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Effect of Drying on Physicochemical and Nutritional Quality of *Ficus carica* (Fig)

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Abstract : In this study, the consequences of various process ways i.e. sun drying (SD) and tray drying (TD) of fresh fruits (FS) for ficus carica in terms of proximate, physical, nutritional and phytochemical composition are studied Analysis of information showed that drying techniques improved the macromolecule, carbohydrates, ash content, total phenol, antioxidant activities and mineral content. The result obtained during this analysis is clearly indicated that some process ways area unit established smart for additional nutrient retention as compared to different. This study aim to form shoppers conscious of the consequences of process ways on nutritional value of fruits which they should become aware of consumption seasonal recent fruits.

Keywords: Sun drying, tray drying, pretreatment and *Ficus carica*.

Introduction : Many varieties of fruit should process to keep up their quality as a result of they are solely offered in season types of fruit should be processed to keep up their quality as a result of their seasonal and their time period is restricted. Fig (Ficus carica) is an Asian species of flowering plants within the family Moraceae. The market of fig is split into recent and processed sectors. The market of recent figs consists of recent fruit harvested and brought to promote. whereas the market refers to whole dried figs oversubscribed in retail client packages within the bulk amount. it's delicious and sweet fig fruit is one amongst the favored fruits enjoyed since so many year. In India fig fruit is mentioned as minor fruit.

Figs are a powerhouse of nutrients similarly as health benefits. Fig is rich in phytonutrients, antioxidants and vitamins. Entirely develop and ripe fig with pear form having succulent and juicy flesh within. Civilizations across the planet have used figs in ancient remedies for centuries: improve digestion, anti-clotting, Anti-spasmodic, Anti-ulcer, Anti-cancer and lipid lowering properties.

Material and Methodology

Raw Material

Material chosen on the basis of size, shape, color and maturity of the fruit.

Fig (Ficus carica)

Fig was procured from native market of Aurangabad. when the removal of unripe and spoiled one, they were washed totally with water and hold on at refrigeration temperature (4 ± 1oC) till additional use

Different materials and Chemicals

The other materials and chemicals that were needed for dehydration and analysis were procured from the native market of Aurangabad and created accessible from Department of Agricultural Engineering, M.I.T. Aurangabad.

Equipments and Instruments

The different equipments needed for the dehydration of fig fruit and their physicochemical characterization were created accessible from the Department of Agricultural Engineering, M.I.T. Aurangabad.

Pretreatment for fig fruit:

Blanching and sulphitation:

The blanching of recent fig fruit was carried out in water at 600C for 4 minutes. The ratio of fruit to blanching water was maintained at 1:5. The blanched fruits were then dipped in one percent potassium Metabisulphite (KMS) solution for half-hour at normal temperature.

Drying techniques

The selected fresh whole fruit was subjected to 2 different methods:

Sun drying:

Ficus carica fruits were distributed on the stainless steel trays and dried below direct daylight at temperature between 25 and 30°C, for 5 days.

Tray drying:

Ficus carica fruits were dried in tray drier at temperature 70oC

Physical properties:

Length, fullness index and breadth were measured by vernier calliper technique (Mohsenin, 1970) and density was measured by toluene displacement technique (Mohsenin, 1986; Gezer et al. 2002).

Proximate analysis:

The chosen whole fruits fresh and dried below the influence of selected strategies were analyzed for proximate composition (moisture, ash, fat, protein and carbohydrates). Proximate analysis was analyzed in triplicates. Moisture, ash and fat content were determined by AOAC, 2000. Carbohydrates were determined by anthrone methodology (Hedge and Hofreiter, 1962). protein was determined by micro-kjedahl methodology (AOAC, 2000). Dietary fiber (cellulose, hemicelluloses and lignin) were determined by Van Soest, (1977). Mineral content were calculable by GC-MC (2008, AYUSH).

Phytochemical composition:

The phenolic content within the fruit extract were determined in triplicate in gallic acid equivalent by using Folin-Ciocalteu method (Thimmaiah, 1999). Total antioxidant activity measured by Kekuda et al. (2010). Flavonoid content was determined by photometer and expressed as quercetin per 100 g of fruit (Luximon-Ramma et al. 2002). Anthocyanin was

determined by pH-differential methodology. And absorbance was measured at 520nm and 700nm and expressed as cynidine-3-glycoside equivalents per 100 g of fruits (Giusti and Wrolstad, 2001). organic compound was calculable by Herborne,(1973). Tannins was determined by using Spectrophotometric methods (Iwuoha and Kalu 1995).

