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Studies on Sensory Analysis of Preparation of Date Palm Ready to Serve (RTS) Beverage by Using Whey and Soy Protein Powder

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A B S T R A C T

The present investigation is an attempt to formulate higher nutritional value of beverage with added health benefit by addition of date palm pulp and whey with soy protein. Studied for its sensory properties such as color and appearance, flavour and taste, consistency and overall acceptability by trained panelist by using 9 point hedonic scale. These experiments have four different treatment combinations such asT_0 (93% whey with 7% sugar), T_1(70% whey and 27% date palm pulp with 3% soy protein), T_2(60% whey and 37% date palm pulp with 3% soy protein), T_3(50% whey and 47% date palm pulp with 3% soy protein). The experiment T_1has been taken as 70% whey and 27% date palm pulp with 3% soy protein beverage for getting the best overall acceptability. It was found that among all treatments T_1(7.82) scored higher in sensory evaluation and was considered as optimized product. The developed whey based ready to serve beverage from date palm could be recommended for the large scale production at industrial level.

Introduction

Phoenix dactylifera, commonly known as date or date palm is a flowering plant species in the palm family, *Arecaceae*, it cultivated for sweet fruit. Date is one of the oldest known fruit crops and has been cultivated in North Africa and the Middle East for at least 5000 years (Zohary and Hopf, 2000). Date trees is growing singly or forming a clump with several stems from a single root system. Date fruits (dates) ranging from bright red to bright yellow in colour, depending on variety. They are very sweet containing about 75 percent of sugar when it dried. Date fruit are good sources of iron and potassium, calcium, chlorine, copper, magnesium and sulfur and a minor source of phosphorus. In addition, dates are a source of 16 amino acids and vitamins A, B_1, and B_2 (Ahmed *et al*., 1995; Vandercook *et al*., 1980). Date fruit also have many medicinal uses. They can be used as an

astringent for treating intestinal problems, treatment for sore throat and colds, relief of fever, cystitis, liver and abdominal problems. In India, the gum or exudate of dates is used for treating diarrhea and the roots are used to treat toothache (Barreveld, 1993; Dowson and Aten, 1962).

Whey is a valuable by-product obtained during coagulation of milk by using acid and/or rennet or physico-chemical process for the preparation of paneer, cheese, chhana, chakka and casein. By adding some ingredients in the whey, like sugar, colour and flavour to it, results in improvement of its taste, nutritive value and acceptability. So utilization of whey for the conversion into best beverage would be one of the important ways to utilize it. There is a lot of scope to explore whey of its utilization in beverage industries (Sakhale *et al*., 2012). Manufacture of beverages through lactic acid fermentation can provide desirable sensory profiles and it has already been considered an option to add value to whey (Salminen *et al.*, 1991; Skudra *et al*., 1998; Pescuma *et al*., 2008).The main biological activities of whey proteins are cancer prevention, increase of glutathione levels, antimicrobial function and increase of satiety response (Valli and Trail, 2005; Madureira *et al*., 2007).Whey proteins provide highest quality absorption characteristics as well as sulfur contain essentially amino acids like leucine, iso leucine and valine which are important in growth and repair of tissue, improved muscle strength and body composition (Khare *et al*., 2007).

Soy protein is a protein that is isolated from soybean. Soy protein isolate has been used in foods for its functional properties. It is made from soybean meal that has been de-hulled and defatted. De-hulled and defatted soybeans are processed into three kinds of high protein commercial products such as soy flour, concentrates, and isolates. Recently, soy protein popularity has increased due to its use in health food products. It is generally regarded as being concentrated in protein bodies, which are estimated to contain at least 60–70% of the total soybean protein (William, 2008).

Materials and Methods

Experimental site

The experiment "Studies on sensory analysis of preparation of Date palm Ready to serve beverage by using whey and soy protein powder" was carried out in research lab, Warner College of Dairy Technology, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj-211007, U.P. (India).

Procurement and collection of ingredients

Date palm purchased from local market of Prayagraj. Fresh paneer whey procured from Student Training Dairy (SHUATS). Soy protein purchased from local market of Prayagraj.

