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The Interaction Effect of Single NPK Fertilizer with Compound NPK Fertilizer on Growth and Yield of Shallot Plants (*Allium ascalonicum* L.)

Pengaruh Interaksi Pupuk NPK Tunggal dengan Pupuk NPK Majemuk terhadap Pertumbuhan dan Hasil Tanaman Bawang Merah *(Allium ascalonicum* L.)

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ABSTRAK

Keberhasilan usahatani bawang merah dipengaruhi oleh tersedianya benih varietas unggul yang berkualitas disertai pemupukan yang berimbang. Pupuk NPK penting untuk pertumbuhan dan perkembangan tanaman serta hasil umbi bawang merah. Percobaan dilaksanakan pada bulan Agustus sampai Oktober 2019 di lahan kering Kebun Percobaan Karangploso, Balai Pengkajian Teknologi Pertanian (BPTP) Jawa Timur (Kabupaten Malang) pada musim kemarau. Penelitian ini bertujuan untuk mengetahui interaksi dari pemberian berbagai dosis pupuk NPK tunggal Urea, ZA, SP-36 dan KCl serta pupuk NPK majemuk terhadap pertumbuhan dan hasil bawang merah. Rancangan percobaan menggunakan rancangan acak kelompok (RAK) yang disusun secara faktorial (8x3). Faktor pertama adalah paket pemupukan NPK tunggal yang terdiri dari dua taraf yaitu: P1= 150 kg ha^{-1} Urea + 300 kg ha^{-1} ZA + 150 kg ha^{-1} SP-36 + 150 kg ha^{-1} KCl; dan P2= 200 kg ha^{-1} Urea + 500 kg ha^{-1} ZA + 200 kg ha^{-1} SP-36 + 200 kg ha^{-1} KCl. Faktor kedua adalah pupuk NPK majemuk yang terdiri dari empat taraf, yaitu: N0= tanpa pupuk NPK majemuk; N1= 100 kg ha^{-1}; N2= 200 kg ha^{-1}; dan N3= 300 kg ha^{-1}. Hasil penelitian menunjukkan bahwa perlakuan pupuk NPK dosis tunggal dan pupuk NPK majemuk tidak memberikan interaksi yang nyata sehingga kedua faktor tersebut saling bebas.

Kata Kunci: Pupuk Anorganik, Produksi, Bawang Merah

ABSTRACT

The success of shallot farming is influenced by the availability of high-quality seeds of superior varieties, accompanied by balanced fertilization. NPK fertilizer is important for the growth and development of plants and the yield of shallot bulbs. The experiment was carried out from August to October 2019 in dry land Karangploso Experimental Garden, Assessment Institute of Agriculture Technology (AIAT) of East Java (Malang Regency) during the dry season. This study aims to determine the influence interaction from applying various doses of single NPK fertilizer Urea, ZA, SP-36 and KCl and compound NPK fertilizer against growth and shallot yield. The experimental design used a randomized block design (RBD) arranged factorially (8x3). The first factor is the fertilization package single NPK which consists of two levels, namely: P1= 150 kg ha^{-1} Urea + 300 kg ha^{-1} ZA + 150 kg ha^{-1} SP-36 + 150 kg ha^{-1} KCl; and P2= 200 kg ha^{-1} Urea + 500 kg ha^{-1} ZA + 200 kg ha^{-1} SP-36 + 200 kg ha^{-1} KCl. The second factor was compound NPK fertilizer, which consisted of four levels: N0= without compound NPK fertilizer; N1= 100 kg ha^{-1}; N2= 200 kg ha^{-1}; and N3= 300 kg ha^{-1}. The study's results showed that the treatment of single doses of NPK fertilizer and compound NPK fertilizers did not provide a significant interaction, so these two factors were independent.