Results and Discussion

The data contained physical properties, proximate and phytochemical composition depicted in Tables and Figures given below:

Table 1 **Physical properties of *Ficus carica***

Drying method	Fresh fig (FS)	Sun drying (SD)	Tray drying (TD)
Length(mm)	15.46± 0.05	14 .26±0.05	14.46±0.05
Width(mm)	18.14±0.00	17.46±0.05	17.86±0.05
Density(gm/cc)	0.93±0.02	0.94±0.01	0.91±0.00

*Values are average of three determinations

Depicted the length of fig was ranged from 15.46 mm, 14.26 millimeter and 14.46 millimeter for fresh, sun drying and tray drying. The dimension ranged from 18.14 mm, 17.46 millimeter and 17.86 millimeter for fresh, sun drying and tray drying. Similar findings are reported by Behzad, (2011).The results of the length and dimension showed that there was a major distinction between the samples. Drying method minimized the length with decreasing the rotundity of the fruits (Milovan et al. 2011). Isik and Izli (2007) reported similar results with our study i.e. length minimized because the wetness content minimized. The density of *ficus carica* was ranged from 0.93gm/cc, 0.94gm/cc and 0.91 gm/cc for fresh, sun drying and tray drying. Similar results were reported by Sayed et al.(2010). Result showed that density of fresh fruit was less as compared to dried as a result of increased density throughout drying method because of the variation within the mass, volume and structure of the plasma membrane and removal of water content (Pacco et al. 2007; Baryeh, 2002; Ratti, 1994).

Table 2 **Nutritional Composition of *Ficus Carica***

Drying method	Fresh fig (FS)	Sun drying (SD)	Tray drying (TD)
Moisture (%)	80 .2±0.00	25.86±2.48	25.43±3.23
Ash (%)	4.00±0.34	4.42±0.19	4.30±0.11
Carbohydrate(g/100g)	16.03±0.18	65.15±0.20	65.18±0.18
Fat (%)	0.53± 0.08	0.56±0.00	*0.59*±0.03
Protein (%)	0.53± 0.08	3.01±0.09	3.18± 0.07

*Values are average of three determinations

The moisture content was determined and depicted in (Table 2) and it ranged from 80 per cent, 25.86 per cent and 25.43 per cent for recent, sun drying and tray drying and there was a big distinction between the sample. These results were in keeping with the findings of (Maha et al., 2013). The low moisture content is very important throughout storage as they will be unbroken for a extended time while not spoilage. (Mcloughlin et al., 2003) reportable that tray drying is speedily absorbed by water molecules and resulted, fast evaporation of water that caused higher drying rates as compare to another drying strategies. The ash content of fig was ranged from 4.00 per cent, 4.42 per cent and 4.30 per cent for fresh, sun drying and tray drying. (Soni et al., 2014) reportable similar results. Ash is the quantity of mineral present in a very sample or a substance. Ash content is one of the strategies that are used for locating out what quantity minerals are gift in a explicit sample. The ash content was higher in sun dried sample and lower in fresh sample (Maha et al., 2013). It implies that there was no a lot of distinction within the ash content once processing of the samples. High content of ash could also be because of the removal of moisture content (Morris et al., 2004). The Carbohydrate content of the sample reportable from 16.3 gm / 100gm, 65.15 gm / 100 gram and 65.18 gm/100gm for fresh, sun drying and tray drying. Similar results are obtained by Mehmeet et al. (2009). Tray dried sample showed higher preservation of the nutrients as compared to sun dried sample as a result of sun drying caused reduction within the nutritionally contents because of prolonged heating (Kyzlink, 1990; clary et al., 2007). The fat content ranged from 0.53 per cent, 0.56 per cent and 0.59 per cent for fresh, sun drying and tray drying. Similar results are obtained by maha et al. (2013) . during this study it had been discovered that the fat content increased in dried samples because of removal of moisture content, that is directly associated with increase the concentration of nutrients (Morris et al., 2004). it was reportable consistent results that drying method increased 4.5 times fat content in fruits. The protein content was ranged from 2.98 per cent, 3.01 per cent and 3.18 per cent for recent, sun drying and tray drying. Similar results are obtained by (Mehmeet et al., 2009).

Table 3 Phytochemicals Composition- Total Phenolic Content (T_p), Total Flavonoids Content (T_f) and Antioxidant Activity (DPPH and FRAP).

