64/2018 Change on the Regulation no 30 [20] on importation of horticulture produce.

3.1.4. Food task force

The formation of a food task force is based on Indonesian Republic Law no. 2 year 2002, and Republic Indonesian Law no. 8 year 2009, about consumer protection; Director of Police warrant letter No:Sprint/1464/VII/2017, dated June 2017. The task force comprises of civil servant and policeman [21]. Their duty is to perform an investigation if there is an illegal operation or breaking of law by members of society or companies operating in Indonesia.

3.2 Mini-survey

Small size onion are available in the central market in Kramat Jati, Central Market in Tambun Bekasi, the traditional market in Bekasi, and some supermarket in Bogor. The diameter of the onions was between 3–10 cm. The bulb colour was brown and purple. The price of small onion ranged from IDR 15000 - 36000 per kg in Jakarta, Bogor and Bekasi central market and Bekasi traditional market. The price of local shallot at the time of the survey was IDR 32000 per kg.

Results of the survey in Tambun, Bekasi, Fruit and Vegetable central market indicated that the average weight was 75.5 g ± 15.7 g (x±sd); transversal diameter was 58.3 mm ± 4.7 mm (x±sd); and longitudinal diameter 40.4 mm ± 3.2 mm (x±sd). Whilst from Kramat Jati Fruit and Vegetable Central market, the average weight was 24.7 g ± 7.0 g (x±sd); transversal diameter 38.3 mm ± 4.4 (x±sd); longitudinal diameter 29.6 mm ± 3.7 mm (x±sd). Figure 2 shows small size onion which if compared with shallot Cv. Sembrani (Figure 1), it is very difficult to distinguish.

3.3 Follow up and impact of the study

The Director published an on line opinion on the ICAPRD website on 2017-10-02 with the title ‘Imports of "fake shallots" fool the community’. Immediately, the food task force seized 25 containers (670 tonnes) of alleged fake shallot in Medan from India. CV. From India, small onion sell for only IDR 2500 per kg [24]. Five importers have been black listed by the Ministry of Agriculture.

3.4 General discussion

If we study Thai Standard [16], it explicitly distinguishes between shallot and onion. Onion is *Allium cepa* L, while shallot is *Allium ascolonicum*. In SNI and other standards it is not so strict such as *Allium cepa* L var. *Ascolonicum*. Since flavour can be clearly distinguished, it is suggested to use *Allium ascolonicum* L. It is very important for the user of standard SNI, ASEAN and Codex Stan, that onion and shallot are differentiated.

With market globalization it is very important to have a standard which is very strong. If it is very difficult to comply because it is expensive, at least there should be a method which is fast and reliable.
So far it is the flavour analyses, using GC MS by injecting the shallot oil [12]. Improved methods now use Head Space GC MS using SPME, which is much more easier compared to thr previous one [13]. In the future, procedures might be developed to use a reliable sensor which can detect the aromatic chemicals very quickly and reliably.

There is also a need to study the supply and demand in the market. In our opinion, imported shallots if they were to compete with local producers, would have a significant negative impact of smallholder farmers income and thus threaten their livelihoods.

4. Conclusion
There is an overlap in the size code in the standard for small onion (<5 cm) and large size shallot. The appearance, particularly small size onions below 5 cm in diameter, is very similar to large size shallot in the market. The only way to distinguish is by measuring the flavour component where shallot produces more trisulphide while onion produces more disulphide. Thus, small size of onion cannot replace shallot in cooking traditional Indonesian cuisine and in traditional medicine. Thus, the importation of small size onion (<5 cm in diameter) must be stopped to protect consumers who cannot readily distinguish between the two. The Ministry Agriculture Decree can be used as an alternative to regulate the trading of shallot in Indonesia, which is faster to implement compared to changing the standard parameters in SNI, ASEAN Standard and Codex Stan.

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Acknowledgement
In this occasion we would like to thank to Dra. Hernani, MSc for collecting sample together. We also would like to thank Mr. Kusdinar for analysing the samples from the market.