

# **EFFECT OF AGROCHEMICAL FOR PADDY YIELD IN KALUTARA DISTRICT: A REGRESSION APPROACH**

Bulathsinghalage Lahiru Navodya Perera

168808E

MSc in Operational Research

Faculty of Engineering

University of Moratuwa

Sri Lanka

September 2020

## Declaration

This research project report is submitted to the Department of Mathematics Faculty of Engineering of University of Moratuwa as a partial fulfillment of MSc- Operational Research. It has been composed by myself and has not been submitted for any Degree.

.....

B.L.N. Perera

168808E

.....

Date

## **Acknowledgement**

First and foremost, I would like to express my deep and sincere gratitude to my research supervisor Dr. Pasan Edirisinghe, for the continuous support of my research project in Operational Research and for his patience, motivation, enthusiasm and immense knowledge. His guidance helped me in all the time of research study and writing this report. It was a great privilege and honor to work and study under his guidance.

Besides my supervisor, I would like to thank the rest of the examiner panel for their knowledge, guidance and encouragement.

Special thanks goes to all the respondents who contributed their time and effort for giving answers to the questionnaires and those who gave extra support in making this work have a better quality.

Also I express my thanks to my family for their understanding, prayers and continuous support to complete this research work.

## **Abstract**

Paddy is a major crop in Sri Lanka. Many farmers use Agro-Chemicals for their crops. Farmers believe that Agro-chemical increases the paddy yield. The objectives of the research were to: identify the effect of the fertilizer consumption to the paddy yield in Kalutara district; identify the effect of the pesticide usage to the paddy yield in Kalutara district, identify the relationship between paddy yield and fertilizer consumption, pesticide usage. Simple random sampling technique was used to select the sample of farmers. Regression analysis used as the analyzing technique for this specific study. The average fertilizer and pesticide usage around 622.5 kilograms per acre and 248.4-millilitres per acre respectively. The regression equation as follows:  $\text{Log Paddy yield} = 5.95 + 0.001458 \text{ Fertilizer consumption (KG per acre)}$ . The coefficient value for fertilizer consumption of the regression equation around 0.001458, With increment of one KG of fertilizer 0.001458 KG of paddy yield per acre can be expected to increase. According to the regression analysis fertilizer consumption positivity impact for the paddy yield while pesticide consumption negatively effects for the paddy yield. But to increase the paddy, yield the farmers use an acceptable level of fertilizer level and the pesticide level.

Key words: - Paddy yield, Fertilizer consumption, Kalutara district, Agro-chemicals

## Content

CHAPTER 01 .....	7
1.Introduction to Research .....	7
1.1 Research gap .....	9
1.2Research objectives.....	9
1.2.1 Main objective .....	9
1.2.2 Specific objectives .....	9
Chapter 02.....	10
2.1Literature survey .....	10
2.2Paddy cultivation in the Asian region.....	10
2.3 Soil nutrient level and the paddy cultivation .....	11
2.4Nitrogen for paddy cultivation.....	13
2.5Phosphorous for paddy .....	13
2.6Paddy cultivation and fertilizer consumption .....	14
2.7Pesticide consumption for paddy cultivation.....	15
2.8Effects of fungus for paddy yield.....	18
2.9Paddy cultivation in Sri Lanka.....	19
2.10Fertilizer consumption in Sri Lanka .....	19
2.11Paddy cultivation in Kalutara district .....	19
Chapter 03.....	21
3.1 Research design and methodology.....	21
3.1.1Introduction.....	21
3.2 Conceptual framework of the model.....	21
3.3Hypotheses Development .....	22
3.4Study area .....	22
3.5Data collection .....	23
3.6Paddy yield .....	23
3.7Pesticides consumption.....	23
3.8Fertilizers .....	23
3.9Methods .....	24
Regression equation.....	24
3.10Basic assumption testing.....	25
3.10.1Normality of the data .....	25

3.10.2 Shapiro-Wilk W Test .....	25
3.10.3 Kolmogorov-Smirnov Test .....	26
3.10.4 Multicollinearity .....	26
3.10.5 VIF (Variation Inflation Factor) .....	26
3.10.6 Heteroscedasticity .....	27
Chapter 04.....	27
4.1 Data analysis .....	27
Descriptive statistics .....	27
4.2 Normality test .....	27
4.3 Results of Regression Analysis.....	30
4.4. Test of Heteroscedasticity.....	30
4.5 Variance Inflation Factor (VIF).....	31
4.6 Correlation test results .....	32
4.7 Pesticide usage.....	33
4.8 Fertilizer consumption .....	33
Chapter 05.....	34
5.1. Conclusion .....	34
5.2 Recommendations.....	35
6. References.....	36

### List of figures

<i>Figure 3.1:</i> - Graphical illustration of the model.....	21
<i>Figure 3.2:</i> - Study area.....	22
<i>Figure 4.1:</i> - Probability plot of..... fertilizer consumption .....	28
<i>Figure 4.3:</i> - Probability plot of paddy yield .....	28
<i>Figure 4.4:</i> - Probability plot of Log paddy.....	29
<i>Figure 4.5:</i> - Regression coefficients.....	30
<i>Figure 4.6:</i> - Residuals plot .....	31

### List of tables

<i>Table 4.3</i> :- VIF table.....	32
<i>Table 4.4</i> :- Correlation coefficients .....	32