Keywords: Anorganic Fertilizer, Production, Shallots

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INTRODUCTION

Shallot (*Allium ascalonicum* L.) is one of the leading lowland vegetable commodities with high economic value and has market opportunities to be developed as an agribusiness venture with promising prospects. The latest BPS data update for East Java Province (2020) shows of that shallot production in Malang Regency is 507.610 quintals with a harvested area of 4.755 hectares, while production of shallots in East Java Province is 454.584 tons. Malang Regency is the third-largest producer of shallots after Nganjuk and Probolinggo Regencies (BPS East Java Province, 2020). The success of shallot farming is not only influenced by the availability of superior quality seed varieties but also by balanced fertilization. Fertilization in a balanced manner with location-specific recommended doses will increase productivity and yield quality (Directorate General of Agriculture, 2005). The success of shallot production on land with low levels of nutrient availability is determined by several factors; apart from using varieties that are suitable for the local environment, have good adaptability and can provide high yield potential, fertilizer input must also be considered (Sumarni and Ahmad, 2005). One of the efforts to increase the nutrient content and soil fertility to increase shallot productivity is by fertilizing.

In increasing plant productivity, the role of fertilizer is very important, especially the macronutrients N, P, and K, which are needed by plants in large quantities (Fi'liyah et al., 2016). NPK fertilizer is important for the growth and development of plants and the yield of shallot bulbs. Shallot plants need each of these nutrients for vegetative and generative growth. Nutrient N is a building material for amino acids, enzymes, nucleic acids, nucleoproteins, and alkaloids. A deficiency of N nutrients will limit cell division and enlargement (Sumiati and Gunawan, 2007). Meanwhile, nutrient K acts as an activator of 46 enzymes and plays a role in photosynthesis, increasing LAI (leaf area index) and growth and photosynthate translocation from source to recipient. It is also useful in forming sugar and starch (Sumarni et al., 2012).

Giving N and K fertilizers in high doses contains sufficient nutrients is an effort to increase the wet bulb weight (Napitupulu and Winarto, 2010). If there is an excess of N nutrient, it will cause excessive vegetative growth and produce few bulbs, and plants will easily fall over (Firmansyah and Sumarni, 2013), while excess K nutrient causes plants to lack Mg and Ca nutrients, and the bulbs do not last long (Sumarni et al., 2012). Potassium is an essential nutrient that shallot plants need after the nitrogen element is added to plant metabolic processes (Uke et al., 2015). Potassium is needed more than other elements in root crops (Woldetsadik, 2003; Sumiati and Gunawan, 2007) and plays a general role in bulb formation and increases photosynthetic activity and leaf chlorophyll content so that it can increase plant dry weight (Rahayu et al., 2016; Damanik et al., 2010). Napitupulu and Winarto (2009), added that potassium plays a role in increasing the vegetative growth of plants, such as the formation, enlargement and elongation of bulbs and has an effect on increasing the weight of shallots. Sumarni et al., (2012) stated that NPK fertilizer at 600 kg ha^{-1} had the best effect on shallot production. Fertilizer, the compound NPK used, was enriched with microelements in solid briquettes. This contains N 13%, P_2O_5 6%, K_2O 27%, MgO 4%, and BO_2 0.65%. However, the ratio of NPK elements contained in the Lintang Songo compound fertilizer is not sufficient for the growth of shallots, so this fertilizer is used as an additional fertilizer that can be used to reduce the use of single fertilizers. This study aims to test the effectiveness of Lintang Songo compound fertilizer to determine the effect of interaction between the administration of various doses of single NPK fertilizer and Lintang Songo compound NPK fertilizer on the growth and yield of shallots.