Drying method	Fresh fig (FS)	Sun drying (SD)	Tray drying (TD)
(TP)(mg TAE/g)	4.58±0.01	4.92±0.01	4.94± 0.01
(TF)(mg E/100g)	0.21±0.01	0.19±3.39	0.20± 0.01
(DPPH) (%)	73.42±0.83	75.36±1.45	75.84± 1.67
(FRAP) (%)	76.22±4.90	76.55±0.09	78.54±0.56

*Values are average of three determinations

Total phenolic content is expressed as mg of tannic acid equivalents in 100 g of dried sample (mg TAE per100 g dried sample)

The total phenol content was ranged from 4.58 mg TAE/100gm, 4.92 mg TAE/100gm and 4.94 mg TAE/100gm for fresh, sun drying and tray drying. (Ana et al. 2011) reportable similar results. Table 1.4 showed the results of the entire phenol content that there was a big distinction between the samples. phenolic resin compounds are familiar to act as antioxidants not solely due to their ability to donate hydrogen or electrons however in the main because of their stable radical intermediates, which prevent the oxidization (Cuveliev and Berset, 1992; Maillard et al. 1996). Total phenolic content either could also be enhanced or reduced once drying, relying not solely on the variety, however additionally on the production system used, conventional or organic (Sablani et al. 2011). according to this study, it had been discovered that the phenolic content enhanced once drying due to loss of moisture (Sarsavadia, 2007) and (Slatnar et al.2011) are obtained similar findings. Drying responsible to unleash the bond phenolic compounds from matrix throughout the breakdown of cellular

constitutents (Arslan and Ozcan, 2010). Drying at coldness resulted, reduction within the phenol content (Gupta et al. 2011) and long drying time might need destroy some phenolic compounds (Li et al. 2006). receptacle drying enhanced the phenolic content as compared to sun drying thanks to less heating period within the microwave might have needed to enhanced the phenolic content (Garau et al. 2007). But, just in case of sun drying needed massive drying amount that fruit sample is exposed to the part oxygen that caused the reduction in ascorbic acid and phenolic compounds etc. (Sarsavadia, 2007).

The total flavonoid content ranged from 0.21 (mg q E/100g db), 0.19 (mg q E/100g db) and 0.20 (mg q E/100g db) for fresh, sun drying and tray drying. Similar findings were reported by Ana et al. (2011). fresh sample contained a lot of flavonoid as compared to dried sample due to thermal degradation of flavonoids throughout process (Crozier et al.1995; and Rhodes, 1997). Heating could also be breakdown some phytochemicals that have an effect on semipermeable membrane integrity and caused a migration of some flavonoid part (Davey et al. 2000). Thermal degradation occurred throughout process within the presence of oxygen by direct oxidization mechanism or through the action of oxidizing enzymes i.e. (PPO) polyphenoleoxidase. Degradation of flavonoid is occurred not solely because of temperature and heating, it's going to additionally rely on alternative parameters like pH, the presence of oxygen, and therefore the presence of different phytochemicals within the medium (Ioannou et al. 2012). Less degradation of flavonoid occurred in receptacle drying as compared to sun drying because of constant heating (Mechlouch et al. 2015). antioxidant activity, 2,2-diphenyl-1-picrylhydrazyl (DPPH) ranged from 73.42 per cent,75.36 per cent and 75.84 per cent for fresh, sun drying and tray drying . Emine and Hisil, (2013) reportable similar result. The result showed that there was a significant distinction between the sample. tray dried sample contained higher antioxidant activity due to the discharge of a free phenolic fraction. Turkmen and Velioglu, (2005) additionally reportable that tray drying enhanced the antioxidant activity due to improvement of antioxidant properties of present compounds like Millard reaction product that have antioxidant activity (Yin and chang, 1998). (Yamaguchi et al. 2001) reported that the release of phenolic compounds once tray drying resulted to boost the antioxidant activity in fruit extracts. ferric reducing scavenging activity (FRAP) ranged from 76.22 per cent, 76.55 per cent and 78.54 per cent for fresh, sun drying, and tray drying . (Emine and Yasar, 2013) were reportable similar results. FRAP wont to verify the capability of the plant extract to donate electron to Fe3+ and reduce it to Fe2+ particle. Higher FRAP value, suggests that higher the antioxidant activity (Yan et al. 2006). Radical scavenging activity increased when thermal treatment because of the inhibition of oxidative enzymes and destruction of the cell membrane that unleash the antioxidant compounds (Yamaguchi et al. 2001).

Conclusion

This study concludes that these selected ways i.e. Sun drying and tray drying have a big impact on the physiochemical, nutritional and phytochemical properties. Compare to fresh, sun drying and tray drying technique would be wont to turn out smart quality dried fruit in terms of protein, carbohydrates, ash content and minerals. Purpose of the study is to get awareness among individuals regarding the influence of process ways on fruits and to extend the intake of underutilized fruits in their daily diet. the longer term studies should focus on nutrients retention by exploitation different drying strategies (Sun drying and tray drying) and totally different pretreatments.

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