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SINTA 2

Farmer Preferences In Using Local Chinese Mustard Green Seeds (Brassica Chinensis Var. Parachinensis) In Kebonagung Village, Kaliwates District, Jember District

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ABSTRACT

Kebonagung village is one of the areas in Jember Regency that has potential as a producer of Chinese mustard green. The cultivation process for caisim mustard in Kelurahan Kebonagung still uses local seeds as the production input. Therefore, this research aims to analyze farmers' preferences in using local Chinese mustard green seeds. The analysis method used is factor analysis with the assistance of IBM SPSS Statistics 24 software. The research results indicate that farmers' preferences in using local Chinese mustard green seeds are formed by 6 attributes: fertilizer use, seed germination capability, seed quality, soil type, pest and disease resistance, and seed stock. Based on the analysis results, the seed quality attribute is excluded from the model, thus farmers' preferences in using local seeds are based on 5 attributes: fertilizer use, seed germination capability, soil type, pest and disease resistance, and seed stock. Furthermore, based on the rotation process, they are grouped into 2 factors: external factors (fertilizer use and soil type) and internal factors (seed germination capability, pest and disease resistance, and seed stock).

Keyword: Chinese mustard greens, lcal seeds, preference

INTRODUCTION

The horticulture sector is one of the sub-sectors of agriculture that plays an important role in the economic development and needs in Indonesia. Horticultural plants, according to their types, have several qualifications, namely fruits, vegetables, medicinal plants, and other ornamental plants. The abundance of harvested crops and the variety of parts that can be utilized are among the advantages of horticultural plants compared to other sub-sectors of plants Sudarko et al. (2023). One region known for vegetable cultivation is Jember Regency.

The abundance of areas highly potential as food security supporters in Jember Regency is one of the advantages that, if utilized effectively, will have a significant impact on the economy. This includes providing job opportunities and vegetable food security, with one such sector being the producer of horticultural plants in Kaliwates District (Puspaningrum et al., 2022).

Kaliwates District has maintained stable production in vegetable commodities, particularly Chinese mustard greens (sawi caisim), at 1088 quintals from 2020 to 2021, despite not achieving as high yields as other districts within Jember Regency. Based on this explanation, it is evident that Chinese mustard greens cultivation holds potential in Kaliwates District. According to the Badan Pusat Statistik (2022),

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Kebonagung Village is the sole area with the largest harvested area and production of Chinese mustard greens in Kaliwates District.

According to agricultural extension data (2023), Kebonagung Village has a significantly large and productive production of Chinese mustard greens, with a harvested area of 30 hectares and a production of 870 quintals. However, the fluctuating daily prices of sawi caisim, ranging from as low as 1000 IDR per 10 bundles to as high as 15000 IDR per 10 bundles, pose a challenge, resulting in uncertain incomes for farmers. Therefore, vegetable cultivation, in general, must consider various factors, including the use of superior seeds. Farmers in Kebonagung Village show a tendency to be interested in the seeds they use for cultivating sawi caisim. As consumers of Chinese mustard greens seeds, farmers have different criteria for selecting seeds based on their preferences. Given these issues, this study aims to analyze farmers' preferences in using local Chinese mustard greens seeds in Kebonagung Village.

METHODS

The research location was intentionally determined through purposive sampling conducted in Kebonagung Village, Kaliwates District, Jember Regency. The method employed in this study is analytical descriptive. Data collection methods included observation, interviews, and documentation. The population consisted of Chinese mustard greens farmers in Kebonagung Village, totaling 100 farmers. The sample size was determined using simple random sampling, a technique for randomly selecting samples without considering strata within thepopulation (Sugiyono, 2017). Based on the Slovin's formula with a 10% margin of error, the sample size was calculated to be 50 individuals randomly selected from Kebonagung Village, Kaliwates District, Jember Regency.

The analysis method used is factor analysis, which is employed to examine farmers' preferences in using local Chinese mustard greens seeds. This involves constructing an equation for farmers' preferences from the independent variables (X), namely the attributes/factors of local Chinese mustard greens seeds in Kebonagung Village, Kaliwates District, Jember Regency. The data are processed and analyzed using IBM SPSS Statistics 24 software.

