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Effect of different pre-treatments on physico-chemical parameters of raisins prepared from variety Thompson Seedless

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ABSTRACT

The present investigation was carried out at the Post Graduate Laboratory of the Department of Horticulture, Junagadh Agricultural University, Junagadh during the year 2008. The experiment consisted of 3 levels of olive oil concentrations *viz.,* 0.5%, 0.1%, and 1.5% and 3 levels of potassium carbonate concentrations *viz.,* 2.0%, 4.0%, and 6.0% and control, there were 10 treatment combinations employed in this study. Fully ripened, fresh, healthy, uniform size, shape and colour berries of Thompson seedless variety were taken for experiment. The berries treated with different treatments for 3 minutes at 42^{0}C and treated berries were subjected to shade drying for 8-17 days. The dehydrated grape raisins were packed in polythene bags and kept at ambient conditions. The experiment was laid out in Completely Randomized Design with three replications. The dehydrated grape raisins samples were analyzed for various physical, biochemical and organoleptic changes. The results of the study indicated that, the combination of olive oil concentrations and potassium carbonate concentrations affect the quantitative and qualitative characteristics during the storage period. The treatment combination of olive oil 0.5% and potassium carbonate 4% concentrations, recorded the highest TSS, sugars, ascorbic acid and organoleptic score during the entire storage period. The chemical parameters *viz.,* TSS, reducing sugar, total sugar content were increased with advancement and titrable acidity decreased during storage period. The organoleptic rating with regard to colour, texture, flavour, and taste was also found higher in the treatment combinations of olive oil 0.5% and potassium carbonate 4%. Among different treatments, T_{10} (dipping (1.5% olive oil + 6.0 % K_2CO_3) for 3 min. at 42^{0}C) recorded the highest recovery % with lowest dehydration ratio. From the present investigation it is clear that, for quality production of raisins (dried grape berries) from fresh grape berries under shade drying by using treatment olive oil of 0.5% and potassium carbonate 4% would be beneficial.

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Raisin is one of the important processed products obtained from grapes. The word raisin has been taken from French word 'Raisin gel' meaning dry grapes (Amba Dan, 1985). As raisins are prepared by drying of grapes, they contain most of the vitamins, minerals and other nutrients present in the original fruit (Winkler, 1962). The quality of raisins is determined by physico-chemical characteristics of grape berries and the method of their preparation (Chavan *et al*., 1992). The cold dip method is easy and economical and mostly used in Australia. The sulphur bleach, golden bleach, soda dip, hot dip, etc. methods are used for raisin preparation. The acid preyal dip method before sulphuring is used to provide a product of better quality stability.

MATERIALS AND METHODS

The present experiment on was conducted during 15th April-15th September 2008-09 in the post graduate laboratory of the Department of Horticulture, Junagadh Agricultural University, Junagadh. This laboratory experiment was carried out by using Completely Randomized Design with ten treatments with three replications of each treatment (Table 1). Ripe, fresh grapes (*Vitis vinifera* L.) cv. 'Thompson seedless' obtained at the local market in Junagadh for making raisin. Methodology shown in Fig. (a) was used for making raisins prepared from variety 'Thompson seedless' of grapes (*Vitis vinifera* L.). The samples were analyzed for moisture, TSS, sugars, titratable acidity, ascorbic acid, by methods described by Ranganna (1986).

RESULTS AND DISCUSSION

The data recorded on various physiological parameters *viz.*, weight, moisture per cent, physiological loss in weight (PLW), drying time requirement, dehydration ratio and recovery per cent of raisins prepared from grape

