Original Article

THERMOPHYSICAL PROPERTIES OF THE *PEQUI* PULP IN DIFFERENT CONCENTRATIONS

PROPRIEDADES TERMOFÍSICAS DA POLPA DE PEQUI EM DIFERENTES CONCENTRAÇÕES

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ABSTRACT: The *pequi* fruit (*Caryocar coriaceum* Wittm) has a great economic interest, regarding the use of its fruits in cooking as a source of vitamins and extraction of oils for the manufacture of cosmetics. However, are unknown studies on the thermophysical properties (specific heat, thermal diffusivity and thermal conductivity), in which properties are very important to the pulp being favored in an industrial level. The work in question was aimed at studying the physical properties of the *pequi* pulp with levels of total soluble solids of 6, 8, 10 and 12 °Brix. The physical properties were studied: specific heat, thermal diffusivity and thermal conductivity. The specific heat of the pulps was determined using the method of mixtures, the thermal diffusivity was determined using the method proposed by Dickerson and the thermal conductivity KD-2 equipment. Therefore, it was found that the specific heat tended to increase with the increase of temperature and total soluble solids content of the pulp. The thermal diffusivity of the *pequi* pulp decreased with the increase in total soluble solids; the thermal conductivity of the pulp did not show a definite increase in temperature trend in the pulps investigated.

KEYWORDS: *Caryocar coriaceum* Wittm. Specific heat. Thermal conductivity. Thermal diffusivity.

INTRODUCTION

The presence of native species with economic potential fruitful in the *Cerrado* region deserves special attention; among them is the *pequizeiro*, much for its high occurrence such as the sensory and nutritional characteristics of its fruit, which contribute to the supply of the nutritional requirements of the population (GONÇALVES et al., 2011; SOUZA et al., 2007).

Pequi is a cariocacea that can be found evenly distributed throughout the Southeast, West and Northeast of Brazil, representing the main source of income for the population. In recent years, the fruit gained nutritional and economic importance and its trade has expanded beyond the borders of Brazil, being exported to other countries, including Australia (ALVES et al., 2010).

In Brazil, the increased demand for food products brings some consequences, such as requiring modernization, technological adaptation and better quality for industries. In food processing it is necessary to know the physical properties for calculations of processes, which may be subjected. (MOURA et al., 2005). However, to obtain pulps intended for manufacturing thermal treatments are indispensable, such as heating and cooling, the same used to inactivate the enzymes and slow the metabolic and microbiological processes (ARAÚJO et al., 2004).

Therefore, it becomes inevitable the knowledge of thermophysical properties, such as specific heat, thermal conductivity and thermal diffusivity, which for *pequi* pulp (*Caryocar coriaceum* Wittm) are still unknown studies on the thermophysical properties, which are of great importance so that the pulp is benefited for industrial level. Therefore, this work aimed to study thermophysical properties of the p*equi* pulp in different concentrations of total soluble solids (6, 8, 10 and 12 °Brix).

MATERIAL AND METHODS

The raw material used was *pequi* (*Caryocar coriaceum* Wittm.), harvested in January 2011 in the *Araripe* region, located in the southern Ceará state. The fruits were pulped in depulper stainless steel. The integral pulp obtained was packed in polyethylene bags sealed and frozen at -20 °C.

The *pequi* pulp presented moisture content of 80% (5 ^{o}Brix), it was concentrated by a rotary evaporator at 60 °C under vacuum, yielding concentrated *pequi* pulps with different

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concentrations of total soluble solids (6, 8, 10 e 12 °Brix), which correspond to the moisture contents of 70, 65, 60 and 55%, respectively. Subsequently, *pequi* pulps were processed for determination of specific heat, thermal diffusivity and thermal conductivity.

Thermophysical properties

The determination of the specific heat of the *pequi* pulps with different contents of total soluble solids (6, 8, 10 and 12 ºBrix) was made by the method of mixtures using the calorimeter (MOHSENIN, 1980). The calorimeter used was built with a vacuum bottle, inserted into a plastic pipe of 200 mm diameter. The space between the bulb and the plastic cylinder was filled with glass wool to ensure maximum thermal insulation. The closure of the inner is made with a rubber stopper with a hole in the center through which the stem of the thermocouple for measuring the internal temperature goes.

