Effect of Drying on Physicochemical and Nutritional Quality of grapes

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***Abstract*—In this study the impact of the pretreatment and drying strategies on completely different quality parameters were studied. The effect of without treated grapes were subjected to pretreatment before drying i.e. dipping grapes in to 1 % NaOH solution at 80oC for 2 min. Pretreatment used in drying of grapes improve the physical, chemical and bioactive components of raisins and also reduce the time required for drying. Dipping treatment reduced the drying time i.e. for treated grapes it was 21 hrs. and for without treatment it was 30 hrs.**

Keywords— NaoH, Drying, Bioactive Components

I. INTRODUCTION

Grape is a very important fruit crop of Asian nation. Industrial grape cultivation in Asian nation is principally restricted for table purpose and has fairly high level of productivity within the world. a region of 125430 HA was lined below grape cultivation with production of 3685910 MT was recorded throughout 2015-16. Grape is principally cultivated in geographical area followed by Mysore, Tamil Nadu, Mizoram and state. Some northern states viz.; Punjab, Himachal Pradesh and Jammu and geographic region are manufacturing grapes. While 68.5 per cent of grape made is accessible for table purpose, nearly 28.5 per cent is dried for dried fruit production, 2.5 per cent for craft and zero.5 per cent is employed for juice. The drying of grape bunches below sheds is common follow followed in major dried fruit creating areas of Asian nation. Major dried fruit creating regions are Sangli, Solapur and Nashik districts of Maharashtra; and Bijapur and Bagalkot districts of Mysore. As per Associate in Nursing estimate a complete of 171 thousand tonnes of raisins was made throughout 2015 (Sharma et. al., 2014).Drying removes the wetness from the grapes therefore bacterium, yeast and mould cannot grow and spoil the grapes. Drying additionally slows down the action of enzymes (naturally occurring substances that cause foods to ripen), however doesn't inactivate them. as a result of drying removes wetness, the grapes becomes smaller and lighter in weight. Grapes may be dried within the sun, during an receptacle drier or in a food dehydrator by victimization the proper combination of heat temperatures, low humidness and weather. Drying is one in all the oldest ways of protective food, Slows down however doesn' t fully inactivate enzymes. Drying additionally helps within the preservation of the grapes thereby increasing its period of time (Lokhande et. al., 2016).

II. METHODOLOGY OF USE

A. Raw Material

Thomson seedless and sonaka grape verities were procured from local market of Aurangabad. After the removal of unripe and spoiled one, the seedlings were washed thoroughly with water and stored at refrigeration temperature (4 ± 1°C) until further use.

B. Other materials and Chemicals

The other materials and chemicals that were required for dehydration and chemical analysis were procured from the local market of Aurangabad and made available from Department of Agricultural Engineering, M.I.T. Aurangabad.

C. Equipments and Instruments

The different equipment required for the dehydration of fig fruit and their physicochemical characterization were made available from the Department of Agricultural Engineering, M.I.T. Aurangabad.

D. Pretreatment for fig fruit

Sodium hydroxide: Grapes were boiled in 1 per cent solution of sodium hydroxide for 2 minutes for cracking the outer waxy layer to increases the drying rate.

E. Drying techniques

The selected forms of grape were subjected to 2 totally different methods.

Sun Drying: Grapes were distributed on the stainless-steel trays and dried underneath direct daylight at temperature between thirty to 40°C, for 5-6 days

Tray Drying: Grapes was dried in receptacle drier at temperature 70oC.

F. Physical properties

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

G. Proximate analysis

The elite forms of grape dried underneath the influence of selected ways were analyzed for proximate composition (moisture, ash, fat, macromolecule 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). macromolecule was firm 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).