Table 1 : Treatment details

Treatments No.	Treatment details
T_1	Control
T_2	Dipping (0.5 %olive oil + 2.0 % K_2CO_3) for 3 min. at 42^0C.
T_3	Dipping (0.5% olive oil + 4.0 % K_2CO_3) for 3 min. at 42^0C.
T_4	Dipping (0.5% olive oil + 6.0 % K_2CO_3) for 3 min. at 42^0C.
T_5	Dipping (1.0% olive oil + 2.0 % K_2CO_3) for 3 min. at 42^0C.
T_6	Dipping (1.0% olive oil + 4.0 % K_2CO_3) for 3 min. at 42^0C.
T_7	Dipping (1.0% olive oil + 6.0% K_2CO_3) for 3 min. at 42^0C
T_8	Dipping (1.5% olive oil + 2.0 % K_2CO_3) for 3 min. at 42^0C.
T_9	Dipping (1.5% olive oil + 4.0 % K_2CO_3) for 3 min. at 42^0C.
T_{10}	Dipping (1.5% olive oil + 6.0 % K_2CO_3) for 3 min. at 42^0C.

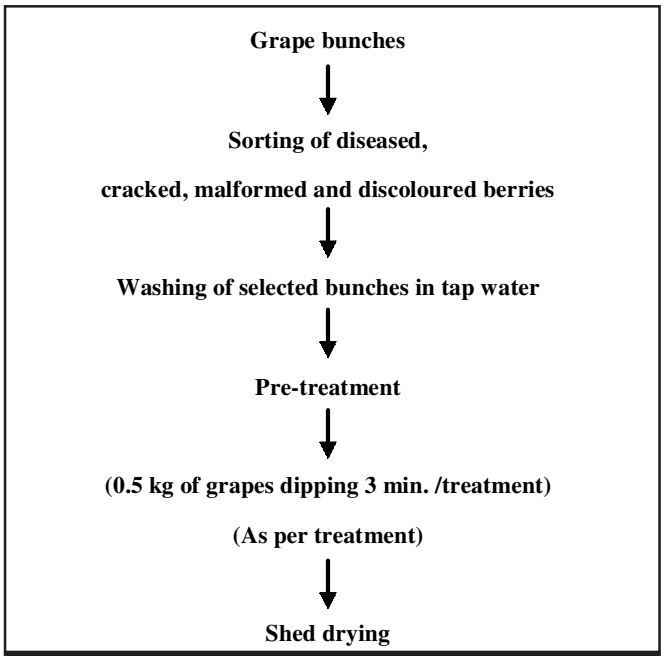

Fig. (a) : Experimental work plan

variety 'Thompson seedless' are presented in Table 2.The significantly maximum weight of raisins (837.83g) was recorded in treatment T_{10} that was followed by treatment T_9 (833.97g), T_8 (823.37g) and were found to be at par with each other. The data on moisture (%) revealed significant differences amongst the different treatments. However, numerically maximum percentage of moisture in raisins was noticed under treatment T_8 (13.71%) and minimum under treatment T_1 (12.36%). The lowest (72.11%) physiological loss in weight during the raisins preparation was noticed in treatment T_{10}. However, significantly highest physiological loss in weight (79.13%) was observed in treatment T_1. The lowest drying time and dehydration ratio required for preparation of raisins were observed to be less (10 days and 3.58 %, respectively) in treatment T_{10} and was found to be significantly superior to rest of all the treatments. The significantly maximum recovery per cent of raisins (27.97%) was registered in treatment T_{10}.

The data recorded on various chemical parameters *viz.*, TSS, acidity, total sugars, reducing sugars, non reducing sugars and ascorbic acid content of raisins are presented in Table 3. The maximum TSS content in raisins prepared from grape variety 'Thompson seedless' was recorded in treatment T_3 (82.97 ^{0}Brix). The rise in TSS could be due to accumulation of sugar as consequence of starch hydrolysis in storage (Medlicott *et al.,* 1986).