To calculate the specific heat of the sample was used the Equations 1 and 2, in which the first was used to determine the heat capacity of the calorimeter.

$$C_1\, m_1\,(T_1 - T_3) + C_{cal}\,(T_1 - T_3) = C_2 m_2\,(T_3 - T_2) \qquad (1)$$

where:

C_1 and C_2 - specific heat of water (kJ/kg °C)
m_1 - mass of water at room temperature (g)
m_2 - mass of chilled water (g)
T_1 - water temperature 30 °C
T_2 - temperature of chilled water 15 °C
T_3 - equilibrium temperature (°C)
C_{cal} - heat capacity of the calorimeter (kJ/kg °C)

It was used the Equation 2 to calculate the specific heat, at temperatures from 10 to 50 °C of the sample:

$$m_p C_p\,(T_4 - T_5) = C_1 m_3 (T_5 - T_3) + Ccal\,(T_5 - T_2) \qquad (2)$$

where:

m_p - mass of the product (g)
C_p - specific heat of the product (kJ/kg °C)
C_1 - specific heat of water (kJ/kg °C)
m_3 - sum of the masses m_1 and m_2
T_4 - initial pulp temperature (°C)
C_{cal} - heat capacity of the calorimeter
T_3 - equilibrium temperature (°C)
T_5 - equilibrium temperature (°C)

The determination of the thermal diffusivity of the *pequi* pulps with different total soluble solids contents (6, 8, 10 and 12 °Brix) was determined using the method of Dickerson (1965), using a metal capsule plated brass, insulated at the ends and coupled with two thermocouples, one to check the internal temperature in the center of the capsule and the other on its surface in order to record the variations in the sample temperature. The capsule was filled with sample and immersed in the water bath with mechanical stirring. The thermal diffusivity was calculated according to Equation 3.

$$\alpha = \frac{AR_c^2}{4(Ts - Tc)} \qquad (3)$$

In which: (1)

α - thermal diffusivity (m²/s)
A - heating rate (°C/s)
R_c - cylinder radius/capsule (m)
T_s - surface temperature of the radius R capsule (°C)
T_C - temperature in the center of the sample (°C)

The theoretical thermal diffusivity of the *pequi* pulps were calculated using equations, as shown in Table 1, at temperatures from 10 to 50 °C.

Table 1. Theoretical equations of thermal diffusivity

Product	Equation	Source
Food in general	$\alpha = (0{,}057363.Xw + 0{,}000288.T).10^{-6}$	MARTENS (1980)
Food in general	$\alpha = 0{,}088.10^{-6} + (\alpha w - 0{,}088.10^{-6}.Xw)$	RIEDEL (1969)
Orange juice	$\alpha = 7{,}9683.10^{-8} + 5{,}9839.10^{-8}.Xw + 0{,}02510.10^{-8}.T$	TELIS ROMERO (1998)
Lulo juice	$\alpha = 8{,}29.10^{-8} - 5{,}27.10^{-8}.Xw + 2{,}76.10^{-10}$	GIRALDO-GÓMEZ et al. (2010)

Where: α - thermal diffusivity (m^2/s); X_w - mass fraction of water (dimensionless); α_w - water diffusivity (20 °C); T - temperature (°C)

The thermal conductivity (k) of *pequi* pulps with different amounts of total soluble solids (5, 6, 8, 10 and 12 °Brix) at temperatures of 10 to 50 °C were determined using a thermal sensor, KD2

(Decagon Inc., KD2 model). The thermal conductivity was expressed in W m^{-1} $°C^{-1}$.

The equations that are in Table 2 were used to estimate the thermal conductivity of the pulp.

Table 2. Equations for calculation of theoretical thermal conductivity, at temperatures from 10 to 50 °C.

