JTEP Jurnal Keteknikan Pertanian,
Vol. 13 No. 2, p 179-194, 2025
P-ISSN 2407-0475 E-ISSN 2338-8439

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

Utilization of Drying House for Curing Process of Sweet Potato

Ghazian Satya Ihsan[1*], Sutrisno[1], Emmy Darmawati[1]

[1]Department of Mechanical and Biosystem Engineering, Faculty of Agricultural Engineering and Technology, IPB University, Lingkar Akademik Street, IPB Dramaga Campus, Babakan, Bogor, West Java 16680, Indonesia
*Corresponding author, email: ghaziansatya@apps.ipb.ac.id

Article Info

Submitted: 13 January 2025
Revised: 20 March 2025
Accepted: 21 April 2025
Available online: 2 June 2025
Published: June 2025

Keywords:
Curing, drying house, Sweet Potato, Tubers

How to cite:
Ihsan, G. S., Sutrisno., Darmawati, E. (2025). Utilization of Greenhouse Solar Dryer For Curing Process of Sweet Potato. Jurnal Keteknikan Pertanian, 13(2): 179-194. https://doi.org/10.19028/jtep.013.2.179-194.

Abstract

Sweet potato (Ipomoea batatas L.) Cilembu is an export commodity with a high economic value. However, approximately 50% of Cilembu sweet potato harvests do not meet export quality. One of the reasons was uncontrolled curing process. Temperature and Relative Humidity (RH) are environmental factors that significantly influence the curing process. The purpose of this study was to develop a control method and conduct a temperature and RH performance test in a drying house in accordance with the needs of the curing process, and to analyze the effects of temperature, RH, and curing time on the quality of sweet potatoes. The study was conducted experimentally in three stages: tool performance testing, preliminary research, and main research. The experimental design used was a completely randomized factorial design with three factors: temperature (30°C and 35°C), RH (80% and 90%), and curing time (3 days and 5 days). The quality parameters observed were physical damage, skin color, texture, water content, and Total soluble solids. The results of the study showed that the drying house with additional controllers connected to the thermostat and hygrostat was able to control the temperature and RH in the drying house according to the needs of the curing process in the drying house for 24 h. During the storage period, treatment with the curing process increased the Total Soluble Solids value when compared to the control. The curing process at a temperature of 30°C (T1), humidity of 90% (H2), and curing period of 3 days (D3) was able to maintain the quality of sweet potatoes during storage.

Doi: https://doi.org/10.19028/jtep.013.2.197-194

1. Introduction

Sweet potato (Ipomoea batatas L.) The Cilembu variety is an export commodity with high economic value and potential (Mardiyanto et al., 2020). The high demand in the international market makes it necessary to maintain the quality of sweet potatoes (Krochmal et al., 2020). The main factor limiting the export potential of sweet potatoes is the decrease in quality during storage. Sweet potatoes generally have high moisture content (50-80%) and thin skin, making them susceptible to mechanical damage during handling (Sugri et al., 2019). This damage causes losses for exporters and affects the export value.

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

To obtain high-quality Cilembu tuber products in accordance with SNI 01-4493-1998, postharvest handling of Cilembu tubers is required in a controlled manner. One of the post-harvest treatments commonly performed by farmers is curing. Curing aims to dry the neck and outer skin layer of the tuber, which can help cover tuber skin wounds during harvesting, reduce water loss, and prevent the entry of microbes during storage (Siahaan, 2020). However, the curing process that is usually carried out by farmers is still traditional and uncontrolled, so the curing process itself does not take place effectively and takes 7 to 10 days. The need for high curing temperatures and can be achieved throughout the day is by utilizing a drying house, therefore, there is a need to develop a curing method that utilizes a drying house to maximize the Cilembu tuber curing process and produce good quality Cilembu tuber products. The purpose of this research is to develop a control method and test the performance of temperature and humidity (Relative Humidity/RH) in a drying house according to the needs of the curing process, and to analyze the effect of temperature and RH during the curing process on the quality of sweet potatoes.

2. Materials and Methods

2.1 Materials and Tools

The tools used in this study include a drying house, thermostat XH-W3001, hygrostat XH-W3005, thermometer and hygrometer with Elitech GSP-6 datalogger, 20mm ceramic type mist maker, Heater fan model lamp 300watt, portable heater 2000watt, incandescent lamp 100watt, plastic box container, float tap, 10 liter water jerry can, 10mm water hose, Sinleader SL 4500 water pump, 0.2mm misting nozzle, CR-300 penetrometer, Mettler PM-4800 digital scale, Mettler oven, ATAGO Master Serial (ACT) hand refractometer, and Minolta CR-400 chromameter.

The main raw material used in this study was the sweet potato vr. Cilembu, which comes from the Cilembu village area, Sumedang, with a harvest age of four months after planting. Distilled water was used as another material.

2.2 Research Procedure

This research consists of making control devices, preliminary research, and research.

