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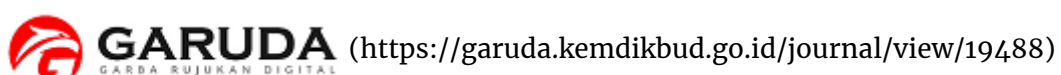
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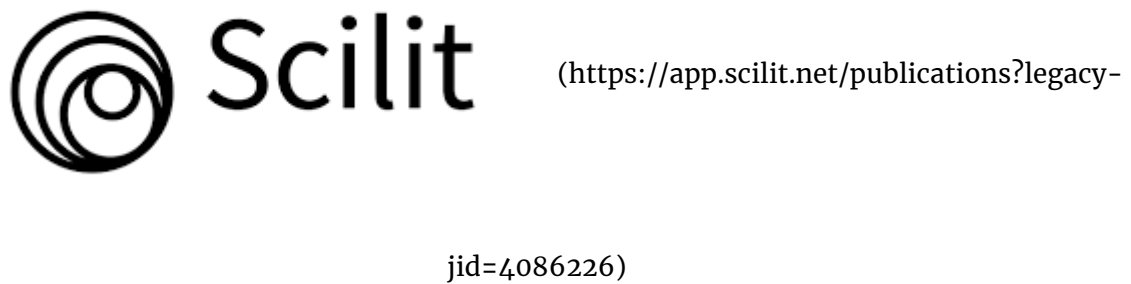
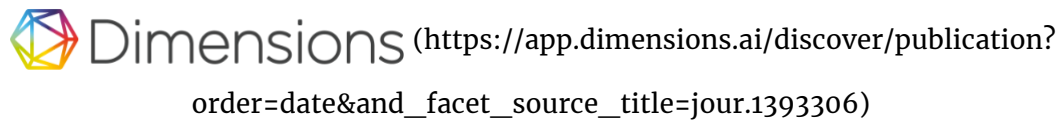
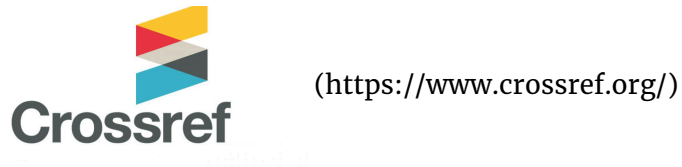
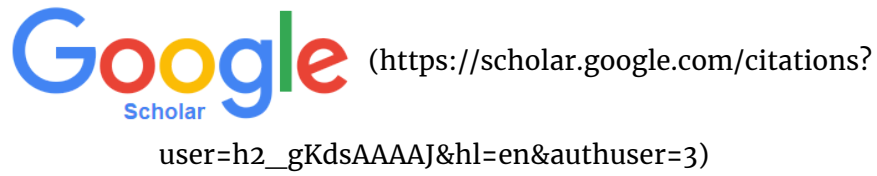


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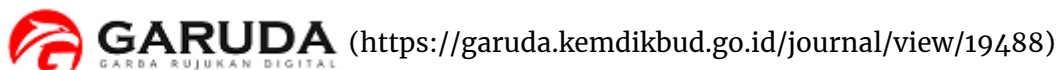
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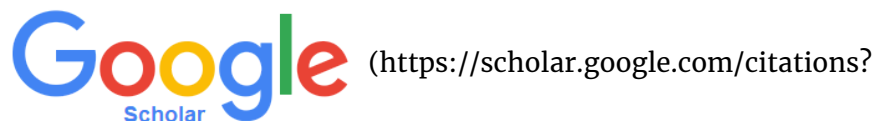
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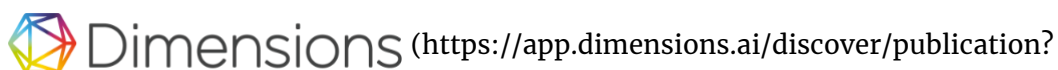


