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Coffee Dryer with Dehydrated Air

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Abstract

Coffee is one of the most consumed beverages in the world, it has a high added value, and the manufacturing process must be taken care of. New coffee post-harvest technologies dispense concrete base systems and reduce defects of traditional drying. This study analyzed the effects of new drying units with static dryers that work with dehydrated air to produce gourmet coffees. The results showed that an air dehydrator can dry coffee pods with an initial moisture content of 52% to 10% in just 3.2 days. The conclusion was that the dried coffee fruits in the concrete bases lose more quality than the dried coffee in new drying units.

Keywords: Artificial drying; Coffea Arabica L.; Electric dryers; Quality of the coffee quality ou beverage quality drink; Postharvest losses

Introduction

CHEMISTRY OF DEFECTIVE COFFEE BEANS Adriana S. Franca* and Leandro S. Oliveira esse artigo é bom para ver os termos tecnicos Drying is used to prolong food quality from harvest to future consumption, coffee fruit also goes through this post-harvest process. The largest portion of coffee harvested is still dried in concrete bases, which can cause losses and reduce the sensorial quality of the coffee acho que fica melhor [1-5]. This motivates new drying technologies-to minimize such losses. In this paper its present a static dryer working with dehydrated air that can be eliminate the concrete bases and increases the quality of the coffee. Modified atmospheres are the subject of recent studies, including the freeze drying é liofilização (igual cafe soluvel) talvez drying in low temperatures of foods [3,6,7], whose results highlight the high cost of this process as a factor preventing its diffusion, and the use of dehydrated air in convection drying [8-11] which showed viability in the drying of peanuts and soybeans. Now this technology has been tested in coffee drying.

Material and Methods

The dryer is called SBJ©, was built with static capacity of 15 m^3 and consists of a fixed bed drying tank, and the coffee in the trays was arranged in a "w" format (Figure 1) [12]. The trays are perforated, and air passes through the grains in an upward flow. To fill the module, the grain entrance valve (a) is opened, and the grain flow occurs when the base of the plate's "w" is mechanically moved (b). The electrical power and the cooling capacity of the air dehydrator are 148 kW and 363,636 kcal h^{-1}, respectively, which are sized for the static drying of 75 m^3 of coffee. Thus, the system built in the coffee farms has an UTA© [13] for air conditioning and five modules SBJ© with an individual capacity of 15 m^3 (SBJ-15©); they were named drying units (DUs), and the assembly scheme is presented in Figure 2.

Coffee drying was monitored on four coffee-growing Brazilian farms, the evaluated coffee varieties were Topaz Catuai e Novo Mundo (primeira letra maiscula da variedade e não traduzir The initial moisture content of the harvested grains was 52% não precisa, characterizing a larger quantity of grains in the cherry beans não é mais usual? cherry é aquele estagio cereja,green beans verde e black já é o seco ?. The grain moisture was obtained with an Agrologic meter, model AL-102 ECO, with humidity limits of 1-60%, a precision in humidity indication of +/- 0.3%, and humidity reading accuracy of 0.1%, a balance accuracy of 0.001kg and a balance temperature range of 10-60°C. The equipment serial number was 102634, and it was initially calibrated using the oven method at 105°C [14,15].

To the air outflow of the SBJ©, a ICEL brand thermohygrometer, model HY-4010, with a temperature scale of -40 ºC to 105 ºC, a resolution of 0.1ºC and an accuracy of ±1ºC was coupled. The relative humidity reading range of this meter is from 0 to 100%, and it has a resolution of 0.1% and an accuracy of ± 3%. Dehydrated

air was injected in the SBJ© for approximately 12hours daily, after which time, the movement of the grains between the vats was promoted and the grain mass remained in rest for the remaining period. This process made it possible to homogenize the moisture between the grains in a similar way as the process of revolving the mass of coffee in the base system.