MATERIALS AND METHODS

The experiment was carried out from August to October 2019 in a dry land with an altitude of 543 m above sea level in Karangploso Experimental Garden, East Java Assessment Institute of Agriculture Technology (AIAT) of East Java (Malang Regency) during the dry season (DS II 2019). The red shallot seeds of the Batu Ijo variety used were quality bulbs obtained from plants harvested at 80 days after planting (DAP). They were fresh, healthy, and dense in appearance and stored for 2-4 months. The size of the shallot variety used is 3 – 4 cm in diameter. Preparation of shallot seeds before planting: First, cut the tip of the bulb about a quarter of the top of bulb. Extensive land 155 m^2 perfectly tilled land then made maps with size 1 m x 5 m, a total of 27 trial plots. The distance between the bunds was made with a distance of 0.40 m with a bund depth of 0.60 m and a bund height of 0.40 m. After the mounds of the trial plots were formed, they were sprinkled with manure at a dose of 5 tons ha^{-1}, and all doses of SP-36, according to treatment, were given as basic fertilizer. Shallot planting using the Batu Ijo variety of shallot seeds by immersing two-thirds of the bulb into the soil with a spacing of 20 cm x 15 cm. The plant population was 167 plants per experimental plot, and the number of plants observed was 16 plants per experimental plot.

Data Collection and Analysis

Parameters observed included plant height at 14, 28, 42 and 56 DAP, number of leaves per clump at 14, 28, 42 and 56 DAP, number of tillers per clump at 14, 28, 42 and 56 DAP, number of bulbs per clump, weight wet bulbs per clump, and dry bulb weight askip (ton ha^{-1}). Askip bulb weight is obtained from 25% of bulb weight per clump (grams) multiplied by the number of plant population (ha) then the result is converted into tons ha^{-1}, then from the conversion result the askip bulb

weight is multiplied by 20% for irrigation. The treatment design used factorial, which consists of two factors. The first factor was the fertilization package single NPK which consisted of two levels, namely P1= 150 kg ha^{-1} Urea + 300 kg ha^{-1} ZA + 150 kg ha^{-1} SP-36 + 150 kg ha^{-1} KCl; and P2= 200 kg ha^{-1} Urea + 500 kg ha^{-1} ZA + 200 kg ha^{-1} SP-36 + 200 kg ha^{-1} KCl. The second factor was Lintang Songo compound NPK fertilizer, which consisted of four levels: N0= without Lintang Songo compound NPK fertilizer; N1= 100 kg ha^{-1}; N2= 200 kg ha^{-1}; and N3= 300 kg ha^{-1}.The experimental design used a randomized block design (RBD) with three groups, which served as replicates. The data were analyzed using the ANOVA followed by the Least Significant Difference (LSD 5%). Table 1 presents the fertilizer application treatment and organic. Lintang Songo compound NPK fertilizer in briquettes was given a lot of giftie at the time plant 7 DAP. Lintang Songo compound NPK fertilizer is only given to P1N1, P1N2, P1N3, P2N1, P2N2, and P2N3 treatments. Basic fertilization with organic fertilizer 5 tons ha^{-1} and all doses of SP-36 in each treatment. At the age of 7 DAP given ½ dose of Urea + ½ dose of ZA + all doses of KCl + inorganic fertilizer Lintang Songo according to each treatment. then at the age of 25 DAP given ½ dose of Urea + ½ dose of ZA the rest according to each treatment.

RESULTS AND DISCUSSION

Plant Height

The results of variance analysis in Table 2 with a significance of α= 0.05 showed the main effect of single NPK fertilizer and Lintang Songo compound NPK fertilizer on shallot plant height at various ages of observation varied greatly. There was no interaction effect between single NPK fertilizer and Lintang Songo compound NPK fertilizer at all ages of observation. The effect of Lintang Songo compound NPK fertilizer was significant at 14 DAP but not significant at 28, 42, and 56 DAP. The effect of a single NPK fertilizer was significant at 28 DAP but not significant at 14, 42, and 56 DAP.

Table 1. Application treatment of inorganic fertilization dosage.

Treatment	Types and Dosage of Fertilizers				
	Urea (kg ha^{-1})	ZA (kg ha^{-1})	SP-36 (kg ha^{-1})	KCl (kg ha^{-1})	Lintang Songo Compound NPK (kg ha^{-1})
P1N0	150	300	150	150	0
P1N1	150	300	150	150	100
P1N2	150	300	150	150	200
P1N3	150	300	150	150	300
P2N0	200	500	200	200	0
P2N1	200	500	200	200	100
P2N2	200	500	200	200	200
P2N3	200	500	200	200	300

Table 2. The result of the variance analysis of the Batu Ijo shallot plant is due to the treatment of single NPK fertilizer and compound NPK fertilizer.