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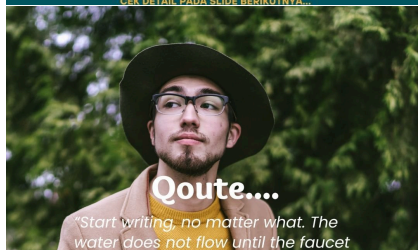
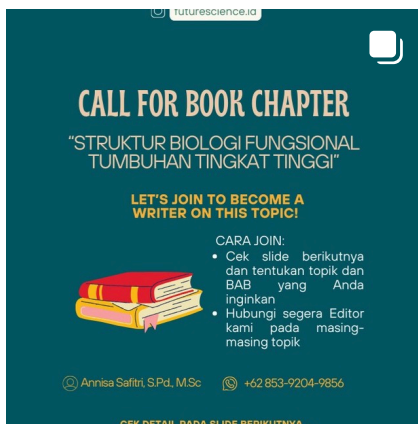
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# **Demand and Supply of Vegetables and Fruits During Pandemic Covid-19 at Downtown of Jember Regency**

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## **Abstract**

People try to fulfill their need on food during pandemic Covid-19, both on quantity and kind of food that have vitamins and minerals which are good for keeping and increasing endurance of body, such as vegetables and fruits. This study aimed to identify if there was a difference on: (1) demand of vegetables and fruits, and (2) supply of vegetables and fruits before and during pandemic Covid-19 at downtown of Jember Regency. Method of study was descriptive analytic with 100 samples, consist of consumer and green groceries of vegetables and fruits. Data was analyzed by t-test paired samples. The result were: (1) demand of vegetables decreased during pandemic Covid-19 as describe below: (a) green vegetables at traditional market was decreased 21.25% , another vegetables decrease 61.61% , and they were significant at 5% and 10% test level, (c) green vegetables at modern market decreased 11.76% and another vegetables increased 23.57 % but they were not significant (2) demand of fruits : (a) decreased 57.28% at traditional market and significant at 5% level (b) increased 16.67 % at modern market but not significant, (3) supply of vegetables when study was done (January) decreased 28.88% and significant at 10% test level, meanwhile supply of fruits decreased 56.00% and significant at 1% test level.

(Key words: fruits, demand, supply, vegetables)

## **1. Introduction**

Covid-19 was determined by World Health organization (WHO) as world pandemic since 2019 because had spread at almost all over countries in the world. Indonesian government had done various effort for overcoming it, such as suggestion to wear masker, wash hand, social distance, avoid crowded and reduce mobility. Meanwhile society try to fulfill their food and consume vegetables and fruits which has vitamins and mineral for keeping and increasing endurance of body. Data from BPS (Indonesian Central Bureau of Statistic) showed that demand of food increased until 51%, not only in account but kind of food which was chosen that must has high vitamins and mineral.

According to producer and government, there were two big challenge for agriculture, they were fulfilling supply of food with achievable price in one side, but on the other side still keep welfare of farmer. According to consumer, there were also two challenge too, they were keeping and increasing endurance of body by consume good food in one side, but on the other side the income was unchanged even tend to decrease in some household because declining economic activity in social restriction.

Jember Regency produce 15 kind of vegetables, 936.234 ku in account in 2018 and increased to 1.168.276 ku in 2019. Beside that, Jember also produce 25 kind of fruits, 5.370.043 ku in account in 2018 and in 2019 reached 7.250.267 ku (BPS Jember Regency, 2020). A lot of kind and account of vegetables and fruits could be an indicator that supply was high to fulfill demand, not only for Jember but also for another city. Related to pandemic Covid-19 that attack Indonesia in early 2020, so it predicted that there was a different of demand of vegetables and fruits between before and during pandemic, and so was the supply because producer always try to fulfill consumer needs.

Based on that background, this study aimed to identify if there was a difference on: demand of vegetables and fruits between before and during pandemic Covid-19 and (2) supply of vegetables and fruits between before and during pandemic Covid-19 at down town in Jember Regency.

## 2. Material and Methods

### 2.1. Method of Study

Study used descriptive and analytic method. This method examine status of population, object, set of condition, system of thinking, condition or occurrence in once time, testing hypothesis and interpreting analysis result deeply (Nazir, 2009).

### 2.2. Field of Study

Field of study was determined by purposive method at downtown Jember Regency in two kind of market: (a) "Pasar Tanjung" as main traditional market in Jember with , and (b) modern market such as Lippo Hypermart and Giant.

