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THE ROLE OF VERNALIZATION AND GIBBERELIN IN INCREASING FLOWERING AND PRODUCTION ONIONS IN THE LOWLANDS

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Abstract

Importance of the work: The importance of this research is to know the role of Vernalization and Gibberellins in Increasing Shallot Production, which is still low. **Objectives**: This study aims to find out the role of vernalization and gibberelin in increasing the flowering and production of onions in the lowlands, this study was carried out in the form of a separate plot experiment (RPPT), the Main Plot of five selected onion varieties from the first experiment, which was grown in lowlands and highlands namely Bima Brebes Variety (V 1), Manjung Variety (V 6), Bauji Variety (V 7), Bangkok Jeneponto Variety (V 10), Mentes Variety (V 14). The plot consists of 4 stratification of vernalization temperature namely (room temperature (F1), Temperature 4 ° C (F2), Temperature 8 ° C (F3) and Temperature 12 ° C (F4). Children's Plot consists of 4 concentrations of GIBBerlin GA3, namely; 0 ppm/Aquades (H1), 50 ppm (H2), 75 ppm (H3), and 100 ppm (H4). **Results**: Each treatment was repeated three times, so it was obtained as much as: 5 x 4 x 4 x 3 = 240 trial plots of each research site and 80 combinations of treatments attempted. Onion varieties have different responses to the treatment of vernalization and gibberellin GA_3. No vernalization temperature strata and GA_3 concentrations consistently supported certain observational parameters for the growth and production of five varieties of onions. The Manjung and Bauji varieties that have great potential produce more botanical flowers and seeds. **Main finding**: Onion varieties have different responses to the treatment of vernalization and gibberellin GA_3. The Manjung and Bauji varieties that have great potential produce more botanical flowers and seeds. Vernalization given to seed bulbs interacts with flowering and botanical seed formation in lowlands.

Keywords: Vernalization, Gibberelin, and Onion

INTRODUCTION

Onions (Allium ascalonicum L.) are a superior vegetable commodity that has many benefits and high economic value, and has good market prospects. In the last decade or so, the demand for onions for domestic consumption and seedlings has increased. But the productivity of onion plants in Indonesia is still low (Idhan & Makassar, 2016).

The average production is 9.54 tons per hectare. To meet the growing demand for onions in line with the increasing population and the development of various industries that require onion raw materials, the production and quality of onion products must always be improved, and onion planting must be able to be done throughout the year so that the supply and price do not fluctuate (Candra, 2018).

Increased production and productivity of national onions is faced with the problem of scarcity of the availability of quality, low-yield, and expensive seeds. To get high-yielding seeds more and more farmers are using tuber seeds from imported onions that are relatively expensive (Palupi, Rosliani, 2015).

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The government's efforts to develop onion plants have led Indonesia to become an onion-serving country since 2016 and subsequently the government proclaimed 2045 to be an onion exporting country, especially for Southeast Asian purposes, because the largest consumption of onions is in Southeast Asian countries (Pangestuti & Sulistyaningsih, 2011).

New technologies continue to be sought after in achieving efficient and efficient farming. Botanical seeds of onions or True Seed of Shallot (TSS) is one of the options to be able to substitute onion seed and increase domestic onion production and increase the efficiency of onion farming (Aldiani & Puji, 2017).

The flowering of the onion plant can be stimulated by low temperatures during its growth. The administration of artificially low temperature treatment (vernization) on seed bulbs can stimulate the flowering of onions. (Sartono Putrasamedja and Suwandi, 1996), reported that the treatment of vernalization with a temperature of 10 0C for 30-35 days on onion seed bulbs, can increase the flowering and yield of onion seeds (Rizki et al., 2018).

Increased flowering can be done with the addition of exogenous growing regulatory substances such as gibberelin that can induce and stimulate flowering, and can replace some or all of the low temperature function in stimulating flowering (Rahayu et al., 2018).