Product	Equation	Source
Fruit juice	$K = 0.140 + 0.42.Xw$	KOLAROV & GROMOV (1973)
Apple juice	$K = 0{,}27928 - 3{,}5722.10^{-3}.B + 1{,}1357.10^{-3}.T$	CONSTENLA (1989)
Orange juice	$K = 0{,}0797 + 0.538Xw + 0{,}000580.T$	TELIS–ROMERO et al. (1998)

Where: K - thermal conductivity (W/m °C); Xw - mass fraction of water (dimensionless); T – temperature (°C); B - °Brix.

The specific heat data were evaluated by means of factorial 4x5x3, (total soluble solids, temperature and replications) using the program ASSISTAT version 7.6.

For statistical analysis of thermal diffusivity was used completely randomized design (CRD) program ASSISTAT applied in version 7.6, with a comparison of means using the Tukey test. For thermal conductivity was conducted by factorial (4x5x3), which corresponds to 4 soluble solids, 5 temperatures and 3 replications.

The determination of the percentage error (Equation 4) was used to evaluate the experimental and theoretical data of thermophysical properties, among them the thermal diffusivity and thermal conductivity equations.

$$E = \left(\frac{V_{Cal} - V_{exp}}{V_{exp}}\right) X\ 100 \qquad (4)$$

where:

E – percentage error (%)

Vexp – experimental value

Vcal – calculated value

RESULTS AND DISCUSSION

Specific heat

In Table 3 it can be seen that with increasing temperature in the *pequi* pulp, there was a tendency of increase of the specific heat. The specific heat decreased with an increase of total soluble solids. It was observed that the minimum specific heat was 2.20 kJ/kg °C and the maximum specific heat of 3.45 kJ/kg ºC. The specific heat of fruit pulp can vary according to their chemical and physico-chemical composition, in addition to direct influence on determination of the amount of energy being added or removed in process of heating and cooling (ARAÚJO et al., 2004). To Souza et al. (2011), the higher the moisture content of the pulp will be higher specific heat, but the effect of the total solids is less important due to the various components (fat, protein, sugars and ash) exert a smaller influence as compared with water.

Note that there was no significant difference between the means of the specific heat at the temperature of 10 °C between the pulp in different levels of total soluble solids.

At 20 °C there was no significant difference between the mean specific heat of the pulps with 8, 10 and 12 ºBrix; at 30 °C the specific heat of the *pequi* pulps with 6, 8 and 10 ºBrix did not differ statistically; at 40° C the average specific heat of *pequi* pulp with 8 and 10 ºBrix were statistically the same; and at 50 °C the means with *pequi* pulp with 6, 8 and 10 °Brix were also statistically similar.

Note in the temperature of 10 °C that the mean specific heat between the pulp with different total soluble solids contents were very close; an increase in °Brix remained the specific heat steady between pulps with different soluble solids, at 20 °C the specific heat of the pulp at 6 °Brix value presented farther from the other pulp and pulp of medium 8, 10 and 12 Brix were similar; and a lower average value than the other pulp; at 30 °C the specific heat of the *pequi* pulp 6, 8 and 10 °Brix were similar and the pulp with 12 °Brix showed lower mean and different value from other pulp; at 40 °C the means of the specific heat of *pequi* pulp with 8 and 10 ºBrix were similar; pulps at 6 and 12 ºBrix showed the highest and lowest value, respectively; and at 50 °C the medium of the *pequi* pulps with 6, 8 and 10 ºBrix were also similar; and pulp with 12 ºBrix presenting the lowest value and different from the other samples.

Table 3. Specific heat (kJ/kg °C) of the *pequi* pulps with temperature and different levels of total soluble solids.

Temperature (°C)	Total soluble solids (°Brix)			
	6	8	10	12
10	2.24 eA	2.22 eA	2.20 eA	2.21 dA
20	2.59 dA	2.54 dB	2.52 dB	2.51 cB
30	2.98 cA	2.93 cA	2.97 cA	2.84 bB
40	3.37 bA	3.29 bB	3.29 bB	3.15 aC
50	3.45 aA	3.42 aA	3.42 aA	3.17 aB

Means followed by the same letter in columns and rows in the capital, do not differ by Tukey test at 5% probability.