### 2.3. Method of Sampling

Method of sampling was convenience sampling because it was easy, available dan comfortable. Account of sample was 100 respondent as decripe in Table 1.

**Table 1.** Determined sample

No.	Description	Number of sample	
		Vegetables	Fruits
1	Consumer at traditional market	30	30
2	Consumer at 'Giant' modern market	5	5
3	Consumer at 'Lippo Hypermart' modern market	5	5
4	Green Groceries	10	10
Total number of samples		50	50

### 2.4. Method of Data Analysis

For testing the difference of demand and supply before and during pandemic covid-19 using two tail paired sample t-test with this formula:

$$t = \frac{\bar{X}_D - \mu_0}{S_D / \sqrt{n}}$$

$$\bar{X}_d = \frac{\sum D}{n}$$

$$S_d = \sqrt{\frac{1}{n-1} \left\{ \sum D^2 - \frac{(\sum D)^2}{n} \right\}}$$

Explanation:

$\bar{X}_d$  = mean of Difference compared variable

D = difference of compared variable

$S_d$  = deviation standard of D

n = size of sample

Hypothesis:

H0 = value of compared variable was same, or  $\mu_1 = \mu_2$

Ha = value of compared variable was different, or  $\mu_1 \neq \mu_2$

Criteria of decision making:

$t_{hitung} > t_{\alpha} (0,05)$ , so: Ho was rejected

$\leq t_{\alpha} (0,05)$ , so: Ho was accepted



### 3. Result And Discussion

#### 3.1 Profile of Consumer and Green Groceries at downtown of Jember Regency 2021

There were three kinds of respondents in this study, they were consumers at traditional and modern markets and also green groceries (Table 2).

**Table 2.** Profile of consumer and green groceries at downtown of Jember Regency 2021

Profile	Clasifikasi	Consumen		Green Groceries
		Traditional market	Modern Market	
Gender	Male	43.33	10.00	40.00
	Female	56.67	90.00	60.00
Age	< 30 years	53.33	20.00	20.00
	30 – 55 t years	46.67	80.00	70.00
	> 55 years	0.00	0.00	10.00
Education	Not educated	0.00	0.00	20.00
	Primary school	20.00	0.00	50.00
	Secondary school	10.00	0.00	0.00
	High secondary school	30.00	40.00	30.00
	Graduated from university	40.00	60.00	0.00
Income	< 2.000.000	56.67	10.00	20.00
	2 – 2.9 million	26.67	60.00	20.00
	3 – 4.9 million	10.00	30.00	20.00
	5 – 10 million	6.67	0.00	30.00
	> 10 million	0.00	0.00	10.00
Main Job	entrepreneur	26.67	90.00	0.00
	Official employee	20.00	10.00	0.00
	Labor	6.67	0.00	0.00
	Student at university	20.00	0.00	10.00
	Trader	26.67	0.00	90.00
Side Job	Ada	36.67	40.00	20.00
	Tidak ada	63.33	60.00	80.00
Knowledge about Covid 19	Just little know	13.33	0.00	10.00
	know	70.00	70.00	80.00
	Know well	16.67	30.00	10.00

Source: Processed primary data (2021).

Based on gender, respondents were dominated by females, 56% at traditional markets, 90% at modern markets, 60% green groceries and most of them were between 30 – 55 years old. This data showed that the task for shopping for most households was done by females. Most of green groceries were female too, it might be because they knew what consumers wanted well. Education of respondents at traditional markets was spread evenly, primary school 20%, secondary school 10%, high secondary school 30% and graduates from university 40%. Respondents at modern markets were dominated by graduates from university (60%), and the rest were high secondary school (40%). The interesting condition occurred in green groceries respondents, 20% of them were not educated, just 30% until high secondary school and the rest (50%) was until secondary school.

Based on income, 10% of green groceries got more than 10 million per month, 30% got 5 – 10 million, and the rest got less than 5 million. Meanwhile, 56.67% of consumers at traditional markets got less than 2 million per month, 26.67% got 2 – 2.9 million per month, 10% got 3 – 4.9 million per month and 6.67% the rest got 5 – 10 million per month. About 10% of consumers at modern markets got less than 2 million per month, 60% got 2 – 2.9 million per month and 30% the rest got 3 – 4.9 million per month.