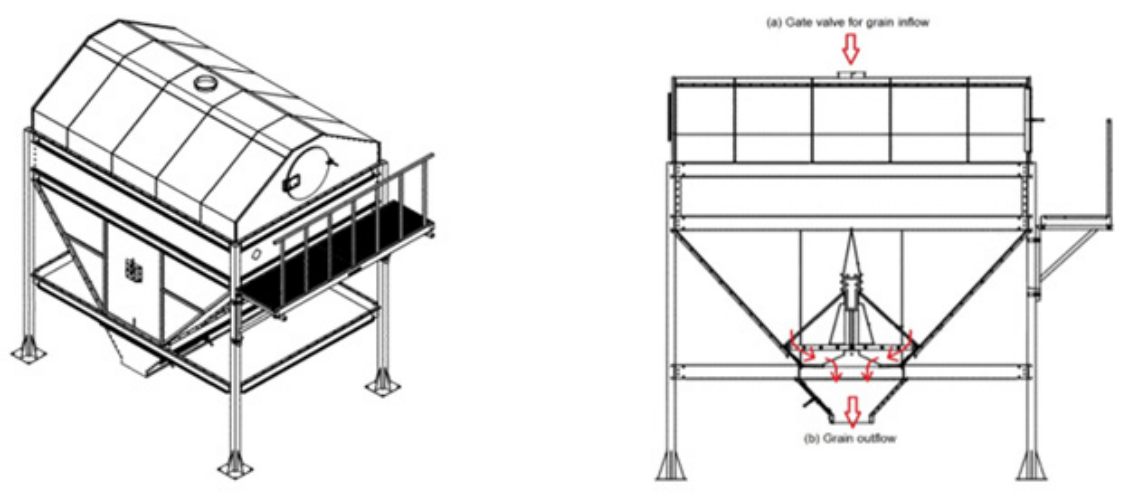

Figure 1: Front view of a tray dryer module (SBJ©) with longitudinal section (the grain inlet valve (a) and outflow (b)). Font: Adapted from Barreto (2013).

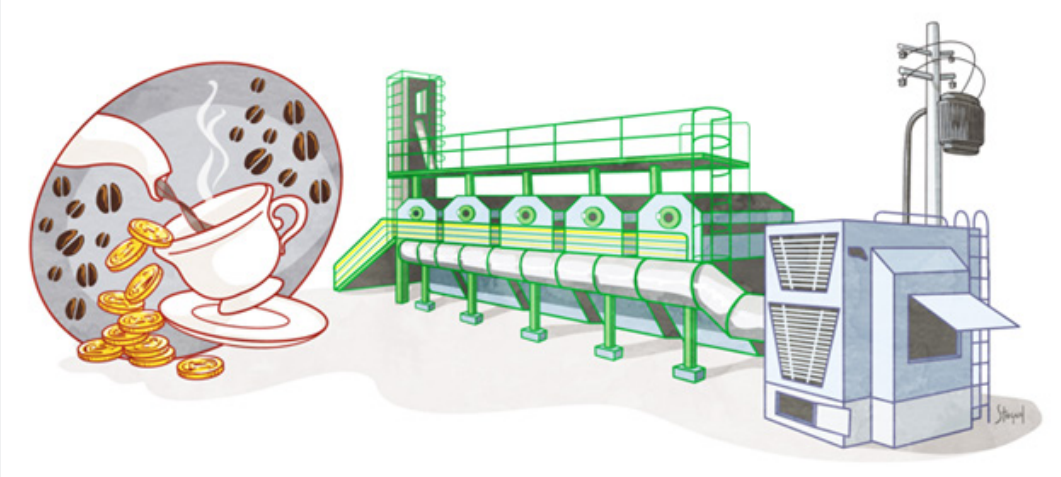

Figure 2: Drying unit (DU) assembly diagram.

