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### Shallot extension shelf life with fogging and the storage temperature

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**Abstract.** Some leaves of plants can serve as an anti-pest and pathogen. Applications can be extracted or made of smoke. This method is generally done to preserve fish. The use in agriculture has not been generally used, so the specific purpose of this study is to use the smoke of some leaves and combine it with the storage temperature to extend the shelf life of shallot. The postharvest handling technology package of shallot will help farmers and entrepreneurs provide the shallot throughout the year and allow the government to stabilize the price. This research was conducted using a randomized block design arranged in a nested fashion. The first factor was the storage temperature (18°C, 22°C, and 26°C). The second factor was the plant leaves for fogging (*Mahogany*, *Tillandsia diversifolia*, and cloves) and fungicides without treatment as positive and negative controls. The best fogging materials were *Mahogany* and *T. diversifolia* leaves, expressed in the weight loss percentage of 4.19% and 5.33%, respectively. The better storage of shallot was at a temperature of 22, where the weight loss of shallot was low (18.46%), the percentage of tuber roots and rotteness was 0%, the disease percentage was 2.75%, and tubers sprouted by 2.1 %.

#### 1 Introduction

Shallot is a horticultural commodity in relatively high demand in the world. In 2021, the Top importers of Onions and shallots, fresh or chilled are the United States (\$537,289,27K, 666,408,000 Kg), Germany (\$210,710,18K, 251,350,000 Kg), Malaysia (\$207,067,71K, 484,867,000 Kg), United Kingdom (\$201,877,00K, 296,195,000 Kg), European Union (\$200,393,88K, 298,148,000 Kg) [1]. Consumption of shallots in Indonesia has fluctuated and relatively increased. The average shallot consumption in 2020 reached 2,764 kg/capita/year [2]. To cover the shortfall, Indonesia imported shallot. Fluctuations shallot imports showed an increase in the number. As a result, Indonesia's shallot production in 2021 is 2,615,677; in 2050, it will be 4,189,324. Nevertheless, in 2020, Indonesia imported shallots from Vietnam, Malaysia, and Thailand 8,17 thousand tonnes of production in 2020, of 1,815,445 [3].

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# Artikel 3

## Shallot extension shelf life with fogging and the storage temperature

 Henik Sukorini 1

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# Shallot extension shelf life with fogging and the storage temperature

Henik Sukorini<sup>1,\*</sup>

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**Abstract.** Some leaves of plants can serve as an anti-pest and pathogen. Applications can be extracted or made of smoke. This method is generally done to preserve fish. The use in agriculture has not been generally used, so the specific purpose of this study is to use the smoke of some leaves and combine it with the storage temperature to extend the shelf life of shallot. The postharvest handling technology package of shallot will help farmers and entrepreneurs provide the shallot throughout the year and allow the government to stabilize the price. This research was conducted using a randomized block design arranged in a nested fashion. The first factor was the storage temperature (18°C, 22°C, and 26°C). The second factor was the plant leaves for fogging (*Mahogany*, *Tithonia diversifolia*, and cloves) and fungicides without treatment as positive and negative controls. The best fogging materials were *Mahogany* and *T. diversifolia* leaves, expressed in the weight loss percentage of 4.19% and 3.33%, respectively. The better storage of shallot was at a temperature of 22, where the weight loss of shallot was low (18.46%), the percentage of tuber roots and rotteness was 0%, the disease percentage was 2.75%, and tubers sprouted by 2.1 %.

## 1 Introduction

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recommended dosage (0.5 ml/l), and the negative control was no fogging and pesticide. Fogging treatment of shallots was done for 8 hours, from 2.30 to 9.30 pm.

**c. Storage**

Smoked shallots were stored under temperature treatments 18, 22, and at room temperature ( $\pm 26^{\circ}\text{C}$ ) for ten weeks.