Materials and Methods

Time and Place

This experiment took place from October 2014 to January 2015, in Tombolo Pao Subdistrict (place height of 1000 m above sea level) and lowlands (place height of 10 m above sea level) in Pallangga District of Gowa Regency of South Sulawesi.

Materials and Tools

The ingredients used in this experiment are 50 kg of onion bulbs per variety, both highlands and lowlands. The seedling bulbs used are the result of the production of the first test selected varieties. Mol-M2 liquid organic fertilizer and granuler cap wasp (16-16-16), and giberellin (GA_3) organic fertilizer.

The tools used in this study are Tractor for land-smelting, hoe for bedmaking, sickle for weed cleaning, machete as cutting tool, digital scales brand CAMRY Model EHA401(0.01-100 g), meter, GPS, thermometer, plastic drum, flush (gembos), bags, streamin fabric, stationery, Canon type EOS 60D camera, Polytron brand Show case refrigerator

RESULTS AND DISCUSSION

The research was conducted in the form of experiments of Divided Plots based on the pattern of The Design of Separate Plots (RPPT); The main plot of the five varieties of shallots selected from the first experiment, which was grown in lowlands and highlands, namely;

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Main Tile:

1. Bima Brebes Variety (V 1)
2. Manjung Variety (V 6)
3. Bauji Variety (V 7)
4. Bangkok Jeneponto Variety (V 10)
5. Mentes variety (V 14).

Anak Petak consists of 4 stratification of vernization temperature, namely

1. (room temperature (F1),
2. Temperature 4 °C (F2),
3. Temperature 8 °C (F3) and
4. Temperature 12°C (F4).

Children's Plot consists of 4 concentrations of GIBBerlin $_{GA3}$, namely;

1. 0 ppm/Aquades (H1),
2. 50 ppm (H2),
3. 75 ppm (H3), and
4. 100 ppm (H4).

Each treatment was repeated three times, so it was obtained as much as: 5 x 4 x 4 x 3 = 240 trial plots of each research site and 80 combinations of treatments attempted. To assess the effect of treatment,

The results of the observations were carried out by the ANOVA test, and to determine the best treatment, a follow-up test was conducted by comparing two average values, using the Duncan test.

Seed bulbs to be planted are relatively uniform by choosing seed bulbs that weigh an average of 5 - 10 g. The selected bulbs are given vernalization treatment for 25 days at four temperature strata, namely, 1) room temperature, 2) temperature 4^0C, 3) temperature 8^0C, and 4) temperature 12 ^{0}C. Vernization uses a refrigerator (Show Case). Seed bulbs that have been vernized are soaked into aquedical, GA3 solution with concentrations of 0 ppm (akuades), 50 ppm, 75 ppm and 100 ppm for 25 minutes, to be further lined up to then be planted.

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RESULTS AND DISCUSSIONS

1. Plant Height

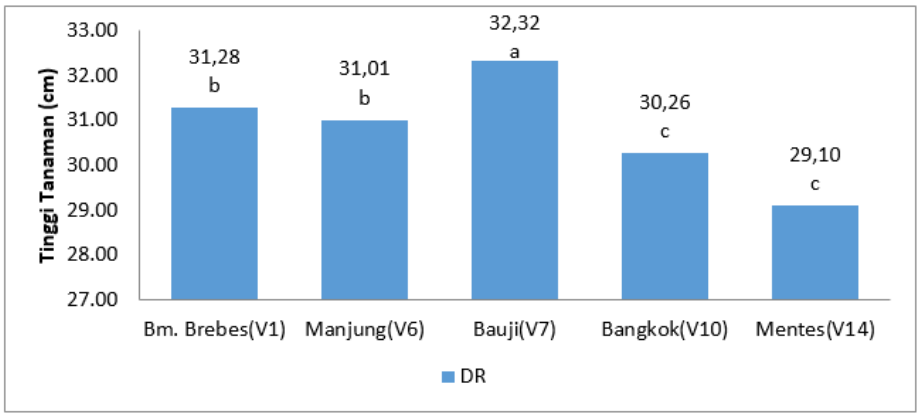

Figure 1: Average height of plants in lowlands

Description: The number followed by the same letter (a-c) is not real according to Duncan's 5% test. Bauji varieties have the highest plant height and differ very markedly from other varieties. The Bangkok Jeneponto variety differs very markedly from the Mentes variety, but the different is not real with the Bima Brebes and Mentes varieties, nor is the Bima Brebes variety different from the Mentes (Figure 1).

