Stay Home Practical: Simulation Model On Ginger As The Samples On Dryer Naturally Operation Module

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Abstract. During the COVID 19 virus impact to the most area in Indonesia, most of the teaching and research activities doing at home. The idea to force the activity at home by giving the idea to do research in drying natural operation. It is the sample of how students can apply the drying operation at their home. The idea to dry the Ginger as the material sample was applied and have given the result on the size or shape of the sample variation. The operation time and temperature impact on drying the sample. Drying at the open area and naturally were give the information have impacted the rate of drying. In this study, the type of shape was the most impacted in comparing the temperature and operation time.

1. Introduction
Ginger is a daily food that is used as an edible spice and medical ingredient. It believed to be a native crop of South East Asia that has been used by many people in the world. Ginger's natural content is used to treat many diseases, such as arthritis, cramps, rheumatism, sprains, sore throats, muscular aches, pains, constipation, vomiting, hypertension, indigestion, dementia, fever, and infectious diseases [1,2]. Drying is the oldest preservation techniques for agricultural products that have been widely applied throughout the world. Drying is widely operated for agricultural products thus can be preserved for use as raw materials for further processing [3].

Studies on drying various of the products have been reported by several researchers, for turmeric [4], sweet potato [5], cassava [6], tomato [7], paddy [8], etc. Drying has been carried out in a unit operation laboratory Universitas Sumatera Utara using a tray dryer to measure the drying kinetics [4,9]. Figure 1 shows a sample product of the ginger.
Related study on the impact of environmental conditions as available environmental performance, firm profitability, and asset utilization have been reported [10]. During the COVID 19 virus impacts the environment of work activities include the research operation. Working from home mitigate the spread of the disease under controlling consumption, working time, and personal interaction [11]. Stay at home is the mobility effect of COVID-19 [12], and research from home is an alternative relate to scientific activities.

The purpose of this study is to take the opportunity to do natural drying research from home during the lockdown on-campus activities. Ginger that is dried until their weight does not change provides the information on drying kinetics base on weight changes from fresh to dry products.

2. Experiment and Method

The material used in this study was ginger that bought at the traditional market in Selayang, Medan, Sumatera Utara. The tools used in this study are cutters and rulers. Sample were prepared and weighed with an analytical balance digital, Camry EHA901, as shown in figure 2A. Also, the volume is measured with a measuring cup (figure 2B). Drying is done openly by analyzing the online ambient temperature as shown in figure 2C.

This research was carried out by measuring the weight of the sample changes every 20 minutes to one hour until the sample weight has been constant. Measurement methods were carried out for each sample until the fourth day. In this study, pictures were taken with OPPO 11 camera digital with 48-megapixel image quality. For drying kinetics, weight loss was measured with a digital balance until the weight changes are stable at suitable time intervals. Weight loss on the results is calculated by:

$$\text{Weight}_{(t)} = \text{Weight}_{(0)} - \text{Weight loss}_{(t)}$$  \hspace{1cm} (1)
Where, weight \(_{(0)}\) is the weight of wet ginger before drying and weight \(_{(t)}\) is the weight of the dry ginger at specified time intervals. Weight loss \(_{(t)}\) is the weight of the dry ginger at specified time intervals.

3. Results and Discussion

Table 1. Identification the ginger physical properties

| Sample | Thickness (cm) | Length (cm) | Wide (cm) | Weight (mg) | Volume (ml) | Rho (mg/ml) |
|--------|----------------|-------------|-----------|-------------|-------------|-------------|
| 1      | 0.5            | 1.25        |           | 0.8         | 0.86        |             |
| 2      | 1              | 1.25        | 1         | 1.04        | 1.12        |             |
| 3      | 1.5            | 1.24        |           | 2.6         | 2.80        | 0.9302      |

The first data is the sample physical properties based on variations in size. After weighing and measuring the volume, the data obtained are shown in table 1. Weight and volume data can estimate the sample-specific gravity which is around 0.9302 mg/ml. This data is useful if it will be used to compare the drying rates of other ingredients samples such as sweet potato, turmeric, cassava, etc.

Drying kinetics on the 1st day is shown in figure 3. The initial appearance data as shown in table 1 then changes to the weight of the sample. Until the 5th hour, the 1st sample was stable, followed by the 2nd and the 3rd sample. It proves that size affects the reduction in material weight due to the drying operation. Jabeen et al. 2015 [13] state that sample thickness can increase the drying time because the mass transfer has to travel a longer distance to the sample surface. During the drying operation, the weight of the sample on the 1st hour carried out until the 7th hour shows a significant weight change at 1st hour, 2nd to the 3rd hour. On the 3rd hour to the 7th hour shows the drying kinetics has decreased and the weight changes for each sample tend to be stable. Therefore, based on the variables the difference in shape and time results in the differences in drying kinetics for each sample.

Figure 3. The drying kinetics on the 1st day
Figure 4. The drying by adding the day

Figure 4. give information on the drying rate by adding time in days. Based on the samples, the drying rate was related to variation in thickness. It shows that the highest loss of weight is in H0 on the first day, and the trend for the next day tends to stabilize. The first day has the most impact on the drying rate compared to the next day. The shape of the thickness of the samples had the most impact on the drying rate. The study of temperature changes during natural drying taken online from Google temperature is shown in Figure 5. An increase in temperature from 25°C (A) to 27°C (B) and to 33°C (C) causes a significant difference in each sample. In this study, an increase in temperature up to 33°C produced the most significant drying rate. It shows that temperature becomes one of the important variables in the drying operation besides the sample shape. Correia, et al. 2015 [7] state that during the drying operation, heat and mass transfer cause the removal of water by heat passing through the sample surface. Increased temperature will shorten the drying time and increase the amount of water removed.

Figure 5. The impact of temperature on drying ability
The changing on the sample surface characteristic as shown in Figure 6. The weight of the sample was extremely changing from 10.04 at H0 to 3.56 at H2 then to 0.78 mg at H4. The impact on removing some water content was changed the sample become wrinkled and rough. Adding the time shows the impact on the sample much significant after the 4th day. Drying operation makes the sample become wrinkled because the structure of the fruit cells becomes limp, soft, and dry which is affected by turgor pressure. In the dehydration process, the fruit will be increasingly wrinkled along the amount of water removed [14].

4. Conclusions
The idea to dry the Ginger with natural drying operation has given that shape of sample, time, and temperature impact the drying kinetics. In this study, the sample was varied into some variations in sample thickness and ambient conditions. From this study, it can be seen that shape of the samples was the most impacted in comparing the temperature and operation time. Weight loss in the sample will quickly occur due to the temperature increasing and drying operation also affects the shape of the product due to water removed in the sample which causes the sample is wrinkled.

5. References
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