For the *pequi* pulp with total soluble solids of 6 ºBrix (70% moisture content) and 12 ºBrix (55% moisture content) results were below those found by Sousa et al. (2010), for *umbu* pulp, which ranged from 3.66 to 4.18 kJ/kg °C for moisture content from 70 to 95% and at different temperatures (5, 15, 25, 35, 45, 55, 65, 75 and 85 °C). Approximate results were found by Muniz et al. (2006) when studying the specific heat of *bacuri* pulp depending on the concentration of soluble solids (5-20 ºBrix), which varied between 2.98 and 3.61 kJ/kg °C.

Results similar to those found in *pequi* pulp were checked by Souza et al. (2011), and found maximum average experimental values for minimum specific heat of 2.70 kJ/kg °C and 3.92 kJ/kg °C to jackfruit pulp with moisture contents of 65-95%. The values obtained by Araújo et al. (2004) for specific experimental heats of *cupuassu* pulp with a 9 °Brix and sieved, were 3.24 kJ/kg °C, 3,71 kJ/kg °C and 3.18 kJ/kg °C, respectively, close to the *pequi* pulps with different contents of total soluble solids and at elevated temperatures (40 and 50 °C).

Bon et al. (2010) found that the specific heat of mango pulp at temperatures of 20, 40, 60 and 80 °C and moisture content between 50 and 90% was between 2.738 to 4.093 kJ/kg °C; where the values of the specific heat of *pequi* pulp with moisture content of 55% (12 ºBrix) to 70% (6 ºBrix) were within this rating (2.20 to 3.45 kJ/kg °C).

Muramatsu et al. (2010) measured the thermophysical properties of three kinds of juice (grape, orange and cucumber), at temperatures ranging from 10 to 50 °C and soluble solids concentrations of 10 to 50 °Brix, and found that the values of the specific heat ranged from 2.6 to 4.1 kJ/kg °C, observed in the *pequi* pulps values close to those.

Thermal diffusivity

Table 4 presents the values of thermal diffusivity of *pequi* pulp due to total soluble solids content. It is observed that the diffusivity tends to decrease with to increase total soluble solids content. All average values of thermal diffusivity were statistically different according to Tukey's test at the 5% probability level. It is observed that the thermal diffusivity decreased with the increase of soluble solids. This behavior was expected since the thermal diffusivity measures the ability of the sample (pulp) to conduct energy, varies according to the composition there of, and the lower the concentration of samples the greater its ability to conduct energy.

Table 4. Thermal diffusivity of *pequi* pulps with different levels of soluble solids.

Total soluble solids (ºBrix)	6	8	10	12
Thermal diffusivity ($m^2\ s^{-1}$)	1.32×10^{-7} a	1.29×10^{-7} b	1.26×10^{-7} c	1.23×10^{-7} d

Means followed by the same letter do not differ by Tukey test at 5% probability.

Corrêa et al. (2008) studied the thermal diffusivity of papaya pulp depending on of maturation, noting that after ripening the fruits soften by cellular degradation and an increase in permeability occurs, consequently there was an increase of total soluble solids content of fruits and decreased of thermal diffusivity.

Mercali et al. (2011) studied the physical properties of *acerola* and blueberries pulp, and found, concerning the thermal diffusivity of pulp, values of 1.53×10^{-7} and 1.47×10^{-7} $m^2\ s^{-1}$, being higher than those of *pequi* pulps studied. Azoubel et al. (2005) evaluated the effect of the concentration of soluble solids on the physical properties of cashew juice in concentrations of 5 to 25 °Brix, observing a variation in the diffusivity of 1.34 x 10^{-7} to 1.44 x 10^{-7} m^2 s^{-1}, with the results found on the *pequi* pulps with levels of total soluble solids 8-12 ºBrix lower. Giraldo-Gomez et al. (2010) evaluated the thermophysical properties of lulo juice with moisture content of 55-90% and found values of thermal diffusivity of 0.95 x 10^{-7} to 1.33 x 10^{-7} m^2 s^{-1}, with the diffusivity of *pequi* pulp within this rating.