RESULTS AND DISCUSSION

Farmers in Kelurahan Kebonagung tend to have specific preferences for the seeds used in cultivating Chinese mustard greens. As consumers of caisim seeds, they have different criteria for choosing the seeds based on their individual preferences. Generally, vegetable farmers in Kelurahan Kebonagung use local seeds in their farming practices. The choice of seeds also affects the production of the caisim mustard greens that are grown. Based on the research finding, farmers' preferences in using local seed in Kelurahan Kebonagung can be described as Table 1.

More specific information regarding farmers' preferences as outlined in Table 1 above can be explained as follows:

1. **Farmers' preferences in using local Chinese mustard greens seeds based on fertilizer usage are divided into: <19.6 gr/m2, 19.6 gr/m2, and >19.6 gr/m2.**

In the category of >19.6 gr/m2, 34 out of 50 respondents strongly agree. This indicates that the majority of local Chinese mustard greens farmers apply fertilizer >19.6 gr/m2 in their farming activities. The fertilizer commonly used by farmers is chemical fertilizer, specifically Urea. According to Aziz & Chusna (2021), one

of the trade brands of nitrogen fertilizer (N) is urea fertilizer, a nitrogen (N) element with a nutrient content of 42-46% is useful for stimulating the growth and development of plants. The real benefit of urea fertilizer is making plant leaves greener, denser, and fresher.

Table 1
Attributes/Factors of Farmers' Preferences in Using Local Seeds

Atribut	Sub Atribut	Responden			
		4	**3**	**2**	**1**
Fertilizer Usage (X1)	1. <19,6gr/m^2	2	5	5	38
	2. 19,6gr/m^2	15	13	12	10
	3. >19,6gr/m^2	34	5	2	9
Seed Germination Rate (X2)	1. Fast (2-3 hari)	39	6	1	4
	2. Moderate (5 days)	10	14	6	20
	3. Slow (10 days)	1	3	4	42
Seed quality (X3)	1. Superior (80% growth)	39	8	2	1
	2. Good (50 - 80% growth)	13	16	4	17
	3. Defective (<10% growth)	-	1	6	43
Land Type (X4)	1. Humid	15	15	4	16
	2. Semi-dry	25	12	6	7
	3. Dry	15	4	7	24
Pest And Disease Resistance (X5)	1. Resistant	22	3	5	20
	2. Non-resistant	25	3	5	17
Seed Availability (X6)	1. Easily obtainable	50	-	-	-
	2. Hard to obtain	-	1	-	49

Source: Primary Data Analysis, 2024

2. Farmers' preferences in using local Chinese mustard greens seeds based on seed germination rate are divided into: fast, moderate, and slow.

In the category of fast (2-3 days), 39 out of 50 respondents strongly agree. This is because the majority of respondents indicated that local Chinese mustard greens seeds germinate easily during sowing. The quick germination of local Chinese mustard greens seeds in Kebonagung Village is attributed to their relatively short storage life, allowing them to sprout within 2-3 days.

This is supported by Arifiana et al. (2020), seedling growth is influenced by several factors, including growth regulators, phosphorus, and carbohydrates. These elements provide energy for seed germination and account for 90% of seed growth.

3. Farmers' preferences in using local Chinese mustard greens seeds based on seed quality are divided into: superior, good, and defective.

In the category of superior (80% growth), 39 out of 50 respondents strongly agree. The quality of local Chinese mustard greens seeds in Kebonagung Village is classified as superior. However, access to the market is cited as a reason why farmers continue to prefer using local seeds, besides their superior quality. According to Chan (2021), proper and effective use of seeds and seedlings can reduce the gap between actual harvest productivity and potential agricultural commodity productivity.

4. **Farmers' preferences in using local Chinese mustard greens seeds based on land type are divided into: humid, semi-dry, and dry.**

In the semi-dry land category, 25 out of 50 respondents strongly agree. The Chinese mustard greens farming land in Kebonagung Village is characterized by loamy sandy soil with good drainage and no waterlogging. This condition allows for optimal growth of Chinese mustard greens if waterlogged, Chinese mustard greens can suffer from leaf rot due to fungal infection, leading to losses for farmers.