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

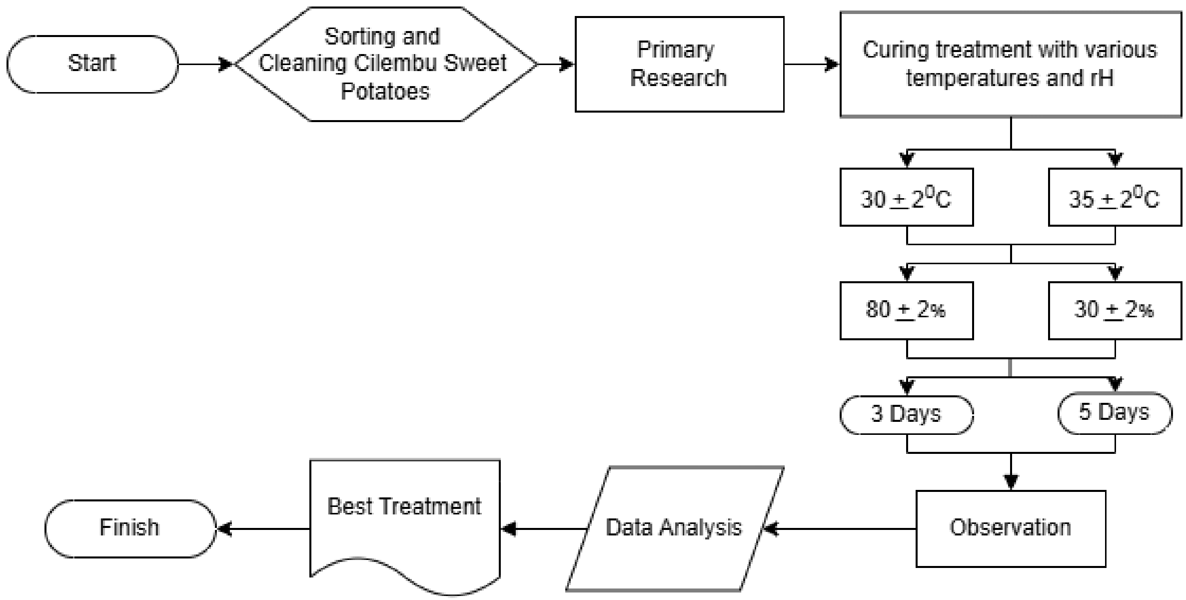


Figure 1. Flowchart of Research.

2.3 Performance Test of Temperature and RH Control Device

The first step was to clean the drying house area. The drying house had outer dimensions of 350 cm (P) × 308 cm (L) × 202 cm (T), and shelf dimensions of 247 cm (P) × 154 cm (L) × 100 cm (T). The drying house had an iron frame, and the wall and roof material were polycarbonate. The second stage involved installation of a curing control device. The temperature control device uses 4 100-watt incandescent lamps and 3 200-watt portable heater lamp models used as heat sources at night. The equipment was hung on a rack at a height of 1 m above the material. A 2000 watt portable heater and fan were hung above and placed on the edge of the drying house wall. The temperature-control device was connected to a thermostat. Humidity control devices, namely mist makers with as many as two pieces, were placed on two sides of the rack. The mist maker is a container filled with water and four mist makers. A small fan in the container blows steam from the container. The water level in the container was regulated by using a float tap. If the water level drops past this limit, the faucet opens and adds water from the water storage to the mist maker container. Meanwhile, a pressurized water misting was attached to the roof edge of the drying house. The water misting device had three nozzles, each with a size of 0.2 mm. The humidity control device is connected to a hygrostat. The placement of the temperature- and humidity-control devices is shown in Figure 2.

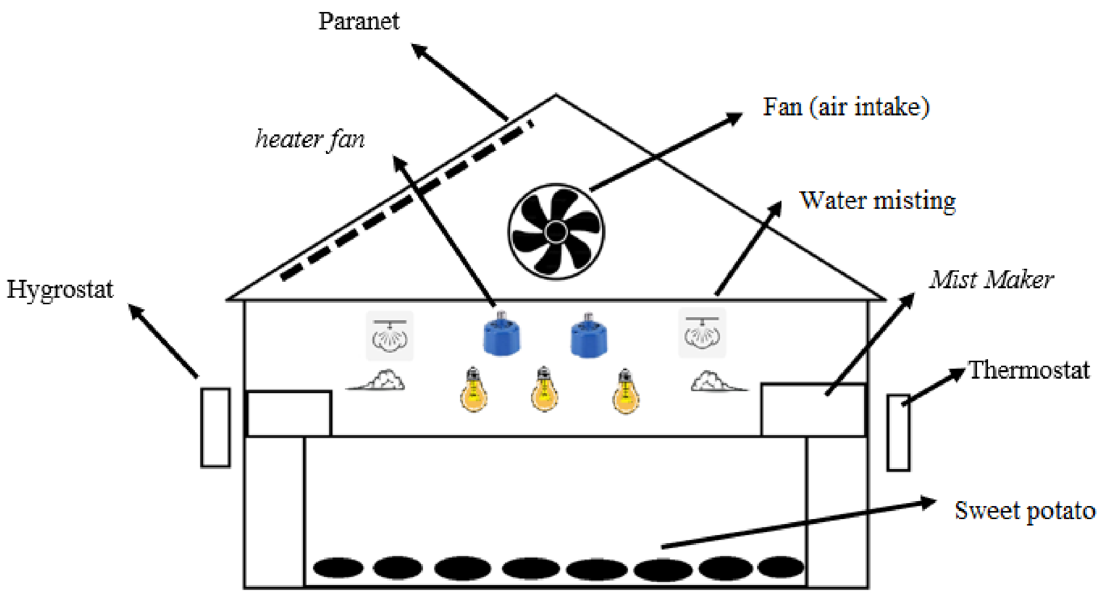


Figure 2. Layout of the drying house.

2.4 Preliminary Research

Performance tests of the temperature and RH control devices with sweet potato loads. This stage aimed to determine the performance of the controller during the curing process using a sample of eight sweet potatoes. The controller performance test was performed by activating the temperature controller and RH controller in the form of a thermostat and hygrostat. The controller was set at 30°C and 80% RH and tested for one day. After the device was ready, it was tested for curing with a load of 8 Cilembu sweet potatoes for one day at 30°C and 80% RH. The tested sweet potatoes were scratched (mechanically wounded) intentionally and a mechanical wound was observed after the curing process was completed.

2.5 Primary Research

After the preliminary research was completed, the main research continued with a performance test of the drying house with the load. Sweet potatoes (80 kg) were stored in a drying house and subjected to three experimental treatments: temperature, RH, and curing time. The first factor is temperature, with two levels: 30°C (T1) and 35°C (T2). The second factor is RH, with two levels: 80% (H1) and 90% (H2). The third factor is the length of curing with two levels, namely, three days (D3) and five days (D5). After curing, the sweet potatoes were stored for 15 d at room temperature, and the quality changes during storage were measured.

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

2.6 The Observation Parameter

The parameters measured in the preliminary study were the temperature and RH in the drying house before loading (no samples in the drying house yet). The parameters in the main study included physical damage, moisture content, total soluble solids, hardness, and skin color during curing.

