Ann PUBLISHER
Journal of Agricultural Sciences (Agrosci)
e-ISSN : xxxx-xxxx
p-ISSN : xxxx-xxxx

Growth Response and Yield of Shallots (Allium Ascalonicum L.) on Giving Various Types of Mulch and NPK Fertilizer Doses

Winesih[1], **Wijaya**[2], **Suband Nur**[3]
[1-3]Universitas Swadaya Gunung Jati Cirebon, West Java, Indonesia

Abstract. This study aims to determine the type of mulch and dose of NPK fertilizer that can increase the growth and yield of shallots (Allium ascalonicum L.). The research was conducted in Cibogo Village, Cirebon Regency, West Java. The location is located at an altitude of 30 meters above sea level (m asl), the rain type belongs to type C (slightly wet). The research was conducted from April to June 2021. This study was prepared based on Group Randomized Design (RAK) with 2 treatment factors and 3 repeats. The first factor is the type of mulch and the second factor is the application of NPK fertilizer. The results showed that the combination of rice straw mulch treatment with NPK fertilizer 300 kg / ha had a significant effect on growth components, namely plant height 28 HST, number of leaves aged 42 HST, and a real effect on yield components, namely tuber diameter, fresh weight of tubers per clump and per plot, dry weight of tubers per clump and per plot. The results also showed that the combination of rice straw mulch treatment with NPK doses of 300 kg/ha and 400 kg/ha gave a good average dry weight of tubers per hectare, namely 8.4 tons/ha and 7.9 tons/ha, respectively.

Keywords: Shallot, Mulch Type, NPK Fertilizer

INTRODUCTION

Shallots (Allium ascalonicum L.) are one of the plants included as a spiced vegetable used to complement spices to add flavor and enjoyment to cooking. Likewise, this plant is as efficacious as traditional medicine, such as fever medicine, colds, diabetes mellitus, large intestine, and insect bites (Samadi & Cahyono, 2005). The quality of tubers is one of the consumer references in choosing shallots and is determined by several criteria, such as color, flavor density, aroma, and shape (Jasmi et al., 2013).

The need for the onion market will continue to increase from time to time as the population and purchasing power increase. National onion productivity in 2015-2019 fluctuated. One of the triggers of low productivity of onion plants is a relatively high relative temperature, resulting in high evaporation. One of the triggers of low onion productivity is a high temperature enough to

cause high evaporation. This makes the developed land lose water, so it becomes dry, while onion plants need quite a lot of water for bulb formation.

Therefore, efforts should be made to reduce the rate of evaporation. One material that can reduce evaporation is by applying mulch and natural ingredients. Mulching is a method to avoid water loss through evaporation, suppress weed growth, and improve soil air management (Mayun, 2007). Mulch is a kind of artificial ground cover widely used for plant cultivation activities; it is expected to keep water loss from the soil so that water loss can be reduced by maintaining soil temperature and moisture. Mulch is an effort to inhibit the development of weeds, create suitable conditions for plants, and modify water balance, temperature, and soil moisture so plants can develop and grow well (Mulyatri, 2003 in Damaiyanti et al., 2013).

Research conducted by Maharaja et al. (2015) shows that mulching can increase the growth and yield of shallots. The results also showed that mulching rice straw gave the highest yield on crop length and wet weight per plot. In addition to the use of mulch, the use of fertilizer also affects the production of shallots. Fertilization is one of the agricultural intensification efforts aimed at increasing the supply of nutrients plants need to increase the production and quality of shallots. According to Sumarni and Hidayat (2005), optimal nutrient management through fertilization can increase productivity, yield quality, and preserve soil. Onion plants need macro essential nutrients in sufficient and balanced quantities to achieve the goal of nutrient management.

According to Lakitan (1996), giving the correct dose will increase plant growth and then increase plant metabolism so that the formation of protein, starch, and carbohydrates is not inhibited. This results in increased growth and yield. The results of Manurung and Laoly's (2020) research show that the application of NPK fertilizer has a significant effect on plant height, tuber diameter, tuber wet weight per plant, tuber wet weight per plot, tuber dry weight per plant, and tuber dry weight per plot. Based on this description, it is necessary to research the use of various mulch and fertilizer doses on the growth and yield of onion plants.