According to Saparinto & Susiana (2014), Chinese mustard greens can be grown in various types of soil, but the most suitable for optimal growth is sandy clay soil that is loose, rich in humus, fertile, and has good drainage. This is supported by research Yusuf et al. (2020), indicating that one of the factors affecting plant production is the type of land (e.g., wetland or others).

5. **Farmers' preferences in using local Chinese mustard greens seeds based on pest and disease resistance are divided into: resistant and non-resistant.**

In the category of pest and disease resistance, non-resistant, 25 out of 50 respondents strongly agree. Local Chinese mustard greens seeds are susceptible to pest and disease attacks without prompt handling, farmers may experience crop failure. Some pests affecting local Chinese mustard greens in Kebonagung Village include cabbage caterpillars (*Setomorpha rutella*), which damage the leaves and leave only the stems intact. Worms also cause damage by creating holes in the leaves, reducing their market value. Grasshoppers create holes along the leaf edges, lowering the selling price of Chinese mustard greens. Additionally, leaf rot can occur, resulting in crop failure. Farmers address these issues using various pesticide brands such as Regent, Curacron, Decis, and Amistar Top.

This is consistent with Gumala et al. (2024), mustard greens are a type of plant that heavily relies on pesticides due to their susceptibility to pests and diseases. This dependency is one of the factors that hinders the production of high-quality mustard greens.

6. **Farmers' preferences in using local Chinese mustard greens seeds based on seed availability are divided into: easily obtainable and hard to obtain.**

In the category of easy availability of seeds, 50 out of 50 respondents strongly agree. Farmers in Kebonagung Village use local seeds obtained from previous harvests. Additionally, the ease of acquiring seeds is due to the ability to propagate them whenever needed. This is consistent with Rahmani & Yanuar (2023) research, which indicates that certified seed usage remains limited despite efforts in socialization and procurement due to lower prices. However, non-certified seed usage comes with numerous drawbacks.

The initial testing in the factor analysis of farmers' preferences involved using Keiser Meyer Olkin (KMO) and Bartlett's Test to determine whether the factors under study had a Measure of Sampling Adequacy (MSA) greater than 0.5 and a Significance ≤ 0.05. In the subsequent analysis of variables regarding farmers' preferences in using local Chinese mustard greens seeds, one variable was excluded: seed quality (X3), due to its KMO - MSA value being < 0.5. After eliminating this variable, the results are shown in Tables 2 and 3.

Table 2
Keiser Meyer Olkin (KMO) measure and significance test

Information	Value
KMO – MSA	0.664
Approx. Chi-Square	35.403
Df	10
Sig Bartlett's Test of Sphericity	0.000

Source: Primary Data Analysis, 2024

Based on Table 2, when 1 variable was excluded, the MSA value of 0.664 is greater than 0.5, indicating that the factor analysis process can proceed. Additionally, the Bartlett's Test of Sphericity yielded a value of 35.403 with a significance level of sig=0.000 ≤ 0.05, indicating that the sample data is multivariately normally distributed and meets the requirements for factor analysis. The next step is to determine the Anti-image Correlation values for each variable, which should be above 0.5. The Anti-image Correlation values are presented in Table 3

Table 3
Anti-Image Correlation Value

Var.	X1	X2	X4	X5	X6
X1	0.626[a]	0.121	-0.185	-0.012	-0.291
X2	0.121	0.651[a]	0.055	-0.169	-0.316
X4	-0.185	0.055	0.738[a]	-0.106	-0.124
X5	-0.012	-0.169	-0.106	0.706[a]	-0.381
X6	-0.291	-0.316	-0.124	-0.381	0.636[a]

Source: Primary Data Analysis, 2024

In Table 3, it is evident that the Anti-image Correlation values for all 5 variables, indicated by α, are greater than 0.5 (α > 0.5). Because α > 0.5, all variables and samples can now be further analyzed by performing Extraction and Rotation to examine the relationships among variables within a factor. The communalities values are presented in Table 4

