Determinant factors for Brebes shallot farmers in selecting shallot varieties (Case study in Brebes, Central Java Indonesia)

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Abstract. The using of a high quality seed is very important for a successfully cultivation and an increasing of vegetable production. The vegetable productions, including for shallot are much more affected by seed varieties. Previous studies showed that production rate, shape, colour, resistant to pest and disease, number of bulbs and demanding by market were factors that influence farmers to choose shallot variety. The aim of the study is to observe determinant factors that influence shallot farmers to change their shallot varieties and persist to use certain varieties. The study was conducted in June to December 2014 in Wanasari, Tanjung, Kemukten and Limbangan villages, Brebes District. Brebes was selected as it is the biggest shallot production in Indonesia. Data were collected from 35 shallot farmers through survey by using the structural questionnaire. The data then analysed with the descriptive statistic.

1. Introduction
The using of a high quality seed is very important for a successfully cultivation and an increasing of vegetable production including for shallot. Vegetables ‘production are much more influence by seed. In selecting seed varieties, farmers consider various aspects such as seed produces high yield, resistant to pest and disease, and growth well. Moreover, it is fit with its environment, the price is affordable and it is favoured by market [1]-[4].

In the regard with the shallot, previous studies showed that farmers decided certain shallot varieties to be planted was affected by several factors such as production, time planting, a resistance of shallot to pest and disease, shape, colour, flavour (aroma), number of stems and market demand toward shallot varieties [4]-[7].

Indonesian government through Indonesian Vegetables Research Institute (IVegRI) have conducted some efforts to produce new and high qualities shallot varieties so that farmers could adopted the varieties. For shallot, until currently IVegRI has releases 11 shallot varieties, they are Bima Brebes, Maja Cipanas, Kramat 1, Kramat 2, Kuning, Sembrani, Katumi, Mentes, Pancasona, Pikatan dan Trisula.

Meanwhile, in shallot farmer itself develops various local shallot varieties for instance Lembah Palu from Central Sulawesi [8], Medan from Samosir-North Sumatera, Maja Cipanas from Cipanas-West Java, Sumenep from Madura, Kuning and Gombong from Brebes- Central Java [9]. Nevertheless until currently, majority of shallot farmers in Indonesia use Bima Brebes and Bima Curut varieties. Almost 95% of the farmers use the varieties [10].


The aim of the study is to observe determinant factors that influence shallot farmers to change their shallot varieties and persist to use certain varieties until currently. The study is expected could provide a contribution to shallot breeders, especially when they create new shallot varieties. These determinant factors should be considered by the breeders, hence, the farmers would like to adopt the varieties.

2. Materials and Methods
The study was conducted in June to December 2014 in Wanasari village, Tanjung, Kemukten and Limbangan Brebes district. Brebes was chosen because the area is the biggest central shallot production in Indonesia. Respondents were consisted of 35 shallot farmers. Data were collected through individual survey by using structural questionnaire and were analysed with the descriptive statistic.

3. Results and Discussion
3.1 The using of varieties at currently
The respondents are used Bima Brebes (12 respondents) and Bima Curut varieties (23 respondents) at currently. Before adopting Bima Brebes dan Bima Curut varieties, Brebes shallot farmers used various shallots varieties. For instance Kuning, Ampenan, Bangkok Warso, Mentes, Markonah and Philip varieties.

The first respondent planted Bima Brebes in 1995. Meanwhile, Bima Curut have been planted since 1987. As the general, the use of the varieties since the first time are described in table 1. The largest Bima Brebes’ shallot planting was before 2000, they were 5 respondents (41.7%) and between 2006 to 2010 as much as 33.3%. Meanwhile, for Bima Curut, most of farmers had planted during 2006-2010 (43.5%) and after 2010 as much as 6 respondents (26.1%).

| Year      | Bima Brebes | Bima Curut |
|-----------|-------------|------------|
|           | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| < 2000    | 5           | 41.7       | 2             | 8.7          |
| 2000-2005 | 2           | 16.7       | 5             | 21.7         |
| 2006-2010 | 4           | 33.3       | 10            | 43.5         |
| > 2010    | 1           | 8.3        | 6             | 26.1         |
| Total     | 12          | 100        | 23            | 100.0        |

