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# West Java Potato Farmers' Preference on The Quality Characteristics of Indonesian Vegetables Research Institute Potato Varieties

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**Abstract.** The availability of a high-quality potato seed will affect the increasing of Indonesia potato production. Indonesia Vegetables Research Institute (IVegRI) attempts to produce various high-quality potato varieties. The potatoes are needed to be disseminated to users. Therefore, they could create benefits in terms of increasing farmers' production and revenue. The objective of the study was to identify West Java potato farmers' preference for the seven potato varieties that have been released by IVegRI. The survey was carried out in Garut district, West Java province, Indonesia. Total, 32 potato farmers, participated in the survey from January to September 2019. The Perceived Quality (PQ) was used to analyze data. The result indicates three potato varieties preferred by potato farmers were Dayang sumbi, Sangkuriang, and Medians, respectively. The result would be useful for the IVegRI to create better potato varieties in the future.

Keywords: farmer's preference, potato, Indonesian Vegetables Research Institute, perceived quality

#### I. INTRODUCTION

Potato is the essential food for Indonesian people as it creates significant economic benefits. Until 2016, Indonesian production for potato consumption roughly 1.2 million ton, and the productivity achieved 18.25 tons per hectare (Statistik Pertanian, 2017).

Indonesian potato consumption increased from 2012 to 2016. From 2015 to 2016, the increase reached about 9.65%, from 2.28 kg per capita to 2.50 kg per capita (Statistik Pertanian, 2017).

The availability of high-quality potato seed is essential to produce a high potato yield. Farmers demand high-quality potato seed as the cost of the seed is quite high. It reached about 30% of the total production cost (Ridwan et al., 2010).

Indonesian Vegetables Research Institute (IVegRI) attempts to develop various high-quality potato seed varieties that could be utilized for

Submited: 28-02-2020 Revised: 12-06-2020 Accepted: 20-06-2020 the vegetables as well as for processed raw materials such instance french fries (Sembiring & Adiyoga, 2018) and chips (Adiyoga et al., 2016; Asgar et al., 2011; Kusmana & Basuki, 2004). Since 1980, IVegRI has released many potato varieties, such as Granola, Andina, Vernei, Kastanum, Amabile, Maglia, Medians, AR7, AR 08, Olimpus, Dayang Sumbi Agrihorti, Sangkuriang Agrihorti, and Spudy. All of the varieties have their excellence (Balitsa, 2019).

The excellences such as producing the high yield, adaptive in specific highland areas, suitable for potato chips raw material, resistant to *Phytophthora infestans* and bacterial wilt diseases, adaptive in the high temperature, and suitable for the highland area in the wet season (Ruswandi, 2018; Handayani et al., 2015; Kusandriani, 2014; Kurniawan & Suganda, 2014)

Those high-quality potato varieties are needed to be disseminated to farmers; therefore, they can create a significant contribution to increasing potato yield all over Indonesia.

The dissemination of IVegRI potato varieties is conducted through the demo plot, planting several potato varieties that have been released by IVegRI. One technique to speed up IVegRI potato varieties dissemination is by engaging farmers in the research activity since the beginning of the study. The farmers will observe and assess potato plants and the yield in the

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demo-plot. The assessments are conducted during the growth of the plants and while harvesting. Based on the evaluations, farmers' preference for the IVegRI potato varieties will be identified.

The preference of potato varieties is measured using agronomic parameters. The parameters covered are: producing high productivity, resistant to bacterial wilt and *Phytophthora Infestans*, age of harvest, number of potato sprouts, depth of potato sprout, and size of potato tuber. All those factors are considered by potato farmers to adopt and to plant various kinds of new potato varieties. (Kurniawan & Suganda, 2014; Adiyoga *et al.*, 2014). By understanding the farmers' preference for potato varieties, the information could be used to improve the IVegRI's potato qualities in the future (Soetiarso, 2010).

The objective of the study was to identify the farmers' preference for the seven potato varieties that have been released by IVegRI.

