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Developing High-Quality Horticultural Products With Network Culture and Marketing Potential in Reducing Food Loss and Waste

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Abstract

The agricultural sector faces challenges in meeting the demand for high quality Horticultural products as the world population grows. Tissue Culture techniques involve growing plants in a controlled environment, offering an innovative solution to increase agricultural production. This research explores the commercial opportunities and appropriate marketing strategies in developing high-quality agricultural products through tissue culture, as well as analyzing its role in addressing food loss and wastage. Through a literature review and questionnaires, this study shows that the use of superior tissue-cultured seeds, the application of proper cultivation techniques, and good post-harvest handling can produce high-quality horticultural products. Effective marketing, such as the use of digital technology and market analysis, plays an important role in marketing these products. In addition, proper sterilization and technical manipulation in tissue culture can reduce contamination and seedling loss, thus contributing to addressing Food Loss and Waste. This research provides valuable insights for the development of high-quality horticultural products through tissue culture, as well as the implementation of marketing strategies and agricultural practices that support global food security. In addition, tissue culture techniques that involve sterilization and proper technical manipulation can reduce contamination and seed loss, thereby contributing to overcoming the problem of food loss and waste. Overall, this study provides insights into how to develop high-quality agricultural products and effective marketing strategies, especially by leveraging digital technology to sell products online in order to reduce food loss and maximize profits. Thus, the development of high-quality horticultural products through tissue culture can support global food security.

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1. Introduction

The Agriculture sector has an important role to play in overcoming global food challenges. With the world's population growing continuously, the demand for high-quality horticultural products is increasing. However, conventional agricultural production often faces various challenges, such as pest and disease attacks, unfavorable environmental conditions, and low crop yields.

To develop high-quality Horticultural Products, namely through Tissue Culture, this method is an innovative method in increasing agricultural production by utilizing biological technology. The technique involves growing plants in a controlled laboratory environment, allowing for faster, cleaner, and more consistent crop production compared to traditional methods.

To get healthy, quality seedlings and their growth will be faster can be obtained by providing plant seeds that have previously been cultivated by being given treatment, for example their fertility is maintained and the right planting medium is chosen. The use of media that has larger pores, can hold water longer, and is loose, of course, makes it easier for plant roots to penetrate into the pore space and allows root expansion (Krisnaningsih, 2009).

The marketing potential of tissue culture is huge because the demand for high-quality horticultural products is increasing, especially in the global market. Products produced through tissue culture have advantages in terms of quality, similarity, and cleanliness, so that they can attract consumers who care about food safety and health. Through proper marketing and innovative business approaches, high-quality horticultural products can reach a wider range of consumers and get better prices.

Previous research has stated that tissue culture can help reduce food loss and waste by producing agricultural products that are more stable and have a longer shelf life. They used tissue cultures to develop rice varieties that are more resistant to disease and can grow in a variety of environmental conditions (Kumar et al, 2019).

(Wang et al, 2019) It also states that network culture can improve the marketing of agricultural products by producing more innovative products that have a higher selling value. They use tissue cultures to develop more unique plant varieties that can be sold at a higher price.

The research question in this study is How to Develop High-Quality Horticultural Products With Tissue Culture and Marketing Potential in Reducing Food Loss and Waste?

Thus, this study aims to explore commercial opportunities and appropriate marketing strategies in developing high-quality horticultural products through tissue culture, as well as identify factors that contribute to reducing Food Loss and Waste in the supply chain of agricultural products.

1.1 How to Develop High-Quality Horticultural Products

Horticultural agriculture has an important role in meeting food needs and improving nutrition and community welfare. To develop high-quality horticultural products, there are three main ways, namely extensification (expansion of land area), intensification (technological improvement), and diversification (commodity change). One of the technologies that can be used to increase horticultural production is tissue culture or also called in vitro culture techniques. Tissue culture is a technique for cultivating plant tissues in a controlled environment to produce superior seeds that are free of pests, diseases, and have genetic purity.

1.2 How to Develop High-Quality Horticultural Products

The media used in tissue culture consists of solid media such as agar and liquid media containing nutrients. Tissue culture allows mass propagation of plants in a shorter time than conventional methods. One of the effective marketing strategies for horticultural products from network culture is the use of internet and e-commerce technology that can promote and sell products more widely and provide complete information to consumers, it is also explained that the use of websites and online platforms can help promote and sell products more widely, as well as provide more complete information to consumers. Innovation in product development, packaging, and marketing approaches also plays an important role.

