THE APPLICATION OF SOUND WAVES 3000 HZ THE AUTOMATICALLY TO INCREASE PRODUCTION IN PLANTS SHALLOT (A CASE STUDY IN THE VILLAGE OF DUWURAN, BANTUL YOGYAKARTA)

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ABSTRACT

Indonesia is an agricultural country that produces various kinds of food crops in order to meet their daily needs one of which is a shallot (Allium ascalonicum L.). On the plant cultivation red shallot experienced a variety of problems including fluctuating production due to weather anomalies, the yield losses due to reduction of nutrients in the soil and the presence of land conversion are increasing, as well as the increase in the population so that the availability of shallot that insufficient. The method used in the application of this harmonic sound wave is a control system on growing medium shallot and without treatment. The results obtained by comparing the plants in the control by observing the wet and the dry weight of tubers showed an increased yield of from 700 kg to 800 kg or increase of 14.3 percent, and followed by the increase of quantity and quality to be better than in shallot that does not use sound wave treatment.

Keywords: Sound Waves, Shallot, Allium ascalonicum

1. INTRODUCTION

Shallot (Allium ascalonicum L.) is one of the most common commodity of low land farming in Indonesia. And included as one most provitable because of its demand on common household in Indonesia. The demand of shallot is proportionally increased by the growth of people and their economic value as it was the main spice in Indonesia.

The huge amount of demand was followed by increase of prediction, thus making the price of shallot fluctuated just by weeks or even days. Decrease of sale value was not equal by the price of production input, thus making a great profit loss. These loss is worsen by declining of the plantation field quality. Beside of that, there is a transition of land usage from farming to residential. On Bantul itself, land transition is staggering 20 hectare per year, thus will shorten the field availability on shallot plantation. These will make the production worsen. And also could affect the price and the country will import these commodity and worsen the farmers economics.

Based on data by statistic centre, there is declining trend of shallot plantation by 2010 till 2012, by 2.027 hectare to 1.180 hectare. The production also declined by 2010 till 2012, from 11.950 tonsto 11.854 tons. By the loss of field, productivity will also worsen.

To deal with the problem of these productivity loss by these several years, there is some effort made to by the example of using fertilizer tech, pest control, and seeds selection
and culturing seeds, like development of certified seeds, and other market level effort. But those efforts wasn’t enough because of low rate harvest still occurred.

2. LITERATURE REVIEW

Shallot as lowland vegetables have been cultivated almost in most of Indonesia. Shallot cultivation is affected by several climatic factors such as humidity, temperature, light, precipitation, and wind. The location is suitable for growing shallots ranged between 0-100 meters above sea level. Shallot require fertile soil, high in organic matter, loose, good drainage, good air circulation, not shaded, and not waterlogged (Drijen Hotikultura, 2004).

According to Hidayat and Rosliani (1996 cit. Yulianto 2008), to support the growth and development of optimal shallot crop, crop nutrient factor is one of the growth factors and the easiest of the environmental factors that can be modified, namely the use of fertilizer into the soil. The main nutrients that plants need in large quantities that macro elements N, P, and K. From the observation Hilman et al. (1990 cit. Hidayat dan Rosliani, 1996 cit. Yulianto 2008), note that the average use of fertilizers on crops of shallot at the farm level is 200 kg N, 110 kg P2O5, K2O 396 kg, 337 kg S and 100 kg MgO per hectare without the use of organic fertilizers. In addition, based on research conducted by Nur Kadarisman et al. (2011) obtained an increase in crop production of shallot after treated with bio audio harmonic frequency of 3000 Hz was obtained 0.72 kg per one plant, and as a group increased to 180%.

For the time being, the price of this commodity is affected by imports and climate that affect harvest. And the field usage transition is still the main concern. To deal with the growth problem of shallot, a device which transmit a controlled audio frequency was created (that can be timed at active period). This device will be using a loudspeaker to transmit the audiowave throughout the plantation field. With this device, it boost the growth of the shallot so that it can boost the harvest rate also. And then this device was eco-friendly thus promising for the future, because there is no pollution generated and using sun as its main power which is abundant, more in Indonesia that got maximum sunlight throughout the year because of its tropical region. This audiowave will stimulate the opening time of stomata of the shallot plant so the photosynthesis can take longer time.

