# PERFORMANCE OF SHALLOT (ALLIUM ASCALONICUM) ON SANDY COASTAL AREA OF KULON PROGO

**REKI HENDRATA, MURWATI, ARLYNA BP.**

Yogyakarta Assesment Institute fo Agricultural Technology (AIAT),
E-mail: reki.hendrata @yahoo.com, arlynabudi@gmail.com

**Abstract-** The activities were done on southern coasts area of YSR, at 0.5 ha area in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, from July to September 2008, involved ± 20 cooperator farmers of Wahana Tani Farmer Group. T-test design was used to observe Recommended Technology (A) and Innovated Technology (B). Small or medium size of Tiron variety was planted in 20 x 20 cm spacing and counted 1 seed per hole. Plants' height, bulb diameter, number of tiller, production (drought & wet), number of bulb and disease pest was observed on day 14$^{th}$, 25$^{th}$, 45$^{th}$ and harvest time. The result showed that plant height in Recommended Technology (A) was higher 19.89 cm on day 25$^{th}$ and 40.58 cm on day 45$^{th}$, plant of Innovated Technology (B), that was 19.00 cm on day 25$^{th}$ and 38.00 cm on day 45$^{th}$. Innovated Technology (B) resulted more tiller number than Recommended Technology (A), that was 7.00 tillers on day 25$^{th}$ and 12.00 tillers on day 45$^{th}$ , rather than Recommended Technology (A) which reached 6.74 tillers on day 25$^{th}$ and 11.00 tillers on day 45$^{th}$. Average production of shallot Recommended Technology (A) was 23.11 tons/ha, while in Innovated Technology (B) was 25.17 tons/ha wet weight. The attack of Grayak Caterpillars (Spodophtera exigua) in Innovated Technology (B), 11.05 crops on day 25$^{th}$ and 34.50 crops on day 45$^{th}$ where attacked by Spodophtera exigua. Meanwhile, the attacked crop in Recommended Technology (A) was lower.

**Keywords-** shallot, sandy coastal area

## I. INTRODUCTION

In order to answer some basic challenges, namely food availability, increase rural people's welfare, the availability of work field and management of natural resources controlled it needs to move the encouragement of agricultural development. For that Government of Yogyakarta Special Region (YSR) has been programming sandy land development of southern coasts in YSR as a priority.

Government has projected to make the coastal area of 3300 hectares as agricultural land that may contribute some income for the sake of farmers' welfare (BAPPEDA DIY, 2001). YSR Government will develop this sandy land into a productive agricultural land and able to increase people's income and contribute to the regional economy. It is necessary to realize the success of these programs support and participation from various parties. As a basic consideration in management of farming systems in the southern coastal area of Yogyakarta, it is needed to select commodities of high economic value, such as horticultural crops, hence in a certain time it can give a high yield and return the modal to the working farmers.

Some proper application of soil and crop management technologies was required through soil structure improvement (amelioration) with the use of soil fixing material, appropriate type, dose and timing of organic or inorganic fertilizer to overcome these constraints. The addition of organic material in the form of manure, compost or other fresh green materials can improve soil structure, increase the aggregation, increase water holding power and enriching the soil with a various nutrients of the organic materials dissociation incorporated into the soil (sand). Plants were also required to have a high adaptation to the conditions of the sand land, and have a high economic value.

AIAT Recommended Innovation Technology, for shallot which can fix the existing shallot plantation technology on farmers' level so that farmers could increased their crops production and their incomes.

## II. MATERIALS AND METHODS

The activities were conducted in south coastal area of YSR, at 0.5 ha area of Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, from July to September 2008. The research involved ± 20 cooperator farmers of Wahana Tani Farmer Group. T-test Design was used to study the Recommended Technology (A) compared to Innovated Technology (B).

### Preparation of seedlings

Small or medium size of Tiron variety with 1 seed per hole in 20 x 20 cm plant spacing was planted. Before planting, the shallot bulb tips should be cutted 1/3 part or as needed.

Organic Hormones solvents was applied to the seeds planting for 10 minutes as the treatment of Innovated Technology (B). Besides, the seeds were sprinkled evenly with a pack (100 g) of bio-active agential consisting Gliocladium + Trichoderma before planted.