METHOD

This research was conducted in Cibogo Village, Waled District, Cirebon Regency. The location is at an altitude of 30 meters above sea level (m asl). The period of this study is April to June 2021. The materials used are onion seeds of Bima Brebes cultivar, rice straw mulch, black silver plastic mulch, NPK Mutiara 16:16:16 fertilizer as a treatment, petrogenic fertilizer, soil tester, insecticide made from Chlorfenapyr and fungicide with active ingredient Mankozeb. The

tools used are hoes, tugal, nameplates, plot labels, sprayers, scales, calipers, drills, water pumps, raffia ropes, meters, water hoses, cameras, and other tools that support research.

The research method used was an experimental method with Group Random Design (RAK); the treatment tested consisted of nine combinations of types of mulch and NPK fertilizer doses, namely A (without mulch, NPK fertilizer 200 kg/ha), B (without mulch, NPK fertilizer 300 kg/ha), C (without mulch, NPK fertilizer 400 kg/ha), D (straw mulch, NPK fertilizer 200 kg/ha),

E (straw mulch, NPK fertilizer 300 kg/ha), F (straw mulch, NPK fertilizer 400 kg/ha), G (silver black plastic mulch, NPK fertilizer 200 kg/ha), H (silver black plastic mulch, NPK fertilizer 300 kg/ha), and I (silver black plastic mulch, NPK fertilizer 400 kg/ha silver black plastic mulch, NPK fertilizer 300 kg/ha). Each treatment of the nine treatment combinations was repeated thrice so that the number of plots in the study was 27 maps.

DISCUSSION

Plant Height

The results of statistical analysis showed that there was a noticeable effect on the combination of mulch and NPK fertilizer on plant height at the age of 28 HST, but there was no real effect on the age of 35 and 42 HST. The results of statistical analysis can be seen in more detail in Table 1.

Table 1. The Effect of Different Types of Mulch and NPK Fertilizer Doses on Plant Height (cm) Age 28, 35, and 42 HST

Num	Treatment	Average Plant Height (cm)		
		28 HST	35 HST	42 HST
1	A (without mulch, fertilizer NPK 200 kg/ha)	27,57 a	30,03 a	32,13 a
2	B (without mulch, fertilizer NPK 300 kg/ha)	28,50 b	31,23 a	34,03 a
3	C (without mulch, fertilizer NPK 400 kg/ha)	27,70 a	30,93 a	33,17 a
4	D (straw mulch, fertilizer NPK 200 kg/ha)	28,93 b	31,83 a	34,03 a
5	E (straw mulch, fertilizer NPK 300 kg/ha)	30,90 c	33,07 a	34,53 a
6	F (straw mulch, fertilizer NPK 400 kg/ha)	28,80 b	31,47 a	33,20 a
7	G (MPHP, NPK 200 kg/ha)	29,00 b	30,87 a	32,57 a
8	H (MPHP, NPK 300 kg/ha)	30,03 c	31,90 a	33,93 a
9	I (MPHP, NPK 400 kg/ha)	29,27 b	31,13 a	32,57 a

Table 1 shows that the average height of plants that gave good results at the age of 28 HST was found in the combination of straw mulch treatment and NPK fertilizer dose of 300 kg/ha (E), which was 30.90 cm followed by a combination of black silver plastic mulch with NPK fertilizer 300 kg/ha (H) with an average value of 30.03 cm. The combination of low treatment was in treatment A and C, with an average of 27.57 and 27.70 cm, respectively. Observation of plant height aged 28 HST shows that the combination treatment of mulch (rice straw and black silver plastic mulch) with NPK fertilizer dose of 300 kg/ha has a high average value when compared to the combination of treatment A and C. This is because rice straw mulch and black silver plastic mulch can retain water from evaporation for plant purposes. According to Barus (2006), mulching is a way to improve soil air conditioning and water availability for plants. In addition, mulching can accelerate the growth of newly planted plants.