H. Phytochemical composition

The phenoplast content within the fruit extract were determined in triplicate in acid equivalent by victimization Folin-Ciocalteu methodology (Thimmaiah, 1999). Total inhibitor activity measured by Kekuda et al. (2010). Flavonoid content was firm by photometer and expressed as quercetin per one hundred g of fruit (Luximon-Ramma et al. 2002). Anthocyanin was firm by pH-differential methodology and absorbance was measured at 520nm and 700nm and expressed as cynidine-3-glycoside equivalents per one hundred g of fruits (Giusti and Wrolstad, 2001). Organic compound was calculable by Herborne,(1973). Tannins was firm by victimization Spectrophotometric ways (Iwuoha and Kalu 1995).

I. Methodology for grape raisin preparation

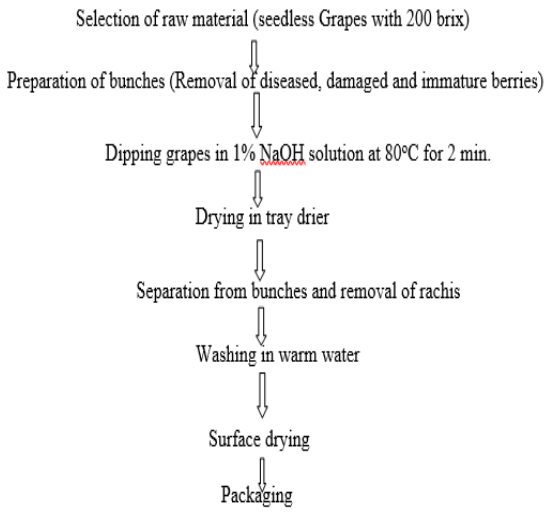

Fig. 1. Australian cold dip method, Doreyappacowda, 1998.

III. Result and Discussion

A. Chemical analysis of grapes

TABLE I. Chemical Analysis of Two Varieties of Grapes

Sr. no.	Parameters	Thompson	Sonaka
1	Moisture (%)	81.29±1.78	79.17±1.21
2	Ash (%)	0.29±0.4	0.27±0.2
3	Protein (%)	0.53±0.11	0.58±0.09
4	Fat (%)	0.11±0.1	0.15±0.2
5	Crude Fiber (%)	1.4±0.28	1.8±0.24
6	Total soluble solids(°Brix)	18.5±1	17.5±1
7	Total sugar (%)	11.33±0.73	12.71±0.68
8	Titratable acidity (%)	0.13±0.01	0.11±0.01
9	Ph	6±1	6±1

[a.] Each value represents the mean ± SD of three determinations.

Chemical analysis of different varieties of Grapes viz. Thompson and Sonaka were carried out with average observations. The per cent moisture content found in both the varieties of grapes was 81per cent for Thompson & 83per cent for sonaka, the per cent Ash content found in both the varieties of grapes was 0.29 per cent for Thompson & 0.27per cent for sonaka, the per cent Protein content found in both the varieties of grapes was 0.53per cent for Thompson & 0.58per cent for sonaka while the per cent fat content found in both the varieties of grapes was 0.11per cent for Thompson & 0.15per cent for sonaka while the per cent Crude Fiber content found in both the varieties of grapes was 1.4per cent for Thompson & 1.8per cent for sonaka, the per cent total soluble solids content found in both the varieties of grapes was 18.3per cent for Thompson & 17.7per cent for sonaka where as the per cent. The Total sugar for both the verities was 11.33per cent and 12.71per cent, Titratable acidity content found in both the varieties of grapes was 0.13per cent for Thompson & 0.11per cent for sonaka and the pH content found in both the varieties of grapes was 6 for Thompson & 6 for sonaka. Obtained results are same as per the results obtained by Thakur et.al.(2010).