**Land preparation**

The land was cultivated with ± 30 cm depth and then it was given a mixture of cows' manure (2.5 tons / ha) + clay type 2: 1 (30 $m^3$/ha).

Special treatment for Innovated Technology (B), the land was given some of chicken waste containing bio-active agential consisting Gliocladium + Trichoderma.

**Fertilizing**

Shallot fertilized with 200 kg urea/ha, SP-36 1500 kg/ha, ZA 250 kg/ha and 200 kg KCl/ha. Fertilizer was applied when planting, on day 7th and day 14th. Special treatment for Innovated Technology (B), Solid Organic Fertilizer (SOF) (1 tablespoon/lt water) was applied. At day 7th , the plants sprayed with Liquid Organic Fertilizer (LOF) (4 to 5 cap per tank) at day 7th and day 50th. At the 30th days, (2 caps of organic hormone) was applied.

**Planting**

Seeds are planted in the standing form. Planting is not too deep, just enough to be covered with a thin sand.

**Maintenance**

Watering is done twice a day (morning and afternoon) or when there is the sea breeze to wash the leaves. Weeding done twice: on day 7th – 10rd and on day 30th – 35rd, depending on the situation and condition or when bulbs breaks.

To anticipate the attacks of pest and diseases, specifically for treatment of Innovated Technology (B), bio-active agential of Sprodophtera Exigua-Nuclear Polyhedrosis Virus (SE-NPV) was used to control pest caterpillars (Spodophtera exigua). To reduce thrips attack, Beauveria bassiana (BVR) up to 100 grams of 1000 m was applied.

**Harvesting**

The plants which were ready to be harvested are characterized 80% of weak stems and dried leaves. The average harvest age ranged from day 60th – 63rd. Plant is revoked in good weather conditions. For more details, the differences between the treatments of Recommended Technology (A) with the Innovated Technology (B) can be seen in Table 1.

**Table 1. The activities of treatments of Recommended and Innovated Technology on the coastal area of Kulon Progo Yogyakarta, 2008**

| No. | Activities | Technology | |
|---|---|---|---|
| | | Recommended (A) | Innovated (B) |
| 1. | **Preparation of seeds** | - Tiron variety<br>- Small/medium size<br>- It has been saved 2 - 3 months or longer | - Tiron variety<br>- Small/medium size<br>- It has been saved 2 - 3 months or longer |
| 2. | **Preparation of land** | - Land cultivated with a depth of ± 30 cm | - Land cultivated with a depth of ± 30 cm |
| | | - Land given a mix of cows' manure (2.5 tons/ha) + clay type 2:1 (30 $m^3$/hectares) | - Land is treated by chicken wastes |
| | | - Mixed manure + clay are put into the land then level it up<br>- Let it for a week on | - Chicken waste was put into the land then level it up<br>Spread and mix active Gliocladium + Trichoderma up onto the land.<br>- Let it for a week on |
| 3. | **Fertilizing** | - Basic fertilizer : spreaded<br>- Dosage (1/3 dosage):<br>o Urea : 200 kg<br>o ZA : 250 kg<br>o SP-36 : 150 kg<br>o KCl : 200 kg<br>- Let it for a week on<br>Supplementary fertilizer I (on day 7th): used (1/3 dose)<br>- Dosage (1/3 doses):<br>o Urea : 200 kg<br>o ZA : 250 kg<br>o SP-36 : 150 kg<br>o KCl : 200 kg<br>- Supplementary fertilizer II (on day 15th): used (1/3 dose)<br>- Dosage(1/3 doses):<br>o Urea : 200 kg<br>o ZA : 250 kg<br>o SP-36 : 150 kg<br>o KCl : 200 kg | - As the basic fertilizer, SOF with dose: 1 spoon per 10 liters.<br>- Dosage (1/9 dosage) :<br>o Urea : 200 kg<br>o ZA : 250 kg<br>o SP-36 : 150 kg<br>- Let it for a week on<br>Supplementary fertilizer I (on day 14th): used (1/9 dose)<br>- Dosage (1/9 doses):<br>o Urea : 200 kg<br>o ZA : 250 kg<br>o SP-36 : 150 kg<br>- Supplementary fertilizer II (on day 15th): used (1/9 dose)<br>- Dosage (1/9 doses):<br>o Urea : 200 kg<br>o ZA : 250 kg<br>o KCl : 200 kg |
| | | - Not done | - At day 7th was sprayed LOF with dosage of 4-5 caps per tank, at day 7th – 10rd to day 50th<br>- At day 30th organic hormones with dose of 2 caps per tank was aplied |
| 4. | **Plantation** | - First day of July<br>- The tip of bulb was cut 1/3 part<br>- Not done<br>- Not done<br>- Seedling was on standing form<br>- Spacing 20 cm x 20 cm, with 1 seed per hole<br>- Planting was not too deep, simply covered with a thin sand | - First days of July<br>- The tip of bulb was cut 1/3 part<br>- 1-2 days before planted, the seed was soaked into the mixture of LOF + water (1 cap per 10 liters for 10 minutes.<br>- Seeds drained, and then sprinkled evenly with 1 pack (100 g) of Gliocladium + Trichoderma<br>- Spacing 20 cm x 20 cm, with 1 seed per hole<br>- Seedling was on standing form<br>- Spacing 20 cm x 20 cm, with 1 seed per hole<br>- Planting not too deep, simply covered with a thin sand |
| 5. | **Maintenance** | - Watering twice a day (morning and afternoon) or when there is the sea breeze to wash the leaves<br>- Weeding done during the bulbs break<br>- Weeding was done twice: at day 7th – 10rd and at day 30th – 35rd, depending on the circumstances and conditions | - Watering was twice a day (morning and afternoon) or when there is the sea breeze to wash the leaves<br>- Weeding done during the bulbs break<br>- Weeding was done twice: at day 7th – 10rd and at day 30th - 35rd, depending on the circumstances & conditions |