Parameters	P		N		P*N	
	F-Values	P-Value	F-Values	P-Value	F-Values	P-Value
PH 14 DAP	0.66	0.432ns	3.74	0.037 *	1.14	0.366ns
PH 28 DAP	7.65	0.015 *	1.39	0.287ns	0.51	0.685ns
PH 42 DAP	0.84	0.374ns	1.50	0.257ns	0.27	0.846ns
PH 56 DAP	1.10	0.312ns	1.24	0.332ns	0.30	0.828ns

Description: ns = not significant; * = significant at α = 5%.

P = Single NPK fertilizer; N = Compound NPK fertilizer; P*N = Interaction of single NPK fertilizer with compound NPK fertilizer; PH = Plant height; DAP = Days After Planting.

Further test results in Table 3 using LSD with levels α= 0.05 show that the main influence Lintang Songo compound NPK fertilizer of 200 kg Ha^{-1} significantly resulted in an average plant height at 14 DAP of 17.08 cm. Increasing the dose of Lintang Songo compound NPK fertilizer to 300 kg Ha^{-1} followed by an increase in the average plant height at 14 DAP by 17.37 cm. The administration of a dose of Lintang Songo compound fertilizer of 200 kg ha^{-1} (N2) was not significantly different from 300 kg ha^{-1} (N3) because the N2 dose was able to meet the nutrients for plant height growth at 14 DAP. The significant effect of Lintang Songo compound NPK fertilizer only occurred on plant height parameters at 14 DAP, where a dose of 200 kg ha^{-1} (N2) gave optimal results, equivalent to a dose of 300 kg ha^{-1} (N3). This shows that the N2 dose is efficient enough to support the early phase of vegetative growth. The effect of a single NPK fertilizer was 150 kg Ha^{-1} Urea + 300 kg Ha^{-1} ZA + 150 kg Ha^{-1} SP-36 + 150 kg Ha^{-1} KCl significantly resulted in an average plant height at 28 DAP of 35.70 cm. Increasing the dose of single NPK fertilizer to 200 kg ha^{-1} Urea + 500 kg ha^{-1} ZA + 200 kg ha^{-1} SP-36 + 200 kg ha^{-1} KCl, lowering the average plant height at 28 DAP of 33.50 cm.

The results of variance analysis were significant at plant height 14 DAP due to the influence of Lintang Songo compound NPK fertilizer, which was proven by a 5% BNT further test. Plant height using Lintang Songo compound NPK fertilizer doses above 200 kg ha^{-1} (N2) showed inconsistent results from using Lintang Songo compound NPK fertilizer by 300 kg ha^{-1} (N3). It could be concluded that using compound NPK fertilizer as an additional 200 kg ha^{-1} is enough to fulfill the nutrients needed for the growth of early-phase vegetative plants at 14 DAP (Figure 1). A significant effect was also shown on plant height 28 DAP (Figure 2) due to the influence of a single NPK fertilizer, as evidenced by the 5% LSD further test. Plant height with the use of a single dose of NPK fertilizer 150 kg ha^{-1} Urea + 300 kg ha^{-1} ZA + 150 kg ha^{-1} SP-36 + 150 kg ha^{-1} KCl (P1) showed the highest plant height yield, and the dose was able to fulfill the nutrients needed for shallot plant growth. Conversely, increasing the dose (P2) actually reduced the yield, indicating that excess nutrients can inhibit optimal growth. It is suspected that the use of a single dose of NPK fertilizer is equal to 200 kg ha^{-1} Urea + 500 kg ha^{-1} ZA + 200 kg ha^{-1} SP-36 + 200 kg ha^{-1} KCl (P2), which farmers commonly use is greater than the recommended dose of P1, causing plants to experience excess nutrients in the initial phase of their growth. Supported by statements Setiawati et al., (2007) in the technical instructions for cultivating vegetables by BALITSA explains that fertilizing shallots in dry land requires an organic fertilizer of 2.5-5 tonnes ha^{-1}, N fertilizer of 150-200 kg Ha^{-1}, P fertilizer of 120-200 kg ha^{-1}, K of 150-200 kg ha^{-1}, ZA fertilizer of 300-500 kg ha^{-1}. So, it can be concluded that using a single dose of NPK fertilizer P1 has been able to meet nutrient needs for the initial phase of plant growth and can reduce the cost of fertilizer issued. At the age of observation, 42 DAP (Figure 3) and 56 DAP (Figure 4) all NPK nutrients needed for the high growth of shallot plants