NPK fertilizer 300 kg/ha can provide good results on the height of onion plants aged 28 HST. According to Syarif (2005), sufficient nutrients can spur plant height, stimulate root system growth, increase yield, and increase leaf growth, to increase the process of photosynthesis. The nitrogen supply dramatically influences the vegetative growth of plants; plants that absorb enough nitrogen will have good vegetative growth. Observations of the average height of plants aged 35 and 42 HST did not have a noticeable effect. This is caused by the attack of dieback disease on onion plants. Symptoms of dieback disease begin to appear in shallots at the age of 25 HST. The attack of dieback causes inhibition of the growth of onion plant height so that in subsequent observations, the treatment given does not have a noticeable effect.

Number of Leaves per Clump

The results of statistical analysis showed that there was a significant effect on the combination of mulch treatment and NPK fertilizer on the number of leaves aged 42 HST, but there was no real effect on the age of 28 and 35 HST. The full results of statistical analysis are presented in Table 2.

Table 2. The Effect of Different Types of Mulch and NPK Fertilizer Doses on the Number of Leaves (strand) Age 28, 35, and 42 HST

No.	Treatment	Average Number of Leaves per Clump		
		28 HST	35 HST	42 HST
1	A (without mulch, fertilizer NPK 200 kg/ha)	24,33 a	25,13 a	25,47 a
2	B (without mulch, fertilizer NPK 300 kg/ha)	22,50 a	24,50 a	25,80 a

3	C (without mulch, fertilizer NPK 400 kg/ha)	24,47 a	25,80 a	29,33 b
4	D (straw mulch, fertilizer NPK 200 kg/ha)	22,90 a	27,67 a	31,63 b
5	E (straw mulch, fertilizer NPK 300 kg/ha)	24,73 a	29,10 a	34,50 c
6	F (straw mulch, fertilizer NPK 400 kg/ha)	23,30 a	25,33 a	30,00 b
7	G (MPHP, NPK 200 kg/ha)	25,20 a	26,17 a	28,43 b
8	H (MPHP, NPK 300 kg/ha)	27,33 a	28,30 a	30,60 b
9	I (MPHP, NPK 400 kg/ha)	26,23 a	27,70 a	30,50 b

The combination of mulch and NPK fertilizer treatment on the observation of the number of leaves aged 28 and 35 HST did not have a noticeable effect; this was due to the intensity of leafworm pest attacks that continued to increase when plants aged 12 HST to 28HST. The pest attacks the leaves by eating plant leaves until the leaves wither. The highest average number of leaves at the age of 42 HST was found in the combination of straw mulch treatment and NPK fertilizer dose of 300 kg/ha (E), which was 34.50 strands significantly different from other treatments, the combination of low treatment in A and B treatments which were 25.47 and 25.80 strands respectively. This is because rice straw mulch can modify environmental factors related to plant physiological activity, such as moisture and soil temperature, that are optimal for plant growth. This is in line with Gustanti et al. (2014), who state that rice straw mulch is a nest that can maintain soil temperature and moisture and minimize evaporation.

In addition to rice straw mulch, the combination treatment of black silver plastic mulch and NPK fertilizer significantly differs from the treatment without mulch except for treatment C. This is because black silver plastic mulch can keep the soil warm so that the growth and development of the root system becomes more optimal, and the process of decomposition of nutrients by microorganisms also improves. This situation encourages onion plants to form a better root system to absorb nutrients and water more optimally. That plants can carry out the photosynthesis process optimally.

In addition to mulching, applying NPK fertilizer of 300 kg/ha gave the highest average leaf count yield in onion plants aged 42 HST. It is suspected that in the combination of treatment E, plants can absorb nutrients well. Shallots need element N for leaf development and growth because leaves are the main product of plants. The function of Nitrogen for plants is to help the growth of leaves so that plant leaves become broader and greener and improve the quality of plants producing leaves (Sutedjo, 2008).

Number of Tubers per Clump

The results of statistical analysis showed that the combination of treatment of various types of mulch with the dose of NPK fertilizer had no real effect on the number of onion bulbs per clump. The results of statistical analysis can be seen in more detail in Table 3.