**d. Observations**

- 1) Weight loss (%): this observation was done by weighing the initial weight of smoked shallots minus the weight of the end of the observation by the formula:  $((a-b)/a) \times 100 \%$
- 2) Whereas  $a$  = initial weight of smoked shallots,  $b$ = weight of the end of the observation
- 3) The percentage of porous and dried shallots (%)
- 4) Calculate the percentage of the number of porous/dried tubers (%) after storage by the formula:  $((a-b)/a) \times 100 \%$ , Whereas  $a$  = some shallots tuber,  $b$  = some porous /dried shallots.
- 5) Disease incidence (%). Calculate the percentage of the number of tubers attacked disease by the formula:  $((a-b)/a) \times 100 \%$ , Whereas  $a$  = some shallot tubers,  $b$  = some tubers attacked disease.
- 6) The percentage of rooted shallot tubers (%), Calculating the percentage of rotten shallot tubers after storage by using a formula:  $((a-b)/a) \times 100 \%$ , Whereas,  $a$  = a number of shallot tubers,  $b$  = a number of rotten shallot tubers
- 7) Sprouted shallot bulbs percentage (%), Calculating the percentage of sprouted shallot tubers after storage by using a formula  $((a-b)/a) \times 100 \%$ , Whereas  $a$  = a number of shallot tubers,  $b$  = a number of sprouted shallot tubers.
- 8) Analysis of data: The collected data were statistically analyzed for variance analysis (ANOVA) to verify the level of significance. Duncan's Multiple Range Test (DMRT) was done to compare the effects of the treatments.

**3 Result and Discussion**

**3.1. Percentage of Weight Losses After Fogging**

Shallot weight loss when smoked with the leaves of *T. diversifolia* was 3.33%, whereas that smoked with mahogany leaves or clove leaves was 4.19 and 4.62%, respectively (Table 1).

**Table 1.** Percentage of weight loss after fogging.

Treatments	Wight loss of shallot tubers (%)
Fogging with Mahogany leaves	4,19 b
Fogging with Clove leaves	4,62 b
Fogging with <i>T. diversifolia</i> leaves	3,33 ab

The number accompanied by the same letters was not significant at 5% of Duncan's

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### 3.2. Average of Weight Loss (%), Rooted Bulbs (%), Sprouted bulbs (%), Porous bulbs (%), and Disease attack (%) at ten weeks after storage

The highest weight loss was observed when fogging with clove leaves and stored at a temperature of 18°C. However, statistically, it was not significantly different from the treatment without fogging, clove leaves, and *T. diversifolia* leaves stored at a temperature of 22°C. The lowest weight loss was observed when *T. diversifolia* leaves were treated and stored at a temperature of 26°C.

**Table 2.** Average weight Loss (%), Rotted Bulbs (%), Sprouted bulbs (%), Porous bulbs (%), and Disease attack (%).

Storage Temperature	Treatments	Average of weights Lost (%)	Rooten Bulbs (%)	Sprouted bulbs (%)	Porous bulbs (%)	Disease attack (%)
18 °C	No Fogiing	27.62 de	2.22 d	22.40 e	0.00 a	0.00 a
18 °C	Mahogany	24.02 bcde	0.54 b	11.96 c	0.00 a	0.00 a
18 °C	Clove	28.69 e	0.52 b	11.96 c	0.00 a	4.09 bc
18 °C	<i>T. diversifolia</i>	22.34 abcd	1.17 ab	22.49 e	0.00 a	1.63 a
18 °C	Fungicide	22.14 abcd	2.19 d	14.94 c	0.00 a	0.00 a
22 °C	No Fogiing	23.57 ab	0.00 a	1.35 b	1.11 b	3.32 b
22 °C	Mahogany	18.46 ab	0.00 a	2.03 ab	0.00 a	2.75 b
22 °C	Clove	27.52 de	0.00 a	0.85 a	0.00 a	3.97 bc
22 °C	<i>T. diversifolia</i>	27.29 cde	0.00 a	0.67 a	0.00 a	9.06 d
22 °C	Fungicide	21.9 abcd	0.00 a	0.76 a	1.76 b	5.86 c
26°C	No Fogiing	19.76 ab	0.00 a	0.00 a	1.12 b	3.54 b
26°C	Mahogany	21.1 abcd	0.00 a	0.00 a	0.56 a	1.74 a
26°C	Clove	21.12 abcd	0.00 a	1.20 a	3.91 d	10.58 e
26°C	<i>T. diversifolia</i>	16.35 a	0.00 a	1.20 a	3.62 c	4.14 bc
26°C	Fungicide	20.95 abc	0.00 a	0.00 a	0.42 a	4.89 c

The number accompanied by the same letters was not significant at 5% of Duncan's

In all fogging treatments, storage at 18°C resulted in a higher percentage of tubers rooted than storage at 22°C and 26°C, but at the storage temperatures of 22°C and 26°C, the lowest percentage of the number of sprouted bulbs reached 0%.