2.7 Physical Damage

The level of damage to sweet potatoes was determined by observing the number of sweet potatoes that had physical damage >25%. A physical damage of 25% was considered as the limit of consumer acceptance of Cilembu tuber damage. The physical damage included blackish or brownish spots. The percentage of damage is calculated using the following equation 1.

$$Damage\ Rate\ \% = \frac{JUR}{JUA} \times 100\% \quad (1)$$

Where JUR; Number of damaged tubers, JUA; Number of initial tuber

2.8 Moisture Content

The moisture content was measured using the oven method (AOAC, 2000). Moisture content was calculated using Equation 2:

$$K\alpha\ (\%bb) = \frac{B-C}{B-A} \times 100\% \quad (2)$$

Where $K\alpha$;Moisture content (%), A;Weight of cup (g), B; Weight of cup and material before drying (g), C; Weight of cup and material after drying (g).

2.9 Total Soluble Solids

The Total Soluble Solids (TSS) were measured using a refractometer. The tuber was crushed and the resulting tuber liquid was dripped into the refractometer prism. The measured TSS was expressed as °Brix.

2.10 Brightness Level

The measurement of changes in brightness in sweet potatoes is based on changes in sweet potato skin during the curing process during storage using a chromameter; the resulting value is the Hunter value. The Hunter value is one way to measure and describe light in a three-dimensional color space, identified as the L* value. Data collection on sweet potato samples was conducted at three points: base, middle, and top.

2.11 Experimental Design

The experimental design used was a factorial complete randomized design (CRD) with three factors and two replicates. The first factor was temperature, 30°C (T1), and 35°C (T2). The second factor was the RH: 80% (H1) and 90% (H2). The third factor was day length, which was 3 days (D3) and 5 days (D5). Data analysis was performed using ANOVA with Minitab version 18 at 95%

JTEP Jurnal Keteknikan Pertanian,
Vol. 13 No. 2, p 179-194, 2025
P-ISSN 2407-0475 E-ISSN 2338-8439

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

confidence interval. If there were significant differences between treatments, the analysis was continued using Duncan's multiple range test (DMRT) with a 95% confidence interval (α = 0.05).

3. Results and Discussion

The preliminary research aimed to test the environmental conditions of the dryer house without load and the performance of the temperature and RH control devices.

3.1 Performance tests of Temperature and RH Control Device

The temperature and RH control devices, namely the thermostat and hygrostat, were tested for 24 h. The temperature and RH in the controller are set according to the treatment, which is 30°C, while the RH is at 80%. The measurements of the drying house environmental conditions during the performance test of the controller are shown in Figure 3.

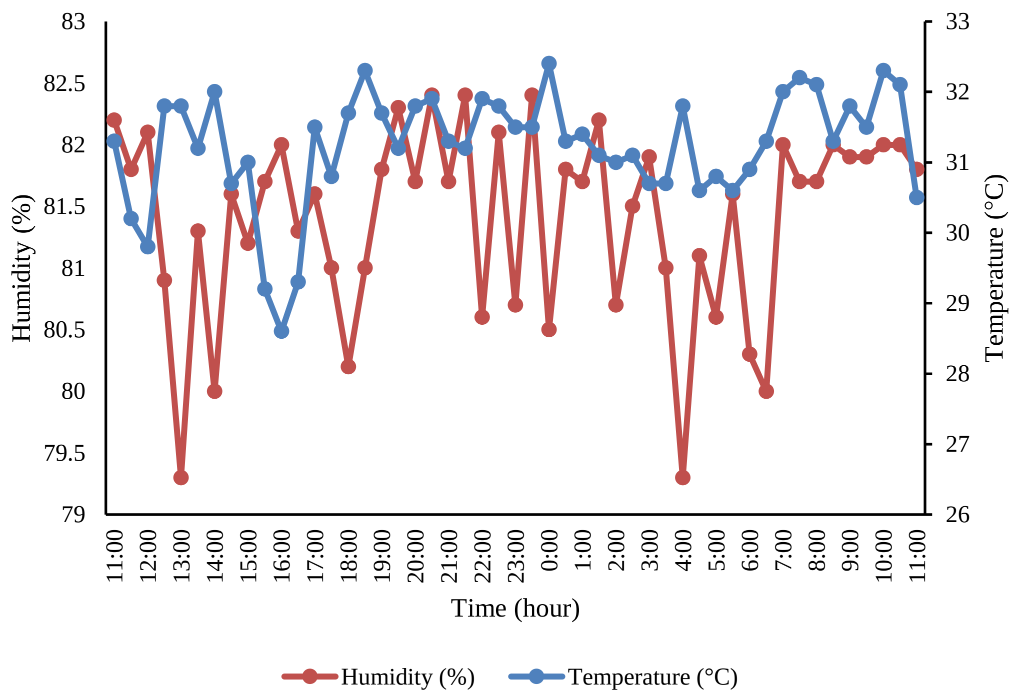


Figure 3. Temperature and RH graphs with ±2°C temperature tolerance and 2% RH inside a drying house for 24 h

The temperature recording data show that during the curing process, it does not exceed the desired temperature limit, which is 30°C, with an upper limit tolerance of 32°C and a lower limit of 28°C. The humidity recording also shows that the humidity is still within the desired value of 80%, with an upper limit tolerance of 82% and a lower limit of 78%. After the successful testing of the tool, it can be continued for the curing process.