Figure 1. Shallot plants aged 14 DAP

Figure 2. Shallot plants aged 28 DAP


Figure 3. Shallot plants aged 42 DAP

Figure 4. Shallot plants aged 56 DAP

had been fulfilled, so they showed the same good results due to the influence of single NPK fertilizer and compound NPK fertilizers. No interaction treatment factor significantly affected plant height due to the effect of a single NPK fertilizer and Lintang Songo compound NPK fertilizers, which means that the effects of each treatment were independent.

Number of Leaves, Number of Tillers, and Production Components

Results of variance analysis in Table 4 with a significance of α= 0.05 showed the main effect of single NPK fertilizer and Lintang Songo compound NPK fertilizer had no significant effect in upgrading growth in the number of leaves, the number of tillers and the components of shallot crop production. There was no interaction effect between single NPK fertilizer and Lintang Songo compound NPK fertilizer at all ages of observation on the growth parameters of the number of leaves, number of tillers and production components. The effect of compound fertilizer NPK Lintang Songo was also not significant at all observation ages on the growth parameters of the number of leaves, number of tillers and production components. The effect of single NPK fertilizer was also not significant at all observation ages on the growth parameters of the number of leaves, number of tillers and production components.

Although the analysis results were not significant from the single factor treatment or its interaction, they were still optimal in producing average growth and production. The average number of leaves, number of tillers, and yield parameters at each dose of single NPK fertilizer and Lintang Songo compound NPK fertilizer were very varied, as presented in Table 5. The highest average number of leaves at 14 DAP was found in the treatment of 100 kg ha^{-1} Lintang Songo compound NPK fertilizer, at 28 DAP there was 300 kg Ha^{-1} Lintang Songo compound NPK fertilizer treatment, at 42 DAP there were treatments without Lintang Songo compound NPK fertilizer, and at 56 DAP there was 300 kg ha^{-1} Lintang Songo compound NPK fertilizer treatment.

The highest average number of tillers at 14 DAP was observed in the single NPK fertilizer treatment of 200 kg ha^{-1} Urea + 500 kg ha^{-1} ZA + 200 kg ha^{-1} SP-36 + 200 kg ha^{-1} KCl and without Lintang Songo compound NPK fertilizer, at 28 DAP there were treatments without Lintang Songo compound NPK fertilizer, at 42 DAP there were 300 kg ha^{-1} Lintang Songo compound NPK fertilizer treatment, and at 56 DAP there were treatments without Lintang Songo compound NPK fertilizer. The highest average production component, such as the number of bulbs per hill, bulb weight per hill, and the weight of askip bulbs, was found in the Lintang Songo compound NPK fertilizer treatment of 300 kg ha^{-1}.

The results of variance analysis indicated that the number of leaves was not significantly affected due to the influence of single NPK fertilizers and Lintang Songo compound NPK fertilizers at all ages of observation. Statistically, all treatments had the same number of leaves, but based on the average value, the effect of Lintang Songo compound NPK fertilizer was 300 kg ha^{-1} (N3) at 28 DAP, and 56 DAP had more leaves than the other treatments. The more significant number of leaves would indirectly affect the production component of shallot plants. This can be seen from Lintang Songo compound

Table 3. A further test of Batu Ijo shallot plant height due to the treatment of single NPK fertilizer and compound NPK fertilizer.

