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Consumer Preferences Of New Rice Varieties (Vub) In Lampung Province (*Case Study In Tanjung Rejo Village, Negeri Katon Subdistrict, Pesawaran District*)

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Abstract*— Some New rice varieties (VUB) found adaptive grown in Lampung. However, the successful of the development of VUB is not only determined by its highness productivity, but a consumer preference is also an important indicator. The study of consumer preferences towards new rice varieties has been done in Tanjung Rejo village, Katon Sub District, Pesawaran District in January to July 2014 . Varieties tested were varieties commonly grown by farmers, i.e. Situbagendit, Cibogo and Ciherang, whereas for the VUB were Inpari 9, Inpari 10, Inpari 14 and Inpari 15. Organoleptic test was conducted to determine consumer preferences for rice and cooked rice. For rice, the preferences tested were whiteness, aroma, shape and general appearances. Preferences of cooked rice were aroma, whiteness, flavor, texture and general appearances. Organoleptic tests on rice and cooked rice using a score from 1 to 5: 1 = extremelly dislike, 2 = dislike, 3 = rather like, 4 = like, and 5 = extremely like. The number of panelists used as many as 20 people. Based on the results of organoleptic test on rice, panelists preferred the rice varieties of Cibogo and Inpari 10, compared to Situbagendit and Ciherang. Score of whiteness for Inpari 10 was 4.24, aroma 3.67, shape and general appearances was 4.24 and 4.05 respectivelly, while the scores of Cibogo 4.29 for whiteness, aroma 3.81, shape 4.52 and general appearances 4.38. The results of organoleptic test on cooked rice, indicating that the panelists preferred the Inpari 9, Cibogo and Inpari 14 compared to Ciherang and Situbagendit. Scores aroma given by panelist for cooked rice Inpari 9 was 4.46, whiteness 4.50, flavor 4.29, texture 4.29, and general appearances was 4,29. This shows that people's preferences have shifted from rice that commonly grown such as Ciherang to the new varieties Inpari 9 and Inpari 10.

***Keywords*— preferences; new varieties of rice; rice; cooked rice**

I. INTRODUCTION

Lampung is one of the centers of rice production in Indonesia. In Lampung Province, the area of wetland in 2011 was 369,362 ha, that divided by type of irrigation consists of irrigated land (184,091 ha), and non-irrigated (rain-fed, lowland swamps, tidal, etc.) was around 161.346 ha [1]. In general rainfed and swamp areas used by farmers for rice cultivation using local varieties which tend to be adaptive with farmers technology, so its productivity relatively low at about 3.0 to 4.0 tons / ha. However Agricultural Research and Development (AARD) have produced VUB with have short maturation rice that can be grown in rainfed upland cultivation system and also VUB that adaptive in both wetlands and tidal swampy area. Along with the development of the superior quantity and quality of rice in order to support national food self-sufficiency and the increasing level of social welfare. Consumers demands for quality rice is concentrated not only on the excellence of its production but also on the quality in accordance with their preferences. Consumers preferred rice with having high cooking quality. VUB developments can not only adhering to the excellence of production, but the preferences of consumers should also consider. It required a study to determine people's preferences for new rice varieties that planted in the area. By knowing the desired characteristics of rice, it can also be used as basic information on the assembly of new varieties of rice specific locations in the Lampung province.

II. METHODOLOGY

A. Time and Place of Research

Survey on consumer preference test conducted at selected locations in the village of Tanjung Rejo, District State Katon, Pesawaran District, Lampung Province. This

location is one of the locations for the adaptation study of in Lampung Province. The activities was carried out in January-March 2014. Analysis of the characteristics of rice was done in Laboratory Polinela and BPTP Lampung in March - July 2014.

B. Materials and Equipment

The material used were paddy grain and rice of Inpari 9, Inpari 10, Inpari 14, Inpari 15, Ciherang, Situbagendit and Cibogo. Books, paper, and pencils were used as a means for filling the questionnaire. While the tools used were scales, rice cooker, plate and other support tools.

C. Sampling

Rice sample to be analyzed was derived from the results of the assessment questionnaire and retrieved each 3 kg, then partially processed into rice and cooked rice.

D. Collecting data / observations

Survey Data Analysis

Preference test farmers / consumers, conducted by survey method. Determination of the location of the survey done purposively. The maximum number of survey respondents was 20 farmers. The data and information collected through questionnaires. Arranged in a structured questionnaire, which includes questions related to preferences of farmers /consumers on the characteristics of rice. During the preference surveys, rice grain and cooked rice samples retrieved each as much as 3 kg for further analysis.