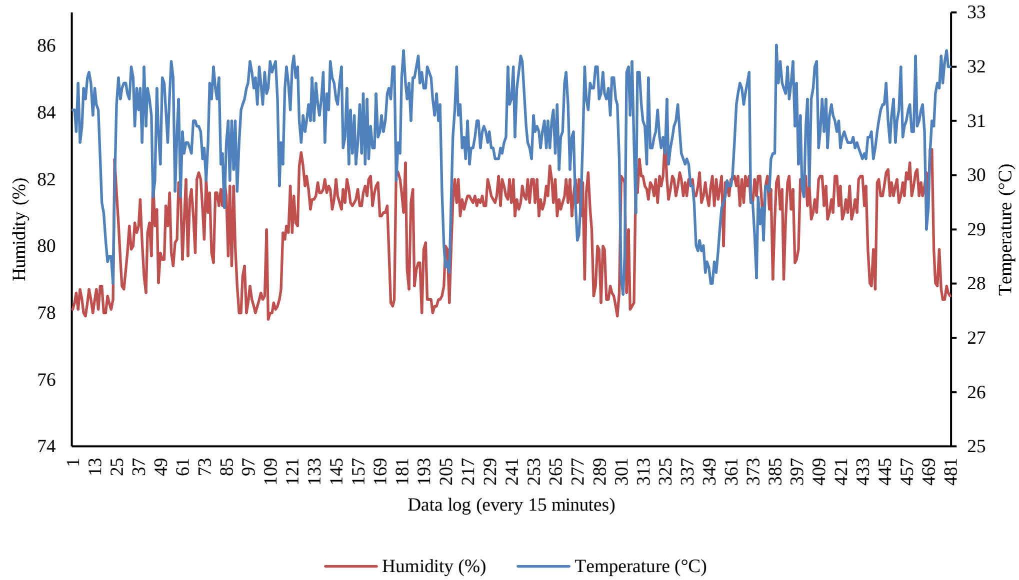
Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

After the tool was ready for the curing process, it was tested using a load of eight Cilembu sweet potatoes for one day at 30°C and 80% RH. Sweet potatoes were scratched (mechanically wounded) and observed for mechanical wounds after the curing process was complete. Preliminary curing results showed that the scratched sweet potato skin had wound closure on the flesh but not on the skin. This indicates that the curing process can restore the mechanical damage to Cilembu sweet potatoes.

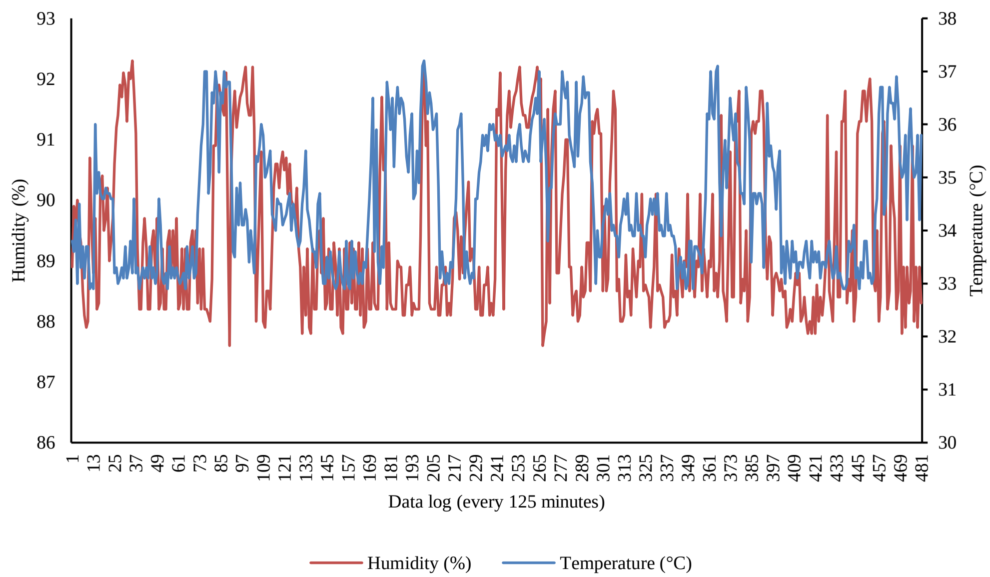
Figure 4. Sweet potato before curing (a) and sweet potato after curing (b)

3.2 Performance of Temperature and RH Control Devices During the Curing Process

Sweet potatoes (80 kg) were stored in racks in a drying room. There were four different treatments in the rack, namely the 3-day and 5-day curing treatments, and each treatment used 20 kg of sweet potato. The temperature and RH during the curing process are shown in Figures 5 and 6, respectively.

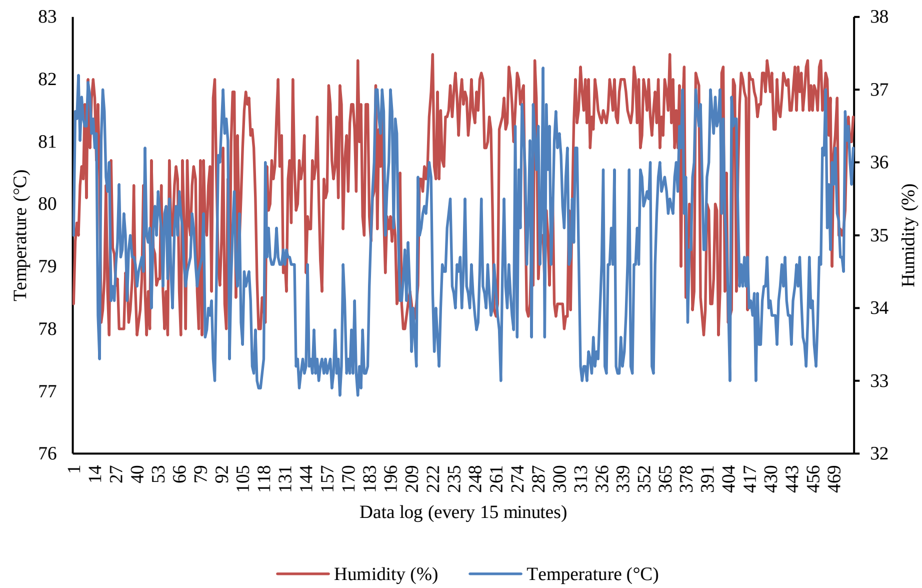


(a)