Factor	PH 14 DAP	PH 28 DAP	PH 42 DAP	PH 56 DAP
Single NPK Fertilizer				
P1	16.14a	35.70a	41.04a	41.33a
P2	16.60a	33.50b	40.18a	40.35a
LSD 5%	1.12	5.41	2.09	2.40
Lintang Songo Compound NPK Fertilizer				
N0	16.08ab	33.58a	39.79a	40.16a
N1	14.95b	34.20a	39.87a	40.20a
N2	17.08a	34.83a	40.54a	40.62a
N3	17.37a	35.79a	42.25a	42.37a
LSD 5%	1.90	1.63	1.98	1.80
% CV	9.81	7.12	6.14	6.07

Description: The numbers followed by the same letter in the same column were not significantly different from the LSD at the 5% level.
P1 = 150 kg ha^{-1} Urea + 300 kg ha^{-1} ZA + 150 kg ha^{-1} SP-36 + 150 kg ha^{-1} KCl; P2 = 200 kg ha^{-1} Urea + 500 kg ha^{-1} ZA + 200 kg ha^{-1} SP-36 + 200 kg ha^{-1} KCl; N0 = Without compound NPK fertilizer; N1 = 100 kg ha^{-1}; N2 = 200 kg ha^{-1}; and N3 = 300 kg ha^{-1}; DAP = Days After Planting.

Table 4. Variance analysis of the number of leaves, number of tillers, and production component Green Stone red shallot due to the treatment of single NPK fertilizer and compound NPK fertilizer.

Parameters	P		N		P*N	
	F-Values	P-Value	F-Values	P-Value	F-Values	P-Value
NL 14 DAP	0.63	0.441ns	0.52	0.678ns	0.74	0.543ns
NL 28 DAP	0.21	0.656ns	0.73	0.551ns	0.39	0.763ns
NL 42 DAP	0.002	0.962ns	0.48	0.704ns	0.16	0.921ns
NL 56 DAP	0.04	0.852ns	0.66	0.591ns	0.26	0.855ns
NT 14 DAP	1.02	0.329ns	0.29	0.834ns	0.40	0.758ns
NT 28 DAP	1.25	0.282ns	0.49	0.696ns	0.16	0.924ns
NT 42 DAP	0.39	0.545ns	0.56	0.648ns	0.04	0.988ns
NT 56 DAP	0.58	0.458ns	0.93	0.453ns	0.04	0.988ns
Number of Bulbs per Clump	1.11	0.311ns	0.54	0.661ns	0.52	0.676ns
Bulb Weight per Clump (g)	0.01	0.940ns	1.94	0.170ns	1.32	0.307ns
Askip Bulb Weight (tonnes Ha^{-1})	0.01	0.940ns	1.94	0.170ns	1.32	0.307ns

Description: ns = not significant; * = significant at α = 5%.

P = Single NPK fertilizer; N = Compound NPK fertilizer; P*N = Interaction of single NPK fertilizer with compound NPK fertilizer; NL = Number of leaves; NT= Number of tillers; DAP = Days After Planting.

Table 5. The average number of leaves, tillers, and production components of Green Stone shallot are due to the treatment of single NPK fertilizer and Lintang Songo compound NPK fertilizer.