Characterization of the physical properties of rice

Characterization of the physical properties of the rice was done based on the method of [2] and [3] to observe physical properties include moisture content of rice, long of rice, width of rice, the ratio P/L of rice, and whiteness.

Characterization of the chemical properties of rice

Determination characterization includes proximate chemical properties of rice (carbohydrate, protein, fat, fiber and ash) based on the method of AOAC [4].

Organoleptic test

Organoleptic test was conducted to determine consumer preferences for rice and cooked rice, the rice was the criteria for the degree of whiteness, aroma, shape and appearance, while the organoleptic criteria for cooked rice was aroma, color and flavor using a score of 1 up to 5 (1 = dislike extremely , 2 = dislike; 3 = rather like, 4 = like, and 5 = like extremely. The number of panelists was 20 people. The design used was randomized block design with a test sample as many as 7 samples (Inpari 9, Inpari 10, Inpari 14, Inpari 15, Ciherang, Situbagendit and Cibogo).

E. Analysis of data

The steps for the data analysis is to identify the descriptive data and the information presented is based on questionnaires or interviews, tabulate the characteristics of test result data and statistically analyzing the data and the results of organoleptic test followed by Duncan Multiple Range test at the 5% level.

III. RESULT AND DISCUSSION

A. Results of Interviews

Results of interviews with farmers/ consumers towards several aspects such as characteristics of paddy grain, rice and cooked rice desirable were shown in Table 1, 2 and 3.

From Table 1 known that rice varieties commonly grown by the public was Ciherang (65% of respondents), while 15% of respondents planted rice varieties Inpari 10 and Inpari 15. In this new society the VUB tried to grow rice in the area was still limited. Paddy Grain shape preferred by most of the respondents was elliptical shaped (75% of respondents), the grain size was medium (80% of respondents) and grain color was bright yellow (100% of respondents). In addition to genetic factors, the bright yellow color of the grain showed that the grain was free of pests and diseases.

Rice shape favored by respondents in general was elliptical (55% of respondents) and long (45% of respondents) with rice size was medium (80% of respondents) and the color was translucent white rice (65%) (Table 2). In addition to genetic factors, the nature of clarity (translucency) was determined by the method of rice milling.

Most respondents preferred the rice with the aroma of rice (75% of respondents) than the scent and more like whole rice (80% of respondents).

TABLE 1.
PADDY GRAIN CHARACTERISTICS BY RESPONDENT

No.	Description Characteristics of Grain	Statement	%
a.	Varieties / types of rice planted	a. Ciherang	65
		b. Inpari 10	15
		c. Padi merah	5
		d. Inpari 15	15
		e. Pandan Wangi	5
		f. Situ Bagendit	5
		g. Inpari 7	10
		h. Inpari 9	5
b.	grain shape preferred	a. Round	10
		b. Elliptical	75
		c. Long	20
c.	The size of grains of preferred	a. Large	20
		b. Medium	80
		c. Small	
d.	Preferred color	a. Bright yellow	100
		b. Dull yellow	0
		c. Dark yellow	0

Similarly, paddy grain and cooked rice, respondents preferred form of cooked rice was elliptical shaped (80% respondents), the size of rice grains was medium (80% of respondents) and the preferred color of pure white rice (80% of respondents). For texture, the majority of respondents liked the rice fluffier texture (85% of respondents) with rice that aroma of rice (80% of respondents).

TABLE II.
RICE CHARACTERISTICS BY RESPONDENT

No	Description Characteristics of Grain	Statement	%
a.	Rice shape preferred	a. Round b. Elliptical c. Long	0 55 45
b.	The size of rice of preferred	a. Large b. Medium c. Small	20 80 0
c.	Preferred color	a.white net b. translucent c.white yellow d. yellow	35 65 0 0
d.	Aroma of Rice preferred	a. fragrant b. Rice aroma c. indiferent	10 75 15
e.	Rice is usually consumed / preferred	a. Whole b. Head rice c. Broken rice	80 20 0

TABLE III.
COOKED RICE CHARACTERISTIC BY RESPONDENT

No.	Description Characteristics of Grain	Statement	%
a.	Rice shape preferred	a. Round b. Elliptical c. Long	5 80 15
b.	The size of rice of preferred	a. Large b. Medium c. Small	20 80
c.	Preferred color	a.white net b. translucent c.white yellow d. yellow	80 20 0 0
d.	The texture of the cooked rice was preferred	a. Fluffier b. *Pera* c. Medium	85 0 15
e.	Aroma Rice preferred	a. Fragrant b. Rice aroma c. Indiferent	10 80 10

B. Physical Characteristics of Rice Varieties

The physical characteristics of rice studied was presented in Table 4. From the seven varieties, four of which was new varieties that was Inpari 9, Inpari 10, Inpari and Inpari 15. Moisture content of 7 varieties ranged between 8.52 (Ciherang) and 11.54% (Situbagendit) which showed that all of these varieties fulfill the quality standards of water content, that a maximum of 14%. Rice with less water content 14% will be securely stored, while the it's more than 14% will lead to microbial metabolism and proliferation of insects running quickly.

