

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**OPTIMIZING FERTILIZER COMPOUNDS OF PINEAPPLE
PRODUCTION USING THE GOAL PROGRAMMING APPROACH**

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FARZANA BINTI MOHD EZAN (2017116959)

NUR HANANI BINTI SHAFII (2017798679)

NURFATIHAH BINTI JUANI (2017956223)

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ABSTRACT

Pineapple is the tropical leading edible plant that embraces around 2000 species. Pineapples are commonly cultivated in Asia and South-Central America, also the fruit is grown all year, where the sweetness and fruit quality varies depending on the different nutrients used. A good pineapple will be produced if fertilized properly since overuse and underuse of it can cause serious damage to the environment. The main aim of this study was to optimize the fertilizer combination for pineapple production, to reduce the total cost of fertilizer used to plant pineapple and to minimize the lower and upper limit of nutrients in nitrogen-phosphorus-potassium (NPK) fertilizers by applying goal programming (GP) model. LINGO 18.0 Software was used in this study to construct the GP model and to achieve the objectives of this study. Five fertilizers with different contents of NPK were analysed.

The result obtained from this research are 107.73 kg/ha of NPK 16/16/16, 102.92 kg/ha of Special Red, 85.47 kg/ha of NPK 44, 101.07 kg/ha of NPK Green and 90.58 kg/ha of NPK Blue are the amount of fertilizers that would optimize pineapple production. Together these results provide the total cost is reduced by RM 1 484.61 which is from RM 2 205 to RM 720.39 and the objective to minimize the total cost is fully achieved. Further analysis showed that the objective to minimize the upper limit of nutrients in NPK was achieved while the objective to minimize the lower limit of nutrients in NPK was not achieved. Overall, the researchers can only help experts in fertilizer and pineapple production to determine the correct amount for each NPK fertilizer required for the production of pineapple based on the GP model applied. In summary, the best result can be obtained with the experts' knowledge to analyse the quantity and functions of each NPK fertilizer. Consequently, it is suggested that further studies can be performed using other NPK fertilizers to see if there are any other best fertilizers that can be used in the production of pineapple using a different combination of NPK compounds.

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