Main job of most consumer was entrepreneur, even at modern market reached 90%, and more than 60% had no side job.

Related to the importance to consume vegetables and fruits to endurance of body, more than 70% respondent answered know, even consumer at traditional and modern market and also green groceries. But unchanged income be a restriction for buying more.

### 3.2. Demand of Vegetables and Fruits During Pandemic Covid-19 at Downtown of Jember Regency 2021

Demand is a number of things which was bought by consumer on determined price. Beside price, there were so many factors that affect demand. This study would like to identify if there was a difference of demand and supply of vegetables and fruits during pandemic Covid-19 at downtown of Jember Regency.

#### 3.2.1. Demand of Vegetables

Demand of vegetables was different between before and during pandemic covid-19 (Table 3). Green vegetables at traditional market decreased 21,25 % and significant at 5% test level, and the other vegetables decreased very large until 61,67 % and significant at 10% test level

**Table 3.** Demand of vegetables between before and during pandemic at downtown of Jember Regency 2021

Kind of Commodity	Demand Before and During Pandemic		
	Before (unit)	During (unit)	Change (%)
Green vegetables at traditional market	4.0	3.1	- 21.25
Other vegetables at traditional market	6.0	2.3	- 61.67
Green vegetables at modern market	1.7	1.5	- 11.76
Other vegetables at modern market	1.4	1.7	+ 21.43

Source: Processed primary data (2021).

There was a few decreasing of demand of green vegetables about 11.76%, meanwhile other vegetables pandemic at modern market precisely increased about 21.43 % during, but both of them were not significant (Table 3 and 4). Here are the result of paired sample t- test difference of demand of vegetables between before and during pandemic

**Table 4.** Paired sample t- test Difference of demand of vegetables between before and during pandemic at downtown of Jember Regency 2021

Kind of Commodity	Mean of Difference	Std deviation	95% Confidence interval of the difference		
			T	df	Sig (2-tailed)
Traditional Market					
Green vegetables	0,85	1,777	2,249	21	- 0,030
Other vegetables	3,67	9,153	1,968	23	- 0,061
Modern Market					
Green vegetables	0,20	0,632	1,000	9	- 0,343
Other vegetables	-0,33	0,577	-1,000	2	+ 0,423

Source: Processed primary data (2021).

Decreasing of demand of vegetables at traditional and modern generally during pandemic was not caused by lack of knowledge about covid-19. Table 1 showed that 70% respondent knew about covid-19, including the importance of vegetables and fruits for increasing endurance of body. It might be caused by increasing of price, because based on the law of demand there was a relation between price and demand. Data in Table 5 showed that price of vegetables increased during

pandemic, both at traditional and modern market, and the difference of price between before and during pandemic was significant as shown in Table 6

**Table 5.** Price of vegetables between before and during pandemic Covid 19 at downtown of Jember Regency 2021

Kind of Commodity	Price of vegetables before and during pandemic		
	Before (unit)	During (unit)	Difference (%)
Green vegetables at traditional market	10,715	13,954	+ 30.22
Other vegetables at traditional market	7,612	11,866	+ 55.88
Green vegetables at modern market	3,150	3,390	+ 7.61
Other vegetables at modern market	8,997	9,433	+ 4.84

Source: Processed primary data (2021).

Based on Table 5 decreasing of demand of vegetables agree with the law of demand, that was caused by increasing of price. Price of green vegetables at traditional market increased 30.22 % and significant at 5% test level, meanwhile other vegetables increased higher, about 55,88% and significant at 1% test level (Table 6).

**Table 6.** Paired sample t- test Difference of price of vegetables between before and during pandemic at downtown of Jember Regency 2021

Kind of Commodity	Mean of Difference	Std deviation	95% Confidence interval of the difference		
			T	df	Sig (2-tailed)
<b>Traditional Market</b>					
Green vegetables	3,238.64	6,113.26	-528.17	21	0.021
Other vegetables	4,254.17	613.64	-6.933	23	0.000
<b>Modern Market</b>					
Green vegetables	240.00	330.66	-467.54	9	0.047
Other vegetables	436.67	382.14	-1.979	2	0.189

Source: Processed primary data (2021).

