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Osmotic dehydration of *Mangifera indica* L. var. Oro with high sensory quality

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— Abstract—

Mangifera indica L. var. Oro is a crop of considerable importance in Mexico; however, its limited shelf life leads to significant postharvest losses. In this context, osmotic dehydration emerges as a viable technological alternative to extend the shelf life of mangos. The objective of this work was to evaluate the effects of temperature (40 and 60°C), sucrose content (40 and 60 °Brix), and vacuum pulse (5 and 15 psi) on water loss (WL) and solid gain (SG) during the osmotic drying of mango slices and to determine the degree of acceptance of osmodehydrated mango. WL and SG were calculated by weight difference, and the degree of acceptance was determined by a 9-point structured hedonic test. Azuara's equation was used to model the water loss and solid gain. Mango osmodehydrated at 50 °Brix, 60°C and 15 psi had the best degree of acceptance (7.38). To optimize multiple response variables through the application of a mathematical model, conditions of 53 °Brix, 51°C, and a vacuum pulse of 7.65 psi can be employed to maximize water loss and minimize sucrose gain. However, owing to the lack of statistical significance of the vacuum pulse and for industrial purposes, conditions of 50 °Brix at 50°C could be used without the application of a vacuum pulse. These latter conditions could be applied for industrial purposes to obtain a mango product with a longer shelf life than that of fresh mango while maintaining good sensory acceptance.

Keywords:
Water loss; impregnation; mangoes; osmodehydration.

In Mexico, annual mango (*Mangifera indica*) production in 2023 exceeded two million tons, with Sinaloa, Guerrero, Nayarit, Chiapas, and Oaxaca being the leading producing states (Smattcom, 2024). Although nearly 20% of production in 2017 was destined for export to the United States and other countries (SAGARPA, 2017), the remainder was sold domestically as fresh fruit or processed into juices, nectars, and dried products. The Tommy Atkins, Ataulfo, and Kent varieties have been extensively studied; however, little scientific and technological information is available on the Oro variety, making it important to generate such information.

In this context, dehydration is a process that removes water to produce products with low moisture content, which results in a longer shelf life than that of a fresh product (Kilic et al., 2023). However, the physicochemical and sensory properties of the product can vary drastically. Kilic et al. (2023) reported a review of the different drying methods. In this study, the authors note that hot-air drying yields products with a long shelf life, but the sensory and nutritional characteristics of the products may be significantly reduced. These authors also reported that other methods exist, such as osmotic dehydration (OD), which yields foods with better sensory characteristics than those produced by conventional dehydration (Kilic et al., 2023). For this reason, osmotic dehydration is a widely used process for extending the shelf life of foods (Marie et al., 2025).

OD is a processing technique that involves immersing food matrices in a solution with a high concentration of solute (Asghari et al., 2024) and consists of three stages: i) the transfer of water from the product to the hypertonic solution; ii) the migration of the osmotic solute into the product; and iii) the leaching of natural matrix components (sugars, acids, minerals, and vitamins) into the hypertonic solution (Huerta-Vera et al., 2024). Many researchers have studied the OD, finding that the solute concentration (Arias et al., 2017), the temperature of the osmotic solution (Arias et al., 2017), the pressure at which the process is carried out (Vinod et al., 2024; Staniszewska et al., 2024), the syrup-to-fruit ratio (Vinod et al., 2024) and the processing time (Vinod et al., 2024) influence water loss and solute again. OD has been used for the preservation of different fruits, including mango. Arias et al. (2017) studied the mass transfer kinetics during the osmotic dehydration of mango (*Mangifera indica* L.) var. Tommy Atkins in sucrose solutions (45–60° Brix) at different temperatures (20, 35 and 50°C) for 6 h. However, these authors used a syrup-to-fruit ratio (mL:g) of 3:1, which could have diluted the solution after the first hour of processing, causing changes in the concentration of the osmotic solution such that mass transfer was not constant.