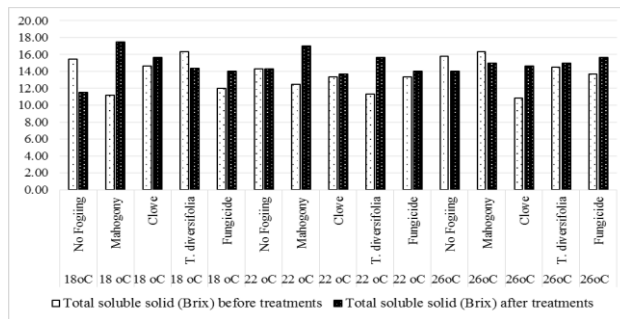
The highest percentage of porous tubers was 3.91% in the fogging treatment with clove leaves and stored at room temperature ( $\pm 26$  °C). In contrast, the lowest percentage of porous tubers reached 0% in the storage temperatures of 18°C and 22°C in all treatments, except the treatment without fogging.

In the treatment of storage temperature at 18°C, without fogging, mahogany leaves and fungicide were the best treatments for percentage disease attacks, with the lowest reaching 0%. The percentage of disease was the highest in the treatment of storage at room

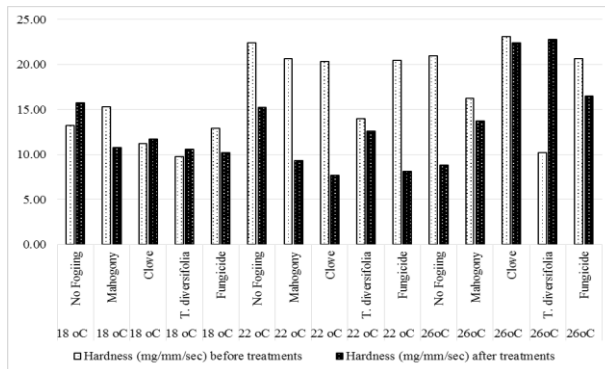
temperature ( $\pm 26^{\circ}\text{C}$ ) with clove leaves fogging, reaching 20.58%, and the lowest was smoked with mahogany leaves by 1.74%.

### Total Soluble solid and Hardness of shallot Bulbs

All treatments of the storage temperature and fogging led to an increase in total soluble solids and otherwise caused a decrease in the hardness of shallot bulbs (Figures 1 and 2).



**Fig. 1.** The Total Soluble Solid of shallot before and after treatment with plant leaves and storage at different temperatures.



**Fig. 2.** The Hardness of shallot before and after treatment with plant leaves and storage at different temperatures

## 4 Discussion

Fogging with mahogany and *T. diversifolia* leaves treatments was the best because those did not lead to a high percentage of weight loss of shallot before storage. *Tithonia diversifolia* is a wild species commonly found in medium to high altitudes. Its leaves contain flavonoid compounds, alkaloids, and tannins that can act as botanical fungicides, insecticides, antifeedants, and anti-oviposition agents [9]. Fogging could significantly reduce the water content. The depreciation weight of shallot occurred due to the process of evaporation (transpiration) during curing, causing water levels in tubers to be reduced, resulting in shrinkage of tuber weight. Fogging with clove leaves caused a high percentage of weight loss, which was 4.62%. This happens because the clove produced more smoke; it affected the evaporation of water from the smoked material, which would increase as a result of the increased thickness of the smoke around the bulbs, so weight loss was also

increased. Clove leaf thickness of smoke could be seen from the higher water content compared to other leaf material, which was 77.6%. At a temperature of 18°C, a better treatment contained in the leaves of *T. diversifolia* fogging and spraying fungicide. The best treatment was in *T. diversifolia* fogging, which had a relatively low weight loss of 22.34%, and the percentage of porous tubers was 0%. However, there was a percentage of disease at 1.63%, a percentage of tuber roots of 1.17%, and tubers emerged shoots at 22.49%.

Two compounds identified as plant volatiles, hexanal and 2-trans-hexenal, were placed on their ability to inhibit postharvest pathogens and their use in an overall postharvest strategy in combination with 1-methylcyclopropene (1-MCP) [10]. Fumigant toxicity tests conducted with essential oils of plants (mainly belonging to *Apiaceae*, *Lamiaceae*, *Lauraceae*, and *Myrtaceae*) and their components (cyanohydrins, monoterpenoids, sulfur compounds, thiocyanates, and others) have largely focused on beetle pests such as *Tribolium castaneum*, *Rhyzopertha dominica*, *Sitophilus* [11].