| | | | |
|---|---|---|---|
| | | - Fixing the landslide beds so that bulbs undisturbed<br>- Pests: worms & locusts<br>- Integrated Pest Management (IPM)<br>• Spray active deltamethrine insecticide ingredient 2-3 gs/liter when the attacks come > 10%<br>• Not done<br>• Thrips pest :<br>• Use of pesticides if found any attack | - Fixing the landslide beds so that bulbs undisturbed<br>- Pests (*Spodophtera exigua*)<br>- SE-NPV<br>○ Sprayed on afternoon to the attacked plants, dose of 1 sachet per tank (5 grams per liters)<br>○ For prevention, SE-NPV was sprayed every 10 days at + organic adhesives doses of 0.5 cap per tank<br>○ Thrips pest :<br>✓ Controlling<br>✓ Provide BVR biological agential dose of 100 grams of 1000 $m^2$<br>✓ Spray a natural pesticide with dose of 4 caps per tank + organic adhesive with dose of 0.5 cap per tank<br>✓ Waterring was lessened to once a day (at morning) |
| | | - Disease:<br>○ Anthracnose, control: Diphenoconazoe 2-3 g/liter<br>○ purple spots, control: Score: 0.55 cc / liter<br>○ Moler, control: increasing manure<br>○ Floured dew, control: environmental sanitation | - Disease :<br>○ No action indeed, since the beginning of planting has been given biological agential<br>○ Natural pesticides is emphasized at every stage of plant development |
| | | ○ Use the concept of IPM to handle Pest Disease Plant attacks, chemical pesticides as a last alternative | |
| 6. | Harvest | - 80% weak stems<br>- Dried leaves<br>- At day $60^{th} - 63^{rd}$<br>- Plant revoked in good weather conditions | - 80% stems weak<br>- Dried leaves<br>- At day $60^{th} - 63^{rd}$<br>- Plant revoked in good weather conditions |

## III. RESULTS AND DISCUSSION

### Agronomical Components Measurements

The parameters observed in this activity include the seeds' turgor, plants' height, root's diameter, number of saplings, level of grayak caterpillars (Spodoptera exigua)'s attacks, the wet and dry weight production. Observations were made in the field and laboratory before and after harvesting.

a. **Plants' growth Turgor**

Average plants' turgor of shallot was quite high, which was 96.79% (Recommended Technology) and 95.9% (Innovated Technology) as seen on Table 2. In Innovated Technology, soaking the seeds into a condensation of Liquid Organic Fertilizer for 10 minutes a day before planting, didn't give any effect to the shallot turgor.

