International Journal of Chemical and Biochemical Sciences
(ISSN 2226-9614)

Journal Home page: www.iscientific.org/Journal.html

Auxin contents of oil palm leave in response to watering and chicken manure fertilizers

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Abstract

The auxin contents of oil palm seedling leaves under the influence of water sacristy and after application of organic fertilizer has been studied first time in the present study. The chicken manure fertilizer can overcome negative impact of continuous use of inorganic fertilizers. This study aims at determining the effect of chicken manure and watering on auxin contents of oil palm seedlings in prenursery. This study was conducted from May to August 2020, using the CRD (completely randomized designed) method with 6 treatments and 3 replications, namely, W1=0.30 l water day^{-1}; W2=0.30 l water days^{-2}, and W3= 0.30 l water days^{-4} while chicken manure consisted of A0 = control, A1 = 0.50 kg, and A3 = 0.75 kg. The results showed that the effect of treatment was not significant but there were lower leaf auxin contents at less watering. The chicken manure dose up to 0.50 kg gave higher auxin contents.

Keywords: Chicken manure, watering, auxin content, oil palm, CRD

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1. Introduction

Drought is a major obstacle to oil palm cultivation in various regions. The plant characteristics are needed to be studied under drought, and from the physiological aspect with a focus on auxin. Auxin is a generic term with capacity to induce elongation in shoot cells. The physiological analysis should be directed on growth at a certain age. One important key in the nursery is the provision of water [1-7]. Each oil palm plant has a different response to water deficit and chicken manure. Chicken manure fertilizer has a good potential and can be added to soil, especially problematic soils in Indonesia. Watering oil palm seedling in the prenursery is variable, some ffarmers provide 0.2 liters of water each day but others 0.3 liters of water every day.

2. Materials and methods

Oil palm seedling was the Tenera variety obtained from the Pusat Penelitian Kelapa Sawit, North Sumatra. The study was conducted from May 2020 to August 2020. This experiment used the CRD method consisting of 6 treatments and 3 replications namely watering, W1=0.30 liters per day, W2=0.30 liters per 2 days and W3= 0.30 liters per 4 days, while chicken manure fertilizer consisted of A0 = control, A1 = 0.50 kg and A3 = 0.75 kg planting media^{-1}. Observation of leaf auxin at the age of 3 months of seedlings was carried out in Bogor. Statistical analysis, data processing was done by using analysis of variance source.

3. Results and Discussions

Auxin observations were made on 3 months oil seedlings. The effect of treatment was not significant (Table 1). The higher auxin contents were observed at lower water level and higher amount of chicken manure.

The effect of treatment of watering and chicken manure at different levels was not significant, this observation is in line with previous research studies that organic fertilizer has no significant effect on oil palm growth [6,10]. From the results of research, it was revealed that auxins and cytokinins act dynamically and complementary to regulate a large number of developmental processes for mediating stress adaptation responses[11,12].

Using of inorganic fertilizers cause the soil to become hardened and plants become unresponsive to fertilizers after certain time and requires the resortation of physical and biological fertilities first [11]. On the other hand, chicken manure with a relatively smaller nutrient content requires a large amount for use. In the short term, the response of plants to organic fertilizers is not as fast as the application of inorganic fertilizers [11].

Table 1. The Experiment Matrix at Treatment of Frequency of Watering and Chicken manure to increasing of growth of oil palm seedlings in the pre-nursery phase.

Treatment	Leaf Auxin content (ppm)
W1=0,30 l days^{-1}	2.38
W2=0,30 l days^{-2}	2.34
W3=0,30 l days^{-4}	2.30
A0 =control	2.34
A1=0,50 kg media^{-1}	2.41
A2=0,75 kg media $^{-1}$	2.44

Chicken manure fertilizer up to 0.75 kg gave better results than lower levels. The results of the present study revealed that water is needed for the formation of auxin where the precursor of auxin is tryptophan. Allegedly, the higher chicken manure fertilizer was able to withstand the higher water humidity, causing higher auxin contents even though it was not significantly different from each other. As much as 72% mixture of compost and humus resulted in the best growth of oil palm seedlings in prenursery.

4. Conclusions

Following conclusions can be withdrawn from the present study:

1. Watering 0.30 l water to planting media^{-1}days^{-4} decreases leaf auxin contents although the obtained result was non-signifcant to other levels.
2. Chicken manure fertilizer up to amount of 0.75 kg planting media^{-1} has a trend to increase leaf auxin contents.

Acknowledgements

We express our gratitude to the Board of Darma Agung University Foundation and Rector of Darma Agung University for their help both materially and morally.

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