3.2 Comparison of previous shallot varieties and current shallot varieties
Various shallot varieties are emerged in Indonesia and farmers have their own choice to select which varieties that they want to be planted. Indonesia government through IVegRI has released numerous shallot varieties with varied high qualities in order to be adopted by the farmers and provide benefit for them. The benefits include increasing the production and a resistance of shallot to pest and disease and decreasing cost of production. However, still, the farmers decide which variety to select for planting. Below are the respondents’ description about the difference between their previous shallot varieties and the currently used varieties (Bima Brebes dan Bima Curut).

3.2.1 Day of harvest. In term of day of harvest, table 2 shows 5 respondents (41.7%) said that their currently used variety (Bima Brebes) has shorter day of harvest compare to the previous one. As much as 41.7% respondents said that day of harvest of Bima Brebes was longer than the previous one. The rest, 16.7% respondents said that Bima Brebes has shorter than the previous varieties. Meanwhile, for
Bima Curut’s respondents, 10 respondents (45.5%) said that day of harvest Bima Curut was shorter than the previous ones and 36.4% said that the currently used was the same as the previous ones.

**Table 2.** Day of harvest of current shallot varieties and the previous varieties that are used by Respondents.

| Day of harvest | Bima Brebes | | Bima Curut | | |
|----------------|-------------|---|-------------|---|
|                | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| Shorter        | 2            | 16.7 | 10 | 45.5 |
| Same           | 5            | 41.7 | 8 | 36.4 |
| Longer         | 5            | 41.7 | 4 | 18.2 |
| Total          | 12           | 100.0 | 22 | 100.0 |

3.2.2. **Yield.** In term of yield, both of the varieties’ user said that their current varieties produced more yield than the previous ones (41.7% respondents of Bima Brebes and 42.9% respondents of Bima Curut). This is shown in table 3.

**Table 3.** Shallot’s yield of current varieties compare to the previous ones.

| Yield  | Bima Brebes | | Bima Curut | | |
|--------|-------------|---|-------------|---|
|        | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| More   | 5            | 41.7 | 9 | 42.9 |
| Same   | 4            | 33.3 | 5 | 23.8 |
| Less   | 3            | 25.0 | 7 | 33.3 |
| Total  | 12           | 100.0 | 23 | 100.0 |

3.2.3. **Time of planting.** About time of planting, Table 4 shows that all respondents Bima Brebes and Bima Curut users (100%) said that the current varieties could be planted both in dry and wet seasons. Meanwhile, the previous varieties could be planted only in dry season.

**Table 4.** Time of planting the currently used varieties compare to the previous ones.

| Time of planting  | Bima Brebes | | Bima Curut | | |
|-------------------|-------------|---|-------------|---|
|                   | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| Dry and wet seasons | 11          | 100.0 | 23 | 100.0 |
| Dry season        | 0           | 0    | 0 | 0    |
| Total             | 11          | 100.0 | 23 | 100.0 |

3.2.4. **Number of stems.** Table 5 shows majority of respondents (Bima Brebes 91.7% and Bima Curut as much as 73.9%) said that number of stems for currently used seed varieties more than the previous ones.
Table 5. Number of stems the current varieties compare to the previous ones.

| Number of stems | Bima Brebes |       | Bima Curut |       |
|----------------|-------------|-------|------------|-------|
|                | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| More           | 11          | 91.7  | 17         | 73.9  |
| Same           | 3           | 13.0  | 3          | 13.0  |
| Less           | 1           | 8.3   | 3          | 13.0  |
| Total          | 12          | 100.0 | 23         | 100.0 |

3.2.5. *Bulb's size.* Meanwhile, most of the farmers said that bulb’s size of the current varieties are bigger than the previous ones. This is answered by 66.7% Bima Brebes’s users and 82.6% Bima Curut’s users as shown in Table 6.