TABLE IV.
PHYSICAL CHARACTERISTICS OF RICE VARIETIES

Rice Varieties	Water Content (%)	Length (mm)	Wedth (mm)	Ratio (P/L)	White-ness (%)
Inpari 9	9.77	7.3	2.4	3.04	35.10
Inpari 15	9.52	7.2	2.6	2.77	35.60
Inpari 14	10.16	7.3	2.5	2.92	34.22
Cibogo	8.93	7.1	2.6	2.73	33.15
Inpari 10	10.59	7.2	2.0	3.60	33.97
Ciherang	8.52	7.2	2.4	3.00	34.52
Situbagendit	11.54	7.1	2.0	3.55	34.05

The ratio of the length and width of the rice classification determines the shape of rice grains. International Rice Research Institute (IRRI) [5] classifies the form of rice into 4 forms the slender (long and slender) (> 3 mm), medium (2.1 - 3.0), bold (rather short oval) (1.1 - 2.0) and round ($\leq$ 1.0). Research found that the ratio of rice ranged from 2.73 (Cibogo) to 3.60 (Inpari 10). There are 4 varieties in the form of slender (Inpari 10, Ciherang and Situbagendit) and 3 varieties in the form of bold (Inpari 14, 15 and Cibogo). From the interviews known that consumers tend to prefered a long and slender rice.

Whiteness of rice ranged between 33.15 and 35.60%. Inpari 15, tends to have a higher degree of whiteness (35.60%) than other varieties, and followed by Inpari 9 was equal to 35.10%.

C. Chemical Characteristics of Rice Varieties

The result of the chemical characteristics of rice presented at Table 5. Table 5 shows that the ash content of the seven varieties ranged between 0.58 (Situbagendit) and 0.92% (Inpari 14), the range of protein content was from 6.00 (Inpari10) to 7.85% (Ciherang), fat content was 0.45 (Inpari 9) to 0.78% (Inpari 14), crude fiber was 0.53 (Situbagendit) to 2.13% (Cibogo) and the carbohydrate content was 78.95 (Situbagendit) to 81.48% (Inpari 15).

TABLE V.
CHEMICAL CHARACTERISTICS OF SOME RICE VARIETIES

Rice Varieties	Ash (%)	Protein (%)	Fat (%)	Crude Fiber (%)	Carbohydrate (%)
Inpari 9	0.91	6.84	0.45	1.53	80.49
Inpari 15	0.61	6.38	0.61	1.38	81.48
Inpari 14	0.92	6.79	0.78	1.11	80.24
Cibogo	0.79	7.05	0.67	2.14	80.41
Inpari 10	0.65	6.00	0.63	1.01	81.11
Ciherang	0.67	7.85	0.75	0.92	81.27
Situbagendit	0.58	7.67	0.71	0.54	78.95

In general, the chemical characteristics of the varieties, showed no differences between all the rice varieties tested. Carbohydrate is the main compound of rice and part of its is starch, whereas others such as the pentose carbohydrates and

cellulose, hemicellulose and sugar is only present in smaller amounts. Therefore, starch is the largest fraction in the rice, so that the physicochemical properties of the starch has an important role in determination of the physicochemical properties of rice [5].

Although the amount of protein in rice is small but when its compared to other grains, rice protein quality is better because it has a higher lysine content. Nevertheless lysine remains a major limiting amino acids (the smallest amount) in rice [6].

D. Consumer Preference of Rice

Consumer preferences of rice was determined by organoleptic test, which includes degree of whiteness, aroma, shape and general appearances. Organoleptic test results of 20 panelists presented in Table 6.

The results of consumer preferences for color of cooked rice showed that varieties Cibogo, Inpari10 and Inpari 14 was significantly different with Inpari 9, Inpari 15, Ciherang and Situbagendit. Highest score for color was Cibogo (4.29) and the lowest was Ciherang (2.62). The higher the value of whiteness, the whiter the rice. In general, consumers prefer white rice. Color of rice is generally measured from the highest degree of white rice due to milling and variety. The longer the milling time, the whiter the milled rice. Scores of the consumer preference for color for VUB (Inpari 9, 10, 14 and 15) ranged from 2.95 to 4.24, which is in between of 3 ("rather like") to 4 ("like"). Based on Table 4, the degree of whiteness of VUB ranged from 33.97 to 35.60%, were similar with whiteness value of Ciherang (34.52%) which widely grown and produced in Lampung. Based on the scores of whiteness, Ciherang was the lowest position when compared with other rice. It shows that the level of consumer preferences to for color the rice has shifted.