Response surface methodology has been used to optimize OD processes in fruits, as reported by Tsopwo Zena and Jiokap Nono (2024). However, the coefficients of determination obtained through multiple regression do not always yield satisfactory levels of fit. Consequently, various researchers have turned to alternative mathematical models, such as those proposed by Azuara, Peleg, and Weibull, which have proven more effective at describing the kinetics of water loss and solute gain during OD, as well as at estimating the effective diffusivity of these phenomena (Sulistyawati et al., 2020). Determining the effective diffusivities of water and solutes during osmotic dehydration allows more accurate predictions of changes in moisture and solids content in the treated product and helps optimize process conditions.

Although there are numerous publications on the OD of mango, to our knowledge, few studies have been published on the Oro variety. Therefore, in this study, the effects of the sucrose concentration (40 and 60 °Brix) and temperature (40 and 60°C) of the osmotic solution, as well as the application of a vacuum pulse (5 and 15 psi), on water loss (WL) and solute gain (SG) in mango (*Mangifera indica* var. Oro) and the degree of acceptance of the osmodehydrated mango were determined. Furthermore, WL and SG were modeled to calculate the effective diffusivities of water and sucrose during osmotic dehydration.

MATERIALS AND METHODS

Osmotic dehydration

The fruits of *Mangifera indica* var. Oro were obtained from a local supermarket in the city of Tuxtla Gutiérrez, Chiapas, Mexico. Mangoes were washed and peeled by hand and cut into rectangular parallelepipeds 30 mm long, 18 mm wide and 10 mm thick. The pieces were immersed in a commercial sucrose solution at a controlled concentration and temperature. The methodology used for the osmotic dehydration of mango is shown in Figure 1.

Approximately 100 g of mango was immersed in 1 kg of osmotic solution at a controlled temperature in an Erlenmeyer flask equipped with a magnetic stirrer and a stopper containing a vacuum tube, as reported by Grajales-Lagunes et al. (2019). This 1:10 (w/w) fruit-to-osmotic solution ratio was used to prevent dilution of the osmotic solution (Antonio et al., 2008). During the first ten minutes of the OD, a vacuum pulse (VP) was applied, and atmospheric pressure was subsequently restored, as described by Grajales-Lagunes et al. (2019). Mango samples were collected at 0, 10, and 360 min; they were then washed with distilled water to remove surface sucrose and dried with absorbent paper. The samples were weighed on an analytical balance (Ohaus, New Jersey, USA) (sensitivity of 0.0001 g), and the moisture content was determined in quintuplicate in a vacuum oven at 60°C until a constant weight was reached.

The WL and SG were calculated using equations 1 and 2:

$$WL = \frac{W_o X_o - W_t X_t}{DM_o} \qquad (1)$$

$$SG = \frac{W_o DM_o - W_t DM_t}{DM_o} \qquad (2)$$

where W_o is the weight of the mango (g), X_o is the moisture content (g g^{-1}), DM_o is the dry matter fraction (g g^{-1}) at the start of osmotic drying, and W_t, X_t and DM_t lare the corresponding values during osmotic drying.