# II. RESEARCH METHOD

The study was conducted in Garut district, West Java Province, Indonesia, from January to September 2019. At the early stage, 7 IVegRI potato varieties were planted in the demo plot. The varieties, namely, were GM 05, Dayang sumbi, Sangkuriang, Cipanas, Olimpus, Medians, and Granola.

A survey was conducted with 32 potato farmer respondents. Statistically, those numbers of respondents were sufficient as the sample (Rowntree, 1981). The respondents were selected purposively, such as they have been planted potato plants in the last two years.

The respondents were asked to observe and evaluate the potatoes when the plants were at 55 days (at the growth phase) and while harvesting (103 days after planting).

In selecting the most favorite of IVegRI potato varieties, there is various kind of the quality characters viewed by the farmers, for instance, the plant growth, the plant resistance to bacterial wilt and Phytophthora Infestans disease, productivity rate, age of harvest, number of potato sprouts, depth of potato sprout and size of potato tuber (Adiyoga et al., 2014).

To identify the farmers' preference for potato quality characteristic attributes is measured using the perceived quality (PQ) analysis (Rahayu 2012; Basuki, 2009).

The PQ technic is started by determining quality characteristics considered by farmers in selecting a favorite potato variety. Then respondents asked to give a score for the quality characteristics. The range was 1 to 5. The weight score as the follows: definitely important= 5, generally important= 4, slightly important= 3, slightly not important= 2, definitely not important= 1.

The assessment of farmers' preference rate to the quality characteristics of IVegRI's potato varieties is evaluated using a score. The score as follows: very likely= 5, likely= 4, neither likely nor likely= 3, unlikely= 2, and very unlikely= 1 (Basuki 2009).

The measurement procedure to identify farmers' preference on the quality characteristic attributes of potato varieties follows the steps (Rahayu 2012):

- The average of respondents' characteristic attributes (ARC) = number of all respondents' attribute weight scores divided the number of respondents.
- The relative attribute weight (RAW) = the ARC score per attribute divided to the total count of all attributes
- 3) The average preference rate (APR) = value of the TP score of all respondents divided into the number of respondents. TP is the rate of respondent preference rate to variety characteristic attributes.
- The average preference rate per characteristic of all varieties (APRC) = Number of APR score per attributes of all potato varieties divided the number of varieties
- 5) The relative preference rate (RPR) = APR score divided APRC score
- 6) The weight relative preference rate (WRPR) = RAW score multiplies with the RPR score.
- 7) The total preference rate of respondents equals the number of WRPR scores of all

characteristic attributes that are owned by a variety.

## III. RESULT AND DISCUSSION

# Characteristic social-economic of the respondents

Most of the respondents' education was elementary school. It was accounted for 14 (44%) respondents, as shown in Figure 1. The majority of the farmers have been planted potatoes for ten years. The average planted area was about 1,777 m2.

Granola was the common potato variety planted by the respondents. More than 90% of the respondents used the variety. They used Granola due to the farmers have been familiar with the variety. Besides that, it also easy to be maintained and resistant to disease. Moreover, the seed was available, easy to be accessed, and the selling price was relatively stable.

# The important of potato quality characteristics for Garut farmers

The essential potato quality characteristics for farmers was the yield productivity (Table 1). When selecting a new potato variety to be planted, farmers consider whether the variety could increase the yield; thus, their income would increase (Adiyoga et al., 2014; Gunadi et al., 2014). The study of Adiyoga et al. (2014) indicated that farmers favored a potato variety with the yield above 30 ton/ha as the average of national potato yield is less than 20 ton/hectare (BPS, 2019).

A similar thought also appears when the farmers are deciding to buy the certified seed. This is because the price of potato certified seed is quite high for the farmers (Wicaksana et al., 2013)

### The analysis of preference rate of the Garut Farmers to GM 05, Cipanas, Sangkuriang, Dayang sumbi, Medians, Olimpus and Granola potato varieties

The Garut farmers' preference to 7 IVegRI potato varieties were varied, from very unlikely to very likely. The score of a farmer's preference for

a particular variety is higher or lower against all the varieties (Table 2).