Table 3. The Effect of Different Types of Mulch and NPK Fertilizer Dosage on the Number of Tubers per Clump

No.	Treatment	Average Number of
1	A (without mulch, fertilizer NPK 200	6,03 a
2	B (without mulch, fertilizer NPK 300	6,63 a
3	C (tanpa mulsa, pupuk NPK 400 kg/ha)	7,33 a
4	D (straw mulch, fertilizer NPK 200 kg/ha)	7,10 a
5	E (straw mulch, fertilizer NPK 300 kg/ha)	8,10 a
6	F (straw mulch, fertilizer NPK 400 kg/ha)	6,73 a
7	G (MPHP, NPK 200 kg/ha)	7,40 a
8	H (MPHP, NPK 300 kg/ha)	7,23 a
9	I (MPHP, NPK 400 kg/ha)	7,90 a

Remarks: The average number accompanied by the same letter in the same column indicates an intangible difference according to the Scott Knott Cluster Test at 5%

Table 3 shows that the combination of treatment of various types of mulch with NPK fertilizer has no real difference in the number of onion bulbs. This is due to environmental and climatic factors that affect the resulting tubers. At the time of the experiment, there was too high rainfall that increased the attack of important pests and diseases on shallots, and during harvesting, there were rotten bulbs; shallots are plants that require enough sunlight to optimize the results of photosynthesis during the vegetative growth of more optimal plants (Anisuzzaman et al., 2009). In addition to environmental factors, onion genetic factors also affect the number of bulbs produced. Tubers come from shoots that emerge from existing seedling bulbs. The more buds that emerge from the bulbs at the beginning of planting, the more likely the number of tubers produced. In line with Gunawan's opinion (2010), the number of bulbs of onion plants is determined by the ability of the main bulb and bulb.

Tuber diameter

The results of statistical analysis show that the combination of side mulch type treatment in forming new bulbs and new bulbs produced by onion plants is influenced by the number of lateral shoots that grow because, from these lateral shoots, new leaves will be formed, which will later form bulbs. According to Rukmana (2003), in onion bulbs, there are many lateral shoots (2-20), and from these shoots, new bulbs are formed and will grow into saplings. The greater the number of saplings, the greater the number of tubers produced. The tubers formed are the result of bulging the base of the leaves, so the number of tubers formed is not different from the number of leaves produced. According to Samadi and Cahyono (2005), onion bulbs form from layers of leaves, which then develop into onion bulbs. NPK fertilizer on onion plants has a noticeable effect on the diameter of the bulbs. The full results of the statistical analysis are presented in Table 4.

Table 4. The Effect of Different Types of Mulch and NPK Fertilizer Doses on Tuber Diameter

No.	Treatment	Average Diameter of Tubers (mm)
1	A (without mulch, fertilizer NPK 200 kg/ha)	19,72 a
2	B (without mulch, fertilizer NPK 300 kg/ha)	22,16 b
3	C (without mulch, fertilizer NPK 400 kg/ha)	22,38 b
4	D (straw mulch, fertilizer NPK 200 kg/ha)	24,58 c
5	E (straw mulch, fertilizer NPK 300 kg/ha)	26,87 c
6	F (straw mulch, fertilizer NPK 400 kg/ha)	24,40 c
7	G (MPHP, NPK 200 kg/ha)	23,66 c
8	H (MPHP, NPK 300 kg/ha)	22,99 b
9	I (MPHP, NPK 400 kg/ha)	21,83 b

Remarks : The average number accompanied by the same letter in the same column indicates an intangible difference according to the Scott Knott Cluster Test at 5%

Table 4 shows that the combination of D, E, F, and G treatments differs markedly from non-mulch treatments with NPK fertilizer 200 kg/ha (A). It is suspected that the use of rice straw mulch can provide optimal soil moisture for microbial activity so that organic matter decomposed by microbial activity can be directly utilized by plants (Wisudawati, 2016). In addition to rice straw mulch, black silver plastic mulch also produces a higher tuber diameter than without mulch with a combination of NPK fertilizer 200 kg/ha. This is because black silver plastic mulch can

withstand the evaporation of water in the soil; such conditions encourage onion plants with fibrous roots to form a more optimal root system to increase plant growth and development.

