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## Original Research Article

### Potential Selection of Flowering and Tuber Production in Fourteen Onion Varieties (*Allium ascalonicum* L.) at Lowland and Upland

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Abstract	Keywords
<p>Flowering and formation of onion seeds are influenced by some factors, including variety, fertilization and pollination success. In the present study, 14 onion varieties which have the potential to produce more flowers naturally, grown in an altitude of 1000 meters above sea level were selected. The study was conducted from May to September 2014, in the uplands of the District Tombolo Pao Gowa in South Sulawesi. The experiments were conducted in a randomized block design; the treatments consisted of 14 varieties of shallots: Bima brebes (V1), Pikatan (V2), Thailand (V3), Sumenep (V4), Super Philips (V5), Manjung (V6), Bauji (V7), Bima adaptation Jeneponto (V8), Bima Enrekang adaptation (V9), Bangkok adaptation Jeneponto (V10), Palu local variety, (11), Katumi (V12), Trisula (V13), and Mastes (V14). The experiments were repeated twice with 28 experimental units; Organic fertilizer of cow manure uniformly 8 t/ha as supplementary fertilization then a liquid organic fertilizer was applied three times at the age of 10, 20 and 30 days after planting as much as 1 liter per square meter. The study found five varieties that produced more flowers than other varieties, namely: 1) Bangkok adaptation Jeneponto (103.2 umbel flowers), 2) Bauji (70 umbel flowers), 3) Milky Brebes (32.3 umbel flowers), 4) Manjung (31.9 umbel flowers), and 5) Test varieties (31.7 umbel flowers). Varieties selected and expected potential to produce flowers and seeds that much after treatment with Gibberellic Acid (GA3) and vernalization. Bima Jeneponto, Palu, Pikatan, Thailand and Trisula were the varieties produced larger tubers in the lowlands with a production range of 6.5 to 9.5 t/ha than upland varieties which showed a range of production from 2-5 t/ha.</p>	<p><i>Allium ascalonicum</i> Flowering Onion Seed selection Shallots</p>

#### Introduction

Onion (*Allium ascalonicum* L.) is a vegetable with high economic value, in the cultivation of conventional face major problems in the provision of planting material (propagule) which causes low productivity. The cause of

low productivity is the result of the purity of variety and the influence of environment factors.

This problem can be solved with the use of True Shallot Seed (TSS) as plant material (Winarso Drajad Widodo, Roedhy Poerwanto, and Nani Sumarni, 2011).

Furthermore, it is stated that TSS has various advantages such as planting material needs fewer, relatively free of disease transmission when compared with seed tubers. Based on the results of previous studies that the productivity of onion originating from TSS can reach 33.30 t/ha. The productivity is almost three times the productivity of the national onion. Another advantage of TSS is easy in the storage and transport of seed which is much more efficient than the seed tubers.

Botanical seed production business (TSS) is required an onion varieties that have the potential to produce flowers and seeds, the varieties adapted to environmental conditions as a target as well like by farmers and consumers. The use of TSS seed the volume of advantages compared to the use of tuber (conventional way) among others, the volume of seed needs less TSS is 3-6 kg/ha while the mother bulb needs about 1-1.5 t/ha, storage and transport of TSS is more easier and cheaper, resulting in healthier plants due to TSS relatively free from disease pathogen, and produces tubers with good quality (Ridwan et al., 1989; Permadi, 1993; Rosliani et al., 2005) and can be grown throughout the year.

Flowering is a physiological and morphological phenomena in the life cycle of plants. The beginning transition can be seen at the end of the shoots, the vegetative phase is puffed up form and generative phase, growth at the end of the shoot is meristem flat. During the transformation phase biochemical changes occur in the plant which effected the changes in the differentiation pattern of leaves, shoots, and the floral parts. Flower components are formed on maturity of flowers and end on the full bloom. Through meiosis development of pollen and the embryo sac is perfectly occur, then the plant is ready to undertake the next stage of fertilization via pollination (Zulkarnain, 2010).

Generally farmers are cultivating onion by seed tubers (vegetative), but there are many problem as the result of using seed tubers like, the cost of providing seed tubers are quite expensive which can reach until 40% of total cost production, it is not guaranteed also because often carry the disease pathogen from the origin plant, it is implicated leading lower production. It is needed to solve and break the chain of disease pathogens. The solution is using **True Shallot Seeds (TSS)**.