Treatment combination

T_0 -Control prepared from whey and sugar (93:7)
T_1–Experimental sample prepared from whey, date palm pulp and soy protein (70:27:3)
T_2–Experimental sample prepared from whey, date palm pulp and soy protein (60:37:3)
T_3–Experimental sample prepared from whey, date palm pulp and soy protein(50:47:3)

Organoleptic quality: (9 Point hedonic scale) Sensory evaluation of Date palm Ready to serve beverage by using whey and soy protein powder

The sensory evaluation of Date palm Ready to serve beverage by using whey and soy protein powder samples was done by a panel of judge

using a 9 point hedonic scale. Five experienced Technical staff members of the Warner college of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj served as a judging team and evaluated the samples of different treatment of Date palm Ready to serve beverage by using whey and soy protein powder. Numerical score was allocated for colour and appearances, flavour and taste, consistency and overall acceptability of Date RTS by using whey and soy protein. The numerical score was as an indication of the quality of Date RTS (Fig. 1 and 2; Table 1).

Statistical analysis

The data will be analyzed statically by Analysis of variance (ANOVA) at 5% level of significance and Critical Difference (C.D) in WASP software and excel software.

Results and Discussion

The sensorial quality characteristics of Date palm Ready to serve beverage by using whey and soy protein powder play a vital role in attracting consumers to purchase the product. Consumer judges Date palm Ready to serve beverage by using whey and soy protein quality on the basis of its sensory parameters such as colour and appearance, flavour and taste, consistency and overall acceptability. Sensorial evaluation was done by using 9 point Hedonic scale.

Colour and appearance count of date palm ready to serve beverage by using whey and soy protein powder

From the above Table 2, colour and appearance score in samples of different treatments and control, the highest mean of colour and appearance score was recorded in the sample T_1 (7.88) followed by T_2 (7.24), T_3 (6.74) and lowest score of control T_0(6.14). It indicates that higher the proportion of date palm pulp and soya protein, increase score of different treatments T_1 and T_2has significant difference ($P<0.5$).The significant difference was further analyzed statistically to find out the C.D. between and within the different treatment combinations. The difference between the mean values of T_0-T_1 (1.74), T_0-T_2 (1.10), T_0-T_3 (0.60), T_1-T_2 (0.64), T_1-T_3(1.14) and T_1-T_3(1.14) greater than the C.D. value, 0.397. Therefore, the difference was significant.

Flavour and taste score of Date palm Ready to serve (RTS) beverage by using whey and soy protein powder

From the above Table 3, The flavour and taste score in samples of different treatments and control, the highest mean flavor and taste score was recorded in the sample T_1 (7.82) followed by T_2 (7.06), T_3 (6.84) and T_0(6.54).This indicates that, increased in proportion of date palmpulp and soya protein in the blend increased the score for flavour and taste of ready to eat beverage. There was significant differences ($P<0.5$) for consistency score between the mean values of between T_0 and T_3. The significant difference was further analyzed statistically to find out the C.D. between and within the different treatment combinations. The difference between the mean values of T_0-T_1 (1.28), T_0-T_2 (0.52), T_0-T_3(0.3), T_1-T_2(0.76) and T_1-T_3(0.98) greater than the C.D. value, 0.276 Therefore, the difference was significant. The difference between the mean values of T_2-T_3 (0.22) less than the C.D. value, 0.276. Therefore, the difference was non significant.

Consistency score of Date palm Ready to serve (RTS) beverage by using whey and soy protein

From the above Table 4, consistency score in samples of different treatments and control,

the highest mean consistency score was recorded in the sample T_1 (7.9) followed by T_2 (7.4), T_3 (7.12) and T_0(7.06). It indicates that higher the proportion of date palm pulp and soya protein, increase score of consistency of different treatments has shown significant difference (P<0.5). The significant difference was further analyzed to find out the C.D. between and within the different treatment combinations. The difference between the mean values of T_0-T_1 (0.84), T_0-T_2 (0.34) T_1-T_2 (0.50), T_1-T_3 (0.78) and T_2-T_3 (0.28) greater than the C.D. value, 0.276 Therefore, the difference was significant and the difference between the mean values of T_0-T_3 (0.006) less than the C.D. value, 0.276. Therefore, the difference was non significant.