Table 4
Communalities Value

Variable	Extraction
Fertilizer Usage	0.623
Seed Germination Rate	0.705
Land Type	0.558
Pest And Disease Resistance	0.601
Seed Availability	0.706

Source: Primary Data Analysis, 2024

In Table 4, it is observed that most variables used have communalities >0.5, indicating a strong relationship with the formed factors. The higher the communalities values, the better the factor analysis results. Communalities represent the amount of variance in an original variable that can be explained by the existing factors. Based on Table 4, the factors can be explained as follows:

1. Seed Stock (0.706): The seed stock factor has a Communalities value of

0.706 (70.6%), indicating that 70.6% of the variance in the seed stock factor can be explained by the sub-attributes of easy availability and difficulty in obtaining

2. Seed Germination (0.705): The seed germination factor has a Communalities value of 0.705 (70.5%), meaning that 70.5% of the variance in the seed germination factor can be explained by the sub-attributes of fast, moderate, and slow germination

3. Fertilizer Use (0.623): The fertilizer use factor has a Communalities value of 0.623 (62.3%), indicating that 62.3% of the variance in the fertilizer use factor can be explained by the sub-attributes of <19.6gr/m^2, 19.6gr/m^2, and >19.6gr/m^2.

4. Pest and Disease Resistance (0.601): The pest and disease resistance factor has a Communalities value of 0.601 (60.1%), suggesting that 60.1% of the variance in the pest and disease resistance factor can be explained by the sub-attributes of resistant and non-resistant to attacks.

5. Soil Type (0.558): The soil type factor has a Communalities value of 0.558 (55.8%), indicating that 55.8% of the variance in the soil type factor can be explained by the sub-attributes of moist, semi-dry, and dry conditions.

Further explanation is the Total Variance Explained as seen in Table 5. According to Ardiansyah et al. (2023), the Total Variance Explained test is used to assess the formed factors, where each factor must have an eigenvalue >1 to indicate its significance. If the eigenvalue is <1, it signifies that no factors are formed. Here are the results of the Total Variance Explained test presented in Table 5.

Table 5
Total Variance Explained Test
Total Variance Explained

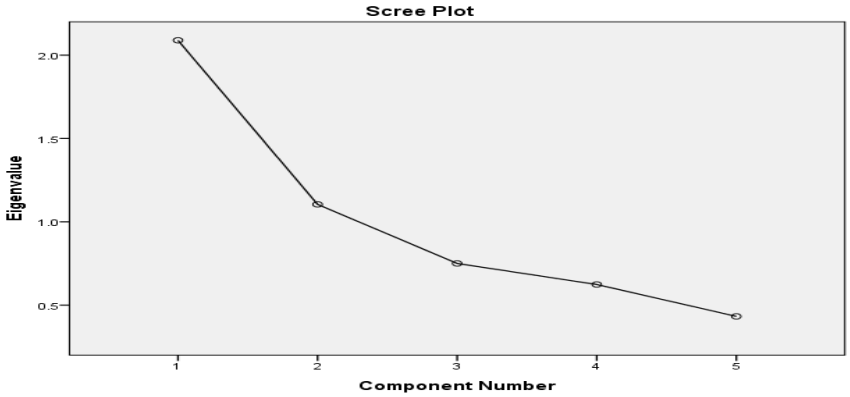
Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var	Cum. %
1	2.089	41.781	41.781	2.089	41.781	41.781	1.773	35.467	35.467
2	1.104	22.088	63.869	1.104	22.088	63.869	1.420	28.402	63.869
3	0.750	15.002	78.871						
4	0.624	12.478	91.349						
5	0.433	8.651	100.000						

Source: Primary Data Analysis, 2024

From the results in Table 5, it is evident that out of the 5 measurement factors, two factors are combined because their eigenvalues are > 1, totaling 2 factors in the fertilizer use and seed germination factors. If the total variance explains the basis for the number of factors obtained through numerical calculations, the Scree Plot illustrates this graphically as shown below.