a. number of tillers

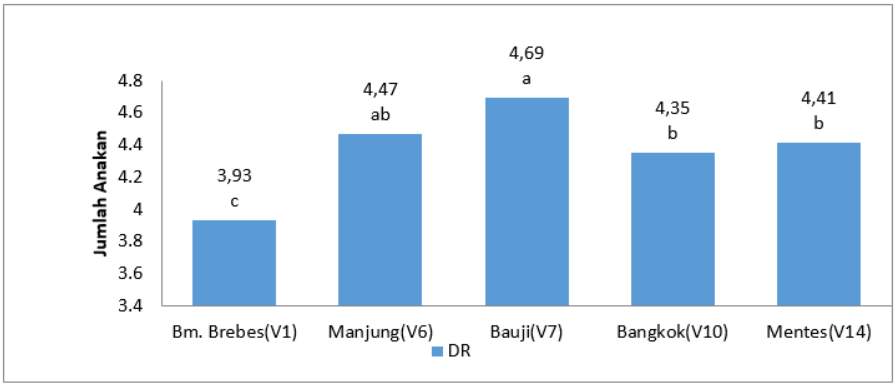

Figure 2: The number of saprings formed five varieties of onions grown in the lowlands

Description: The number followed by the same letter (a-c) shows no real difference according to Duncan's 5% test.

Bauji varieties make up an average number of more saplings and differ very markedly from the Bima Brebes variety, but differ not noticeably from the Bangkok varieties jeneponto, mentes and manjung.

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b. Percentage of Flowering Varieties

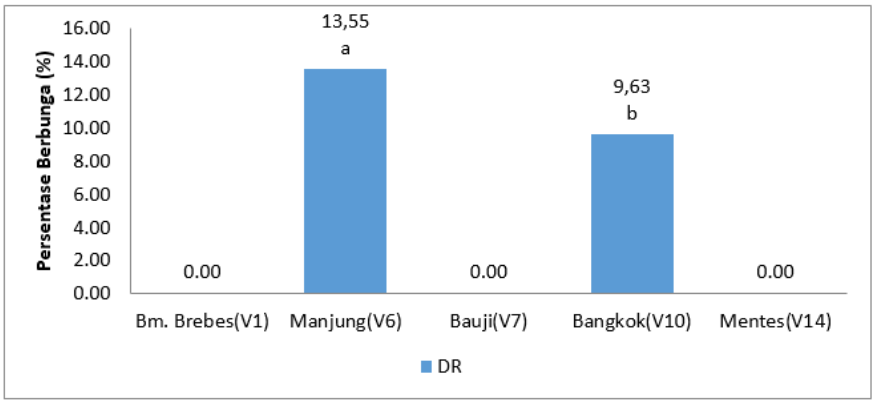

Figure 3: Influence of varieties on flowering of varieties in lowlands

Description: The number followed by the same letter (a-c) in the lowlands showed no real difference according to Duncan's 5% test.

The Manjung varieties flower up to the highest 13.55% and differ very noticeably from the Bangkok varieties Jeneponto, Bima Brebes, Mentes and Manjung. Between the Bangkok jeneponto varieties, Bima Brebes and Manjung differ not real, but differ very real from the Mentes variety (Figure 3).

c. Botanical Seed Production (kg h^{-1})