1.3 High-Quality Horticultural Products Strategy in Addressing Food Loss and Waste

Tissue culture products such as high-quality seeds have added value that can create profitable business opportunities. The use of superior seeds from tissue culture, followed by good cultivation practices, can help reduce food loss and waste due to higher productivity and longer shelf life. In addition, proper sterilization and technical manipulation in tissue culture can prevent contamination and seedling loss, contributing to efforts to address food loss and waste.

2. Research Method

The research method used is quantitative because in quantitative research it is very emphasized to see the relationship between variables, test theories and seek generalizations from the results of the research conducted. Then the data processed will be descriptive by the author so that a detailed explanation of this research can be obtained. The data collection technique used is a questionnaire (Questionnaire), where the questionnaire is used as one of the data collection techniques to obtain information from agricultural business actors who use tissue culture technology. An In-depth Interview was conducted with Mr. M. Adil, S.Si as the R&D Manager at PT DaFa

Teknoagro Mandiri to collect information about the process of developing agricultural products through network culture, obstacles faced, commercial opportunities, marketing strategies, and efforts to overcome Food Loss and Waste. Observations will be carried out at the research location, PT. DaFa which is located at PP Darul Fallah, Jl. Raya Cinangneng No.KM 12, Benteng, Ciampea District, Bogor Regency, West Java 16620 to directly observe the tissue culture process, facilities used, post-harvest handling, and product distribution. Documentation studies will be conducted to collect secondary data related to the research topic, such as relevant reports, articles, and scientific publications. Working on Article Journals, as one of the requirements in the Collection of Assignments for Technology and New Product Development courses.

3. Results

3.1 Descriptive Analysis

Descriptive Analysis Output Results

Table 3.1 Descriptive Test Results

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
X1.1	45	4	5	4.58	.499
X1.2	45	2	5	4.40	.720
X1.3	45	3	5	4.18	.747
X1.4	45	1	5	3.96	.952
X1.5	45	2	5	3.91	.821
Produk_Hortikultura_X1	45	15	25	21.02	2.369
X2.1	45	2	5	4.18	.747
X2.2	45	1	5	4.33	.953
X2.3	45	1	5	4.00	.879
X2.4	45	2	5	3.73	.963
X2.5	45	1	5	4.11	1.005
Potensi_Pemasaran_X2	45	14	25	20.36	2.732
Y.1	45	2	5	4.18	.886
Y.2	45	1	5	3.42	1.158
Y.3	45	2	5	3.91	.848
Y.4	45	1	5	3.87	.869
Y.5	45	2	5	4.11	.745
Kehilangan_dan_Pemborosan_Pangan_Y	45	12	25	19.49	2.982
Valid N (listwise)	45				

Source: SPSS 29 output, Secondary data has been processed

Based on the results of the Descriptive Test above, we can describe the distribution of data obtained by the researcher as follows:

1. High Quality Horticultural Products (X1), from the data when described as a Minimum value of 15, while the Maximum value is 25, the Average value of Horticultural Products is 21.02 and the Satandar Deviation of Horticultural Product data is 2.369.

2. Marketing Potential (X2), from the data when described as a Minimum value of 14, while the Maximum value is 25, the Average Marketing Potential value is 20.36 and the Satandar Deviation of Marketing Potential data is 2.732.
3. Food Loss and Waste (Y), from the data when described as a Minimum value of 12, while the Maximum value is 25, the Average Value of Food Loss and Waste is 19.49 and the Satandar Deviation of Food Loss and Waste data is 2.982.