From the Scree Plot, it is evident that the transition from one to two factors shows a sharp decline where the eigenvalue exceeds 2 and then drops drastically to 1 for the second factor. Factors 3 to 5 show a graph that tends to decline but not as sharply as factors 1 and 2. After identifying that two factors, namely fertilizer use and seed germination, have eigenvalues ≥ 1, the Component Matrix table illustrates the distribution of these five factors across the two formed factors based on the factor loading values. These factor loadings indicate the correlation of a factor with

Factor 1 (fertilizer use) and Factor 2 (seed germination). The positive (+) and negative (-) signs in the factor loading only indicate the direction of the relationship, whether it is positive or negative.



Source: Primary Data Analysis, 2024

Figure 1
Scree plot chart as eigenvalue

Table 6
Component Matrix Value

Factor	Component	
	1	2
Fertilizer Usage	0.524	0.591
Seed Germination Rate	0.567	-0.619
Land Type	0.490	0.564
Pest And Disease Resistance	0.745	-0.214
Seed Availability	0.836	-0.090

Source: Primary Data Analysis, 2024

Table 7
Rotated Component Matrix

Factor	Component	
	1	2
Fertilizer Usage	0.097	0.783
Seed Germination Rate	0.818	-0.189
Land Type	0.085	0.742
Pest And Disease Resistance	0.735	0.245
Seed Availability	0.739	0.399

Source: Primary Data Analysis, 2024

Factor loadings are determined from values > 0.5. If there are two or more factor loadings with values > 0.5 in correlation, then a rotation process is conducted. Based on Table 6, it is found that there are two correlations with values > 0.5: fertilizer use factor with correlation values of 0.524 and 0.591, and seed germination factor with correlation values of 0.567 and 0.619. These results necessitate a rotation process.

According to Tarigan et al. (2021), factor rotation serves to ensure that a variable aligns with the respective factor

group, thereby determined by identifying the highest correlation value between variables and the formed factors (components). Based on Table 10, the explanation is as follows:

1. The fertilizer usage factor has a variable distribution value greater than 0.5, specifically 0.783, found in the Component column for factor 2.
2. The seedling growth factor has a variable distribution value greater than 0.5, specifically 0.818, found in the Component column for factor 1.
3. The soil type factor has a variable distribution value greater than 0.5, specifically 0.742, found in the Component column for factor 2.
4. The pest and disease resistance factor has a variable distribution value greater than 0.5, specifically 0.735, found in the Component column for factor 1.
5. The seed stock factor has a variable distribution value greater than 0.5, specifically 0.739, found in the Component column for factor 1.

Based on the above grouping, 2 factors have been identified: external factors (fertilizer usage and soil type) and internal factors (seedling growth, pest and disease resistance, and seed stock). According to Sunarmi et al. (2022), the final stage in factor analysis involves drawing conclusions based on the component transformation matrix, which indicates whether the analysis results are suitable for explaining all the analyzed variables, each having correlations > 0.5.

Table 8
Component Transformation Matrix Value

Component	1	2
1	0.824	0.566
2	-0.566	0.824

Source: Primary Data Analysis, 2024

Table 8 illustrates the display of the Component Transformation Matrix, where the diagonal values from top left to bottom right are > 0.5. This proves that the two formed factors are appropriate, as they exhibit high correlation values: 0.824 for Component 1, comprising seedling growth (X2), pest and disease resistance (X5), and seed stock (X6); and 0.824 for Component 2, encompassing fertilizer usage (X1) and soil type (X4).

CONCLUSION

Farmers' preferences in using local mustard greens seeds are shaped by 6 attributes: fertilizer usage, seedling growth, seed quality, soil type, pest and disease resistance, and seed stock. Based on the analysis results, the seed quality attribute was excluded from the model. Therefore, farmers' preferences in using local seeds are based on 5 attributes: fertilizer usage, seedling growth, soil type, pest and disease resistance, and seed stock. Furthermore, through the rotation process, these attributes are grouped into 2 factors: external factors (fertilizer usage and soil type) and internal factors (seedling growth, pest and disease resistance, and seed stock).

Based on the results and discussion of farmers' preferences, it is advisable to provide more intensive treatment in local mustard greens farming. Local seeds are susceptible to pests and diseases because they must come from healthy mustard greens plants to qualify as seeds.

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