

Application of Multiple Fertilizers and White KNO_3 to Increase Pepper Plant Growth

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Abstract. Pepper production was decreased, it is caused by quality varieties and less intensive maintenance. Furthermore, price of pepper is unstable. Fertilization is one of the efforts to increase pepper production. This study aims to obtain the right dose of compound fertilizer (NPK) and white KNO_3 to increase production of pepper plants. The experiment using 5 combinations of fertilization : 0,5 g NPK (control), 1 kg NPK combined with 2% white KNO_3 each plant, 1,3 kg NPK combined with 2% white KNO_3 each plant 1,6 kg NPK combined with 2% white KNO_3 each plant. Variables observed for cultivated pepper plant: panicle length (cm), number of panicles, number of segment, and number of branches. Application of 1,3 kg NPK combined with 2% white KNO_3 each plant visualized the best of panicle length (4,38 cm), number of panicles (34), number of segment (49,8), and number of branches (17,2).

1. Introduction

One of the improvements in cultivation technology to increase production is fertilization. Fertilization aims to supply nutrients to the soil and plants. [1] that pepper is a plant that requires a lot of nutrients (nutrient demanding crop) so to be able to grow and produce well this plant requires a relatively high amount of fertilizer. Pepper plants will return to bear fruit if there are enough nutrients in the stem, vegetative growth is supported, and climatic conditions that support flowering and fruiting, pepper plants will return to bear fruit.

[2] proposed application of NPKMg (12-12-17-2) to plants aged 1, 2 and 3 years respectively 50, 100 and 200 g/plant with a frequency of 4 times a year, was able to increase the growth and production of peppe. Likewise, the application of NPK (12-12-17) to pepper plants aged \pm 3 years, and significantly affected the diameter of the pepper plant canopy. White KNO_3 fertilizer (potassium nitrate) is a fertilizer containing potassium (45-46%) and nitrogen (13%). Application of white KNO_3 fertilizer is able to increase the growth of tomato plants, namely the number of productive branches, the number of bunches and flower buds [3], and can increase the production of shallot bulbs [4]. From this study, it is expected to increase the pepper growth and production.

2. Methods

This study was conducted at Kebun Percobaan Natar from April to October 2022. The tools used in the experiment were soil tester, luxmeter, electric scale, bucket, sprayer, hoe, label, cutter knife, pruning shears, and stationery. The material used in the study was pepper plant, Varieties of Natar 1. Other ingredients are NPK fertilizer (16-16-16), white KNO_3 , and pesticides

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combined with 2% white KNO_3 each plant. Variables observed for cultivated pepper plant: panicle length (cm), number of panicles, number of segment, and number of branches. The overall stages of the implementation of this study were plant surveys, cleaning around plants, applying fertilizer in 3 stages, and observing of variability (panicle length (cm), number of panicles, number of segment, and number of branches).

3. Results and Discussion

Before treatment, a plant survey was carried out. Each plant tree was tested for moisture using a soil tester. Then, to measure the intensity of light around the plant, using a luxmeter. Pepper pruning was carried out 1-2 times within 7 months of the study.

Before application of fertilizer, drilling is carried out by scraping/lifting the surface of the soil around the plant, an area within a radius of approximately 60 cm below the pepper plant canopy. The topsoil and the subsoil are separated. Pepper plants require inorganic fertilizers. Inorganic fertilization as much as 500 - 1,600 grams of NPK (16-16-16)/plant/year for productive plants. NPK fertilizer was combined with white KNO_3 , application of white KNO_3 with sprayer (Figure 2). Tajar pruned (Figure 1) 7-10 days before fertilization is done, so that there is no competition for nutrients and maximize the entry of sunlight. Fertilizer application is done by scraping/lifting the surface of the soil around the plant, spreading the fertilizer and then covering it again with topsoil plus undersoil around the plant.



Fig 1. Pruned



Fig 2. Application of white KNO_3

Application of 1,3 kg NPK combined with 2% white KNO_3 each plant visualized the best of panicle length (Fig 3), number of panicles (Fig 4), number of segment (Fig 5), and number of branches (Fig 6). Based on the results of research [5], fertilization is important in supporting the growth and development of sugar palm plants. Continuous application of inorganic fertilizers can cause soil damage which results in reduced soil carrying capacity as a planting medium, especially sugar palm as one of the potential plantation crops to be developed. It possible to apply it to immature oil palms.