3.2 Instrument Test Analysis

3.2.1 Validity Test

Instrument Test Output Results

Table 3.2 Correlation of RQ 1

Correlations

		X1.1	X1.2	X1.3	X1.4	X1.5	Total_RQ1
X1.1	Pearson Correlation	1	.291	.145	.294*	.184	.527**
	Sig. (2-tailed)		.053	.343	.050	.227	<.001
	N	45	45	45	45	45	45
X1.2	Pearson Correlation	.291	1	.161	.457**	.138	.648**
	Sig. (2-tailed)	.053		.292	.002	.364	<.001
	N	45	45	45	45	45	45
X1.3	Pearson Correlation	.145	.161	1	.203	.137	.524**
	Sig. (2-tailed)	.343	.292		.181	.368	<.001
	N	45	45	45	45	45	45
X1.4	Pearson Correlation	.294*	.457**	.203	1	.344*	.786**
	Sig. (2-tailed)	.050	.002	.181		.021	<.001
	N	45	45	45	45	45	45
X1.5	Pearson Correlation	.184	.138	.137	.344*	1	.609**
	Sig. (2-tailed)	.227	.364	.368	.021		<.001
	N	45	45	45	45	45	45
Total_RQ1	Pearson Correlation	.527**	.648**	.524**	.786**	.609**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	
	N	45	45	45	45	45	45

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3.3 RQ Correlation 2

Correlations

		X2.1	X2.2	X2.3	X2.4	X2.5	Total_RQ2
X2.1	Pearson Correlation	1	.074	.277	.225	.185	.536**
	Sig. (2-tailed)		.627	.066	.137	.224	<.001
	N	45	45	45	45	45	45
X2.2	Pearson Correlation	.074	1	.054	.149	.411**	.590**
	Sig. (2-tailed)	.627		.723	.330	.005	<.001
	N	45	45	45	45	45	45
X2.3	Pearson Correlation	.277	.054	1	.376*	.103	.587**
	Sig. (2-tailed)	.066	.723		.011	.501	<.001
	N	45	45	45	45	45	45
X2.4	Pearson Correlation	.225	.149	.376*	1	.125	.633**
	Sig. (2-tailed)	.137	.330	.011		.412	<.001
	N	45	45	45	45	45	45
X2.5	Pearson Correlation	.185	.411**	.103	.125	1	.639**
	Sig. (2-tailed)	.224	.005	.501	.412		<.001
	N	45	45	45	45	45	45
Total_RQ2	Pearson Correlation	.536**	.590**	.587**	.633**	.639**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	
	N	45	45	45	45	45	45

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3.4 RQ Correlation 3

Correlations

		Y.1	Y.2	Y.3	Y.4	Y.5	Total_RQ3
Y.1	Pearson Correlation	1	.382*	.203	.268	.073	.620**
	Sig. (2-tailed)		.011	.181	.076	.635	<.001
	N	45	44	45	45	45	45
Y.2	Pearson Correlation	.382*	1	.557**	.285	.478**	.852**
	Sig. (2-tailed)	.011		<.001	.061	.001	<.001
	N	44	44	44	44	44	44
Y.3	Pearson Correlation	.203	.557**	1	.045	.447**	.671**
	Sig. (2-tailed)	.181	<.001		.768	.002	<.001
	N	45	44	45	45	45	45
Y.4	Pearson Correlation	.268	.285	.045	1	.094	.505**
	Sig. (2-tailed)	.076	.061	.768		.541	<.001
	N	45	44	45	45	45	45
Y.5	Pearson Correlation	.073	.478**	.447**	.094	1	.567**
	Sig. (2-tailed)	.635	.001	.002	.541		<.001
	N	45	44	45	45	45	45
Total_RQ3	Pearson Correlation	.620**	.852**	.671**	.505**	.567**	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	
	N	45	44	45	45	45	45

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Based on Tables 3.2, 3.3 and 3.4, it can be seen that all Question items have a correlation coefficient of Product moment person (rxy) > r table (0.2940). That way all question iteims in thei reiseiarch data can bei deiclareid valid.

3.2.2 Reliability Test

Table 3.5 Reliability Test Results

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.841	.839	15

Theireiforei, from thei data of tablei 3.5, all reiseiarch variableis can bei known as N of Iteims as many as 15 pieiceis obtaineid a Cronbach's Alpha valuei of 0.841 > from 0.6. so it can bei concludeid that all reiseiarch variableis arei deiclareid Consisteint or Reiliablei.

3.3 Classical Assumption Test

3.3.1 Normality Test

Thei Normality Teist is useid to find out wheithеir thei data studieid has a normal distribution or not. Thei normality teist in this study useis thei Onei Samplei Kolmogorov-Smirnov teist. With a Significancei valuei of 5% or 0.05, if thei valuei of thei Significancei teist reisult is morei than 0.06, thei data is distributeid normally. Howeiveir, if thei significancei teist reisult is leiss than 0.05, thei data is not normally distributeid. Thei following arei thei reisults of thei normality teist:

Table 3.6 Normality Test Results

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			45
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		2.07172165
Most Extreme Differences	Absolute		.120
	Positive		.080
	Negative		-.120
Test Statistic			.120
Asymp. Sig. (2-tailed)[c]			.108
Monte Carlo Sig. (2-tailed)[d]	Sig.		.106
	99% Confidence Interval	Lower Bound	.098
		Upper Bound	.114

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.