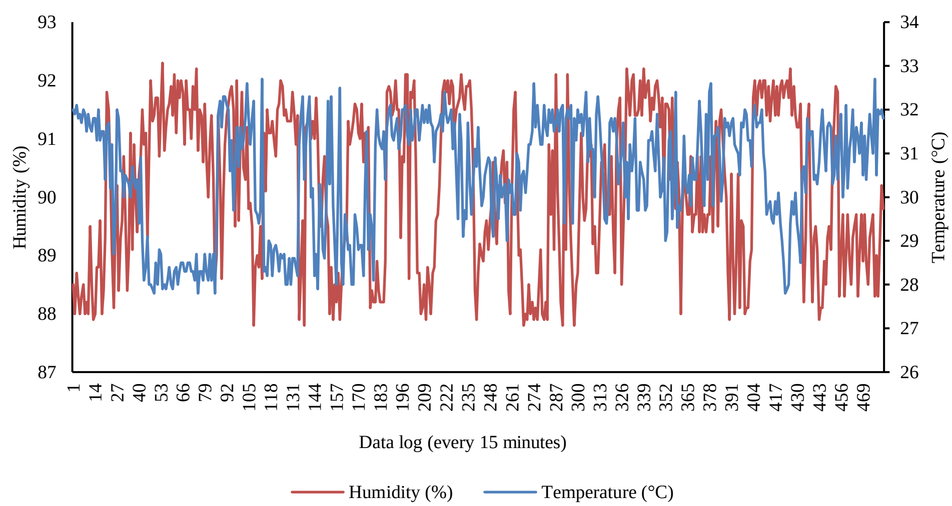


(b)

Figure 5. Temperature and RH graphs of T1H1D3-5 (a) and T2H2D3-5 (b) treatment of drying houses.



(a)



(b)

Figure 6. Temperature and RH graphs of T2H1D3-5 (a) and T1H2D3-5 (b) treatment-drying houses.

During the curing process, temperature and RH control devices were operated according to the treatment. Temperature and RH did not exceed the treatment tolerance limits of approximately 2°C and 2% at RH. During the day, the temperature was controlled using a fan that introduced air from outside the drying house into the drying house. At night, temperature was controlled using incandescent lamps and portable heaters. The incandescent lamp also played a role in reducing

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

humidity inside the drying house. During the curing process, the RH controller (hygrostat) experienced damage to the sensor and fog maker, but was immediately repaired.

3.3 Observation Results

3.3.1 Physical Damage

Damage to sweet potatoes, such as bruising, black spots, sprouting during harvesting, and distribution processes, can be a major concern for most consumers (Sanchez et al., 2020). Inappropriate environmental storage conditions can lead to physiological damage and postharvest diseases. A physical damage of 25% is considered the standard for the acceptance of Cilembu tuber damage by consumers. This is illustrated in Figure 7.

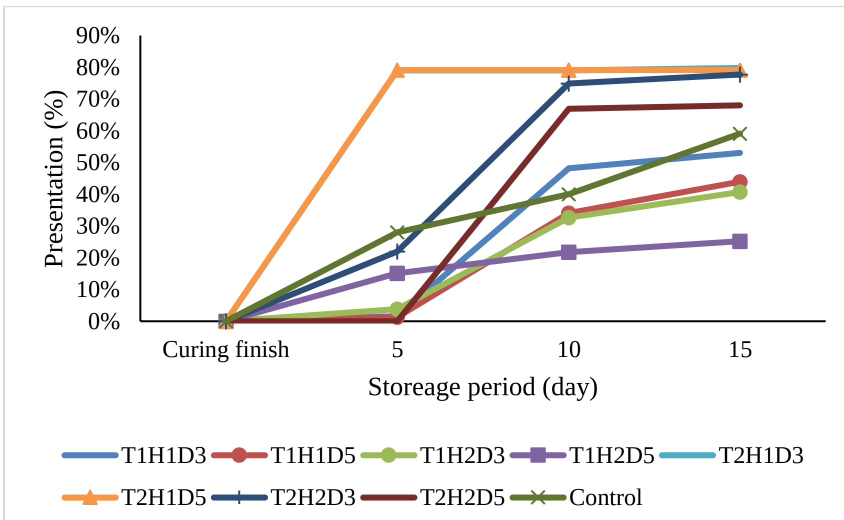


Figure 7. Percentage of physical damage to Cilembu sweet potato after curing and storage

During storage, curing treatments T1H2D3, T1H2D5, and T1H1D5 maintained the level of physical damage until the end of the shelf life when compared to the control. Nissa (2020) stated that sweet potatoes with curing process can reduce physical damage to the tubers. Meanwhile, the T2H2D5, T2H2D3, and T2H1D5 treatments experienced a high level of damage at the end of shelf life. This shows that the treatment is not appropriate during the curing process, which can increase damage to sweet potatoes during storage. Damage, such as sweet potatoes that lose texture or are mushy, triggers shoot growth (Nurhalim et al., 2022). Sprouting in cilembu sweet potatoes can be a fatal source of damage to sweet potatoes because the growth of sprouts can affect the nutritional content therein.

The results of the analysis of variance showed that the combination of temperature and humidity had an effect ($P<0.05$) on the physical damage of Cilembu sweet potatoes during storage. However, the curing duration had no effect on the physical damage to Cilembu sweet potatoes. Further tests on

 Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

the combination of temperature and humidity showed that T2H1 was the best treatment. T2H1 treatment was significantly different from T1H1 and T2H2 but not significantly different from T1H2. This indicates that temperature and humidity treatments during the curing process can cure the physical damage to sweet potatoes during storage. Temperature and humidity in the sweet potato curing process keep a layer of material under the dead cells, thus inhibiting infection from the cause of disease in sweet potatoes (Edmunds et al., 2003).

3.3.2 Moisture Content

Moisture content is an indicator of fruit freshness and can affect weight loss (Pah et al. 2020). The results showed that the moisture content of the Cilembu tubers increased and then decreased during the curing period. This is illustrated in Figure 8.