This audiowave is used to boost the growth of shallot by using frequency of 3,000 hertz and used side by side organic fertilizer from cow manure. These resonance will vibrate the nutrition on the leaf, thus intensify its penetration to the stomata. There’s thousands of these hole on the surface of the leaf. Every stomata that no more than 1/1,000 inch wide hollow oxygen and vapor go trough (transpire), also another gas will go through here to support the photosynthesis for the plant to make its food source. During dry conditions, the stomata will be closed to prevent the withering of plants due to drought (Kadarisman et al., 2011). When there is an automatic audio wave treatment on the shallot in the form of energy or vibrations of the audio wave will have an effect on the plants, namely the stomata in plants will open wider as a result of the vibrations of the audio waveform so that the energy to move on the leaf surface and stomata will open.

Application of sound waves to fertilize the growth of plants has long been done. Singh in 1960 has observed the effect of the application of sound waves in the form of music "charukes soul" of the gramophone for rice cultivation in Madras and the Bay of Bengal, which was able to increase crop yields 25-60 percent more than the average yield usual in the region, Hageseth, early 1973 found that the rate of germination of radish accelerated when given a sound with a frequency of 4,000 hertz (Tompkinn and Bird, 2004 cit. Ghofur, S. A., 2004 cit Kadarisman et al., 2011).
3. METHOD

3.1. Time and Place

The engineering implementation is carried out for 5 months starting in January 2014 until May 2014. The shallots grown on an area of 1500 square meters with the system in the form of an array of beds planted with a spacing between plants of 30 \times 30 \text{ centimeters}. The research carried out in the village of Duwuran, Bantul Yogyakarta.

3.2. The Treatment with the 3000 Hz Audiowave

Automatic audio wave system design is started from a very simple system but it has important functions in the audio waveform diagram automated tools work which we named "Stomata Spirit" works like the diagram in Figure 3.1 below:

![Figure 3.1 Diagram Tool Stomata Spirit.](image)

The Power Supply is solar energy and saved to a battery, which gives the intake of energy to the control system and the signal generator and control system gives instructions to the signal generator to be processed into a frequency of 3000 hertz and a speaker is provided to the signal generators which is directed to the shallots.

![Figure 3.2 Schematic Side View Stomata Spirit](image)

audiowave transmitter automatic "Stomata Spirit" scheme is shown in Figure 3.2 above, of the image is one of the points of the eight lane that we will apply to the land area of 1500-meter square. While in Figure 3.3 is a drawing application Stomata Spirit in the actual farmland.
The implementation of automated audiowave technology applied to the shallot with two kinds of treatment, i.e. one as a control without treatment and the other with the audio wave treatment of 3,000 hertz. Giving frequency made during a certain period of time i.e. at 4:30 to 9:00 and at 16:00 to 21:00 with the energy from the solar cell and battery that is 24 hours a day. Observation on the shallots growth and evaluate every week or seven days by measuring plant height, weighing the wet and the dry weight of shallot bulbs.

4. RESULTS AND DISCUSSION

This tool emits waves with a frequency of 3000Hz. The wave triggers shallot plants open stomata for more optimal. It has been tested by means of data collection every single week. Developments in each week continues to increase. Known with increasing leaf length and number of leaves. Data were collected for 2 months. Electronic systems are applied that use arduino Nano as a frequency generator. Frequency amplified by the power amplifier which then sounds emitted through the horn speaker. Speakers used were 8 pieces were placed in each plot is about 5m between speakers. The power source of the tool is to use solar panels that utilize solar energy. Electrical energy from solar panels accommodated at 84AH 12V battery. Stomata spirit tool packed in the box by a safety panel in the form of a padlock, to be safe from the influence of weather and anticipate theft. The tool is applied to the land in the village of DuwuranKretekBantul can be function properly. There is an increase in yields, which earlier harvest by 700kg once installed this tool then increased to 800kg, or about 14.3 percent. Additionally bypartners and residents of surrounding farmerresponse / testimony, as the result this tool has increased the production of the shallot, also can repel pests such as field mouses.

5. CONCLUSIONS

Based on the results of this study showed that the "stomata spirit" simply worked and resulting in increased production from 700 kg to 800 kg, or about 14.3 percent of the land area of 1500 square meters compared to the production of shallot without treatment or subjected to sound waves and causing a repellant effect on field mouses.

REFERENCES


