

Effort toward the Sustainable Agricultural Development within the Territory the ASEAN

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Abstract: ASEAN Indonesia and the such as Thailand and Vietnam knew the world largest rice-producing, one of its inputs for the is manure. Manure used in addition to also organic manure, fertilizer impact on pollution. Research objective analyze whether the use of fertilizer, affect the contents of rice grains, production, and productivity of the three countries, rice ASEAN this study using data time series and analyzed use software SPSS, the research results show that Indonesia users more fertilizer compared to countries Thailand and manure vietnam. Use in Indonesia influential production by, but not on productivity and contents of rice grains, in Thailand the use of fertilizer had real impact production by rice, yield, contents of rice grains, but not on in Vietnam influential manure production by, productivity, but not on contents of rice grains.

Keywords : ASEAN, Chemical manure, Rice, Sustainable Development, Environmental Pollution.

I. INTRODUCTION

In ASEAN countries Agriculture is an important sector, in Indonesia the largest agricultural sector producing Gross Domestic Product after Industry, namely agriculture contributes 13.41%, Industry 21.31%, trade 13.37, mining 11.05% and others 40.85% [1], Indonesia, Vietnam and Thailand are the largest rice producers in the world, so it is important to always maintain the production, productivity and yield of rice, in an effort to increase production, productivity and yield, then use artificial fertilizers .

According to [2] Fertilizers or agronomic inputs are able to increase yields on cereal crops, fertilizers are also used in legume plants [3], because fertilizers are one of the sources of artificial nutrients needed to overcome nutrient deficiencies, especially elements nitrogen, phosphorus, and potassium, nitrogen fertilizers contain N plant nutrients. The form of N compounds is generally nitrate, ammonium, amine, cyanide, but artificial fertilizers also have an impact on environmental damage [4].

The use of fertilizers will affect the finances of farmers, so the research [5] shows that there is a negative relationship between fertilizer prices and fertilizer use. When fertilizer prices increase, fertilizer use decreases. In Indonesia, farmers use excessive fertilizer [6], because extensification is difficult to implement, so intensification alternatives are implemented in Indonesia.

Indonesia has become a member of the ASEAN Economic Community, and a common goal will be achieved in 2015, from data showing that Indonesia is experiencing obstacles in terms of high production costs compared to other ASEAN countries, so research is needed on whether artificial fertilizers affect production, productivity and rice yield, and comparing Indonesia with other ASEAN countries

II. METHODS

The study used secondary data from the Food Agriculture Organization (FAO) from 1991 to 2001, the countries chosen were the countries of Indonesia, Thailand and Vietnam, as for the reason for choosing the country because the country is the largest rice-producing country in the world and the country uses artificial fertilizers . Analysis of the data used to analyze the correlation of the use of artificial fertilizers with production and productivity in Indonesia is the SPSS version 23 software, as well as the analysis of the relationship between fertilizer variables with the production, productivity and yield variables of Indonesian, Thai and Vietnamese rice.

Classical assumption analysis was carried out, namely normality test, multicollinearity and heterocedasticity test.

III. RESULT AND DISCUSSION

Fertilizer as one of the sources of artificial nutrients used when the soil overcomes the lack of nutrients, especially elements of phosphorus, nitrogen and potassium, nitrogen fertilizers have N plant nutrients. The form of N compounds is generally in the form of nitrate, ammonium, amine, cyanide.

Indonesia is the ASEAN country that uses the highest amount of artificial fertilizer compared to other countries such as Thailand and Vietnam, the highest use of fertilizers occurred in 1998, the country of Thailand used the lowest chemical fertilizer in 1991, 1994 until 2001, this can be seen in the following picture

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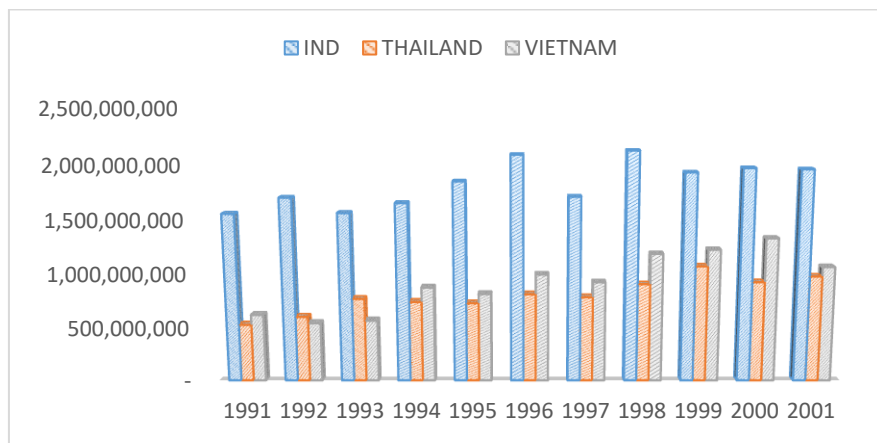