**Table 2. Average turgor of shallots at day $14^{th}$ on Recommended Technology and Innovated Technology in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, 2008**

| No | Technology | Turgor (%) |
|---|---|---|
| 1. | Recommended (A) | 96,79 |
| 2. | Innovated (B) | 95,90 |

Source: primary data analysis of 2008

### Plants' Height

In Table 3 the height of plants could be seen. Based on the general performance plants with Recommended Technology look better than Innovatted Technology. That is 19.89 cm (at day $25^{th}$) and 40.58 cm (at day $45^{th}$), slightly higher than the Innovated Technology ones, which is 19.00 cm (at day $25^{th}$) and 38.00 cm (at day $45^{th}$).

**Table 3. Average height of shallot at day $25^{th}$ and day $45^{th}$ on Recommended Technology and Innovated Technology in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, 2008**

| No | Technology | Height (cm) | |
|---|---|---|---|
| | | At day $25^{th}$ | At day $45^{th}$ |
| 1. | Recommended (A) | 19,89 | 40.58 |
| 2. | Innovated (B) | 19,00 | 38,00 |

Source: primary data analysis of 2008

Growth in vegetative phase mainly occurs in the development of roots, leaves and new stems. By the plants' age increasing to a certain extent, the plants' heights increases also and so do number of leaves and bulb diameter, which means the growth of plants was existing (Haryadi, 1981).

### Bulb Diameter

The diameter of bulb on technology of shallot cultivation can be seen in Table 4.

**Table 4. Average shallot bulb diameter when harvest time on Recommended Technology and Innovated Technology in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, 2008**

| No. | Technology | Diameter (mm) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Big size | | Medium size | | Small size | |
| | | Length | Width | Length | Width | Length | Width |
| 1. | Recommended (A) | 26,41 | 21,59 | 23,64 | 17,37 | 19,64 | 13,46 |
| 2. | Innovated (B) | 30,90 | 26,35 | 28,21 | 21,66 | 23,83 | 16,92 |

Source: primary data analysis of 2008

Table 4 shows that the quality of bulb resulted is nearly the same on the appearance, as well as on the treatments Recommended Technology and Innovated Technology. For category of big, medium and small bulb diameters, are dominated by the treatment of

Innovated Technology in general. Bulb of big category usually have a better view. According to Ameriana et al., 1991, bulb with diameter more than 2.5 cm are categorized into the 1st Class quality. One factor that is determining the quality of shallot seed tubers are the size of the tubers. Large diameter roots tend to provide the necessary food reserves for growth and development in the field (Suwandi, 1989).

**Number of seedlings**

The number of seedlings in shallot cultivation activities is listed in Table 5.

**Table 5. The average number of seedlings per plant at day 25th and day 45th on Recommended Technology and Innovated Technology in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, 2008**

| No | Technology | Amount of seedlings/plants | |
|---|---|---|---|
| | | At day 25th | At day 45th |
| 1. | Recommended (A) | 6,74 | 11,00 |
| 2. | Innovated (B) | 7,00 | 12,00 |

Source: primary data analysis of 2008

Based on the data in Table 5, it shows that the treatment of Innovated Technology tends to give the number of seedling higher than ones of Recommended Technology, in the amount of 7.00 seedlings (at day 25th) and 12.00 seedlings (at day 45th), slightly better than ones of Recommended technology which reached 6.74 seedlings (at day 25th) and 11.00 saplings (at day 45th).

**b. Production**

**Wet shallots production**

Wet shallot production can be seen in Table 6. Wet shallot production is the result of the weighing of wet shallot (with leaves and roots) just after harvested. Average wet shallot production with Recommended Technology treatment is 23.11 tons/ha, whereas with Innovated Technology treatment is 25.17 tons/hectare.

**Table 6. Average shallot production rates at harvest time on Recommended Technology and Innovated Technology in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, 2008**

| No | Technology | Wet Production (ton/ha) |
|---|---|---|
| 1. | Recommended (A) | 23,11 |
| 2. | Innovated (B) | 25,17 |

Source: primary data analysis of 2008

**Dried Shallot Production**

Average production of dried shallot (if stored as seeds) can be seen in Table 7. Average dried shallot production on the Recommended Technology is 13.71 tons/ha, whereas on the Innovated Technology is 15.02 tons/ha. Depreciation of shallot (from wet to dry weight) between the two treatments was almost equal in the amount of 40.67% for Recommended Technology and 40.32% for the Innovated Technology.