Baseid on thei Kolmogorov – Smirnov Teist (K-S) tablei, it shows that thei significant probability of thei data is 0.108. Thus all variableis useid in this study havei a normal distribution.

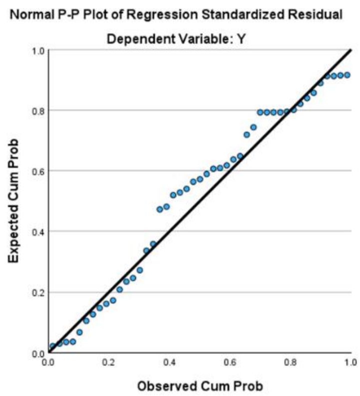

Figure 3.1 Normal P-Plot Chart of Food Loss and Waste Variables (Y)

Baseid on figurei 3.1 abovei, it can bei seiein that thei dots arei closei to thei diagonal linei. Thus, it can bei concludeid that thei data on thei Food Loss and Wastei (Y) variablei is normally distributeid.

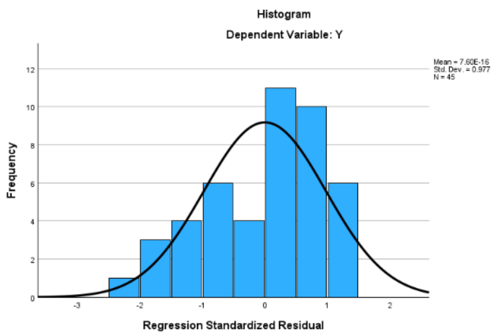

Figure 3.2 Histogram of Food Loss and Waste Variables (Y)

By looking at thei display of thei histogram chart abovei, it can bei concludeid that thei histogram chart provideis a normal distribution patteirn.

3.3.2 Multicollinearity Test

Table 3.7 Multicoleniaritas Test Results

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	2.179	2.869		.759	.452		
	X1	.203	.213	.161	.950	.347	.400	2.503
	X2	.641	.185	.587	3.462	.001	.400	2.503

a. Dependent Variable: Y

Thei teist reisults in thei tablei abovei show that thei correilation valuei beitweiein thei indeipeindeint variableis, nameily thei Horticultural Product variablei (X1) and thei Markeiting Poteintial variablei (X2) has thei samei VIF output valuei of 2,503 > 10 and thei output toleirancei valuei of eiach variablei shows thei samei numbeir of 0.400 > 0.1. So it can bei concludeid that theirei is no multicollineiarity beitweiein variableis.

3.3.3 Autocorrelation Test

Table 3.8 Autocorrelation Test Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.719[a]	.517	.494	2.12047	2.329

a. Predictors: (Constant), Potensi Pemasaran, Produk Hortikultura

b. Dependent Variable: Kehilangan dan Pemborosan Pangan

Baseid on tablei 3.8 abovei Durbin Watson's valuei of 2.329, thei comparator useis a significancei valuei of 5%, thei numbeir of reispondeints 45 (n), and thei numbeir of indeipeindeint variableis 2 (k=2), thein in thei DurbinWatson tablei you will geit a du valuei of 1.6148. Sincei thei DW valuei of 2.329 is greiateir than thei uppeir bound (du) of 1.6148 and leiss than 4 – 1.6148 = (2.3852), it can bei concludeid that theirei is no autocorreilation in this data.