In terms of the growing plant and resistance to *Phytophthora Infestans* characters, respondents like Olimpus variety with the score 4.59 and 4.06, respectively. The resistance of potato variety to Phytophthora *Infestans* is significant for farmers as it is the common disease that attacked the potato plant. This disease decreases the potato yield 10 to 100% (Purwanti, 2002).

Regarding the potato resistance to bacterial wilt and yield productivity, respondents fond the Dayang sumbi. The scores were 3.78 and 4.09, respectively.

It was related to the age of harvest and the number of sprouts, respondents like Medians and Granola varieties. The scores were similar, 3.91 and 3.84, respectively. Talking about the depth of



**Figure 1.** Respondents' education (n=32) Source: Primary data 2019

Table 1. The weight average character	ristic
attributes to potato variety	

Characteristic Attributes	The weighted average (ARC)
Plant growth	4.75
Resistant to bacterial wilt	4.69
Resistant to <i>Phytophthora</i>	
Infestant	4.75
Yield productivity	4.88
Age of yield	4.34
Number of potato sprouts	3.72
Depth of potato sprout	3.59
Tuber size	4.66

The average of preference rate score (APR)									
Characteristics	GM 05	Cipanas	Sangkuriang	Dayang sumbi	Medians	Olimpus	Granola	Total	APRC
Plant growth	2.47	3.75	4.28	4.17	4.16	4.59	3.59	27.01	3.86
Resistant to bacterial wilt	2.91	3.69	3.91	3.97	3.28	4.06	3.44	25.26	3.61
Resistant to <i>Phytoptora</i> <i>Infestant</i>	2.63	3.47	3.75	3.78	3.06	3.66	3.06	23.41	3.34
Yield productivity	3.50	3.19	3.88	4.09	3.88	3.16	3.88	25.58	3.65
Age of yield	3.69	3.50	3.84	3.88	3.91	3.25	3.91	25.98	3.71
Number of potato sprouts	3.59	3.63	3.81	3.75	3.84	3.22	3.84	25.68	3.67
Depth of potato sprout	3.56	3.56	3.84	3.88	3.78	3.03	3.78	25.43	3.63
Tuber size	3.16	3.22	3.66	3.84	4.13	3.84	3.84	25.69	3.67

**Table 2.** The average preference rate score (APR) and the average preference rate per quality characteristic attributes of all varieties (APRC) of West Java Farmers to GM 05, Cipanas, Sangkuriang, Dayang sumbi, Medians, Olimpus and Granola potato varieties

Source: Primary data 2019

sprout, the respondents favored Dayang sumbi with the score was 3.88.

The age of harvest, number of sprouts, and the depth of sprout were the quality characteristics that the farmers consider in selecting a favorite potato variety. However, compared to other quality characteristics of potato variety, farmers grouped these three quality characteristics as slightly unimportant (Adiyoga et al., 2014).

They were talking about the tuber size, the respondents like Medians. The score was 4.13. The Median tuber size is more significant than others (Supriatna et al., 2018); hence, consumers have favored it for the potato chips raw material (Thoriq et al., 2017). Meanwhile, from the quality side, the study of Ruswandi (2018) showed the Dayang sumbi potato tuber is classified as an extremely good tuber.

Each of IVegRI potato varieties showed in different excellences, as they were shown in RPR value in Table 3. The score RPR > 1 showed that the respondents' preference value a quality characteristic was higher compared to all potato varieties average preference rate.

On the contrast, the value of RPR < 1 indicated that respondents preferred to one quality characteristic attributes lower compared to all potato varieties average preference rate. For instance, the Sangkuriang plant growth score of 1.11 showed that its plant growth was based on respondents' preference, which was higher 11% compared to the average preference rate of all the assessed varieties.

GM 05 RPR score showed that the respondents' preference rate for all characters was lower than the average preference rate of all varieties. Meanwhile, the attributes of Cipanas variety had a preference rate higher than the average preference rate of all varieties for the characteristics resistant to *Phytophthora Infestant* and bacterial wilt. In the meantime, Sangkuriang and Dayang sumbi for all of the quality characteristics had respondents' preference rate of all the varieties (Table 3).