The results of the analysis of consumer preferences for rice aroma showed that most consumers liked the aroma of Cibogo (4.52) and did not like the aroma of Situbagendit (2.29). In general consumer liked VUB, scores ranged from 2.43 to 3.48. The lowest score occured on Inpari 10. This is due to Inpari 10 analyzed stored in inappropriate place so that the aroma of rice covered by other aroma disturbing.

TABLE. VI.
CONSUMER PREFERENCE OF RICE

Rice Varieties	Whiteness	Aroma	Shape	General Appearances
Inpari 9	2,95 b	2.43 cd	3.29 cd	3.14 cd
Inpari 15	3,05 b	3.09 bc	3.09 cd	3.52 bcd
Inpari 14	3,77 a	3.48 ab	3.67 bc	3.67 bc
Cibogo	4,29 a	3.81 a	4.52 a	4.43 a
Inpari 10	4,24 a	3.67 ab	4.05 ab	4.24 ab
Ciherang	22.62 b	2.76 cd	2.90 d	2.81 d
Situbagendit	2,71 b	2.29 d	2.905 d	2.90 d

Notes : Number designated by same letters in the same colum are not significantly different.
1 = dislike extremely , 2 = dislike; 3 = rather like, 4 = like, and 5 = like extremely

Table 6 showed that for the shape of rice, consumers most preferred Cibogo (4.52) and Inpari 10 (4.05), followed by other VUB. From the calculation of the ratio (P /L) (Table 4) was known that shaped of Cibogo bold, while rice Inpari 10 slender shape. This indicated that in general the consumer could accept the shape of VUB.

Overall, the general appearance of the consumers for VUB have "rather like" to "like". Although the most preferred was Cibogo (4.52), the score for VUB in the range of 3.14 to 4.24 and the lowest were Ciherang and Situbagendit. This is suggests that the general appearances of VUB prefered by consumers.

E. Consumer Preference of Cooked Rice

Consumer preferences towards rice carried with the organoleptic test criteria include aroma, color, flavor, texture and appearance. Organoleptic test results of 20 panelists presented in Table 7.

TABLE VII.
CONSUMER PREFERENCE OF COOKED RICE

Rice Varieties	White ness	Aroma	Flavor	Texture	General Appearan ces
Inpari 9	4.50 a	4.46 a	4.29 a	4.29 a	4.29 a
Inpari 15	3.33 b	3.50 b	3.04 bc	3.46 b	3.46 b
Inpari 14	3.50 b	3.37 bc	3.08 bc	3.29 bc	3.29 bc
Cibogo	3.54 b	3.21 bcd	3.08 bc	3.37 bc	3.37 bc
Inpari 10	3.33 b	3.21 bcd	3.21 bc	3.00 bcd	3.00 bcd
Ciherang	2.67 c	2.75 cd	2.58 b	2.71 cd	2.71 cd
Situbagendit	2.33 c	2.62 d	2.37 c	2.37 d	2.37 d

Notes: Number designated by same letters in the same colum are not significantly different.
1 = dislike extremely , 2 = dislike; 3 = rather like, 4 = like, and 5 = like extremely

Table 7 showed that, Inpari 9 having the highest score of all the test parameters. Statistically, it was a highly significant with other varieties. While the lowest was Situbagendit. From Table 7 also known that other VUB such as Inpari 10, Inpari Inpari 14 and 15 were also significantly different with the local variety (Ciherang and Situbagendit). The texture of rice influenced by the comparison between the amount of amylose and amylopectin [7][8][9]. The amylose content greatly affects the texture of the rice. For rice contained low amylose content would be produced sticky texture, shiny, not expand when cooked. [10].

IV. Conclusions

Consumer preference for some varieties tested showed tends like Cibogo and Inpari 10. Nevertheless, the appearance of VUB have "rather like" to "like" (3.14 - 4.24). and the lowest score is Ciherang (2,81) and Situbagendit (2.90). While consumer preferences tend to prefer Inpari 9 that having good color, aroma, taste, texture and general appearance. Overall it appears that cooked rice from the VUB was preferred and acceptable to consumers as well. Thus VUB can be developed in the area of research, especially Inpari Inpari 9 and 10.

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