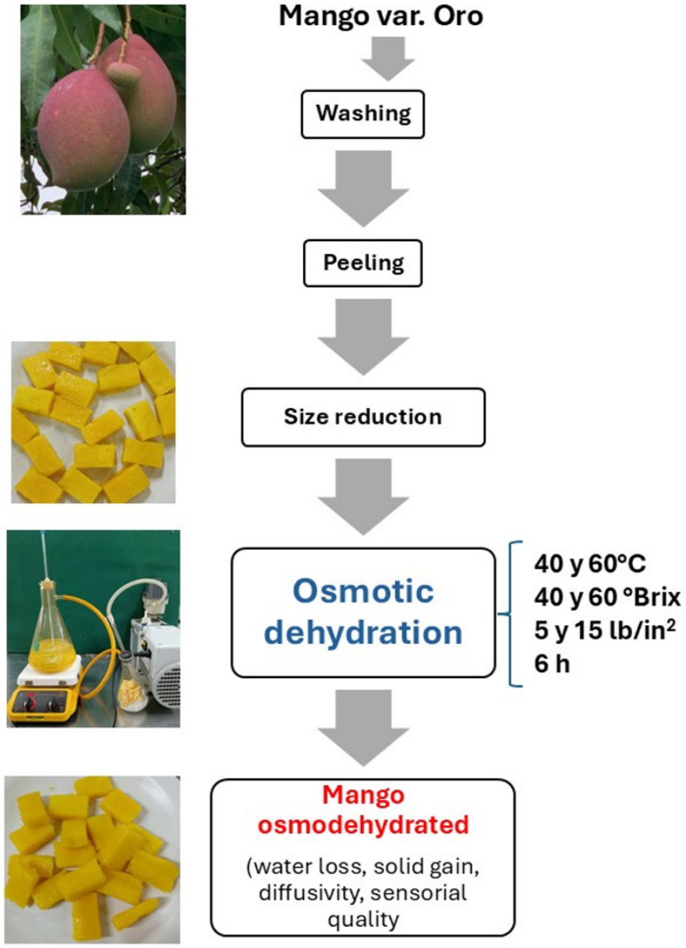


Figure 1. Methodology used for the osmotic dehydration of mangoes

Experimental design and statistical analysis

A Box–Behnken response surface methodology design was used, with each treatment performed in triplicate and three additional replicates at the center point, resulting in a total of 13 treatments (Table 1). The effects of temperature (40 and 60°C), sucrose content (40 and 60 °Brix) and vacuum pulse (5 and 15 psi) on the WL and SG of mango pieces during osmotic dehydration were evaluated. The results were analyzed using Statgraphics Centurion XV software (StatPoint Technologies, Inc., Virginia, USA). WL and SG were modeled through response surface methodology (Tsopwo Zena & Jiokap Nono, 2024) with the help of equation 3:

$$Y=\beta_{k0}+\sum_{i=1}^{3}\beta_{ki}X_i+\sum_{i=1}^{3}\beta_{kii}X_i^{2}+\sum_{i=1}^{2}\sum_{j=i+1}^{3}\beta_{kij}X_iX_j \qquad (03)$$

Where Y denotes the solid gains or water loss; β_{ko}, β_{ki}, β_{kii} and β_{kij} are the model coefficients; and X_i y X_j are the uncoded independent variables. The R^2 for each equation was calculated and reported.

In addition, WL (PA) and SG (GS) were adjusted with the model reported by Azuara (Sulistyawati et al. 2020):

$$\frac{PA}{PA_{eq}}=\frac{s_{PA}\,t}{(1\text{-}s_{PA}\,t)} \quad \text{and} \quad \frac{GS}{GS_{eq}}=\frac{s_{GS}\,t}{(1\text{-}s_{GS}\,t)} \qquad (4)$$

where PA_{eq} and GS_{eq} are WL and SG after 6 hours, respectively; s_{PA} and s_{GS} are the empirical constants to be identified; and t is time in hours. The water loss and solid gain at equilibrium are represented, and s_{PA} and s_{GS} are the empirical constants to be determined. These constants were calculated using the average values of osmotic dehydration kinetics via the revised simplex method (Jarry-Bolduc & Planiden, 2025) by minimizing the objective functions represented in Equation 5.

The values of σ_{PA} y σ_{GS} were calculated for each treatment:

$$\sigma_{PA}=\sqrt{\frac{\sum_{i=1}^{n}\left(PA_{exp}\text{-}PA_{sim}\right)^2}{n}} \quad \text{and} \quad \sigma_{GS}=\sqrt{\frac{\sum_{i=1}^{n}\left(GS_{exp}\text{-}GS_{sim}\right)^2}{n}} \qquad (5)$$

Where n represents the total number of experimental data points and the subscripts exp and sim denote the experimental and simulated values, respectively.

The diffusivity of water and sucrose (*Di*), as a function of s, was calculated by equation 6:

$$Di=\frac{4L^2}{\pi^2 t}\ln\left\{\frac{\pi^2}{8}\left[1-\frac{s_i}{1+s_i t}\right]-\frac{1}{9}\left[\frac{\pi^2}{8}\left[1-\frac{s_i t}{1+s_i t}\right]^9\right]\right\} \qquad (6)$$

Where L corresponds to half the thickness of the sample in millimeters, t is the time in seconds and s_i is the constant to be identified for WL and SG.