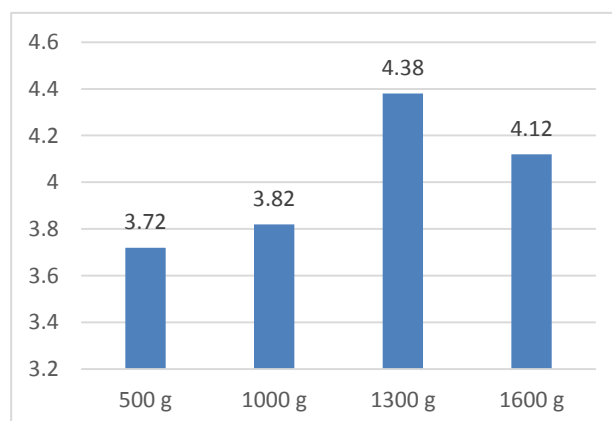


Fig 3. Panicle lenght

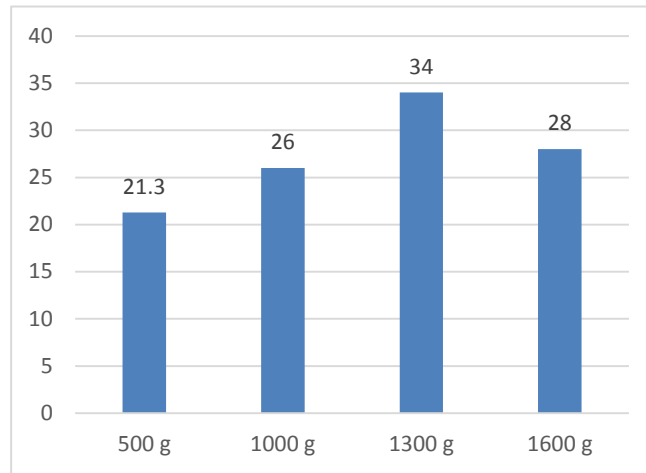


Fig 4. Number of panicles

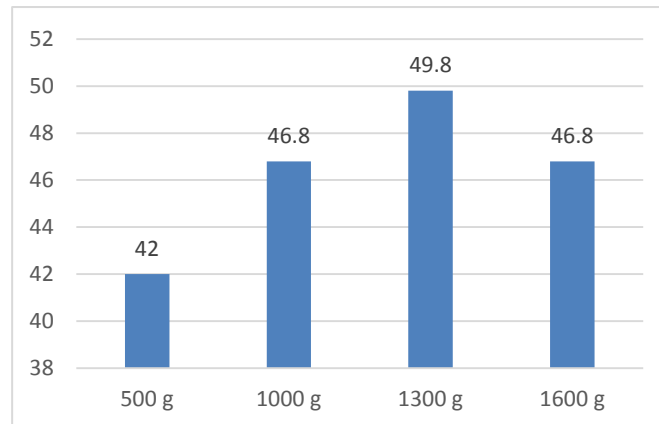


Fig 5. Number of segment

The addition organic fertilizer combined with inorganic fertilizer had a good effect on the growth of immature oil palms, especially on the variables of the average increase in plant height, the average increase in increased plant height and stem circumference. According to [6] NPK fertilizer (15-15-15) is effective in increasing the growth and dry grain weight of the grain yield of 4.12 t/ha. The use of NPK compound fertilizers needs to be accompanied by urea fertilization to meet the N nutrient requirements in the phases of rice growth.

NPK Mutiara fertilizer with 4.5 g/polybag has a significant effect on the totally of leaves and totally of branches [7]. And also NPK 50g increased height of plant, stem diameter, total of branches, and total of fruits shrub pepper [8].

NPK compound fertilizer (16-16-16) is a type of fertilizer that has the nutrients needed by plants. Application of NPK compound fertilizer has a good effect on plantation crops. This is because the availability of N, P and K elements in NPK compound is more balanced and more efficient in its application to plants compared to single NPK. Appropriate and balanced application of nitrogen nutrients can stimulate plant vegetative growth optimally [9].

Nutrients have an important role in plant growth and development. Nutrients that are important in the process of plant vegetative growth are N and K. Nutrient nitrogen (N) is absorbed by plants by breaking down into amino acids, which in the next process form proteins and nucleic acids. In addition, nitrogen is also an integral part of chlorophyll and is the main component that absorbs light needed in the photosynthesis process [10].

KNO₃ fertilizer has become an alternative that has been used in recent years for fertilizer cost efficiency and optimizing plant growth and development, both healthy and diseased. KNO₃ is a nutrient that contains nitrogen and potassium. Potassium is absorbed by plants in the form of K⁺, this ion is channeled from adult organs to young organs. Nitrogen is absorbed by plants in the form of NO₃⁻, this ion is needed for shoot growth, chlorophyll formation and has an important effect on increasing production yields [11].

In general, the application of KNO₃ in plants is able to overcome dormant shoots because it is able to activate gibberellins which can stimulate germination and growth of plant seeds [12]. The results of [13] research showed that potassium nitrate (KNO₃) can increase growth, number of flowers, number of fruits, and productivity of red chili (*Capsicum annum* L.). [14] and [15] reported that the use of KNO₃ fertilizer was able to optimize the growth and production of tobacco plants.

4. Conclusions

From this study, application of 1,3 kg NPK combined with 2% white KNO₃ each plant visualized the best of panicle length (4,38 cm), number of panicles (34), number of segment (49,8), and number of branches (17,2).

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