In the Table 5 was find the thermal diffusivity experimentally measured and theoretical values. It is observed that the theoretical values of thermal diffusivity calculated were equal to or lower than the experimental values. The equations that best estimated the experimental data was that of Telis-Romero (1998) and Riedel (1969), which showed values close to the experimental errors with percentages less than 4%; the other equations resulted in errors between 2.50 and 9.13%; in all samples the biggest mistakes ever occurred in samples with higher total soluble solids, decreasing with a decrease of total soluble solids.

Table 5. Experimental and theoretical values of the thermal diffusivities obtained through equations and percentage errors

Equations	Thermal diffusivities (m^2 s^{-1})			
	X_w	Experimental	Theoretical	Erro (%)
RIEDEL (1969)	0.55	1.23 x 10^{-7}	1.19 x 10^{-7}	3.23
	0.60	1.26 x 10^{-7}	1.23 x 10^{-7}	3.27
	0.65	1.29 x 10^{-7}	1.26 x 10^{-7}	3.06
	0.70	1.32 x 10^{-7}	1.28 x 10^{-7}	2.86
	X_w	Experimental	Theoretical	Erro (%)
MARTENS (1980)	0.55	1.23 x 10^{-7}	1.16 x 10^{-7}	5.96
	0.60	1.26 x 10^{-7}	1.19 x 10^{-7}	5.92
	0.65	1.29 x 10^{-7}	1.22 x 10^{-7}	5.65
	0.70	1.32 x 10^{-7}	1.25 x 10^{-7}	5.38
	X_w	Experimental	Theoretical	Erro (%)
TELIS-ROMERO (1998)	0.55	1.23 x 10^{-7}	1.18 x 10^{-7}	3.62
	0.60	1.26 x 10^{-7}	1.22 x 10^{-7}	3.54
	0.65	1.29 x 10^{-7}	1.25 x 10^{-7}	3.21
	0.70	1.32 x 10^{-7}	1.28 x 10^{-7}	2.90
	X_w	Experimental	Theoretical	Erro (%)
GIRALDO-GÓMEZ et al. (2010)	0.55	1.23 x 10^{-7}	1.12 x 10^{-7}	9.06
	0.60	1.26 x 10^{-7}	1.15 x 10^{-7}	9.13
	0.65	1.29 x 10^{-7}	1.17 x 10^{-7}	8.97
	0.70	1.32 x 10^{-7}	1.20 x 10^{-7}	8.81

*X_w - moisture content (decimal), then the moisture content corresponds to the following soluble solids: 0.55 (12 ºBrix); 0.60 (10 ºBrix); 0.65 (8 °Brix) and 0.70 (6 °Brix).

Thermal conductivity

Table 6 has the thermal conductivity of *pequi* pulp with soluble solids between 6 °Brix (70% moisture content) to 12 ºBrix (55% moisture content), at temperatures of 10, 20, 30, 40 and 50 °C. It is observed that the thermal conductivity showed values ranging from 0.3650 to 0.4723 W/m °C.

It is observed that in the temperatures of 10, 20, 30, 40 and 50 °C the samples with 12 °Brix had lower thermal conductivity than the samples with 6 °Brix. Based on the results it was evident that the thermal conductivity showed no clear trend with increasing temperature in the pulps studied. Giraldo-Gómez et al. (2010) found, when determining the thermal conductivity of the lulo juice (*Solanum quitoense* Lam) with moisture content ranging between 0.50-0.90 kg/kg and temperatures from 4 to 78.6 °C, the results of thermal conductivity found showed a tendency to increase with rise in temperature, but for *pequi* pulps at temperatures 10-50 °C was not a trend. Villa-Velez et al. (2012) concluded, evaluating the thermal conductivity of the *uvaia* juice, there was an increase in conductivity with increasing temperature between 0 and 40 °C, *pequi* pulp was not observed this trend.