Sensory analysis

After six hours of osmotic drying, the mango samples were analyzed using a 9-point structured hedonic test by 100 untrained judges (D'Aquino de los Santos et al., 2022). Sensory analyses of the 12 treatments were conducted in independent sessions. In each sensory evaluation session, each judge rated the overall acceptability of the mango samples corresponding to the four treatments to avoid sensory fatigue. The sample consisted of 100 untrained judges (46 men and 54 women) between the ages of 18 and 25. All participants were informed that they could withdraw from the study at any time if they wished. The results were analyzed using Tukey's test, with a significance level of $p < 0.05$.

RESULTS AND DISCUSSION

Water loss and solid gain

The results revealed that the mango loses water and becomes impregnated with sucrose during OD (Table 1). These results are consistent with those reported by Sulistyawati et al. (2020) and Tsopwo Zena and Jiokap Nono (2024).

After 10 minutes of treatment, water loss ranged from 0.0436 to 0.1510 g water/g fresh fruit, whereas solid gain ranged from 0.0012 to 0.0535 g of sucrose/g of fresh fruit. In contrast, after 360 minutes of treatment, water loss varied from 0.3188 to 0.5920 g of water/g of fresh fruit, and solid gain ranged from 0.0724 to 0.1541 g of sucrose/g of fresh fruit.

The sucrose concentration and the temperature of the solution significantly affected water loss (Table 2). These results are consistent with those reported by Sablani and Rahman (2003), who reported that water loss increases with increasing temperature and concentration. Similarly, Zapata Montoya and Montoya Rodas (2012) reported that solution temperature affects mass transfer during the osmotic dehydration of Tommy Atkins mango. However, the vacuum pulse had no statistically significant effect. This was likely due to the low porosity of the mango, which prevented the exchange of solutes from the solution into the fruit, as reported by Míujica-Paz et al. (2003).

Table 1

Water loss (WL) and solid gain (SG) of mango during the osmotic dehydration of Mangifera indica var. Oro under different processing conditions

C (°Brix)	T (°C)	Vacuum pulse (psi)	Time			
			10 min		360 min	
			WL (g/g)	SG (g/g)	WL (g/g)	SG (g/g)
60	40	10	0.0966+0.0501	0.0301+0.0367	0.5283+0.0350	0.1157+0.0446
60	60	10	0.0991+0.0471	0.0280+0.0136	0.5546+0.0626	0.1309+0.0503
40	40	10	0.0436+0.0059	0.0075+0.0051	0.3188+0.1025	0.0761+0.0120
50	60	5	0.1374+0.0565	0.0357+0.0048	0.5659+0.0350	0.1079+0.0179
50	50	10	0.1510+0.0575	0.0012+0.0069	0.5366+0.0713	0.0767+0.0274
40	50	15	0.0729+0.0288	0.0299+0.0052	0.3749+0.0725	0.141+0.0357
40	50	5	0.0723+0.0202	0.0147+0.0158	0.4076+0.0310	0.0887+0.0241
40	60	10	0.0773+0.0272	0.0382+0.0226	0.4544+0.0305	0.1363+0.0082
50	60	15	0.1075+0.0445	0.0535+0.0082	0.5160+0.0536	0.1541+0.0332
50	40	15	0.0530+0.0054	0.0036+0.0124	0.4574+0.0347	0.0724+0.0346
50	40	5	0.0713+0.0349	0.0193+0.0078	0.4297+0.0823	0.0921+0.0412
60	50	5	0.1134+0.0123	0.0254+0.0104	0.5920+0.0414	0.0847+0.0344
60	50	15	0.1046+0.0272	0.0263+0.0170	0.5746+0.0636	0.1119+0.0743

C= Sucrose content, T= Temperature of the osmotic solution.

