Adaptation Tests of Some Shallots Varieties on Lowlands Area in The Pesisir Selatan District, West Sumatera

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Abstract. The vast utilization of wetland and dry land in the lowlands of West Sumatra Province for the development of shallots as a potential commodity in an effort to increase farmer income. Shallot is one of the leading vegetable commodities since it has been cultivated by the people of West Sumatra in the highlands area. The availability of superior varieties of shallots produced by the Agency of Agricultural Research and Development provides many choices in shallot farming, it is necessary to test the adaptation of these superior varieties in the lowlands area. The study aimed to determine the level of adaptation of several shallot varieties in the lowlands area in Pesisir Selatan Districts, West Sumatra. The study was conducted on farmer group land in the Surantih area, Sutera sub District, Pesisir Selatan Districts from April until July 2016. The study used a Randomized Block Design (RBD) with the treatment of four superior shallot varieties namely: Katumi, Bima Brebes, Pikatan and Mentes, with 6 (six) replications. The data obtained were analyzed using variance and continued with the Duncan Multiple Range Test (DMRT). The results of research showed that: (1) the Katumi variety showed a higher harvest weight (14.00 tons/hectare) followed by the Bima Brebes, Pikatan and Mentes varieties, (2) For the Pesisir lowland dry land area, the most adaptive shallot variety was Katumi.

1. Introduction
Shallots (Allium ascalonicum L.) is one of the important vegetable commodities of high economic value, where shallots have a high nutritional containment, complement cooking spices, materials for medicines, have many vitamins that play a role as activator of enzymes in the body. Shallots are cultivated in almost all regions of Indonesia with a wide range of cultivation and the high interest of farmers to plant shallots due to high economic value and with a wide adaptability that can be planted from an altitude of 0 to 1,000 m above sea level [1, 2].

Shallots have broad adaptability due to they can grow and produce tubers in the lowlands to the highlands, in the rainfed paddy fields, dry land or yard. In general, shallots are mostly cultivated in the lowlands of Alluvial soil types (71%), while in the flat land in the Latosol soil types (16%) and in the highlands (13%) in Andisol soil types or Andisol and Latosol associations [3]. In West Sumatra Province, the cultivation of shallots is mostly carried out in the highlands with production centers in Solok District. The potential of dry land and rainfed paddy fields in 2016 in West Sumatra Province for planting shallots is quite extensive, untreated dry land is spread in 19 District/ Cities in West Sumatra Province.
covering 245,638 hectare and for rainfed paddy fields covering 45,930 hectare. In Pesisir Selatan District, dry land is not cultivated at 15,558 ha and rainfed lowland is 8,440 hectare. [4]. To maximize the potential of rainfed lowland and dry land in the lowlands for the development of shallots, the government of West Sumatra Province through the Agriculture and Horticulture Extension Office in West Sumatra carried out the development of shallots in the lowlands including: Padang Pariaman, South Pesisir, and Agam District and City of Padang. Which adaptive shallot varieties developed in the lowlands of West Sumatra is not yet well known.

In 2014 the harvest area of shallots in West Sumatra was 5,941 ha with a production of 613,354 tons with a productivity of 10.324 tons/hectare, the shallots production center in Solok District with a harvest area of 5,372 ha with a production of 585,010 tons or with a productivity of 10.89 tons/ha [5]. This produce is still low when compared to the potential produce of shallots varieties of 20.0 tons/hectare [6].

The productivity of shallots, besides being determined by environmental factors, is as well influenced by the adaptability of the varieties used to the environment. The use of diverse varieties in the same growing environment will give an concept of the adaptability of a variety. Adaptation test of shallots varieties is needed to get varieties with good growth and production capability in specific environmental conditions [7].

One of the technologies that determine the increase in productivity and success of shallots farming is: the use of improved varieties that are suitable for agroecological and adaptive conditions. The Agency for Agricultural Research and Development through the Indonesian Vegetable Research Institute has released several varieties of shallots, such as: Bima Brebes, Maja, Seberani, Trisula, Mentes, Pancasona, Katumi, Pikatan, Keramat 1, Keramat 2 [8]. For the Province of West Sumatra, the development of shallots is likely to be cultivated in the lowlands area, such as in Padang Pariaman and Pesisir Selatan district. From the results of research [9] in the District of Padang Pariaman can tuber produce 8.45 tons/hectare to 12.08 tons/hectare.