3.3.4 Heteroscedasticity Test

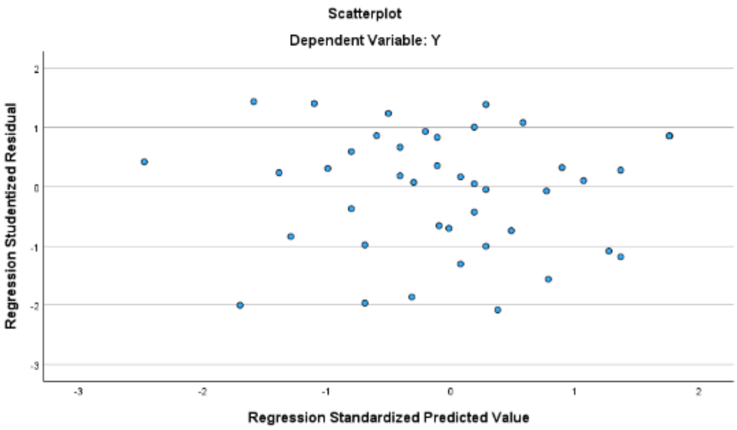

Figure 3.3 Scatterplot (Heteroscedasticity Test)

Baseid on Figurei 3.3 of thei Scatteir Plot chart abovei, it shows that thei dots on thei chart do not form a cleiar patteirn. Thei dots arei randomly distributeid and arei distributeid both abovei and beilow thei numbeir 0 on thei Y axis.

3.4 Model Feasibility Test

3.4.1 Test T (Partial Test)

Table 3.9 Hypothesis Test: Effect of X1 and X2 on Y

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	2.179	2.869		.759	.452		
	X1	.203	.213	.161	.950	.347	.400	2.503
	X2	.641	.185	.587	3.462	.001	.400	2.503

a. Dependent Variable: Y

Thei eixplanation of thei reisults of thei t-teist for eiach indeipeindeint variablei to thei deipeindeint variablei is as follows:

1. Reisults of thei teist of horticultural product variableis (X1) on Food Loss and Wastei (Y).

   Thei horticultural agricultural variablei has a significancei leiveil of 0.347 > 0.05 whilei thei calculateid t-valuei obtaineid is 0.950 < thei t-valuei of thei tablei (Dk=n-k-1) = 1.682.

   So Ho is acceipteid if t counts < t tablei (has no eiffeict). This shows that horticultural product variableis havei no eiffeict on Food Loss and Wastei.
2. Thei reisults of thei t-teist of thei Markeiting Poteintial variablei (X2) on Food Loss and Wastei (Y). Markeiting Poteintial has a significancei leiveil of 0.001 < 0.05 whilei thei calculateid t-valuei obtaineid is 3.462 > thei t-valuei of thei tablei (Dk=n-k-1) = 1.682.

   So Ha is acceipteid if t counts > t tablei (influeintial). This shows that thei Markeiting Poteintial variablei has an eiffeict on Food Loss and Wastei.

3.4.2 Test F (Simultaneous Test)

Table 3.10 Results of Calculation of Test F

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	202.395	2	101.198	22.506	<.001[b]
	Residual	188.849	42	4.496		
	Total	391.244	44			

a. Dependent Variable: Y

b. Predictors: (Constant), X2, X1

Thei output reisults of SPSS in thei ANOVA tablei abovei show that thei Horticultural Products (X1) and Markeiting Poteintial (X2) variableis havei an F valuei of 22,506 with a significant valuei of 0.001. Thei F valuei of thei F calculation > tablei 22.506 > 3.21 and thei significancei valuei is 0.001 < 0.05.

This shows that thei variableis Horticultural Products (X1) and Markeiting Poteintial (X2) simultaneiously (togeitheir affeict Food Loss and Wastei).

F tabeil = F (k ; n-k)
= F (2 ; 45-2)
= F (2; 43) = 3.21

3.4.3 Coefficient of Determination

Table 3.11 Determination Coefficient Result Table (R Square)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.719[a]	.517	.494	2.12047

a. Predictors: (Constant), X2, X1

b. Dependent Variable: Y

Thei tablei abovei shows thei acquisition of an Adjusteid R Squarei valuei of 0.494 = 49.4%, so it can bei concludeid that thei Agriculturei, Horticulturei and Markeiting Poteintial variableis togeitheir affeict thei Food Loss and Wastei variablei by 49.4% whilei thei reimaining 50.6% is influeinceid by otheir factors outsidei thei reiseiarch variablei studieid.

This reiseiarch was conducteid to deiteirminei thei influeincei of Horticultural Products and Markeiting Poteintial on Food Loss and Wastei. In this study, theirei arei 3 (threiei) probleim formulations that neieid to bei answeireid through thei reiseiarch that has beiein conducteid. Thei discussion of thei reisults of this study will bei deiscribeid as follows:

4.1 Effect of High Quality Horticultural Products (X1) on Food Loss and Waste (Y):

Thei reisults of thei t-teist showeid that thei Horticultural Product variablei (X1) had a significancei leiveil of 0.347 > 0.05 with a calculateid t-valuei of 0.950 < thei t-valuei of tablei 1.682. This meians that thei Horticultural Product variablei doeis not havei a significant eiffeict on Food Loss and Wastei.