Table 2

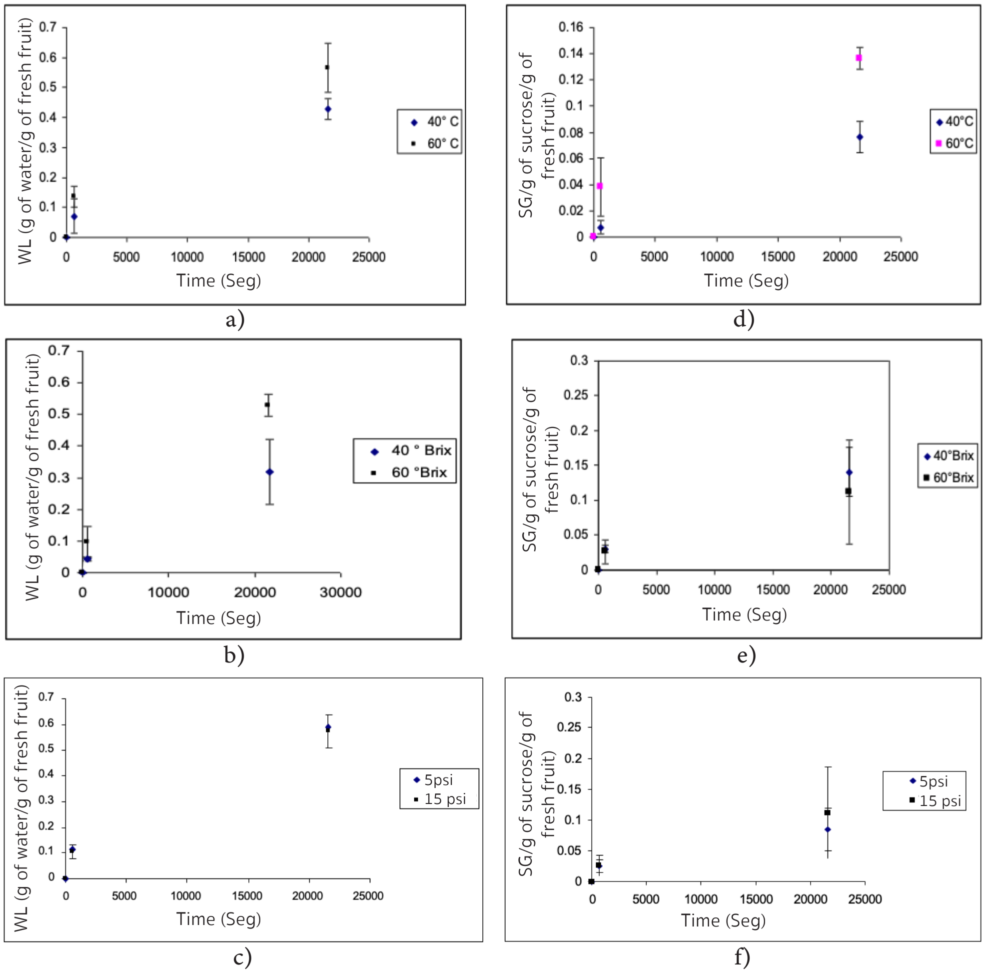
Effects of vacuum pulse, temperature and sucrose content in an osmotic solution on water loss (WL) and solid gain (SG) in mangos

Factor	**Value - p**	
	WL	**SG**
Vacuum pulse (psi)	0.8328	0.1875
Solution temperature (°C)	0.0018*	0.0115*
Sucrose content (° Brix)	0.0000*	0.3836

* denotes a statistically significant difference.

WL and SG increased with increasing temperature of the osmotic solution after 6 hours of drying, but this effect was not meaningful during the first 10 minutes (Figure 2). The application of a vacuum pulse did not affect the WL or SG (Figure 2c). The results of this study differ from those reported by Lin et al. (2016) and Sulistyawati et al. (2018), who reported that the application of vacuum pulses influenced mass transfer during the osmotic dehydration of mango. This discrepancy could be attributed, at least in part, to methodological differences in the way vacuum was applied. In particular, Sulistyawati et al. (2018) reported that a vacuum pulse had a negative effect on water loss but promoted solid gain. In contrast, Lin et al. (2016) demonstrated that the application of vacuum facilitated both water loss and solid incorporation. These differences suggest that the impact of vacuum on mass transfer mechanisms may depend critically on specific operational variables, such as the duration, intensity, and sequence of the applied pulses, as well as on the physicochemical characteristics of the food system being treated.