Table 6. Shallot bulb’s size of current varieties compare to the previous ones.

| Bulb’s size | Bima Brebes |       | Bima Curut |       |
|-------------|-------------|-------|------------|-------|
|             | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| Bigger      | 8           | 66.7  | 19         | 82.6  |
| Same        | 3           | 13.0  | 3          | 13.0  |
| Smaller     | 4           | 33.3  | 1          | 4.3   |
| Total       | 12          | 100.0 | 23         | 100.0 |

3.2.6. *Bulb’s shape.* From bulb’s shape, majority of the farmers said that a bulb’s shape of their currently used varieties were round shape. This was answered by 58.2% respondents of Bima Brebes and 60.9% respondents of Bima Curut as shown in Table 7.

Table 7. Bulb’s shape of currently used varieties compare to the previous ones.

| Bulb’s shape | Bima Brebes |       | Bima Curut |       |
|--------------|-------------|-------|------------|-------|
|              | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| Round        | 5           | 41.7  | 9          | 39.1  |
| Oval         | 7           | 58.3  | 14         | 60.9  |
| Total        | 12          | 100.0 | 23         | 100.0 |

3.2.7. *Bulb’s colour.* Table 8 talking about bulb’s colour. In term of colour, majority of respondents said that the bulb’s colour of currently used varieties are dark red. This is answered by 100% respondents of Bima Brebes and 82.6% respondents of Bima Curut.

Table 8. Bulb’s colour.

| Bulb’s colour | Bima Brebes |       | Bima Curut |       |
|---------------|-------------|-------|------------|-------|
|               | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| Light red     | 4           | 17.4  |            |       |
| Dark red      | 12          | 100.0 | 19         | 82.6  |
| Total         | 12          | 100.0 | 23         | 100.0 |
3.2.8. **Price selling.** About price selling, more than a half respondents said that both of the currently used varieties were more expensive than the previous ones as shown in Table 9.

| Price selling | Bima Brebes | Bima Curut |
|---------------|-------------|------------|
|               | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| Cheaper       | 4            | 18.2       | 5            | 22.7       |
| Same          | 4            | 33.3       | 5            | 22.7       |
| More expensive| 8            | 66.7       | 13           | 59.1       |
| Total         | 12           | 100.0      | 22           | 100.0      |

3.2.9. **Resistance to pests and diseases.** In term of resistance of pests and diseases, as much as 8 respondents (66.7%) of Bima Brebes’s users said that the variety was the same as the previous varieties. On the contrast, majority of Bima Curut’s users (65.2%) said that their variety was more resistant than the previous ones as shown in table 10.

| Resistance to pest and diseases | Bima Brebes | Bima Curut |
|---------------------------------|-------------|------------|
|                                 | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| More resistant                  | 4            | 33.3       | 15           | 65.2       |
| Same                            | 8            | 66.7       | 6            | 26.1       |
| Less resistant                  | 2            | 8.7        |              |            |
| Total                           | 12           | 100.0      | 23           | 100.0      |

3.2.10. **Easy to seed.** Table 11 showed that almost 50% of the respondents agreed that both of the currently used varieties were easy to seed compare to the previous varieties. It was answered by 58.3% respondents of Bima Brebes and 60.9% respondents of Bima Curut.

| Ease to seed | Bima Brebes | Bima Curut |
|--------------|-------------|------------|
|               | Number of respondents | Percentage (%) | Number of respondents | Percentage (%) |
| Easier        | 7            | 58.3       | 14           | 60.9       |
| Same          | 3            | 25.0       | 7            | 30.4       |
| More difficult| 2            | 16.7       | 2            | 8.7        |
| Total         | 12           | 100.0      | 23           | 100.0      |

3.2.11. **Age stored.** In term of age store the varieties, table 12 shows most of both respondents agreed that there was no difference of age store between the currently used varieties and the previous varieties. This was answered by 50% respondents of Bima Brebes and 43.5%) respondents of Bima Curut. However, there is 1/3 of the respondents (Bima Brebes 33.3% and Bima Curut 34.8%) who said that the age store of their currently used varieties was longer than the previous ones.
Table 12. Age stored of currently used varieties compare than the previous ones.