For better growth and produce optimally, shallot plants need fertilizer nitrogen (N), phosphorus (P) and potassium (K) in an amount sufficient and balanced. In general, application of fertilizer N, P, and K can improve the growth and produce of shallots [10;11]. The research results of Ref. [9] stated that fertilizing Katumi shallots with Urea 120 kg/hectare, ZA 300 kg/hectare, SP-36 150 kg/hectare, KCl 100 kg/hectare and chicken manure 10 tons/hectare conducted in the lowlands of Padang Pariaman District can yield 11.20 tons/hectare and shallots local varieties Alahan Panjang 11.47 tons/hectare. Ref. [12] states that using Bima, Maja and Yellow varieties in the lowland drylands of Karo district, North Sumatra, with the same fertilizing dose as that of Ref. [9] research results only yields 8-10 tons of shallots tuber. This study aims to determine the level of adaptation of several shallots varieties in the lowlands of Pesisir Selatan district, West Sumatra.

2. Materials and Method

2.1. Materials
Materials needed include: superior varieties of shallots, organic and inorganic fertilizers, pesticides, dolomites, and other assistive devices.

2.2. Research Implementation
The study was conducted in April to July 2016 at the Hamparan Saiyo Farmer Group, Surantiah, Sutera, Pesisir Selatan district, West Sumatra. The study used a Randomized Block Design (RBD) with the treatment of four superior varieties of shallots, namely: Katumi, Bima Brebes, Pikatan and Mentes, with 6 (six) replications. The study was conducted on a farmer group land with an area of 400 meters². The varieties tested were 4 (four) superior varieties of shallots is Mentes, Katumi, Pikatan and Bima. Seeds derived from Indonesia Vegetable Crops Research Institute (Balitsa) Lembang. Shallots used to have the tuber requirements for the seed are: (a) medium-sized of tuber (weighing 5-10 grams), old enough (70-80 HST); (b) fresh, healthy appearance (free from pests and diseases), dense (no wrinkles and no defects), and brightly colored, and (c) tuber have been stored for 2-3 months after harvest and the shoots have reached the tip of the tuber.
2.2.1. **Land Preparation**
Land cultivated to a depth of ± 30 cm with a hoe, made beds with a width of 1.0-1.2 m, height of 25 cm and a length adapted to the soil conditions. Then 3-7 days before planting, the soil is mashed and mixed with manure 15.0 tons/hectare (24 kg/10 m of plots), NPK 200 kg/hectare (320 grams/10 m of plots), stirring evenly with the soil. In acidic soils with a pH <5.6 is given 1.5 tons/hectare (2.4 kg/10m of plots) dolomite one week before planting.

2.2.2. **Shallots of Planting**
Planting using plastic mulch, plastic mulch is installed before planting on the plots after applying basic fertilizer. Before planting, the tip of the shallot tuber is cut in 1/4 section. Spacing of 20 x 20 cm, with planting tubers to the tip, flattened to the ground.

2.2.3. **Shallots Fertilization**
For fertilizing shallots, basic fertilizer is administered, in the form of manure 15 tons/hectare, NPK (16-16-16) 200 kg/hectare, and dolomite 500 kg/hectare given 3-7 days before planting. First fertilizer applied at 10-15 days after planting (DAP), applied 200 kg/hectare, NPK (320 g/10 m2 of slots) and ZA 250 kg/hectare (0.4kg/10 m2), given directly beside the plant, then piled with soil. Supplementary fertilizer, applied NPK 200 kg/hectare (320 g/10 m2 of plots) and ZA 250 kg/hectare (0.4 kg/10 m2), applied 30-35 days after planting (DAP), is given by means of pouring.

2.2.4. **Shallots Plant Maintenance**
Watering the shallots is done 2 times a day (morning and afternoon). Replanting is done from the beginning of growth until the age of 7 days after planting (DAP). Weeding is done manually by pulling weeds that grow on the shallots planting area before applying supplementary fertilizer. Shallots is done to keep plants from falling easily and to stimulate the growth of plant tuber.