Parameters	Single NPK Fertilizer		Lintang Songo Compound NPK Fertilizer				% CV
	P1	P2	N0	N1	N2	N3	
NL 14 DAP	8.91	8.45	8.62	9.29	8.41	8.41	16.08
NL 28 DAP	19.70	19.12	19.75	19.37	17.95	20.58	15.65
NL 42 DAP	26.68	26.60	27.83	25.83	25.41	27.50	14.81
NL 56 DAP	27.12	26.81	28.00	26.12	25.54	28.20	14.09
NT 14 DAP	3.12	3.33	3.33	3.20	3.08	3.29	16.61
NT 28 DAP	4.27	3.93	4.33	4.08	3.83	4.16	16.26
NT 42 DAP	4.54	4.35	4.58	4.45	4.12	4.62	15.37
NT 56 DAP	4.70	4.47	4.79	4.75	4.16	4.66	15.21
Number of Bulbs per Clump	4.72	4.27	4.61	4.55	4.05	4.77	22.28
Bulb Weight per Clump (g)	58.26	58.61	56.29	52.06	58.29	67.10	23.28
Askip Bulb Weight (tonnes Ha^{-1})	17.47	17.58	16.88	15.61	17.48	20.13	23.28

Description:NL = Number of leaves; NT= Number of tillers; P1 = 150 kg ha^{-1} Urea + 300 kg ha^{-1}ZA + 150 kg ha^{-1}SP-36 + 150 kg ha^{-1} KCl; P2 = 200 kg ha^{-1} Urea + 500 kg ha^{-1}ZA + 200 kg ha^{-1} SP-36 + 200 kg ha^{-1} KCl; N0 = Without NPK fertilizer compound; N1 = 100 kg ha^{-1}; N2 = 200 kg ha^{-1}; and N3 = 300 kg ha^{-1}; DAP = Days After Planting.

NPK fertilizers 300 kg $ha^{-1,}$ which is the highest compared to other treatments. Likewise, the number of tillers is also not significantly affected due to the influence of single NPK fertilizers and Lintang Songo compound NPK fertilizers at all ages of observation. All treatments had the same number of tillers, but based on the average effect without Lintang Songo compound NPK fertilizer (N0) at 14, 28, and 56, DAP had more tillers than the other treatments. This showed that the number of shallot tillers was unaffected by NPK fertilizer use. Supported by the results of Kelvin and Rosliani (2004), Ashandi et al. (2005), Gunadi (2009), Napitulu and Winarto (2010) stated that the application of organic fertilizers, as well as N, P, K fertilizers, did not affect the number of shallot tillers largely determined by genetic factors rather than fertilization factors. The production component parameters, such as the number of bulbs per hill, bulb weight per hill, and the dry weight of the skip, also showed no significant variance. Due to the influence of single NPK fertilizers and Lintang Songo

compound NPK fertilizers. Judging from the average value of the number of bulbs per clump, which was 4.77, it was found in the Lintang Songo compound NPK fertilizer treatment 300 kg ha^{-1} (N3) compared to other treatments. The greater number of bulbs causes an increase in the weight of sip bulbs. The number of bulbs per clump is related to bulb production, where the more the number of bulbs per clump, the higher the production by the experimental results showed that the Lintang Songo compound NPK fertilizer treatment 300 kg ha^{-1} (N3) gave the highest askip dry weight compared to other treatments. The high dry weight of askip was also supported by higher bulb weight per clump compared to other treatments. There was not a single interaction that significantly affected the number of leaves, number of tillers, and production components due to the influence of a single NPK fertilizer with Lintang Songo compound NPK fertilizers, which means that the effects of each treatment were independent.

CONCLUSION

The treatment of single doses of NPK fertilizer and Lintang Songo compound NPK fertilizers did not provide a significant interaction, so these two factors were independent; each treatment did not affect the other. The effect of single dose NPK fertilizer with compound NPK fertilizer Lintang Songo on shallot plants did not occur in each growth and production parameter. The effect of single factor single dose NPK fertilizer occurred in the plant height parameter (28 DAP) during growth. The effect of single factor compound NPK fertilizer Lintang Songo occurred in the plant height parameter (14 DAP) during growth. Excessive use of fertilizers has the potential to pollute the environment and reduce profits because it will increase the cost production.

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REFERENCES

Ashandi, A. A., N. Nurtika, and N. Sumarni. 2005. Fertilizer Optimization in Leisa Shallot Farming in The Lowlands. J. Hort. 15(3): 199-207.