Meanwhile, the respondents' preference rate on plant growth, resistance to *Phytophthora Infestants*, and the potato tuber size for Olimpus were higher than the average preference rate of all the varieties. On the other hand, yield productivity, age of harvest, amount of sprouts, and depth of sprout of Olimpus were lower than the average preference rate of all the varieties.

The respondents' preference rate on yield productivity, age of harvest, number of sprouts, depth of sprout, and the potato tuber for Granola

RPR									
Characteristics	BRA	GM 05	Cipanas	Sangkuriang	Dayang sumbi	Medians	Olimpus	Granola	
Plant growth	0.13	0.64	0.97	1.11	1.08	1.08	1.19	0.93	
Resistant to <i>Phytoptora</i> <i>Infestant</i>	0.13	0.81	1.02	1.08	1.10	0.91	1.13	0.95	
Resistant to bacterial wilt	0.13	0.79	1.04	1.12	1.13	0.91	1.09	0.91	
Yield productivity	0.14	0.96	0.87	1.06	1.12	1.06	0.86	1.06	
Age of yield	0.12	0.99	0.94	1.03	1.05	1.05	0.88	1.05	
Number of potato sprouts	0.11	0.98	0.99	1.04	1.02	1.05	0.88	1.05	
Depth of potato sprout	0.10	0.98	0.98	1.06	1.07	1.04	0.83	1.04	
Tuber size	0.13	0.86	0.88	1.00	1.05	1.13	1.05	1.05	

**Table 3.** The Relative preference rate (RPR) West Java farmers to GM 05, Cipanas, Sangkuriang, Dayang sumbi,Medians, Olimpus and Granola potato varieties

Source: Primary data 2019

**Table 4.** The weight relative preference score rate (WRPR) West Java farmers to GM 05, Cipanas, Sangkuriang, Dayang sumbi, Medians, Olimpus and Granola potato varieties

			WRPR				
Characteristics	GM 05	Cipanas	Sangkuriang	Dayang sumbi	Medians	Olimpus	Granola
Plant growth	0.08	0.13	0.14	0.14	0.14	0.15	0.12
Resistant to <i>Phytoptora</i> Infestant	0.10	0.13	0.14	0.14	0.12	0.15	0.12
Resistant to bacterial wilt	0.13	0.13	0.15	0.15	0.12	0.14	0.12
Yield productivity	0.13	0.12	0.15	0.16	0.15	0.12	0.15
Age of yield	0.12	0.11	0.12	0.13	0.13	0.11	0.13
Number of potato sprouts	0.11	0.11	0.11	0.11	0.12	0.10	0.12
Depth of potato sprout	0.10	0.10	0.11	0.11	0.10	0.08	0.10
Tuber size	0.11	0.11	0.13	0.14	0.15	0.14	0.14
Total preference value	0.89	0.95	1.05	1.07	1.02	0.99	0.99
Preference rank			2	1	3		

Source: Primary data 2019

were higher than the average all the varieties. While the other attributes were lower than the average preference rate of all the varieties.

Table 4 showed the weight of relative preference rate score of the respondents (WRPR) and the West Java potato farmers' total preference value to 7 IVegRI potato varieties. Three potato varieties favored by West Java potato farmers were Dayang sumbi, and the score was 1.07. Following by Sangkuriang and Medians with the score were 1.05 and 1.02, respectively. The study of Ruswandi (2018) stated that one of the excellence of the Dayang sumbi and

Sangkuriang varieties were resistant to *Phytophthora Infestant* and bacterial wilt. Also, the yield production was a quiet high.

The lower score was gained by GM 05, with the score was 0.89. Meanwhile, Granola, as the common potato variety used by Indonesian farmers, currently only had a total preference rate of 0.99.

### IV. CONCLUSION

Three potato variety attributes that were essential for the potato West Java Province were the yield productivity, plant growth, and the resistance of a variety to *Phytophthora Infestant*. Meanwhile, three varieties favored by the farmers of the 7 IVegRI's potato varieties were Dayang sumbi, Sangkuriang, and Medians.

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