2.2.5. **Control of Pests and Diseases**
For pests and disease control using the concept of Integrated Pest and Disease Control.

2.2.6. **Harvest**
Shallots are ready to harvest with the characteristics of 60-70% of the neck limp, yellow leaves, dense tubers partially protruding above the ground, and shiny skin color. The average harvest age ranges from 60-63 days after planting. Plants are uprooted in sunny conditions and dry soil.

2.2.7. **Drying**
For drying the shallots, drying the tubers under the sun 1-2 weeks or drying at home. Clean from the leaves and tuber skin before selling or consuming.

2.2.8. **Research Observation**
The parameters of research observed are: a) the total seedling of shallots, b) the height plant of shallots and c) the productivity of the shallots.

3. **Result and Discussion**

3.1. **Total Tillers of Shallots**
Variance results and DNMRT test showed that the mean of shallot tillers at the age of 25 and 40 days after planting (DAP) was significantly different from the four shallots varieties tested as seen in Table 1.
Table 1. Average tillers of shallot plants at the age of 25 and 40 days after planting (DAP)

| No. | Varieties   | Average tillers of shallot (Stem) | Age (25 DAP) | Age (40 DAP) |
|-----|-------------|-----------------------------------|--------------|--------------|
| 1.  | Katumi      | 3.53a                             | 9.15a        |
| 2.  | Bima Brebes | 4.42b                             | 8.10b        |
| 3.  | Pikatan     | 2.92c                             | 7.40c        |
| 4.  | Mentes      | 4.07d                             | 7.90d        |

Observation of the age of 25 DAP total of tillers of shallots in the Pikatan variety (2.92 stems) was the lowest while in the Bima Brebes variety (4.42 stems) was the highest. Followed by the Mentes variety (4.07 stems) and Katumi variety (3.53 stems). Observations at the age of 40 DAP get different results. Where the total of tillers of shallots of the Katumi variety (9.15 stems) is the highest. Followed by the Bima Brebes variety (8.10 stems), the Mentes variety (7.90 stems), however, the total of tillers of shallots the Pikatan variety (7.40 stems) is the lowest.

3.2. Height of Shallots Plant

Variance results and DMRT test of shallots plant height showed significant differences for the 4 shallots varieties tested (Table 2).

Table 2. Average height of shallots plant at the age of 25 and 40 days after planting (DAP)

| No. | Varieties   | Average of Results (tons/hectare) | Tuber of Harvest | Tuber of Dried |
|-----|-------------|-----------------------------------|------------------|---------------|
| 1.  | Katumi      | 14.00a                            | 8.75a            |
| 2.  | Bima Brebes | 12.88b                            | 5.93b            |
| 3.  | Pikatan     | 11.48c                            | 5.83b            |
| 4.  | Mentes      | 10.90d                            | 4.87c            |

Observation of dried tuber weight from the results of variance and DMRT test showed that the dry weight of the Bima Brebes and Pikatan varieties were not significantly different. While the Katumi and Mentes varieties were very significantly different. The tuber weight after drying in the Katumi variety (8.75 tons/hectare) was the highest. Followed by the dry weight of the Bima Brebes variety (5.93 tons/hectare). Pikatan variety (5.83 tons/hectare), while the Mentes variety (4.87 tons/hectare) is the lowest. This result is lower than the results of a research conducted by Ref. [7] on dry land in East Kolaka District. Sulawesi Tenggara. This result was due to the decrease in tuber weight to tuber weight after drying from the four varieties of shallot which varied considerably from 37.50% to 55.32%. Where the highest tuber weight loss was in the Mentes variety (55.32%). Followed by Bima Brebes variety (53.99%). Pikatan (49.21%) and the lowest Katumi variety were 37.50%. Based on the shallots varieties description (8) tuber weight loss of Bima Brebes variety (21.5%) was the highest. Followed by Katumi variety (14.5%). Pikatan and Mentes varieties (10-15.0%).

4. Conclusion

From the research that has been done it can be concluded as follows: [1] The Katumi variety shows a higher harvest weight (14.00 ton/hectare) followed by the Bima Brebes. Pikatan and Mentes varieties; [2] For the Pesisir Selatan lowland dry land area. The most adaptive shallots varieties is Katumi and Bima Brebes.

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