Samples of one kg of dried coffee were collected in triplicate, in the drying unit (DU) randomly numbered, and presented by the average of each farm?. The DUs were randomly named DU-A, DU-B, DU-C and DU-D for the characterization of properties in the coffee quality assessment process, as requested by the owners. For sample control , was used the natural drying. ..... In the concrete bases of the evaluated properties, the coffee was conditioned in re-rows every hour for the first five days. After the fifth day, the coffee was spread in a layer with a height of 0.05m and revolved four times a day. In the nocturnal period, the product was collected in estimated heights of 2,0m and covered with canvas, and it was examined and spread at dawn. This procedure was also repeated at the beginning and end of the rainy periods. faltou citas as analises feitas tamanho, bebida..

Results and Discussions

Drying with dehydrated air presented technical characteristics viable to its use (Figure 3). It was found that the acho que o certo é cup quality (flavor) the cup quality is higher and defects is lower and the defects in the dry samples in the DUs were lower than the those in the control samples (base), showing that drying in the DUs had lower rates of broken and damaged grains in relation to drying in the base systems. Probably grains with high granulometry indicating smaller grain breakage in its handling. The granulometry of coffee has a direct relation with its value as well as the classification of flat grains or mochas [16]. According

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to Chen et al. [17] the uniformity of the grains retained in high sieves is linked to acceptability in the export market and better remuneration.

Drying in concrete bases systems can also promote fermentation and reducing coffee quality [5]. The better quality of grains showed in the value coffee market. According to Peske et al. [18] the price of coffee dried in a concrete base may strongly depend on unfavorable climatic factors, causing drying delays and the impairment of coffee quality. Drying is a critical step in the postharvest process [19-21]. In this context, the main risks that may arise are biological and chemical, which may lead to a product that is unfit for human consumption [21,22].

Conclusion

An air dehydrator unit drying coffee fruits with an initial humidity of 52% until 10% in just of 9.2 days. Coffee fruits dried in the concrete bases loses more quality than dried coffee in the drying unit. Each coffee grower must size the air dehydrating machines according to their peculiar productive characteristics.

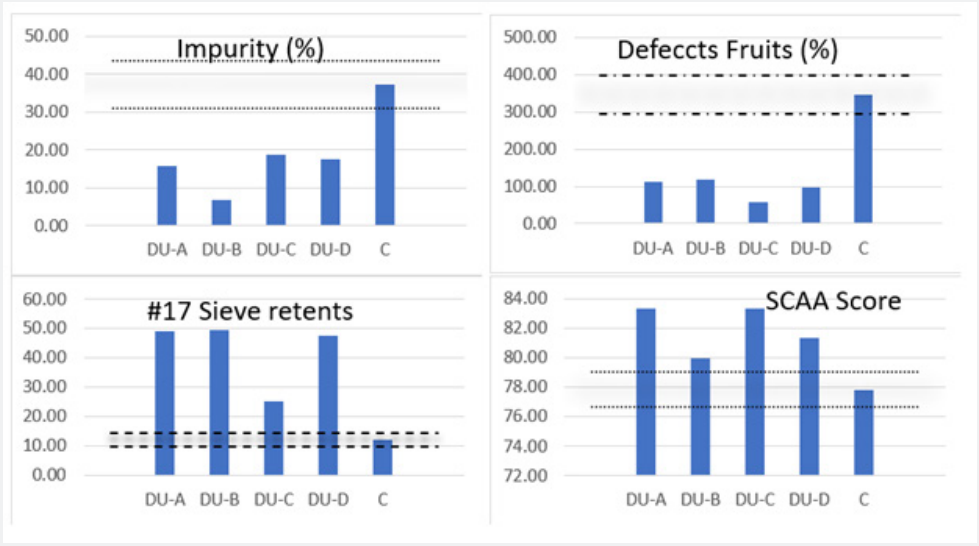

Figure 3: Drying unit (DU) assembly diagram.
Notes: DU-[ ]: Drying unit; C: control composed of coffee dried in the base agricultural units; means followed by the same letter in a line do not differ according to Tukey's test at the 5% level and the control treatment according to Dunnett's test (5%).

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