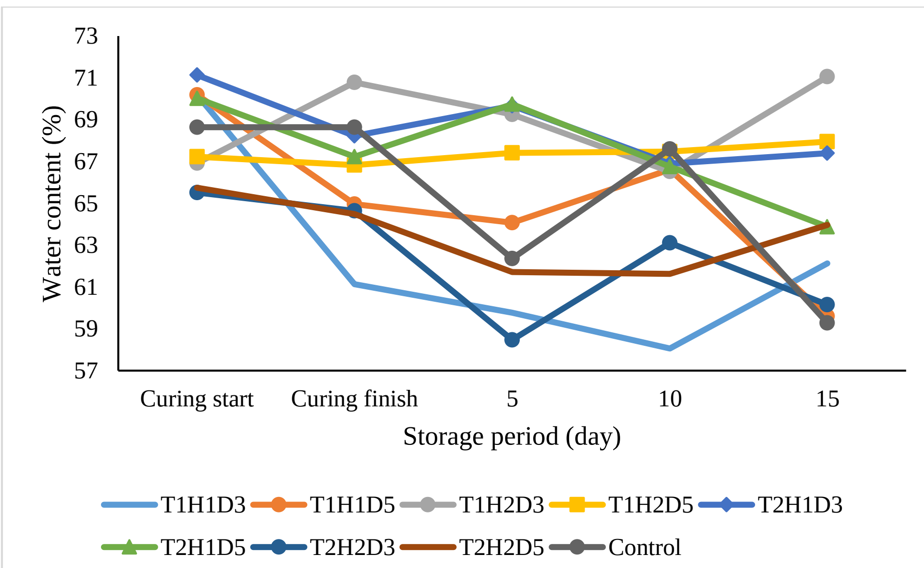


Figure 8. Cilembu tuber moisture content during curing and storage.

During the curing process, the moisture content of sweet potatoes decreased (De Souza et al., 2021). The tuber with a 3-day curing treatment had a relatively small average decrease in moisture content when compared to the 5-day curing treatment. This indicates that curing for a long time can cause a significant decrease in the moisture content. During shelf life, sweet potatoes treated with T1H2D5 had an increase in moisture content with the highest slope value. This indicated that the curing treatment increased the moisture content during the curing process.

The results of the analysis of variance showed that the combination of temperature and humidity treatment had an effect ($P<0.05$) on the moisture content of Cilembu sweet potatoes during storage. Meanwhile, the length of the curing process did not affect the moisture content of Cilembu sweet potato. The lignin layer formed during curing can inhibit the rate of water loss in Cilembu sweet

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

potato (Nissa, 2020). Therefore, curing can maintain the moisture content of Cilembu sweet potato during storage. Further test results showed that T1H2 and T2H1 were the most effective treatments.

3.3.3 Violence

The hardness of agricultural products is related to their textural quality. Post-harvest physiological processes in Cilembu sweet potatoes cause changes in hardness during the curing period. The results showed that The hardness of Cilembu sweet potato decreased and increased during the curing period, as shown in Figure 9.

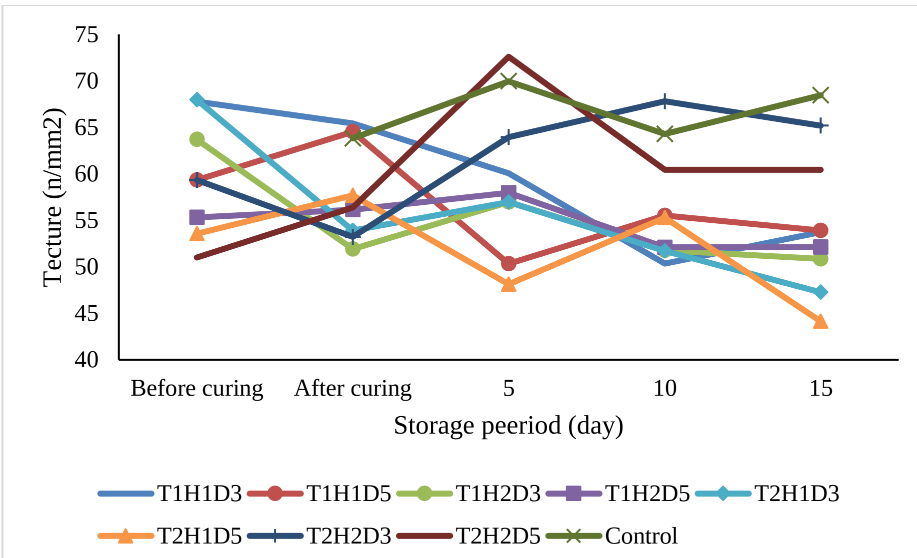


Figure 9. Cilembu tuber hardness during curing and storage.

During the curing process, the hardness of the tubers increased and then decreased. Sweet potatoes cured for five days had an average increase in hardness, whereas those treated for three days had an average decrease in hardness. Inappropriate temperature and RH during the curing process can reduce the hardness of sweet potatoes by converting starch (complex carbohydrates) into simple sugars (such as glucose and fructose). This process usually occurs because of the enzyme activity in sweet potatoes. The sugars formed are more soluble in water, causing loss of hardness and texture in sweet potatoes. During shelf life, sweet potatoes treated with T2H2D3 showed an increase in hardness with the highest slope value when compared to other treatments and the control. This shows that the curing process can maintain hardness during the shelf life. An increase in hardness occurred in sweet potatoes with curing treatment and a decrease in hardness occurred in Cilembu sweet potatoes without curing treatment (Sanchez et al., 2021).

The ANOVA results showed that the hardness of Cilembu sweet potatoes during storage was influenced by moisture during the curing process ($P < 0.05$). The temperature treatment and length of the curing process did not affect the hardness of Cilembu sweet potato. Further test results showed that 90% moisture (H2) was significantly different from 80% moisture (H1), with H2 being the best treatment. An increase in hardness occurred in sweet potatoes with curing treatment and a decrease in hardness occurred in Cilembu sweet potatoes without curing treatment. This means that the lignin layer formed during the curing period can maintain the level of hardness of Cilembu sweet potatoes during the storage period; therefore, sweet potatoes with curing treatment experience an increase in hardness, and sweet potatoes without curing treatment experience a decrease in hardness (Nissa, 2020).