Higher thermal conductivity values of *pequi* pulps were found by Muramatsu et al. (2010), when measuring thermophysical properties of grape and orange juice, at temperatures ranging from 10 to 50 °C and total solids concentration of 10 to 50 °Brix, with values of thermal conductivity ranging between

0.42 and 0.62 W/m °C for the grape juice and 0.46 to 0.61 W/m °C for orange juice, and the thermal conductivity increasing linearly with the increase of temperature and decreases with the increase of concentration. Cabral et al. (2007) observed for the blackberry juice with soluble solids of 9.4 and 58.4 °Brix and at temperatures of between 0.5 and 80.8 °C, the thermal conductivity ranged between 0.389 and 0.652 W/m °C, the thermal conductivity of *pequi* decreases with the increase in total soluble solids between the sample 6 and 12 °Brix, with a thermal conductivity values within the range of results for blackberry.

Table 6. Thermal conductivity of *pequi* pulp (W/m °C) with different total soluble solids contents and different temperature.

Temperature (° C)	**Total soluble solids (ºBrix)**			
	6	**8**	**10**	**12**
10	0.4253 bA	0.4380 aA	0.4333 bA	0.3780 abB
20	0.4723 aA	0.4127 bB	0.4050 cB	0.3910 aB
30	0.4307 bA	0.4077 bB	0.4217 bcAB	0.4010 aB
40	0.4390 bA	0.4483 aA	0.4143 bcB	0.3910 aC
50	0.4280 bB	0.3983 bC	0.4620 aA	0.3650 bD

Means followed by the same letter do not differ by Tukey test at 5% probability

Tables 7-10 are theoretical thermal conductivities of *pequi* pulp with different moisture contents, calculated according to the equations of Kolarov e Gromov (1973) and Telis-Romero et al. (1998) with their respective percentage errors (%). In Telis-Romero equation is an increase in thermal conductivity with the increasing of moisture content and temperature where the values remained between 0.3736 and 0.4754 W/m °C.

Table 7 has theoretical values thermal conductivity of *pequi* pulp with 6 ºBrix corresponds to 70% of moisture content, calculated with different equations and percentages errors. The equations of Kolarov & Gromov and Telis-Romero can be used accurately to predict the thermal conductivity of *pequi* pulp with moisture content, for the temperatures studied, since they showed percentage errors from 0.70 to 8.05%.

Table 7. Theoretical values of thermal conductivity for *pequi* pulp with 6 ºBrix and percentage errors

Equation	**Temp. (°C)**	**Theoretical thermal conductivity (W/m °C)**	**Erro (%)**
KOLAROV & GROMOV (1973)	10	0.4340	2.12
	20	0.4340	8.05
	30	0.4340	0.70
	40	0.4340	1.14
	50	0.4340	1.40
TELIS–ROMERO et al. (1998)	10	0.4522	6.39
	20	0.4580	4.20
	30	0.4638	4.91
	40	0.4696	3.00
	50	0.4754	5.64

In Table 8 it was find the theoretical values of thermal conductivity for *pequi* pulp with 8 ºBrix, it is observed that the minimum percentage error was 0.24% and maximum 7.03%. It is suggested to use the equations of Kolarov & Gromov and Telis-Romero to estimate thermal conductivity of the *pequi* pulp with content of total soluble solids of 8 ºBrix, because of referral percentage errors less than 10% at all temperatures studied.

Table 9 has the theoretical values of thermal conductivity for *pequi* pulp with 10 ºBrix, calculated with the equations Kolarov & Gromov (1973) and Telis-Romero et al. (1998). It is found that the percentage error for equations mentioned exceeds 10% at temperature of 50 °C, with values of 15.15 and 13.47%, respectively. In this light it is clear that, for other temperatures (10, 20, 30 and 40 °C), it can used the equations tested to estimate the thermal conductivity aiming *pequi* pulp with 10 ºBrix.