**Table 7. Average production of shallot (dry weight) on Recommended Technology and Innovated Technology in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, 2008**

| No | Technology | (When stored as seed) | Dried crop production (tons/ha) |
|---|---|---|---|
| 1. | Recommended (A) | 13.71 | 16.17 |
| 2. | Innovated (B) | 15.02 | 17.61 |

Source: primary data analysis of 2008

**Number of tubers**

The average number of tubers between Recommended Technology and Innovated Technology was almost the same that is 18.34 for Recommended Technology and 19.11 for Innovated Technology (Table 8).

**Table 8. The average number of tubers during harvest on recommended technology and innovated technology in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, 2008**

| No | Technology | Average roots |
|---|---|---|
| 1. | Recommended (A) | 18.34 |
| 2. | Innovated (B) | 19.11 |

Source: primary data analysis of 2008

Table 6, 7 and 8 show that the treatment of Innovated Technology in general gives the best results in the appearances of wet weight per hectare, number of tubers and dried weight compared to the treatment of Recommended Technology.

This suggests that on the Innovated Technology treatment, the availability of nutrients in the planting media is able to meet the needs of plants in forming tuber crops. More and more tubers are formed, will further increase the weight of wet and dry weight (Samaullah, 1984).

**c. Pests Diseases**

In this research IPM practices in the form of the introduction of pro-biotic as an agential trigger of organic fertilizer manufacturing process was conducted. Definite matured organic fertilizer will prevent attacks from pests and diseases.

The result of the observations on field did not find any rotted stem root and rotted corms disease. Uret pests which were commonly found brought with manure were not existed because of the possibility of its egg stage or even its young stadia larvae was killed while in the process of organic fertilizer manufacturing. The number of plants attacked by grayak caterpillar pests can be seen in Table 9.

**Table 9. The average number of plants attacked by Grayak caterpillar (Spodophtera exigua)'s at day 25th and at day 45th of Innovated Technology and Recommended Technology treatment in Gupit Orchard, Karangsewu Village, Galur District, Kulon Progo Regency, 2008**

| No | Technology | Number of Plants/farmer | Number of attacked plants | |
|---|---|---|---|---|
| | | | At day 25th | At day 45th |
| 1. | Recommended (A) | 349,77 | 4,16 | 16,43 |
| 2. | Innovated (B) | 312,33 | 11,05 | 34,58 |

Source: primary data analysis of 2008

Table 9 shows that groups of farmer implementing activities of the treatment of Recommended Technology have more plants number than the treatment group of farmers implementing Innovated Technology, which is 349.77 plants/farmer (Recommended), higher than 312.38 plants/farmer (Innovated).

Grayak caterpillars (Spodophtera exigua)'s attacks shallots crop, showed that 11.05 plants attacked (at day 25 $^{th}$) and 34.50 plants attacked (at day 45$^{th}$) is on the group of Innovated Technology. Of course, for the Recommended Technology treatment, lower attacks, which were 4.16 plants attacked (at day 25$^{th}$) and 16.43 plants attacked (at day 45$^{th}$).

## CONCLUSION

1. Shallots using the Recommended Technology treatment (A) have a tendency to have
2. better turgor (96.79%) than Innovated Technology (B) (95.90%).
3. The Recommended Technology (A) resulted higher plant than the Innovated Technology (B) which was 19.89 cm at day 25$^{th}$ and 40.58 cm at day 45$^{th}$.
4. Although the number of shallots in Recommended Technology (A) was much more (349.77 plants per farmer) but it has produced a slightly lower than Innovated Technology (B), which was 23.11 tons/ha (wet weight) and 13.71 tons/ha (dried weight).
5. The high production on Innovated Technology treatment (B) partly due to the large number of bulb's diameter and the number of seedlings produced.
6. The highest grayak caterpillar's attacks, suffered by the plant that used Innovated Technology (B), which was 11.05 plants were attacked at day 25$^{th}$ and 34.58 plants were attacked at day 45$^{th}$.

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