Proper dosing of NPK fertilizer can provide a suitable diameter of tubers. The larger the onion bulb, identifying the food reserves contained in the bulb, the heavier the onion plant bulb is. Weight gain is influenced by cell elongation followed by cell enlargement. According to Mukhlis (2011), the large number of leaves formed means the leaf area becomes more extensive. The ability of the leaves to receive light for the photosynthesis process becomes greater in producing carbohydrates. It will be translocated to the tuber, thus affecting the size and weight of the tuber. Adequate K feeding will help the absorption of N and P nutrients; thus, high production can be achieved.

Fresh Weight of Tubers per Clump and Fresh Weight of Tubers per Plot

The results of statistical analysis showed that the combination of rice straw mulch treatment with NPK fertilizer on onion plants had a significant effect on the fresh weight of tubers per clump and per plot. The results of statistical analysis can be seen in Table 5.

Table 5. The Effect of Different Types of Mulch and NPK Fertilizer Doses on Fresh Weight of Tubers per Clump (g) and per Plot (kg)

No.	Treatment	Average Fresh Weight of Tubers	
		Per clump	Per tile (kg)
1	A (without mulch, fertilizer NPK 200 kg/ha)	17,97 a	1,50 a
2	B (without mulch, fertilizer NPK 300 kg/ha)	19,30 a	1,60 a
3	C (without mulch, fertilizer NPK 400 kg/ha)	21,83 a	1,83 a
4	D (straw mulch, fertilizer NPK 200 kg/ha)	24,83 b	2,10 b
5	E (straw mulch, fertilizer NPK 300 kg/ha)	29,07 b	2,43 b
6	F (straw mulch, fertilizer NPK 400 kg/ha)	26,90 b	2,30 b
7	G (MPHP, NPK 200 kg/ha)	23,07 a	1,97 b
8	H (MPHP, NPK 300 kg/ha)	23,63 a	2,00 b
9	I (MPHP, NPK 400 kg/ha)	20,77 a	1,73 a

Description: The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Test on a real level 5%

The statistical analysis results in Table 5 show that the average D, E, and F treatments significantly differ from other treatments on the fresh weight of tubers per clump. Mulching rice straw results in onion bulbs that grow shallowly on the soil surface to be protected from weather influences because soil moisture conditions can be constant. Constant soil moisture conditions are needed in bulb formation to increase the fresh weight of onion bulbs (Crockett, 1972 in Silvani, 2016).

The combination of D, E, and F treatments resulted in a high average fresh weight of tubers compared to other treatments. Giving the correct dose of fertilizer will increase plant growth so that plant metabolism increases, which results in protein formation; carbohydrates are not hampered so that plant growth becomes optimal (Lakitan, 1996). The use of rice straw mulch and black silver plastic mulch with NPK fertilizer can provide a high average yield of fresh weight of tubers per plot except in the combination of treatment I compared to treatment without mulch or in a combination of treatments A, B, and C. This is because black silver plastic mulch can cover part or all of the soil surface and affect the microenvironment of the covered soil (Sembiring, 2013).

In line with Zulfahmi's (2014) opinion that mulching innovation can prevent evaporation, the water that evaporates to the ground surface will be held back by the mulch material and fall back to the ground. As a result, the planted land does not lack water because the evaporation of water into the air only occurs through the process of transpiration. Treatments A, B, C, and I produce a low average fresh weight of tubers per plot. This is because, in this treatment, more weeds grow around the plant, which causes nutrient competition, causing losses for onion plants.

Dry Weight of Tubers per Clump and Dry Weight of Tubers per Plot

The results of statistical analysis showed that the combination of mulch-type treatment with NPK fertilizer on onion plants had a significant effect on the weight of dry tubers per clump and per plot. The results of statistical analysis can be seen in Table 6.