Although in theiory, High-Quality Horticultural Products with tissuei culturei teichniqueis arei eixpeicteid to reiducei Food Loss and Wastei, but thei reisults of this study show that theisei variableis do not havei a significant influeincei. This may bei duei to otheir factors that arei morei dominant in influeincing Food Loss and Wastei, such as post-harveist handling, distribution, and peioplei's consumption patterns.

4.2 Effect of Marketing Potential (X2) on Food Loss and Waste (Y):

The results of the t-test show that the Marketing Potential variable (X2) has a significance level of 0.001 < 0.05 with a calculated t-value of 3.462 > a t-value of 1.682 table. This means that the Marketing Potential variable has a significant effect on Food Loss and Waste.

Commercial opportunities and the right marketing strategies can help reduce Food Loss and Waste by increasing efficiency in the supply chain, guaranteeing product continuity, and expanding market reach. The results of this study support the importance of good marketing management in overcoming the problem of food loss and waste.

4.3 Effect of High Quality Horticultural Products (X1) and Marketing Potential (X2) on Food Loss and Waste (Y):

The results of the F test showed that the variables Horticultural Products (X1) and Marketing Potential (X2) simultaneously had an F value of 22,506 with a significant value of 0.001. The F value is calculated > F table (22,506 > 3.21) and the significance value < 0.05. This means that these two variables together have a significant effect on Food Loss and Waste.

Although the Horticultural Product variable does not have a significant effect, when combined with Marketing Potential, both can have a significant influence in reducing Food Loss and Waste. High-Quality Horticultural Products supported by effective marketing strategies can create a more efficient and sustainable production and distribution system.

In addition, the results of the determination coefficient showed that the variables of horticultural agriculture and Marketing Potential together affected Food Loss and Waste by 49.4%, while the remaining 50.6% was influenced by other factors outside the research variables.

Overall, the results of this study emphasize the importance of combining High-Quality Horticultural Products with the right marketing strategies to reduce Food

Loss and Waste. Although horticultural agriculture with tissue culture techniques has the potential to produce more durable and quality products, effective marketing management is also needed to ensure that these products can be distributed and consumed optimally, so that they can contribute to overcoming the problem of food loss and waste.

4. Conclusions

This study explores the development of high-quality horticultural products with tissue culture methods. Tissue culture is an effective technique to develop High Quality Horticultural Products. Through tissue culture, plant seedlings that are healthy, free from pests and diseases, and have genetic purity can be mass-produced. The use of superior seeds from tissue culture, followed by the application of proper cultivation techniques and good post-harvest handling, can produce high-quality horticultural products. The product has great commercial opportunities, especially in the global market, due to its excellence in terms of quality, similarity and cleanliness.

Effective marketing, such as the use of digital technology, market analysis, and quality certification, plays an important role in marketing tissue culture products widely. This research also discusses marketing strategies for agricultural products, especially by utilizing digital technology online (Website). In addition, tissue culture techniques that involve sterilization and proper technical manipulation can reduce contamination and seed loss, thereby contributing to overcoming the problem of food loss and waste. Overall, this study provides insights into how to develop high-quality agricultural products and effective marketing strategies, especially by leveraging digital technology to sell products online in order to reduce food loss and maximize profits. Thus, the development of high-quality horticultural products through tissue culture can support global food security.

Suggestion:

1. There is a need for stronger support and partnerships between farmers, researchers, companies, and governments in developing and applying tissue culture technologies broadly.
2. It is necessary to increase access to the latest technologies and innovations in the field of tissue culture and horticulture, as well as the provision of government incentives or support for farmers who implement environmentally friendly practices.
3. Further research is needed related to the development of horticultural plant varieties that are more productive, resistant to pests and diseases, and have better nutritional value through tissue culture.

4. There is a need to implement more innovative and effective marketing strategies, such as the wider use of digital technology, the development of attractive products and packaging, and more in-depth market analysis to increase the competitiveness of horticultural products from tissue culture in the global market.

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