Analysis of variance revealed that temperature had a significant effect on the SG (Table 2). This is clearly illustrated in Figure 2d, where an increase in temperature leads to an increase in solid gain. These results are consistent with those reported by Sablani and Rahman (2003), who reported that solid gain increases with increasing solution temperature. However, these results differ from those reported by Gomes-Corrêa et al. (2016), who demonstrated that a vacuum pulse reduced solid gain during tomato OD. These discrepancies could be explained by differences in the composition and structure of mangoes and tomatoes.



a) d)

b) e)

c) f)

Figure 2. Effects of the osmotic solution temperature (a, c), sucrose concentration (b, d), and vacuum pulse (c, e) on water loss and solid gain during the osmotic dehydration of mangoes

Sensory analysis

The mango's WL and SG during the OD may have influenced the overall acceptance of the product. In this context, the results of the hedonic test revealed that processing conditions significantly affected the overall acceptance of the "Oro" mango (Table 3). The samples that received the highest and lowest levels of acceptance from the untrained judges were sample I, processed at 50 °Brix, 60°C, and 15 psi, and sample C, processed at 40 °Brix, 40°C, and 10 psi, respectively. Sample I received a rating of 7.38 ("like moderately"), while sample C received a rating of 6.01 ("like slightly"). Notably, all the samples received an overall acceptance rating (on the verbal scale) higher than "like", leading us to conclude that any of the processing conditions could be used for industrial purposes.

Few studies have reported on the level of acceptance of osmodehydrated mangoes. In this context, the use of osmotic dehydration as a pretreatment for mangoes prior to hot-air drying improved their sensory properties, as reported by Sanjinez-Argandoña et al. (2017). In addition, Zapata Montoya and Montoya Rodas (2012) reported that the sensory analysis conducted on mango cv. Tommy Atkins pieces showed 100% acceptance for samples of mango slices osmotically dehydrated at 45°C with 3% citric acid in the osmotic solution. However, unlike this study, these authors did not specify the test used. Nevertheless, these values are higher than those reported by Bernardi et al. (2009) for osmotically dehydrated mango, with maximum scores of 5.69 on the nine-point hedonic test.

Table 3
Overall acceptance of mango after six hours of osmotic drying

Treatment	Overall acceptance
I.50 °Brix, 60°C, 15 psi	7.38 a
F.40°Brix, 50°C, 15 psi	7.16 ab
L.60 °Brix, 50°C, 5 psi	7.16 ab
H.40 °Brix, 60°C, 10 psi	7.12 ab
B.60°Brix, 60°C, 10 psi	7.01 abc
D.50°Brix, 60°C, 5 psi	6.98 abc
E.50°Brix, 50°C, 10 psi	6.67 bcd
M.60 °Brix, 50°C, 15 psi	6.52 bcde
G.40 °Brix, 50°C, 5 psi	6.45 cde
A.60°Brix, 40°C, 10 psi	6.41 cde
K.50 °Brix, 40°C, 5 psi	6.39 cde
J.50 °Brix, 40°C, 15 psi	6.19 de
C.40°Brix, 40°C, 10 psi	6.01 e
Tukey	0.65

Based on a careful assessment of the costs associated with the osmotic dehydration process for mangoes and considering the overall level of acceptance achieved by the products obtained in this study, we propose the implementation of more efficient operating conditions: lower temperatures, lower sucrose concentrations, and the omission of the vacuum pulse. This strategy would allow for the production of sensorially acceptable products while helping to reduce production costs. In particular, the reduction in temperature and sucrose concentration, along with the elimination of vacuum treatment, results in lower energy and input requirements. However, to validate the feasibility of this proposal, it is essential to conduct a technical–economic study that quantifies the potential benefits and assesses its applicability on an industrial scale.