Table.1 Sensory parameters of control and experimental Date palm Ready to serve beverage by using whey and soy protein

Treatment	Colour and appearance	Flavour and taste	Consistency	Overall acceptability
T_0	6.14±0.41	6.54±0.31	7.06±0.11	6.64±0.24
T_1	7.88±0.19	7.82±0.19	7.90±0.15	7.82±0.08
T_2	7.24±0.20	7.06±0.15	7.40±0.30	7.26±0.23
T_3	6.74±0.31	6.84±0.11	7.12±0.19	6.88±0.04
C.D. at 5%	0.397	0.276	0.276	0.232

Table indicates Mean ± S.D. of different treatments

Table.2 The data for colour and appearance count in sample of different treatment of Date palm Ready to serve beverage by using whey and soy protein powder are as following

Replication	Treatment			
	T_0	T_1	T_2	T_3
R1	5.6	7.6	7.0	6.9
R2	6.3	7.8	7.2	6.8
R3	6.2	8.0	7.4	6.2
R4	6.7	8.1	7.5	7.0
R5	5.9	7.9	7.1	6.8
Mean	6.14	7.88	7.24	6.74
Max	6.7	8.1	7.5	7.0
Min	5.9	7.6	7.0	6.2
C.D. at 5%	0.397			

Table.3 The data for flavour and taste score in sample of different treatment of date palm ready to serve beverage by using whey and soy protein are as following

Replication	Treatment			
	T_0	T_1	T_2	T_3
R1	6.9	7.9	7.2	6.8
R2	6.3	7.8	6.9	6.9
R3	6.5	8.0	7.1	7.0
R4	6.8	7.9	7.2	6.8
R5	6.2	7.5	6.9	6.7
Mean	6.54	7.82	7.06	6.84
Max	6.9	8.0	7.2	7.0
Min	6.2	7.5	6.9	6.7
C.D. at 5%	0.276			

Table.4 The data for consistency score in sample of different treatment of Date palm Ready to serve (RTS) beverage by using whey and soy protein are as following

Replication	Treatment			
	T0	T1	T2	T3
R1	7.0	8.0	7.5	7.0
R2	7.1	7.9	7.0	7.2
R3	6.9	8.1	7.2	7.4
R4	7.2	7.8	7.8	6.9
R5	7.1	7.7	7.5	7.1
Mean	7.06	7.9	7.4	7.12
Max	7.2	8.9	7.8	7.4
Min	6.9	7.7	7.0	6.9
C.D. at 5%	0.276			

Table.5 The data for overall acceptability score in sample of different treatment of Date palm Ready to serve (RTS) beverage by using whey and soy protein are as follows

Replication	Treatment			
	T_0	T_1	T_2	T_3
R1	6.5	7.8	7.2	6.9
R2	6.5	7.8	7	6.9
R3	6.9	7.9	7.5	6.9
R4	6.9	7.9	7.5	6.9
R5	6.4	7.7	7.1	6.8
Mean	6.64	7.82	7.26	6.88
Max	6.9	7.9	7.5	6.9
Min	6.4	7.7	7	6.8
C.D. at 5%	0.232			

Fig.1 Flow diagram for preparation of date palm ready to serve beverage by using whey and soy protein