| Age stored | Bima Brebes | Bima Curut |
|------------|-------------|------------|
|            | Number of respondents n=12 | Percentage (%) | Number of respondents n=23 | Percentage (%) |
| Shorter    | 2           | 16.7       | 5           | 21.7       |
| Same       | 6           | 50.0       | 10          | 43.5       |
| Longer     | 4           | 33.3       | 8           | 34.8       |
| Total      | 12          | 100.0      | 23          | 100.0      |

3.2.12. Production. In term of production, majority of respondents’ yield was on 7.5 ton to 10 ton/ha. This was answered by 41.7% respondents of Bima Brebes and 39.1% respondents of Bima Curut (Table 13)

Table 13. Production of currently used varieties.

| Production       | Bima Brebes | Bima Curut |
|------------------|-------------|------------|
|                  | Number of respondents n=12 | Percentage (%) | Number of respondents n=23 | Percentage (%) |
| 5000-7500 kg     | 2           | 16.7       | 4           | 17.4       |
| 7501-10000 kg    | 5           | 41.7       | 9           | 39.1       |
| 10001-12500 kg   | 3           | 25.0       | 3           | 13.0       |
| 12501-15000 kg   | 1           | 8.3        | 3           | 13.0       |
| > 15000 kg       | 1           | 8.3        | 4           | 17.4       |
| Total            | 12          | 100.0      | 23          | 100.0      |

As the general, the production of Bima Brebes and Bima Curut as shown as the following; the highest production was 15.62 ton/ha and 18.75 ton/ha, the lowest production was 5.62 ton/ha and 5.4 ton/ha and the average yield of both the varieties was 10.4 ton/ha and 11.03 ton/ha. These information are shown in Table 14.

Table 14. Production rate of currently used varieties.

| Production rate | Bima Brebes (ton/ha) | Bima Curut (ton/ha) |
|-----------------|----------------------|---------------------|
| Higher          | 15.62                | 18.75               |
| lowest          | 5.62                 | 5.4                 |
| Average         | 10.4                 | 11.03               |

Based on the numerous aspects above, farmers changed their shallot varieties because the new (currently used) varieties is better than the previous varieties. The excellency includes aspects : 1) the currently used varieties (Bima Brebes dan Bima Curut) have day of harvest shorter or at least same with the previous varieties 2) the currently used varieties produce more yield or at least same with the previous ones 3) currently used varieties could be planted both in dry and wet seasons, meanwhile the previous ones only could be planted in one season which is on dry season 4) currently used varieties have more number of stems than the previous ones. Those 4 factors above in line with the result of previous studies about farmers’ preference on shallot varieties [1][2][3][4] 5) the shape of currently used varieties’ bulb is oval and this shape is favoured by consumer 6) the bulb’s colour of currently
used varieties is dark red and this is also favoured by consumers [11]. These results is in line with previous studies about consumer’s preference on shallot’s shape and colour [4][5][6][7]. Currently used varieties is more resistant to pest and disease compare to the previous ones. 8) currently used varieties are easier to be seed 9) age store of currently used varieties’ bulb is longer than the previous one.

All of these excellences currently used varieties (Bima Brebes and Bima Curut) make farmers are persist to use both of the varieties until currently, although from the production cost the current ones higher than the previous ones. Nevertheless, it still provides beneficial for the farmers compare to the shortages.

4. Conclusion
There are various excellency aspects of shallot variety such as high production, able to be planted during the year, ease to be seed, number of stems is higher, resistant to pest and disease and longer age store that cause farmers change their shallot variety to new ones and persist until today. For farmes in Wanasari, Tanjung, Kemukten and Limbangan Brebes, they choose Bima Brebes and Bima Curut varieties.

Based on the study, for the breeders who want to release new shallot varieties, it is needed to concern with those aspects. The breeders also are necessity to looking for other excellences of new shallot varieties. Hence, when they are introduced to farmers, the farmers would like to use the new shallot varieties.

Acknowledgments
Thank you very much for the Indonesian Centre for Horticulture Research and Development that had funded for the study and to Rofik Sinung Basuki, the senior researcher of IVegRI for the data.

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