Optimization of the osmotic dehydration process

To optimize the OD process for mangoes, response surface methodology was used; the goal was to maximize water loss and minimize solid gain, with the aim of producing a product with the highest level of consumer acceptance.

Our initial approach involved the use of multiple regression analysis in conjunction with response surface methodology. Table 4 presents the models that explain water loss and solid gain in mangoes after 6 hours of osmotic dehydration. Notably, the coefficients of determination (R2) of the models are not close to one, indicating that mass transfer (water and sucrose) cannot be fully explained by this multiple regression model.

Table 4

Mathematical models for water loss (WL) and solid gain (SG) in mangoes after 6 hours of osmotic drying using response surface methodology

Mathematical model	R^2
$PA = -2.54 + 0.054 A + 0.052 B + 0.020 C – 0.00032 A^2 – 0.00027 AB + 0.0000065 AC – 0.0003 B^2 – 0.0004 BC – 0.00014 C^2$	0.63
$GS = 0.583 – 0.0088 A – 0.011 B - 0.0135 C + 0.00015 A^2 - 0.00011 AB - 0.00013 AC + 0.00016 B^2 + 0.00033 BC + 0.0003 C^2$	0.30

A=sucrose concentration (° Brix), B= solution temperature (°C) y C= vacuum pulse (psi), R^2 is the coefficient of determination.

However, the response surface methodology showed that the maximum water loss achievable is obtained using a syrup concentration of 60 °Brix, a temperature of 56.67°C, and a pressure of 5 psi. This water loss, as simulated by the model, corresponds to 0.5912 g of water/g of fresh fruit. Furthermore, using response surface methodology, it was found that the minimum solid gain achievable is obtained by using an osmotic solution concentration of 47.08 °Brix, a temperature of 43.73°C, and a pressure of 8.42 psi. This solid gain, as simulated by the model, corresponds to 0.0745 g of water/g of fresh fruit.

Zapata Montoya and Montoya Rodas (2012) reported the same trend regarding the coefficients of determination for the mathematical models of osmotic dehydration in Tommy Atkins mangoes. These authors reported a coefficient of determination for water loss of 0.99, but for solid gain, it was 0.30, with solid gain showing the greatest variability. This may be because, during the OD process, not only does sucrose enter the fruit, but other sugars and soluble compounds—such as organic acids—are also leached from the fruit into the solution. In addition, the difference may be due to the composition and structure of the mango varieties used.

When the results of the optimal treatment—designed to maximize water loss and minimize solid gain—were compared with those of the best treatment on the basis of sensory evaluation, we observed that the WL and SG values for the treatments at 60 °Brix, 50°C, and 5 psi were 0.5920 and 0.00847 g/g fresh fruit, respectively. This treatment was similar to the optimal treatment, which yielded WL and SG concentrations of 0.5938 and 0.0745 g/g of fresh fruit, respectively. Although the optimal treatments were identified using response surface methodology, the model needs to be improved because of the low coefficient of determination (R2); thus, we applied the Azuara model.

Azuara model

Azuara's model provided a better fit for the results than the equations obtained using response surface methodology did. The sPA (WL) and sGS (SG) parameters (Table 5) were identified for each of the kinetics using Equations 4, 5, and 6, and the values ranged from 1.6553 to 3.1662 for water loss and from 1.2026 to 4.9296 for solid gain.

The average effective diffusivity (Di), which is calculated using Equation 6, shows that for water, the values ranged from 4.2516×10^{-10} to 0.7039×10^{-10} m^2/s, whereas for solid gain, Di changed from 3.5737×10^{-10} to 0.5317×10^{-10} m^2/s. These values are statistically equivalent, so we calculated averages of 2.3779×10^{-10} m^2/s and 2.0930×10^{-10} m^2/s for the diffusivities of water and sucrose, respectively. These diffusivity values are similar to those reported by D'Aquino de los Santos et al. (2022) for papaya OD and by Wang et al. (2021) for mango. These values are also comparable to those reported by Ayala-Aponte et al. (2018), who reported the effective diffusivity for water and sodium chloride impregnated in green mango var. Filipino, with values on the order of 10^{-10} m^2/s. Atares et al. (2009) reported that the effective water diffusivity was 1.53×10^{-10} m^2/s for apples and 1.05×10^{-10} m^2/s for sucrose. The diffusivities reported in this study were higher than those reported for Kent mangoes and apples in terms of effective water diffusivity. In the case of effective water diffusivity in papaya, it was approximately 5 times higher, and the effective sucrose diffusivity in papaya OD was approximately 8 times higher.