Research of Wirawana and Nubatonis (2019) also showed that increasing of price of green vegetables caused decreasing of demand of restaurant on that vegetables at Sub District of Kefamenanu, Timor Tengah Utara Regency. Decreasing of demand of vegetables which was caused by increasing of price also occurred at Sub Sub District of Kadia, Sub District of Kadia, Kendari Regency (Muthiary dkk, 2019).

### 3.2.2. Demand of Fruits

Demand of fruits at traditional market decreased incisively, about 57.28% and significant at 5% test level as shown at Table 7. In the contrary happened at modern market, demand of fruits precisely increased about , 16.67% although was not significant (Table 8).

**Table 7.** Demand of fruits before and during Pandemic Covid 19 at downtown of Jember Regency 2021

Kind of Commodity	Demand of fruits before and during pandemic		
	Before (kg)	During (kg)	Difference (%)
Fruits at traditional market	20.6	9.1	- 57.28
Fruits at modern market	3.6	4.2	+16.67

Source: Processed primary data (2021).

**Table 8.** Paired sample t- test Difference of demand of fruits between before and during pandemic at downtown of Jember Regency 2021

Kind of Commodity	Mean of Difference	Std deviation	95% Convidence internal of the difference		
			T	df	Sig (2-tailed)
Fruits at traditional market	11.48	57.679	2.249	26	0.031
Fruits at modern market	-0.60	1.955	-0.970	9	0.357

Source: Processed primary data (2021)

Decreasing of demand of fruits at traditional market agree with the law of demand, that was caused by increasing of price about 10.34% and significant at 10% test level (Tabel 9 and 10).

**Table 9.** Price of fruits before and during Pandemic Covid 19 at downtown of Jember Regency 2021

Kind of Commodity	Price of fruits before and during pandemic		
	Before (Rp)	During (Rp)	Difference (%)
Fruits at traditional market	19.333	21.333	+ 10,34
Fruits at modern market	14.920	15.627	+ 4,73

Source: Processed primary data (2021).

**Table 10.** Paired sample t-test Difference of price of fruits between before and during pandemic at downtown of Jember Regency 2021

Kind of Commodity	Mean of Difference	Std deviation	95% Convidence internal of the difference		
			T	df	Sig (2-tailed)
Fruits at traditional market	-2.000,00	5399,43	-1,925	26	0,065
Fruits at modern market	-706,20	2312,36	-0,966	9	0,359

Source: Processed primary data (2021).

According to Table 1, inreasing of demand of fruits at modern market might be caused by this condition, most of consumer (50%) at modern market were 30-50 years old, an age that was settle economically, most of them (60%) graduated from university so should had enough knowledge about good and healthy food at pandemic phase, and also supported by good income compared with consumer at traditional market.

Research of Desfaryani et.al. (2016) on some kind of fruits at Province of Lampung, Habib and Risnawati (2018) on import papaya at Medan, Rosyidi et.al. (2016) on water melon at Sub Districk of Baki, Sukoharjo Regency, Destriani et.al. (2015) on manggo at Indramayu, Province of Lampung, and Medikana (2016) on Baliness salacca at Denpasar also showed a same phenomena, that demand decreased if price increased. The exception occurred to demand of banana at Denpasar which was explained by Ramantha and Budiasa (2017) that was not affected by its price.

Different condition occurred at modern market, demand of fruits increased but actually the case was price increased 4.73% but was not significant. It might be because consumer at modern market had higher income relatively, so increasing of few price was not affected demand. In the contrary occurred to grape based on research of Kilamasa (2015), which was agree with the law of demand. Demand of grape at modern market at Ambon decreased 0,125 kg for every Rp 1 increasing of price.

### 3.3. Supply of Vegetables and Fruit Before and During Pandemic Covid-19 at Downtown of Jember Regency 2021

Based on field observation at traditional market and analysis of data there was decreasing of demand of vegetables about 28.28%, meanwhile fruits decreased about 56.0% (Table 11) and both of them was significant (Table 12). Supply of vegetables and fruits at modern market could not be presented because the manager did not allow researcher to get data

**Table 11.** Supply of vegetables and fruit before and during pandemic Covid-19 at traditional market, downtown of Jember Regency 2021

Kind of Commodity	Demand of vegetables and fruits before and during pandemic		
	Before (unit)	During (unit)	Difference (%)
Vegetables at traditional market	145	104	- 28.28
Fruits at traditional market	55.00	24.2	-56.00

Source: Processed primary data (2021).