Figure 1: Use Of Chemical Manure In ASEAN Region Source : FAO , 2019

Classical Research Assumption Test

The classic assumption test consists of normality test, multicollinearity test and heterokrdastisitas test, on the Normality Test the following results are obtained

Table 1 Normality Test Using the Kolmogorov-Smirnov One-Sample Test

		Fertilizer	Production	Productivity	Rendemen
N		11	11	11	11
Normal Parameters ^{a,b}	Mean	1823134545,4545	32769,2727	4,3509	,6668
	Std. Deviation	202092580,58442	1406,50880	,06992	,00048
Most Extreme Differences	Absolute	,172	,157	,256	,161
	Positive	,172	,095	,129	,161
	Negative	-,148	-,157	-,256	-,114
Test Statistic		,172	,157	,256	,161
Asymp. Sig. (2-tailed)		,200 ^{c,d}	,200 ^{c,d}	,420 ^c	,200 ^{c,d}

In the classic assumption test with a normality test shows that the fertilizer value of Asymptotic significant is production of 0.200, productivity of 0.420, yield of 0.200 which means more than 0.05. This means that there is a normal distribution.

Table 2 Multikolinearitas Analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	23010,549	2718,258		8,465	,000		
	Pupuk	5,353E-6	,000	,769	3,610	,006	1,000	1,000

a. Dependent Variable: Produksi

In multicollinearity test by looking at VIF of 1,000 less than 10 which means there is no multicollinearity, tolerance number 1 so that the data used is free from multicollinearity. And in the heterocedasticity test

To answer the first goal regarding the correlation between fertilizer use and production in Indonesia, the correlation test was used, while the results were as follows

Table 3 Correlation Coefficient of Chemical Fertilizers and Productivity in Indonesia

		USE MENURE	PRODUCTION
USE MENURE	Pearson Correlation	1	,769**
	Sig. (2-tailed)		,006
	N	11	11
PRODUCTION	Pearson Correlation	,769**	1
	Sig. (2-tailed)	,006	
	N	11	11

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

Ho: $r = 0$ (correlation = 0 or fertilizer use does not correlate with production)

Ho: $r \neq 0$ (correlation is not equal to = 0 or fertilizer use does not correlate with production)

Ho is accepted if the correlation is <0.5 or if the significance is > 0.05

Ho is rejected & Ha is accepted if the correlation is > 0.5 or if the significance is <0.05

From the results of analysis of fertilizer use has a correlation value of $0.769 > 0.5$ or close to one and its significance is $0.006 < 0.05$, so Ho is rejected and Ha is accepted, meaning there is a correlation between fertilizer use and production in Indonesia.

This shows that fertilizer is very much needed by the soil, according to [7] indeed one of the important resources is fertilizer containing Nitrogen

		USE	YIELD
USE	Pearson Correlation	1	-,286
	Sig. (2-tailed)		,394
	N	11	11
YIELD	Pearson Correlation	-,286	1
	Sig. (2-tailed)	,394	
	N	11	11

Ho: $r = 0$ (Correlation = 0 or use of chemical fertilizers does not correlate with

The results of the study show that the use of fertilizer 0.394 is less than 0.5 which means that fertilizer use in Indonesia does not correlate with productivity, from research [8] that partially land area, number of seed purchases, production affects productivity, but the use of urea fertilizer and cropping systems has no effect on productivity.

For answer the second objective of this study, which is to analyze the relationship between fertilizer variables with the production, productivity and yield variables of Indonesian and other ASEAN countries, the regression test is used, the results are as follows:

Table 5 Effects of Chemical Fertilizers on Production in ASEAN Countries

No	Country	Variabel Dependent	Independent Variabel	R	F value	Significant
2	Indonesia	Fertilizer	Production	0,54	13,033	0,00
3	Thailand			0,77	30,568	0,00
4	Vietnam			0,81	38,350	0,00

In the analysis of the effect of chemical fertilizers on three countries, chemical fertilizers were very influential in the three countries both in Indonesia, Thailand and Vietnam. Fertilizer use is still ongoing in the three countries. Research

from the Intergovernmental Panel on Climate Change 1998 states that the use of chemical fertilizers needs to be analyzed by government institutions working with fertilizer producers to verify emissions.