[12] The possibility of rejection is caused by the aroma of the leaf extract of *T. diversifolia*, which makes the larvae not want to eat. The treatment of fungicide indicated the lowest weight loss of 22.14%, the percentage of porous tubers by 0%, and 0% percentage disease attack, but there were rooted bulbs and tubers sprout at 2.19% and 14.94%, respectively; it caused a shallot apical meristem response for low-temperature storage (prechilling)

In the storage temperature treatment at 22°C and ± 26°C, leaf mahogany fogging and spraying fungicide treatment were the best treatments compared to other treatments; they were caused by low-temperature storage stimulating the growth of the apical meristem. The percentage of tuber sprout growth at 22°C is lower than the percentage of tuber sprout at 18; it was caused by the response of the bulb inhibitors, which might be lost at lower temperatures, and the growth regulator appears later, which will affect germination. According to Salisbury and Ross [13], gibberellin may leak out of the storage container when it becomes much more permeable membranes at low temperatures. In some species, the hormone cytokinin or ethylene can act as gibberellins.

## 5 Conclusions and recommendation

Based on the results of this study, it was concluded that The fogging materials were better contained in mahogany and clove leaves, while the temperature for shallot storage was 22°C and 26°C. In contrast, 22°C, the weight loss of shallot was 18.46%, the percentage of rooted and porous tubers was 0%, but the percentage of disease attacks was 2.75%, and tubers sprouted by 2.1%. Storage at room temperature (± 26 °C), the weight loss of shallot was 21.10%, the percentage of rooted and tubers sprouted 0%, but the percentage of porous tubers was 0.56%, and the percentage of disease attack was 1.78%. In the future v e, fogging materials could be used for the extended shelf life of Shallot bulbs.

## References

1. Onions and shallots, fresh or chilled imports by country (2021). <https://wits.worldbank.org/trade/comtrade/en/country/ALL/year/2021/tradeflow/Imports/partner/WLD/product/070310>
2. Andriani, I. Cover Depan. *J Transp Multimoda*. **16**(1), (2019).
3. H. Tori , A, Yusuf Kholil , Dyanasari. Prospect Analysis of Onion (*allium cepa* L) Production in Indonesia. *Indones J Agric Environ Anal* [Internet]. **2**(1):1–14. (2023). Available from: <https://journal.formosapublisher.org/index.php/ijaea/index>
4. T.S. Workneh. Effects of nitrogen levels, harvesting time, and curing on quality of

- shallot bulb. *African J Agric Res.* **5**(24):3342–53 (2010)
5. D. Amiarsi, K.S. Sasmitaloka, A.B. Arif, S.M.Widayanti. Curing Process Modification of Shallot Through Cutting Leaves. *IOP Conf Ser Earth Environ Sci.* **309**(1) (2019)
  6. S. Ricardo-Rodrigues, M.I. Rouxinol, A.C. Agulheiro-Santos, M.E. Potes, M. Laranjo, M. Elias. The Antioxidant and Antibacterial Potential of Thyme and Clove Essential Oils for Meat Preservation—An Overview. *Appl Biosci.* **3**(1):87–101(2024)
  7. A.B.N. Aini, Karseno. Technical and fumigation time effects on shallot storage quality. *IOP Conf Ser Earth Environ Sci.* **828**(1) (2021)
  8. N. Nurmalia, Y.A. Purwanto, S. Sobir, S. Sulassih, N. Naibaho. Effect of low temperature and period of storage on the quality of Garlic Seeds (*Allium sativum* L). *IOP Conf Ser Mater Sci Eng.* **557**(1) (2019)
  9. R. Widyastuti, D. Susanti, R. Wijayanti, Toxicity and repellency of tithonia (*Tithonia diversifolia*) leaf extract to whitefly (*Aleurodicus dugesii*) on *Plectranthus scutellarioides*. **29**(1), 1-8 (2018).
  10. P. Sholberg, Control of Postharvest Decay by Fumigation with Acetic Acid or Plant Volatile Compounds. *Fresh Prod.* **3**(1):80–86 (2009)
  11. S. Rajendran, V. Sriranjini, Plant products as fumigants for stored-product insect control. *J Stored Prod Res.* **44**(2):126–35 (2008)
  12. N., Kerebba, A.O., Oyedeji, R., Byamukama, S.K, Kuria, Pesticidal activity of *Tithonia diversifolia* (Hemsl.) A. Gray and *Tephrosia vogelii* (Hook f.); phytochemical isolation and characterization: A review. *S Afr J Bot* **121**: 366-376 (2019)
  13. F.B. Salisbury, and C. W. Ross. *Plant Physiology* (ITB Press, 1995)