BPS Province of East Java. 2020. Production and Harvested Area of Seasonal Vegetables and Fruits by Regency/ City and Types of Plants in East Java Province (Ha). Central Bureau of Statistics of East Java Province. East Java.

Damanik, MMB., B. E. Hasibuan, S.Fauzi, H. Hanum. 2010. Soil Fertility and Fertilization. Medan: University of North Sumatra.

Directorate General of Agriculture. 2005. Government programs and policies in the development of corn agribusiness. page. 1-10. In Suyamto *et al*. (eds). Proceedings of the National Seminar and Workshop. Center for Food Crops Research and Development. Agricultural Research and Development Agency. Makassar, 29-30 September 2005.

Fi'liyah, Nurjaya, Syekhfani. 2016. Effect of kcl fertilizer on soil N, P, K and plant uptake of Inceptisols for corn plants in Situ Hilir, Cibungbulang, Bogor. J. of Land and Land Resources. 3(2): 329-337.

Firmansyah, I., N. Sumarni. 2013. P Influence of N Fertilizer Doses and Varieties on Soil pH, Soil N-Total, N Uptake, and Yield of Shallot (*Allium ascalonicum* L.) Bulbs in Entisols-Brebes Soil, Central Java. Hort. J. 23(4): 358-364. Doi: https://doi.org/10.21082/jhort.v23n4.2013.p358-364

Gunadi, N. 2009. Potassium sulfate and potassium chloride are sources of potassium fertilizer in shallot plants. J. Hort. 19(2): 98–108.

Napitupulu, D., L. Winarto. 2009. The Effect of N and K Fertilizers on the Growth and Production of Shallots. North Sumatra Agricultural Technology Study Center. J. Hort. 20(1): 22-35.

Napitupulu, D., L. Winarto. 2010. The Effect of N and K Fertilizers on the Growth and Production of Shallots. J. Hort. 20(1): 27-35.

Rahayu, S., Elfarisna and Rosdiana, 2016. Response to the growth and production of shallots (*Allium ascalonicum* L.) with the addition of liquid organic fertilizer. 2016 SEMNAS Proceedings. file:///H:/POC%20BAWANG%20MERAH.pdf. Cited on 16 January 2019. p: 123-131.

Setiawati, W., R. Murtiningsih, G. A. Sopha, T. Handayani. 2007. Technical instructions for cultivating vegetables. Vegetable Crops Research Institute. Bandung. 6-11.

Sumarni, N., R. Rosliani, Suwandi. 2012. Optimization of Planting Spacing and Dosage of NPK Fertilizer for Shallot Production from Mini Bulb Seeds in the Highlands. J. Hort. 22(2): 147–154. Doi: https://doi.org/10.21082/jhort.v22n2.2012.p148-155

Sumarni, N., R. Rosliani, R. S. Basuki. 2012. Growth response, bulb yield and NPK nutrient uptake of shallot plants to various doses of NPK fertilization in Alluvial soil. Hort. J. 22(4): 366-375. Doi: https://doi.org/10.21082/jhort.v22n4.2012.p366-375

Sumarni, N., H. Ahmad. 2005. Shallot Cultivation. Vegetable Crops Research Institute. Horticulture Research and Development Center, Agricultural Research and Development Center. Bogor.

Sumiati, Gunawan. 2007. Application of Mycorrhizal Biological Fertilizers to Increase NPK Nutrient Uptake and Its Effect on Yield and Yield Quality of Shallots. J. Hort. 17(1): 34–42.

Uke, K. H. Y., H. Barus, I. S. Madauna. 2015. The effect of bulb size and potassium dosage on the growth and yield of the shallot (*Allium ascalonicum* L.) variety Lembah Palu. eJ. Agrotekbis. 3(6): 655- 661.

Woldetsadik, K. 2003. Shallot (*Allium cepa var. ascolonicum*) responds to plant nutrients and soil moisture in a subhumid tropical climate. Dissertation. Department of Crop Science, Swedish University of Agricultural Sciences. Acta Universitatis agriculturae Sueciae. 28 page.