Table 6. Effects of Chemical Fertilizers on Productivity in ASEAN Countries

No	Country	Variabel Dependent	Independent Variabel	R	F Value	Sigificant
2	Indonesia	Fertilizer	Production	0,08	0,88	0,39
3	Thailand			0,69	20,48	0,02
4	Vietnam			0,73	24,94	0,01

Rice productivity was not influenced by artificial fertilizers, this happened in Indonesia but in Thailand and Vietnam fertilizers have an effect on productivity, so fertilizer use needs to be evaluated, in books written [9] giving an idea of health and safety farmers are very much concerned and rural workers in the main agricultural countries of Mercosur. Mercosur is a block of South American economic trade that was formed in 1991 with the

main countries Argentina, Brazil, Paraguay and Uruguay. Venezuela was added in 2012. The continent of Australia, along with New Zealand, also known as Australasia. Then countries in ASEAN need to study the use of chemical fertilizers.

In the results of research on the effect of fertilizer on yields, it was found that artificial fertilizers did not affect the yield

Table 7 Effects of Chemical Fertilizers on the Revenues in ASEAN Countries

No	Country	Variabel Dependent	Independent Variabel	R	F value	Significant
2	Indonesia	Fertilizer	Production	0,11	0,98	0,71
3	Thailand			0,14	1,14	0,27
4	Vietnam			0,01	0,11	0,78

The results of the study on the effect of fertilizer on yields, showed that artificial fertilizers had no effect on yields, both in Indonesia, Thailand and Vietnam, in studies carried out by [10], showed that yields were associated with raw materials of grain, meaning seeds good quality will produce good yields, rice varieties and tools for grinding rice, in the study [11] showed that relatively low rice yields could be caused by an on-farm harvest and at the time of rice milling (off farm)

The use of artificial fertilizers is higher and has no effect on productivity and yield, so Indonesia needs to replace syntetic fertilizers with organic fertilizers that are cheaper and safer for the environment.

IV. CONCLUSION

1. The use of artificial fertilizers correlates with rice production in Indonesia
2. The use of artificial fertilizers has an effect on rice production in Indonesia, Vietnam and Thailand
3. The use of artificial fertilizers has no effect on rice productivity in Indonesia, but is influential in Vietnam and Thailand
4. The use of artificial fertilizers has no effect on the yield of rice in Indonesia, Vietnam and Thailand

REFERENCES

1. Badan Pusat Statistik Indonesia, "Produk Domestik Indonesia Triwulan 2014-2018," *Produk Domestik Indonesia Triwulan 2014-2018*, p. 118, 2018.
2. J. W. McArthur and G. C. McCord, "Fertilizing growth: Agricultural inputs and their effects in economic development," *J. Dev. Econ.*, vol. 127, no. September 2016, pp. 133–152, 2017.
3. P. Legum and P. Legum, *Pengaruh pemberian nitrogen dan fosfor terhadap pertumbuhan legum*. 2017.
4. B. C. De Gennaro and M. B. Forleo, "Sustainability perspectives in agricultural economics research and policy agenda," vol. 8, no. December 2018, 2019.
5. A. M. Komarek *et al.*, "Agricultural household effects of fertilizer price changes for smallholder farmers in central Malawi," *Agric. Syst.*, vol. 154, no. September 2016, pp. 168–178, 2017.
6. W. R. Susila, "Kebijakan Subsidi Pupuk: Ditinjau Kembali," *J. Penelit. dan Pengemb. Pertan.*, vol. 29, no. 2, pp. 43–49, 2016.
7. F. Pourazari, G. Vico, B. Bâth, and M. Weih, "Nitrogen use Efficiency and Energy Harvest in Wheat, Maize and Grassland ley used for Biofuel – Implications for Sustainability," *Procedia Environ. Sci.*, vol. 29, no. Agri, pp. 22–23, 2015.
8. A. Maghfira, A. Setiadi, and E. T, "Jurnal Sosial Ekonomi Pertanian ISSN 2580-0566," *J. Agrisociconomics Sos. Ekon. Pertan.*, vol. 1, no. 1, pp. 85–93, 2017.
9. K. J. Donham and A. Thelin, "Agricultural Medicine," *Agric. Med.*, 2016.
10. R. Hasbullah and A. R. Dewi, "Kajian Pengaruh Konfigurasi Mesin Penggilingan terhadap Rendemen dan Sudut Giling beberapa Varietas Padi," *J. Keteknikan Pertan.*, vol. 23, no. 2, pp. 119–124, 2009.
11. S. Budijanto and A. boing Sitanggang, "Produktivitas dan Proses Penggilingan Padi," vol. 20, no. 2, pp. 141–152, 2011.

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