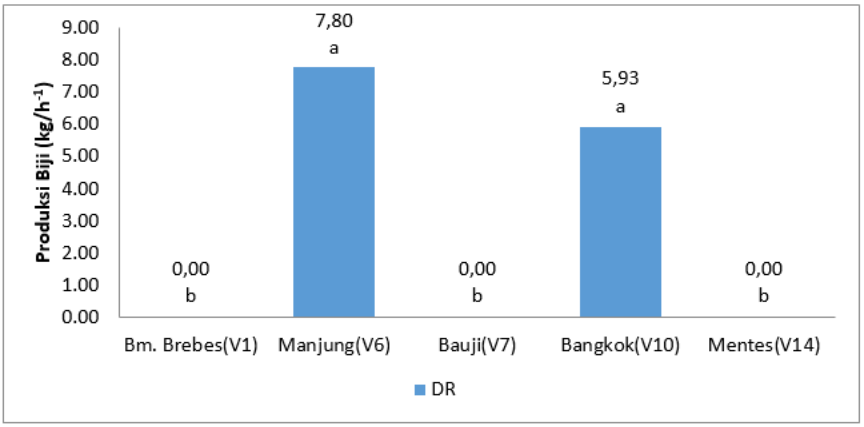

Figure 4: The production of botanical seeds (kg h^{-1}) of five varieties of onions in the lowlands.

Description: The number followed by the same letter (a-b) shows an unreal difference according to Duncan's 5% test.

Figure 4 shows that the main plot (variety) of influence is very real, while the treatment of vernalization and gibberellin (GA_3) effect is not real. Different Manjung varieties are not real

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with Bima Brebes and mentes varieties, but differ very markedly from Bangkok Jeneponto (Figure 4).

d. Weight of 100 Bulbs (g)

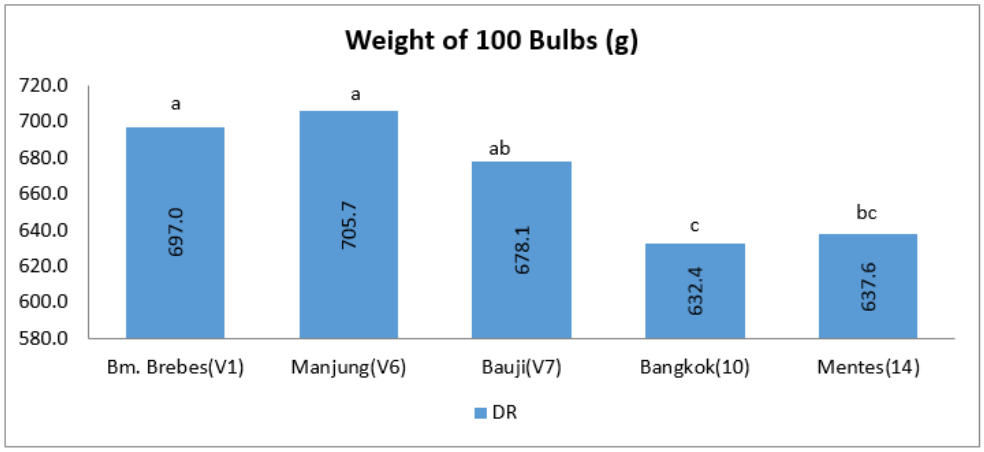

Figure 5: Weight 100 shallots on five varieties in the lowlands

Description: The number followed by the same letter on the same bar color shows no real difference based on Duncan's further test at the level of 5%.

Manjung varieties grown in lowlands have the heaviest bulb weights in real contrast to the Mentes and Bangkok Jeneponto varieties, but differ not real from the Bima Brebes and Bauji varieties, nor are the different Bauji varieties are not real with the Mentes.

CONCLUSION

Onion varieties have different responses to the treatment of vernalization and gibberellin GA_3. No vernalization and concentration strata of GA_3 consistently supported certain observational parameters for the growth and production of five varieties of onions. The Manjung and Bauji varieties that have great potential produce more botanical flowers and seeds. Gibbellin (GA_3) does not contribute significantly to the flowering and formation of the botanical seeds of five varieties of shallots at two different altitudes. Vernalization given to seed bulbs interacts with flowering and botanical seed formation in lowlands

Conflict of Interest

The authors declare that there are no conflicts of interest

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