Table 6. The Effect of Different Types of Mulch and NPK Fertilizer Doses on Dry Weight of Tubers per Clump (g) and per Plot (kg)

No	Treatment	Average Dry Weight of Tubers	
		Per clump	Per Friday (kg)
1	A (without mulch, fertilizer NPK 200 kg/ha)	14,50 a	1,27 a
2	B (without mulch, fertilizer NPK 300 kg/ha)	15,57 a	1,33 a
3	C (without mulch, fertilizer NPK 400 kg/ha)	17,73 a	1,53 a
4	D (straw mulch, fertilizer NPK 200 kg/ha)	20,97 b	1,87 b

5	E (straw mulch, fertilizer NPK 300 kg/ha)	25,43 c	2,27 c
6	F (straw mulch, fertilizer NPK 400 kg/ha)	24,00 c	2,13 c
7	G (MPHP, NPK 200 kg/ha)	20,03 b	1,73 a
8	H (MPHP, NPK 300 kg/ha)	19,77 b	1,73 a
9	I (MPHP, NPK 400 kg/ha)	16,90 a	1,43 a

Description: The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Test on a real level 5%.

The results of statistical tests on the observation parameters of dry weight of tubers per clump and dry weight of tubers per plot showed that the combination of treatments E and F was significantly different from other treatment combinations with an average dry weight of tubers per clump of 25.43 and 24.00 g, respectively. The average dry weight of tubers per plot in treatment E is 2.27 kg or equivalent to 8.4 tons/ha, and the combination of treatment F is 2.13 kg or equivalent to 7.9 tons/ha. Rice straw mulch can suppress weed growth so that the nutrients of onion plants can be adequately absorbed, and onion plants produce a high average dry weight of bulbs. This is the opinion of Umboh (2002), who states that the function of straw mulch is to suppress weed growth, maintain soil aggregates from rainwater blows, minimize soil surface erosion, prevent water evaporation, and protect the soil from sun exposure.

In addition to rice straw mulch, using silver hot plastic mulch in combination with G and H treatments resulted in a markedly different average dry weight of tubers per clump with non-mulch treatment. This is because black silver plastic mulch can create microclimate conditions to be more by the needs of shallots, including conditions in darker root areas, moisture balance with soil temperature, so that plants are in a more suitable environment and make it easier for plants to utilize nutrients in the soil and their development is relatively undisturbed. This is supported by the opinion of Moenandir (1993), who states that black silver mulch provides darker conditions for the medium, thus providing better plant root growth. The silver color on the outside reflects sunlight so that it is more accepted by plants, which increases the efficiency of photosynthesis, which plays a role in the growth of onion plants.

The application of NPK fertilizer in the combination of E and F treatments significantly affects the average dry weight of tubers per clump and plot. NPK fertilizer can increase cell wall permeability, which will enhance the application of chlorophyll-forming nutrients needed for photosynthesis. Photosynthesis and the dry weight of tubers, leaves, and roots also increase (Irma et al., 2018). Potassium (K) has a vital role as an activator of several enzymes in plant metabolism, including potassium, which plays a role in the synthesis of proteins and

carbohydrates and increases the translocation of transport photosynthates to all parts of the plant. Nutrients that have been absorbed by the roots, especially Fospor (P) nutrients, contribute to the weight gain of plant tubers (Hardjowigeno, 1995).

The large number of leaves formed means the leaf area becomes more expansive. Then, the ability of the leaves to receive light for the photosynthesis process becomes greater in producing carbohydrates and will be translocated to the tuber so that it affects the size and weight of the tuber. The results of research (He et al., 2004) show that phosphorus is one of the essential nutrients plants need for optimal growth and yield. P nutrient deficiency can reduce root and leaf growth and development, tuber size and yield, and slow maturity. Shrinkage of Tuber Weight per Plot (%). The results of the variety analysis showed that the combination of mulch-type treatment and NPK fertilizer did not have a noticeable effect on the average shrinkage of tuber weight per plot. More detailed analysis results can be seen in Table 7.