The treatment T_{10} and T_8 registered significantly less acidic raisins (0.25%). However, significantly more acidic raisins (0.29%) were obtained in treatment T_2 and T_6. The loss of acids was also rapid and titrable acidity showed a continuous decrease, such as rapid decline in organic acids suggests their faster utilization in the process of respiration (Medlicott and Thompson, 1985). The data in respect of total sugar, reducing sugars content in raisins showed significant differences amongst different pre-treatments. The significantly maximum total sugars (72.00%) and reducing sugars (70.28) were recorded in treatment T_3. This may be due to the consequence of release of sugars by hydrolysis of starch reserve during post harvest storage as reported by Soule and Hardings (1956). Significantly the highest ascorbic acid content (17.67 mg/100 g) was registered in treatment T_3 while, it was significantly lowest (9.83 mg/100 g) in treatment T_1.

The data recorded on various aspects of organoleptic evaluation *viz.*, colour, taste, flavour and overall acceptability (average) of raisins is presented in Table 3. Though the results in respect of colour and average acceptability of the raisins were found to be significant, the numerically highest scores (7.80) were registered in treatment T_3. The mean scores for taste of the raisin prepared by different pre-treatments ranged from 5.60 to 8.00. Treatment T_3 registered significantly maximum score (8.00) for taste, followed by treatment T_4 (7.23). The mean scores for flavour of the raisins prepared by different pre-treatments ranged from 6.53 to 8.20. Significantly maximum score for flavour (8.20) was registered in treatment T_3.

Table 2 : Effect of pre-treatments on physiological parameters of raisins prepared from variety 'Thompson seedless'

Treatments	Weight (g)	Moisture (%)	PLW (%)	Drying time (days)	Dehydration ratio (%)	Recovery (%)
T_1	626.00	12.36	79.13	14.00	4.79	20.75
T_2	638.33	12.94	78.73	13.83	4.70	21.02
T_3	665.33	13.40	77.83	13.33	4.50	22.71
T_4	644.13	13.34	78.50	13.00	4.66	21.42
T_5	766.67	13.42	74.23	12.50	3.91	23.33
T_6	799.43	13.26	73.36	11.83	3.77	26.82
T_7	788.43	13.25	73.72	11.33	3.80	26.13
T_8	823.67	13.71	72.55	10.83	3.64	27.32
T_9	833.97	13.56	72.33	10.17	3.67	27.75
T_{10}	837.83	13.53	72.11	10.00	3.58	27.97
S.E.±	4.90	0.05	0.04	0.74	0.01	0.12
C.D. (P=0.05)	14.46	0.16	0.13	2.18	0.03	0.37

Table 3 : Effect of pre-treatments on chemical parameters of raisins prepared from variety 'Thompson seedless'

Treatments	TSS (^{0}Brix)	Acidity (%)	Total sugars (%)	Reducing sugars (%)	Non reducing sugars (%)	Ascorbic acid (mg/100 g)	Colour	Taste	Flavour	Texture
T_1	71.27	0.28	61.33	59.17	2.16	9.83	7.40	5.60	7.73	7.40
T_2	74.10	0.29	68.62	65.47	3.14	13.60	7.57	7.17	7.57	7.57
T_3	82.97	0.32	72.00	70.28	1.72	17.67	7.80	8.00	8.20	7.87
T_4	80.26	0.31	71.93	69.11	2.81	16.27	7.70	7.23	8.17	7.83
T_5	78.41	0.32	71.90	68.45	3.45	14.93	7.57	7.20	7.90	7.57
T_6	75.07	0.29	69.48	65.47	4.00	14.47	7.27	6.60	7.60	7.27
T_7	75.21	0.26	63.82	60.18	3.63	14.07	6.77	6.73	7.10	6.77
T_8	71.20	0.25	63.36	60.00	3.36	12.67	6.27	5.90	6.57	6.23
T_9	73.13	0.28	66.23	63.16	3.07	12.93	7.00	6.83	7.33	7.00
T_{10}	70.71	0.25	60.36	58.33	2.03	10.33	6.17	5.80	6.53	6.20
S.E.±	0.09	0.01	2.67	2.82	0.032	1.36	0.33	0.36	0.38	0.40
C.D. (P=0.05)	0.28	0.04	7.89	8.34	0.094	4.03	0.99	1.07	1.14	1.18

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