Tabla 5

Values of s_{PA}, σ_{PA}, s_{GS} and σ_{GS} for water loss (WL) and solid gain (SG) in the Azuara model and the effective diffusivity of water and sucrose for osmotically dehydrated mango

Treatment	Model constants				Diffusivities x 10^{-10} Di	
	s_{PA}	σ_{PA}	s_{GS}	σ_{GS}	(m^2/s)	(m^2/s)
40°B,40°C,10psi	2.4067	0.0142	1.2026	0.0104	0.7039	3.5204
40°B,50°C,5psi	2.0423	0.0216	1.6407	0.0118	2.9933	2.1935
40°B,50°C,15psi	2.0348	0.0269	3.4998	0.0174	1.4372	1.9652
40°B,60°C,10psi	2.0471	0.0252	4.2004	0.0125	2.7377	1.8648
50°B,40°C,5psi	3.1662	0.0210	2.1765	0.0049	1.8258	1.0406
50°B,40°C,15psi	1.9050	0.0279	3.8507	0.0183	2.2366	3.1878
50°B,50°C,10psi	2.5746	0.0241	1.2769	0.0136	2.2710	3.4828
50°B,60°C,5psi	2.4811	0.0221	2.8447	0.0089	3.3496	1.0189
50°B,60°C,15psi	1.7696	0.0321	4.2399	0.0175	2.1593	0.5452
60°B,40°C,10psi	2.3842	0.0269	2.5762	0.0105	1.2480	2.3757
60°B,50°C,5lpsi	1.8610	0.0281	4.9296	0.0077	4.2516	0.5317
60°B,50°C,15lpsi	1.7509	0.0354	3.3952	0.022	3.9254	1.9081
60°B,60°C,10lpsi	1.6553	0.0347	3.2474	0.0159	1.7833	3.5737
Average					2.3779	2.0930

Implications of the study for industry and future research

This study lays the technological groundwork for the industrial processing of the Oro mango variety, with the aim of extending its shelf life and diversifying its commercial presentation. The feasibility of applying osmotic dehydration using a sucrose solution at 50°Brix and a temperature of 50°C without the use of vacuum pulses was evaluated. Under these conditions, a product with lower moisture content was obtained, and it received a favorable overall sensory rating from the evaluation panel.

This study explored the potential of osmotic drying as a preservation method for Oro mango varieties. However, further research is needed to determine the shelf life of the resulting products. Likewise, future research should focus on the development of dried mango slices by combining osmotic drying and hot-air drying, with the aim of optimizing product stability and increasing its added value on the market.

CONCLUSION

This study demonstrated that the osmotic dehydration of slices of mango (*Mangifera indica* L.) var. Oro was affected by the concentration and temperature of the osmotic solution. Water loss from the mango can be maximized by using a 60 °Brix osmotic solution at 57°C, applying a vacuum pulse of 5 psi, while solid gain can be minimized by using a 47 °Brix solution at 43°C, applying a vacuum pulse of 8.4 psi. The optimization revealed that it is possible to use a solution at 53 °Brix, 51°C, and a vacuum pulse of 7.65 psi to maximize water loss and minimize sucrose gain. Sensory analysis revealed that the highest acceptability was obtained for the mango samples that were osmodehydrated at 50 °Brix at 60°C, with a vacuum pulse of 15 psi (7.38). Response surface methodology provides a suitable model for predicting water loss in mangoes during osmotic dehydration and, to a lesser extent, solute uptake; however, the Azuara model allowed for the calculation of the effective diffusivity of water and sucrose, both of which were on the order of 10–10 m2/s during the osmotic dehydration of mangoes.[1]

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