**Table 12.** Paired sample t- test Difference of supply of vegetables and fruits between before and during pandemic at traditional downtown of Jember Regency 2021

Kind of Commodity	Mean of Difference	Std deviation	95% Confidence interval of the difference		
			T	Df	Sig (2-tailed)
Vegetables at traditional market	40,50	61.1246	2.095	9	0,066
Fruits at traditional market	30.80	29.1120	3.346	9	0,009

Source: Processed primary data (2021).

Decreasing of supply of vegetables and fruit at traditional market might be caused by the weather. Study was done in rainy season December 2020 – January 2021. In rainy season vegetables and fruit susceptible to pest and disease and caused its growth was not optimal.

Figure 1 described that at the beginning there was an equilibrium in  $P_1$  and  $Q_1$ . Effect of bad weather on vegetables and fruits shifted supply curve to the left, it mean that supply decreased from  $S_0$  to  $S_1$ , as a result price increased from  $P_1$  to  $P_2$  and demand decreased from  $Q_1$  to  $Q_2$ .

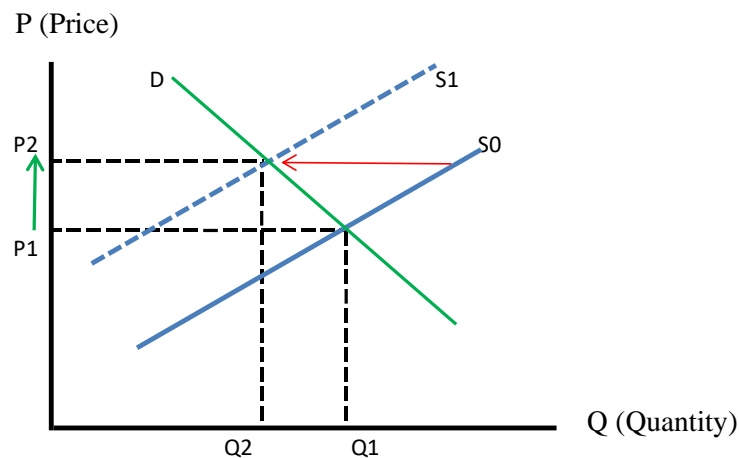


Diagram of supply curve shifting to the left  
caused increasing of price and decreasing of demand  
(Source: Sukirno, 2014)

#### 4. Conclusion

1. Demand of vegetables between before and during pandemic covid 19 at Jember regency was different:
  - a. at traditional market green vegetables decreased 21.25% and significant at 5% test level, and other vegetables decreased 61.61% and significant at 10%
  - b. at modern market green vegetables decreased 11.76% , but other vegetables increased 23.57%, both of them were not significant.
2. Demand of fruits between before and during pandemic covid 19 at Jember regency was different:
  - a. at traditional market decreased 57.28% and significant at 10 % test level,
  - b. at modern market increased 16.67 % but was not significant.
3. Supply of vegetables during pandemic covid 19 at Jember regency in December 2020 – January 2021 decreased 28.28% and signifivant at 10% test level, while supply of fruits decreased 56.0% and significant at 1% test level.

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# ***International Conference on Agriculture and Environmental Sciences***

FACULTY OF AGRICULTURE UPN "VETERAN" JAWA TIMUR

## **CERTIFICATE**

Certificate Number 01/ICAES/FP/2021

*Presented to*

***Ir. Henik Prayuginingsih, M.P.***

in the **International Conference on Agriculture and Environmental Sciences (ICAES) "Driving Agriculture Across The Sustainable Development Goals (SDGs)"**  
as :

**Presenter**

on 27th October, 2021, Faculty of Agriculture  
Universitas Pembangunan Nasional "Veteran" Jawa Timur

Mengetahui,  
Dekan Fakultas Pertanian  
Fakultas Pertanian UPN Veteran Jawa Timur



Dr. Ir. RA Nora Agustien K., M.P.

Surabaya, October 27th 2021  
Conference Chair



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