



Profiling the Nitrogen Efficiency Using Agricultural Engineering Technique of YARA

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Abstract

Nitrogen is one of the macronutrients needed by all type of plants in order for them to grow into a healthy plant. Nitrogen is also one of the important elements in plants because of its role in the chlorophyll production in the leaf. Plants will grow healthy if they receive a sufficient amount of nitrogen needed. The study is conducted at Share Farm UiTM Jasin, Melaka. The YARA ALS N-Sensor has been used to determine the Nitrogen needed by the young oil palm. The result of visual analysis comes in a raster map form the sensor office website. There are 3 types of the map that which are N recommendation Map, N as-applied Map and Relative biomass map. The map is interpreted by the color on the map. For N recommendation map and N as-applied map, the darker the blue color which consists of 16.7% and 5.4% of total area respectively indicates that the area has less N in the leaf while the lighter blue color which consists of 6.0% and 6.7% of total area respectively indicates that the area has sufficient N in the leaf. As for the Relative biomass map, the darker green coloured area which consist 6.9% of the total area indicates that the area has sufficient N while for the lighter colored area which consists of 5.9% of the total area indicates that the area has less N. The area which indicates the less N needs to be applied with N based fertilizer whereas the area with sufficient N did not have to apply fertilizer but needs to be monitored.

Introduction

Nitrogen is one of the macronutrients needed by all type of plants in order for them to grow into a healthy plant. Nitrogen is one of the important elements in plants because of its role in the chlorophyll production in the leaf. It is a basic need in the photosynthesis process. This nitrogen can be monitor and calculate by using certain equipment [1]. This study is about Nitrogen Sensor (N-Sensor). In this study, the Yara ALS N-Sensor by YARA International ASA is used. The Yara N-Sensor is a real-time variable rate nitrogen sensor that allows farmers to measure crop nitrogen requirement as the fertilizer spreader passes across the field and variably adjusts the fertilizer application rate accordingly. The remote sensing for nitrogen is used to identify and monitor the availability of nitrogen in the leaf foliar and also in the soil. With this information acquired, the farmers can determine and can make better decision making when to apply the correct amount of fertilizer. This is because if less nitrogen applied can affect in lower yield whereas when excess nitrogen applied can cause nitrogen toxicity to plants. The YARA N-Sensor is mounted on an autopilot tractor. The system of the sensor is attached to the tractor.



The system of the sensor is attached to the tractor. To operate this sensor, the tractor needs to move across the field in a patterned way to collect the data on each part of the selected field [2]. The data collected will be inserted in the sensor office which is the software that is suitable to analyze the data coming from the sensor. The software is made only for the YARA N-Sensor. The data collected will be presented in a map form. In the map, it will show which area has low, adequate or excess Nitrogen content in the soil. According to the estimated nutrient removed by oil-palm (producing 25 tons per hectare Fresh Fruit Bunches (FFB) per year) are 192, 11, 209, 36 and 71 kg/ha per year of Nitrogen (N), Phosphorus (P), Potassium (K), Magnesium (Mg) and Calcium (Ca), respectively. The Nitrogen data that has been gathered from the field will be compared with the estimated Nitrogen which is 192 kg/ha. From the comparison, farmers can know if the field has a sufficient amount of Nitrogen content or not [3].

Discussion

This precision farming technology is very useful for a large scale plantation area. However, on the small scale plantation area, it is not very effective. This is because the initial cost for buying this tractor is very high so for the smallholder with less income is not recommend to use this modern farming tractor. On the other hand, they can apply to use this tractor at UiTM or UPM because in Malaysia there are only 2 of these YARA N-sensor tractors. Not only that the farmers can learn to use this machinery but it can also benefit the 2 universities to gather information and data to do more research on the tractor at different location of field and crops.

Conclusion and Recommendation

For the conclusion, the objective has been answered. This YARA N-Sensor is one of the tools for modern farming. This precision agriculture tool has been made easy for local farmers to use. By using this tool, we can easily identify the

availability of Nitrogen in the soil without using the soil lab test method which required lots of time to attain the data. We also can ensure that the right and optimal rate of fertilizer is applied at each of the required parts of the area. Thus, we can minimize the cost of fertilizer application while maximizing the output and profits. Future recommendation, from my study, this precision agricultural or modern farming machine is available only in 2 universities which are UiTM Jasin and Universiti Putra Malaysia (UPM).

References

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