## Materials and methods

The study was conducted during May to September 2014 in the upland fields at Tombolo Pao District of Gowa in South Sulawesi. The experiments were conducted in a randomized block design; the treatments consisted of 14 varieties of shallots: Bima brebes (V1), Pikatan (V2), Thailand (V3), Sumenep (V4), Super Philips (V5), Manjung (V6), Bauji (V7), Bima adaptation Jenepono (V8), Bima Enrekang adaptation (V9), Bangkok adaptation Jenepono (V10), Palu local variety, (11), Katumi (V12), Trisula (V13), and Mastes (V14). The experiments were repeated twice with 28 experimental units; Organic fertilizer of cow manure uniformly 8 t/ha as supplementary fertilization then a liquid organic fertilizer was applied three times at the age of 10, 20 and 30 days after planting as much as 1 liter per square meter. The tools used in this study were hoes, sickles, machetes, bamboo, wire ties, scales, meter, altimeter, thermometer, plastic drums, tool flush (deflated), streamin cloth bags, stationery and cameras. The growing components were observed on each flowers variety and also produced shallot seed.

## Results and discussion

### Total number of flowers

The result of statistical analysis in Fig. 1 shows that the varieties producing the highest number of flowers in upland area was Jenepono Bangkok adaptation variety with the average flowers per umbel of 103.2 and it was significantly different with other varieties which showed average flowers 0-32.3 per umbel (Fig. 1). There were several studies Bangkok Variety flowering more than 60% (Putrasamedja and Permadi, 1994). It was showed Jenepono Bangkok adaptation Variety could be developed for producing botanical seed (true shallot seed, TSS).

In this study also showed Sumenep and Local Palu variety did not produce flower, this is suitable of previous studies that Sumenep varieties did not produce flower include planted in the up lands and the lowlands. While Local Palu variety was a derivative variety of Sumenep previously developed by *in vitro*, and after long time adapted in Palu, hence it is called Local Palu. The lowland showed none of the 14 varieties produced flowers due to high daily temperatures at current study location with a daytime and night time average temperatures of 28-35°C and 23-29°C respectively.

Fig. 1: Number of umbels formed from several varieties of onion in the uplands.