Table 8. Theoretical values of thermal conductivity for *pequi* pulp with 8 ºBrix and percentage errors

Equation	Temp. (ºC)	Theoretical thermal conductivity (W/m °C)	Erro (%)
KOLAROV & GROMOV (1973)	10	0.4130	5.71
	20	0.4130	0.24
	30	0.4130	1.23
	40	0.4130	7.81
	50	0.4130	3.77
TELIS–ROMERO et al. (1998)	10	0.4260	2.75
	20	0.4318	3.39
	30	0.4376	4.40
	40	0.4434	4.92
	50	0.4492	7.03

Table 9. Theoretical values of thermal conductivity for *pequi* pulp with 10 ºBrix and percentage error

Equation	Temp. (ºC)	Theoretical thermal conductivity (W/m °C)	Erro (%)
KOLAROV & GROMOV (1973)	10	0.3920	9.47
	20	0.3920	3.21
	30	0.3920	7.11
	40	0.3920	6.00
	50	0.3920	15.15
TELIS–ROMERO et al. (1998)	10	0.3998	7.67
	20	0.4056	1.29
	30	0.4114	5.27
	40	0.4172	4.13
	50	0.4230	13.47

In *pequi* pulp with soluble solids contents with 12 ºBrix (Table 10) the percentage errors were between 0.0 and 7.48%, meaning that for the temperatures studied, the Kolarov & Gromov (1973) and Telis-Romero et al. (1998) equations can be used to predict this thermophysics for *pequi* pulp with this moisture content, due to have presented lower percentage error of 10%, which are recommended and tested to estimate the thermal conductivity for *pequi* pulp of 12 ºBrix equivalent having 55% moisture content.

Table 10. Theoretical values of thermal conductivity for *pequi* pulp with 12 ºBrix and percentage error.

Equation	Temp. (ºC)	Theoretical thermal conductivity (W/m °C)	Erro (%)
KOLAROV & GROMOV (1973)	10	0.3710	1.85
	20	0.3710	0.00
	30	0.3710	7.48
	40	0.3710	5.12
	50	0.3710	1.64
TELIS–ROMERO et al. (1998)	10	0.3736	1.17
	20	0.3794	0.70
	30	0.3852	6.84
	40	0.3910	4.45
	50	0.3968	2.35

CONCLUSIONS

The specific heat tended to increase with the increase of temperature for all samples and the increase of soluble solids *pequi* pulps showed a tendency to decrease the specific heat.

The thermal diffusivity of the *pequi* pulp decreases with increasing the soluble solids content.

The Riedel, Martens, Telis-Romero and Giraldo-Gómez equations can be used to estimate the thermal diffusivity of *pequi* pulp with the Riedel equation showing smaller errors.

The thermal conductivity did not show a definite trend with the increase temperature in the pulps studied.

RESUMO: O fruto do pequi (*Caryocar coriaceum* Wittm) possui um grande interesse econômico, no que se refere ao uso de seus frutos na culinária como fonte de vitaminas e na extração de óleos para a fabricação de cosméticos. Todavia, são desconhecidos estudos voltados para as propriedades termofísicas (calor específico, difusividade térmica e condutividade térmica), nas quais são propriedades de suma importância para que a polpa seja beneficiada a nível industrial. O trabalho em questão teve como objetivo estudar as propriedades físicas da polpa de pequi com teores de sólidos solúveis totais de 6, 8, 10 e 12 ^{o}Brix. As propriedades físicas estudadas foram: calor específico, difusividade térmica e condutividade térmica. O calor específico das polpas foi realizado por meio do calorímetro de mistura, a difusividade térmica utilizando-se o método do cilindro de Dickerson e a condutividade térmica no equipamento KD-2. Portanto, constatou-se que o calor específico apresentou tendência de aumento com o aumento da temperatura e do teor de sólidos solúveis totais das polpas. A difusividade térmica da polpa de pequi diminui com o aumento dos sólidos solúveis totais, a condutividade térmica das polpas não apresentou uma tendência definida com o aumento da temperatura nas polpas estudadas.

PALAVRAS-CHAVE: *Caryocar coriaceum* Wittm. Calor específico. Condutividade térmica. Difusividade térmica.

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