Table 7. The Effect of Different Types of Mulch and NPK Fertilizer Doses on Shrinkage of Tuber Weight per Plot (%)

		Average Weight Loss
1	A (without mulch, fertilizer NPK 200	17,78 a
2	B (without mulch, fertilizer NPK 300	18,80 a
3	C (without mulch, fertilizer NPK 400	18,18 a
4	D (straw mulch, fertilizer NPK 200 kg/ha)	12,62 a
5	E (straw mulch, fertilizer NPK 300 kg/ha)	12,39 a
6	F (straw mulch, fertilizer NPK 400 kg/ha)	13,06 a
7	G (MPHP, NPK 200 kg/ha)	15,70 a
8	H (MPHP, NPK 300 kg/ha)	15,10 a
9	I (MPHP, NPK 400 kg/ha)	19,48 a

Description: The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Test at a real level 5%.

The statistical analysis results in Table 7 showed that the average shrinkage of tuber weights per plot did not give markedly different results in all observed treatments. The percentage of shrinkage value of tubers during grinding is a quality parameter that reflects the level of freshness of tubers. The higher the percentage of shrinkage of tubers, the less the level of freshness. According to Wibowo (2009), the shrinkage of onion bulbs after storage is 5-30%.

Shallots with a low depreciation value have a longer shelf life and are not easily rotten and germinate during storage.

The shrinkage is also due to the drying process of onion bulb respiration. During respiration, an enzymatic process causes the overhaul of complex compounds to form energy, with the final result being water and carbon dioxide released into the air, which causes a decrease in onion weight. Rachmawati et al. (2009) stated that the increase in storage temperature causes the transpiration process to increase so that the evaporation that occurs is quite significant, which results in an increased rate of water loss.

CONCLUSION

Based on the results of research on the response of onion plants (Allium ascalonicum L.) to the application of various types of mulch and doses of NPK fertilizer, conclusions were obtained:

1. The combination of mulch treatment and NPK fertilizer significantly affects the growth component: plant height at 28 HST and number of leaves aged at 42 HST. It has a natural effect on the yield component, namely tuber diameter, fresh weight of tubers per clump and per plot, and dry weight of tubers per clump.
2. The combination of rice straw mulch treatment with NPK fertilizer 300 kg/ha and the combination of rice straw mulch treatment with NPK fertilizer 400 kg/ha has a good effect on the dry weight of tubers per plot, namely with yields of 2.27 kg and 2.13 kg respectively or equivalent to 8.4 tons/ha and 7.9 tons/ha.

BIBLIOGRAPHY

Anisuzzaman, M., M. Ashrafuzzaman, M.R. Ismail, M. K. Uddin, dan M.A. 2009. Planting time and mulching effect on onion development and seed production. Afr.J. Biotehnol. 8(3):412-416.

Barus, W. A. 2006. Pertumbuhan dan produksi cabai (Capsicum annum L.) dengan penggunaan mulsa dan pemupukan PK. J.Penelitian Bidang Ilmu Pertanian 4(1):41-44.

Damaiyanti, D. R. R., Aini, N., Koesriharti, K. 2013. Kajian penggunaan mulsa organik pada pertumbuhan dan hasil tanaman cabai besar (Capsicum annum L.). Jurnal Produksi Tanaman, 1(2).

Gunawan, D. 2010. Budidaya Bawang Merah. Agritek. Jakarta. http://pustaka-deptan.go.id (Diakses pada tanggal 25 Januari 2021).

Gustanti, Y., Chairul, Z. Syam. 2014. Pemberian mulsa jerami padi (Oryza sativa) terhadap gulma dan produksi tanaman kacang kedelai (Glycine max (L.) Merr). J. Bio. UA. 3(1): 73-79.

Hardjowigeno S. 2003. Ilmu Tanah: Akademika Pressindo. Bogor.

He, ZT, Griffin, S, Honey Cutt, W. 2004. Evaluation of soil phosphorus transformation by sequential, fractionation and phosphorus hydrolysis, Soil Sci., vol. 169, pp 515-27.