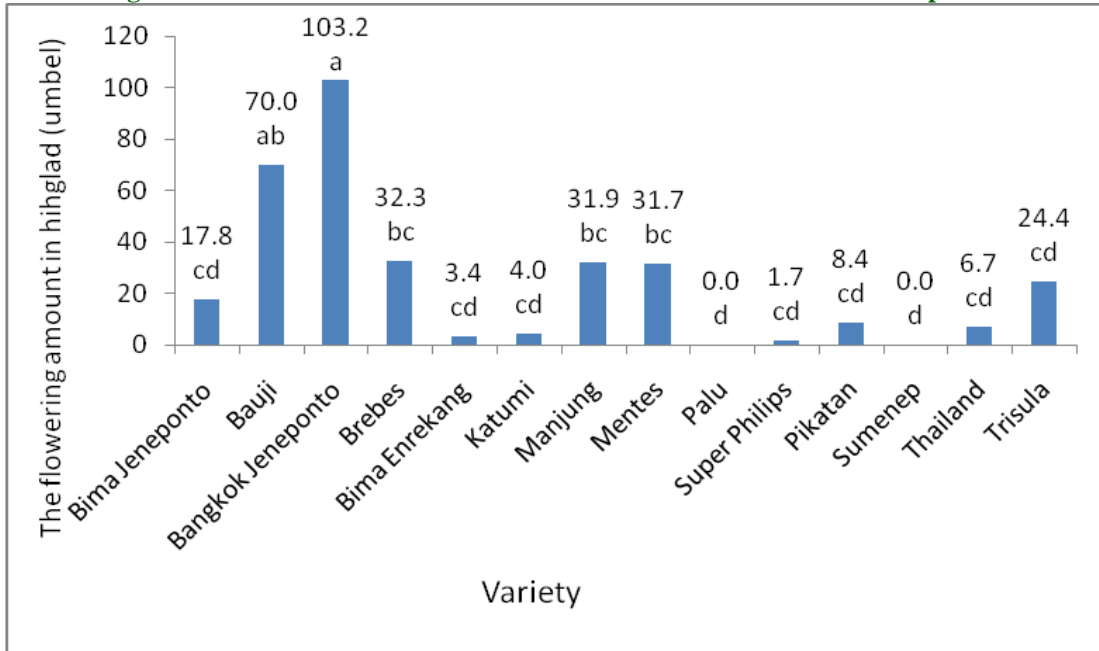


Fig. 2: a) The flowers of Bangkok varieties at harvest



b) Umbel



Fig. 3: a) The flowers of Bauji variety at harvest



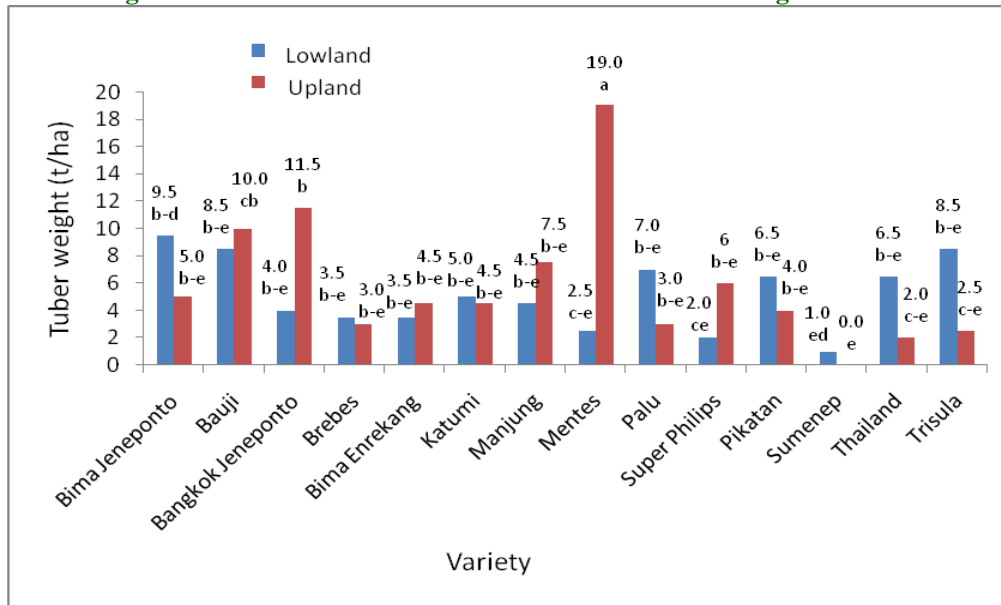
b) Umbel



Fig. 4: Bulbs of Bangkok Jeneponto adaptation variety.



Fig. 5: The interaction of altitude and varieties to tuber weight of onion.



Generally onion is flowering well in the uplands than in the lowlands (Jasmin et al., 2013). Some variety sampling, initiation of flowering influenced of high sea level. The flowering initiation occurred only in the uplands, while the lowland varieties did not show flowering. Flowering was influenced when temperature was higher during flowering initiation in experimental location at lowland. Generally, the upland (temperature 16-18°C) is a suitable location to produce flowering and shallot seed (Sumarni et al., 2009). According to Sumarni and Soetiarso (1998), flowering initiation

required 9-12°C temperature, growing umbel required 17-19°C temperature, while the fruiting and shallot required 35°C temperature. Hilaman et al. (2014) reported that the onion which bloom in the upland, reached an average flowering of 93.44%, while in lowland only special variety can be flowering with the average of 29.89%.

The amount of flowers formed from different onion varieties were very diverse, indicating that the potential of quantum of flowering was influenced by temperature

and genetic characteristics. Sumarni et al. (2013) also stated that the flowering potential of onion is very much influenced by genetic makeup (Hilman et al., 2014).

### Tuber production

The analysis of variance showed that the rate of tuber production was influenced by the interaction of sea level with different varieties. Mentas variety produced the highest bulb with 19 t/ha in upland, but the production was lower in lowland with 2.5 t/ha (Fig. 2)

Based on the production in upland and lowland, Bima Jeneponto, Bauji, Bangkok Jeneponto, Brebes, Bima Enrekang, Katumi, Manjung, Lokal Palu and Pikatan produced tuber relatively not significant different with in upland and lowland. From several varieties, Bauji varieties was a variety that could adaptive to the high and low land where production of tuber was higher with 10 t / ha in up land and the lowlands of 8.5 t / ha.

Bima varieties Jeneponto, Palu, Pikatan, Thailand, and Trident were varieties that could produce larger tuber in lowland with production scale of 6.5 to 9.5 t / ha than to up land with production scale from 2-5 t / ha.

Base on total umbel produced and onion weighty, Bangkok Jeneponto adaptation variety has good potential as a variety to produce true shallot seed (TSS) with 103,2 umbel. It also produced tuber consumption and seed with larger amount of 11.5 t / ha

### Conclusion

Bangkok Jeneponto adaptation Variety is a onion variety flowering naturally in the up lands and it has potential to produce true shallot seed (TSS). It also can produce tuber with 11.5 t/ha. Mentas variety has high potential to produce tuber seed or consumption with amount production 19 t/ha in upland. Bauji Variety naturally produced the most flowering after Bangkok Jeneponto adaptation variety, and it has potentially for producing tuber consumption by 10.00 t/ha in the up land and 8.5 t/ha in the lowlands. The same varieties in the uplands do

not produce flowers naturally in the lowlands; it is due to the unmet needs of the environment to stimulate initiation of flowering and seed formation.

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