3.3.4 Brightness Level

Brightness is the main physical quality parameter consumers evaluate for acceptance. The yellow color of the Cilembu tuber originates from the β-carotene compounds it contains (Grace et al. 2014). The results showed an increase in the brightness level at the beginning of curing and a decrease at the end of curing. This can be observed in Figure 10, which shows the changes in the brightness level of the Cilembu tubers during the curing process and shelf life.

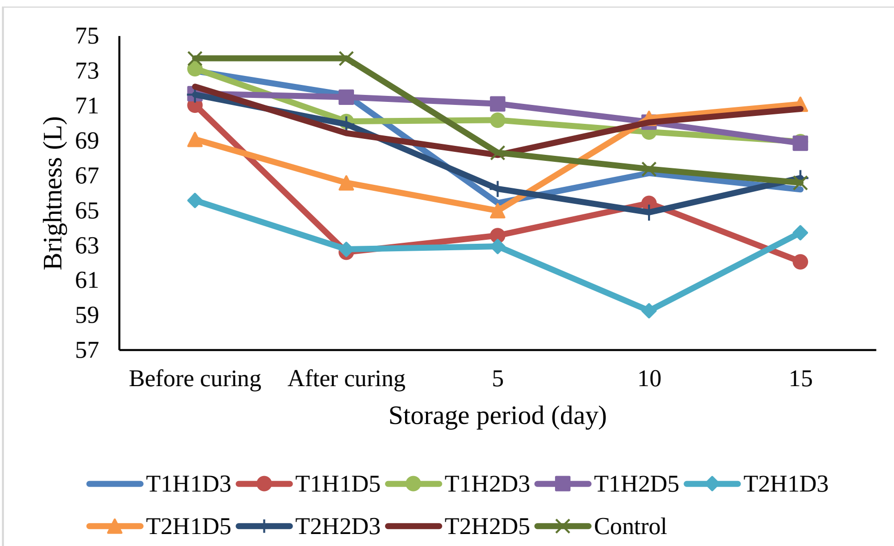


Figure 10. Changes in brightness value (L*) during curing and shelf life.

During the curing process, tubers with a 3-day curing treatment had a relatively small average decrease in brightness value when compared to the 5-day curing treatment. This indicates that curing for a long time can cause a significant decrease in brightness. Meanwhile, during shelf life, sweet potatoes treated with T2H2D5 showed an increase in brightness with the highest slope value compared to the control, which experienced a high decrease in brightness. This shows that the curing process can maintain the brightness level during the shelf life.

The results of the analysis of variance showed that changes in the brightness level of Cilembu sweet potatoes during the curing period were influenced by moisture treatment ($P<0.05$). However, the temperature treatment and length of the curing process did not affect the brightness levels of the Cilembu sweet potatoes. Further test results showed that 90% moisture (H2) was significantly different from 80% moisture (H1), with H2 being the most effective treatment. This indicates that the moisture in the sweet potato curing process can maintain the brightness level during storage.

3.3.5 Total Soluble Solids

TSS content describes the total sugars and organic acids in a material, which indicates the level of sweetness. Varieties, conditions, and storage methods can affect the TSS of sweet potatoes (Sanchez et al. 2020). This can be seen in Figure 11, which shows the changes in the total soluble solids value of Cilembu sweet potato during the curing process.

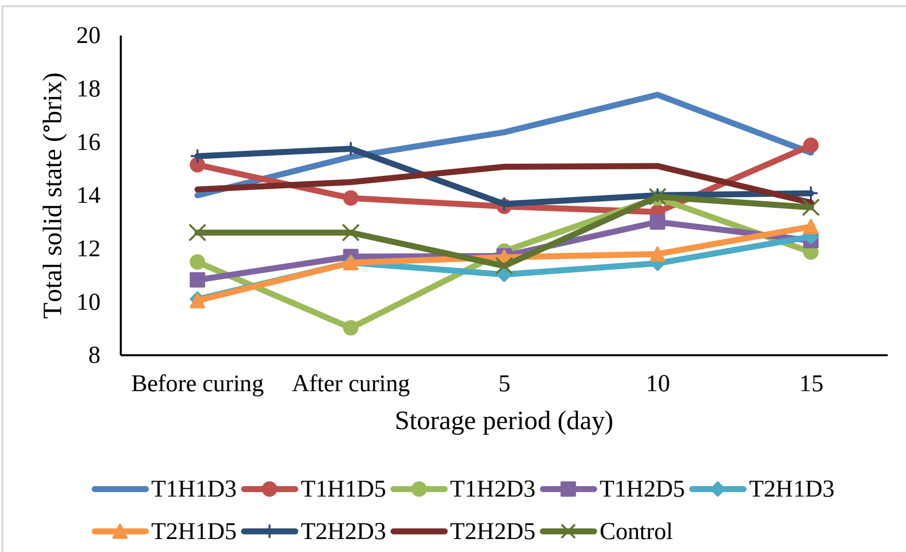


Figure 11. Changes in total soluble solid content during curing and shelf life.

During the curing process, the total soluble solid content of the tubers increased. The tuber with three days of curing treatment had the highest average increase in total soluble solids value when compared to the 5 days curing treatment. During the curing process, the activities of β- and α-amylase enzymes are modified, which facilitates starch hydrolysis during the ripening process and the formation of sugar, an important volatile component in sweet potatoes, resulting in an increase in sugar content in Cilembu sweet potatoes (Soare et al., 2022). During the storage period, sweet potatoes treated with T2H1D5 showed an increase in the TSS value, with the highest slope value when compared to the other treatments and the control. This shows that the curing process can increase the total soluble solids content during shelf life.