Irma, I., Pasigai. M.A., & Mas'ud, H. 2018. Pertumbuhan dan hasil bawang merah (Allium ascalonicum L.) terhadap pemberian berbagai dosis pupuk NPK. e-J. Agrotekbis 6 (1) : 18 - 26

Jasmi, Sulistyaningsih, E, dan Indradewa. 2013. Pengaruh vernalisasi umbi terhadap pertumbuhan, hasil, dan pembungaan bawang merah (Allium cepa L. aggregatum Group) di dataran rendah. Jurnal Ilmu Pertanian Vol. 16 No.1. Hlm. 42-57.

Lakitan, B. 1996. Fisiologi Pertumbuhan dan Perkembangan Tanaman. Raja Grafindo Persada. Jakarta

Maharaja, P.D., Simanungkalit, T., & Ginting, J. 2015. Respons pertumbuhan dan produksi bawang merah (Allium ascalonicum L.) terhadap dosis pupuk npkmg dan jenis mulsa. Jurnal Agroekoteknologi Universitas Sumatera Utara, 4(1), 107336

Manurung, A. I., & Laoly, M. 2020. Respon pertumbuhan dan produksi bawang merah (Allium ascalonicum L.) varietas Tuktukakibat pemberian kascing dan NPK. Jurnal AGROTEKDA, 2.2 : 1-12

Mayun, I. A. 2007. Efek mulsa jerami padi dan pupuk kandang sapi terhadap pertumbuhan dan hasil bawang merah di daerah pesisir. AGRITROP, 26(1): 33–40

Moenandir J. 1993. Persaingan Tanaman Budidaya dengan Gulma. Raja Grafindo Persada, Jakarta

Mukhlis, P., dan Anggorowati D. 2011. Pengaruh berbagai jenis Mikroorganisme Lokal (MOL) terhadap pertumbuhan dan hasil bawang merah pada tanah aluvial. Jurnal Sains Mahasiswa Pertanian, 1(1).

Rachmawati, R., Defiani, M., & Suriani, N. L. 2009. Pengaruh suhu dan lama penyimpanan terhadap kandungan vitamin C pada cabai rawit putih (Capsicum frutescens). Jurnal Biologi, 13, 36-40

Rukmana, R. 2003. Bawang Merah Budidaya dan Pengolahan Pasca Panen. Kanisius. Jakarta.

Samadi, B. dan B. Cahyono. 2005. Intensifikasi Budidaya Bawang Merah. Kanisius. Yogyakarta

Sembiring, A. P. 2013. Pemanfaatan Mulsa Plastik Hitam Perak (MPHP) dalam Budidaya Cabai (Capsicum annum L).http://www.scribd. com /doc/000378-/Pemanfaatan-Mulsa- Plastik-Hitam-Perak-MPHP- Dalam-Budidaya Cabai-Capsicum-annum-L. Diakses pada tanggal 17 Desember 2021

Silvani, S., Yusuf, R., & Syakur, A. 2016. Pengaruh kombinasi pupuk anorganik, organik dan mulsa jerami padi terhadap pertumbuhan dan hasil "Bawang Merah Varietas Lembah Palu" di Desa Oloboju Kecamtan Sigi Biromaru Kabupaten Sigi. e-J. Agrotekbis 4 (5) : 537-543

Sumarni, N. & Hidayat, A. 2005. Budidaya Bawang Merah. Balai Penelitian Tanaman Sayuran. Bandung

Sutedjo, M. 2008. Pupuk dan Cara Pemupukan. Rineka Cipta. Jakarta.

Umboh, A. Harits. 2002. Petunjuk Penggunaan Mulsa. Penebar Swadaya. Jakarta.

Wisudawati, D., Anshar, M., L. Iskandar. 2016. Pengaruh jenis mulsa terhadap pertumbuhan dan hasil bawang merah (Allium ascalonicum Var. Lembah Palu) yang Diberi Sungkup. e-J. Agrotekbis 4 (2) : 126-133

Zulfami, M. 2014. Mulsa. http://kickfahmi./2013/12/mulsa.html. Diakses pada tanggal 26 Desember 2021