B. Chemical properties of grapes after tray drying which was pretreated with sodium hydroxide

TABLE II. Chemical Properties of Grapes After Tray Drying Which was Pretreated with Sodium Hydroxide

Sr no	Parameters	Sun drying	Tray drying		
			50ºC	60ºC	70ºC
1	Moisture content	19.78±1.07	18.39±0.84	18.11±0.78	17.91±0.81
2	Ash	0.53±0.05	0.68±0.07	0.54±0.04	0.57±0.05
3	Protein	0.41±0.02	0.54±0.03	0.43±0.03	0.45±0.02
4	Fat	0.75±0.1	0.83±0.07	0.76±0.04	0.78±0.04
5	Crude Fiber	4.47±0.38	5.23±0.29	4.56±0.43	4.78±0.62
6	Carbohydrate	75.87±1.26	72.94±1.37	75.54±1.08	75.03±0.96
7	Ascorbic acid	0.06±0.01	0.05±0.02	0.06±0.01	0.07±0.02

[b.] Each value represents the mean ± SD of three determinations.

From the table it is revealed that grapes dried at different temperature show difference in chemical composition. The moisture content of dried grapes was higher in sun dried grapes i.e. 19.78per cent as compare to tray tray grapes at 50, 60 and 70oC. Ash content was higher in tray dried grapes i.e. 0.68 % at 50oC. As compare to sun dried grapes and tray dried grape at 60 and 70oC. The similar trends were observed for protein, fat and crude fiber. Carbohydrate content was higher in sun dried grapes i.e. 75.87%. As compare to tray dried grapes at 50, 60 and 70oC. Ascorbic acid was slightly high in tray dried grapes i.e.0.07% at 70oC. As compare to sun dried grape and tray dried grape at 50oC and 60oC. As per the above observation it is found tray dried grapes at 50oC is more nutritious when pretreated with sodium hydroxide. Obtained results are same to the results obtained by Thakur et. al. (2010).

C. Bioactive component of resins

1) Total phenol content (mg of GAE/g): The total phenol content in tray dried grapes which was pretreated with sodium hydroxide is higher at 50ºC i.e. 10.65 (mg of GAE/g) as compare to sun dried fig and tray dried fig at 60ºC and 70ºC.

TABLE III. TOTAL PHENOL CONTENT

Treatment	Sun drying	Tray drying		
		50ºC	60ºC	70ºC
Sodium hydroxide	9.98±0.98	10.65±1.59	10.42±1.43	10.27±0.94

[c.] Each value represents the mean ± SD of three determinations.

2) Antioxidant activity by FRAP AND TEAC method: Antioxidant activity of dried grapes by using FRAP method is higher in tray dried grapes at 50ºC i.e. 23.26 mmol FE2+/kg as compare to sun dried grapes and tray dried grapes at 60ºC and 70ºC. In TEAC method antioxidant activity of dried grapes was higher in tray dried grapes at 50ºC i.e. 6.63 mmol trolox/kg as compare to sun dried grapes and tray dried grapes at 60ºC and 70ºC. As per the above observation it was found that the antioxidant activity of dried grapes was higher in tray dried grapes at 50ºC that was before treated with sodium hydroxide.

TABLE IV. ANTIOXIDANT ACTIVITY OF RESINS BY FRAP AND TEAC METHOD

Method	**Sun drying**	**Tray drying**		
		50ºC	60ºC	70ºC
FRAP (mmol FE2+/kg)	22.93±1.23	23.26±0.77	23.07±0.98	22.71±1.17

[d.] Each value represents the mean ± SD of three determinations.

CONCLUSION

It is finally over that drying rate is quicker at the start and it belittled incessantly with the removal of wet and it became a lot of distinguished because the temperature will increase. The rate of removal of the moisture at different temperature ranges i.e. 50oC, 60oC and 70oC. The drying rate indicates that there is slow rate of moisture removal at 50oC during drying of grapes. Treatment of sodium hydroxide required less time to dry the grapes up to desired level. Resins obtained at 50oC having good quality with respect to all bioactive compounds. Farmers should be use treatment of sodium hydroxide for drying of grapes, because of reducing the losses.

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