JTEP Jurnal Keteknikan Pertanian,
Vol. 13 No. 2, p 179-194, 2025
P-ISSN 2407-0475 E-ISSN 2338-8439
Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

The results of the analysis of variance showed that the combination of curing temperature and humidity treatments affected ($P<0.05$) the total soluble solids content of Cilembu sweet potato during the storage period. While the treatment of the length of the curing process did not affect the total soluble solids of Cilembu sweet potato.Further test results showed that the T1H1 treatment had the highest mean and was significantly different from T1H2. During the curing process, the activities of β- and α-amylase enzymes are modified, which facilitates starch hydrolysis during the ripening process and the formation of sugar, which is an important volatile component in sweet potatoes (Pankomera 2015), resulting in an increase in sugar content in sweet potato cilembu.

Data from the measurement of observation parameters were classified based on the main priorities of consumer assessment, namely physical damage as the main priority in consumer assessment, followed by physical qualities, such as brightness and hardness, and chemical qualities, such as moisture content and TSS. The best treatment was obtained at a temperature of 30 °C and a humidity of 90%. In the observation parameters, the curing time treatment does not really affect the quality of sweet potatoes during storage; thus, a shorter curing time is required, namely, 3 days of curing time.

4. Conclusion

Based on observations in the performance test process of temperature and RH control devices, a drying house with additional temperature control devices such as incandescent lamps, portable heaters, and fans, and RH controllers such as mist makers and water misting connected to thermostats and hygrostats, can control the temperature and RH in the drying house according to the needs of the curing process in the drying house for 24 h. The curing process can also recover physical damage and maintain quality during storage based on the parameters of water content, color, and total soluble solids value, but cannot maintain hardness compared to the control. The best treatment is T1H2D3, which is a curing treatment with a temperature of 30°C, 90% humidity, and curing time of 3 days. From this study, it can be concluded that the drying house can be utilized for the curing process of Cilembu sweet potatoes.

5. References

AOAC. (2000). Official methods of analysis (17th ed.). Gaithersburg, MD. USA. Association of Official Analytical Chemists.

De Souza, D.M., Coelho, S.R.M., Christ, D., Kottwitz, L.B.M., Lewandoski, C.F., Kowaleski, J., Lovato, F., & Gurgacz, F. (2021). Optimization of the drying process for production of biofortified sweet potato flour. Journal Food Process. Preserv., 45(1), Article e15039 https://doi.org/10.1111/jfpp.15039

Edmunds B, Boyette M, Clark C, Ferrin D, Smith T, & Holmes G. (2003). Postharvest handling of sweetpotato. North Carolina Cooperative Extension Service.

Available online:
http://journal.ipb.ac.id/index.php/jtep
DOI: 10.19028/jtep.013.2.179-194

Grace MH, Yousef G, Gustafson SJ, Truong VD, Craig YG, & Lila MA. (2014). Phytochemical Changes in Phenolics, Anthocyanins, Ascorbic Acid, and Carotenoids Associated with Sweetpotato Storage and Impacts on Bioactive Properties. Food Chemistry, 08:107

Krochmal MB, Sawicka B, Bienia B, Górka M, Otekunrin OA. 2020. The Economic Efficiency of Growing Sweet Potato (Ipomoea batatas L. [Lam.]) in Polish Soil and Climate Conditions. Ann. Polish Assoc. Agric. Agribus. Econ. XXII(2):99–110. https://doi.org/10.5604/01.3001.0014.1101

Mardiyanto MG, Muslikah S, Nurhidayati N. (2020). Pengaruh Pengaturan Komposisi Media Tanam Organik Terhadap Pertumbuhan dan Hasil Tanaman Ubi Jalar (Ipomoea batatas L.) Dengan Sistem Tabilampot. Folium J. Ilmu Pertan, 4(2),10. https://doi.org/10.33474/folium.v4i2.8657

Nissa Khaerun, Y. Aris Purwanto, Emmy D, dan Evi S. I. (2020). Pengaruh Curing dan Coating pada Mutu Ubi Jalar Cilembu Selama Masa Penyimpanan. Journal of Agro-based Industry, 37 (2), 99-107.https://doi.org/10.32765/wartaihp.v37i2.6219

Nurhalim, Megayani, S. R., & Asep, S. (2022). Kajian Teknik Pemotongan Umbi dan Penggunaan Giberelin untuk Produksi Bibit Ubi Jalar (Ipomoea batatas L.) dari Tunas Umbi. Bul. Agrohorti, 10(3),450-457

Pankomera, P. (2015). Effects of postharvest treatments on sweet potato (Ipomoea batatas L) storage quality. Unpublished doctoral dissertation. Massey University, New Zealand.

Pah, YI, Mardjan SS, Darmawati E. (2020). Aplikasi coating gel lidah buaya pada karakteristik kualitas buah alpukat dalam penyimpanan suhu ruang. J Keteknikan Pertan. 8(3):105–112.

Sanchez, P.D.C., Hashim, N., & Shamsudin, R. (2020). Application of imaging and spectroscopy techniques for nondestructive quality evaluation of potatoes and sweet potato. Food Science & Technology, 96, 208-221.

https://doi.org/10.1016/j.tifs.2019.12.027

Sanchez, P.D.C., Hashim, N., Shamsudin, R. & Mohd., Nor, M. Z.. (2021). Effects of different storage temperatures on the quality and shelf life of Malaysian sweet potato (Ipomoea Batatas L.) varieties. Food Packaging and Shelf Life, 28, 100642

https://doi.org/10.1016/j.fpsl.2021.100642

Siahaan Sandro P. (2020). Pengaruh Pre-Treatment dalam Proses Curing dan Suhu Penyimpanan Terhadap Mutu dan Masa Dormansi Benih Bawang Putih. Jurnal Keteknikan Pertanian. 8(1):29-38. https://doi.org/10.19028/jtep.08.1.29-38

Sugri, Issah., Maalekuu, B.K., Eli, G. & Francis, K. (2019). Compositional and shelf-life indices of sweet potato are significantly improved by pre-harvest dehaulming. Annals of Agricultural Sciences 64. 113-120

Soare R, Dinu M, Băbeanu C, Soare M. (2022). Biochemical Changes During The Storage Of Sweet Potato Roots. Horticulture. LXVI(1), 526–532.