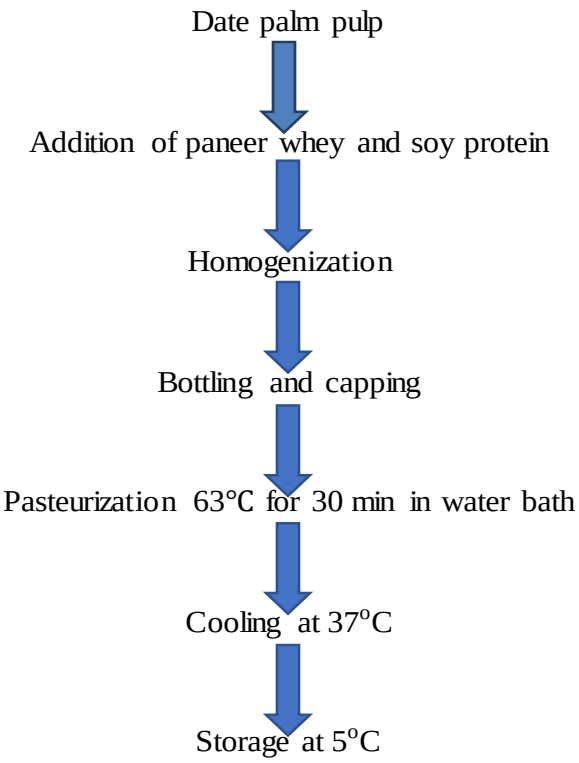
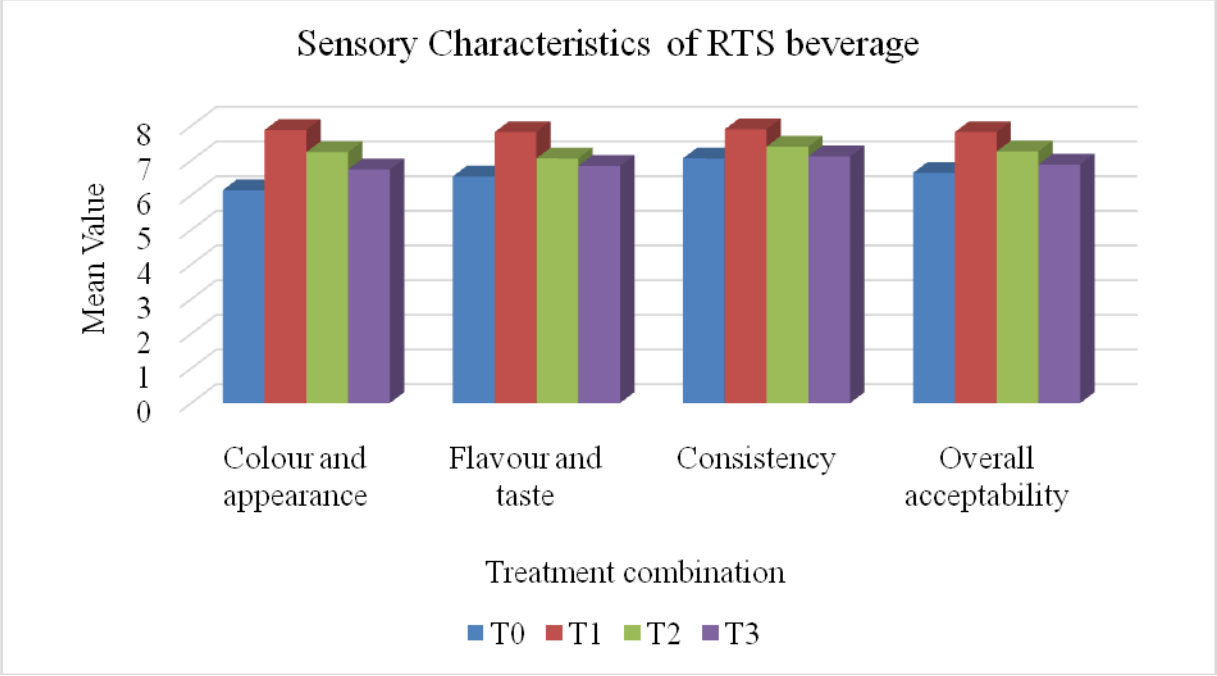


Fig.2 Graphical representation of sensory characteristics of mean value of date palm ready to serve (RTS) beverage by using whey and soy protein



Overall acceptability score of date palm ready to serve (RTS) beverage by using whey and soy protein

From the above Table 5, overall acceptability score in samples of different treatments and control, the highest mean consistency percentage was recorded in the sample T_1 (7.82) followed by T_2 (7.26), T_3 (6.88) and control T_0(6.64). It indicates that higher the proportion of date palm pulp and soya protein, increase score of different treatments T_1, T_2 and T_3 as compared to T_0 has significant difference ($P<0.5$). The significant difference was further analyzed statistically to find out the C.D. between and within the different treatment combinations. The difference between the mean values of T_0-T_1 (1.18), T_0-T_2 (0.62), T_0-T_3 (0.24), T_1-T_2 (0.56), T_1-T_3 (0.94) and T_2-T_3 (0.38) greater than the C.D. value, 0.232. Therefore, the difference was significant.

In conclusion, the study indicated that sensory score of Date palm Ready to serve (RTS) beverage by using whey and soy protein powder were increased significantly of different treatments to control. Colour and appearance score in samples of different treatments and control, the highest mean of colour and appearance score was recorded in the sample T_1 (7.88) and lowest score of control T_0(6.14). Similarly, The flavour and taste score in samples of different treatments and control, the highest mean flavor and taste score was recorded in the sample T_1 (7.82) and lowest in sample T_0(6.54). Consistency score in samples of different treatments and control, the highest mean consistency score was recorded in the sample T_1 (7.9) and lowest score was found in sample T_0(7.06). It indicates that higher the proportion of date palm pulp and soya protein, increase score of consistency of different treatments has shown significant difference ($P<0.5$). Overall acceptability score in samples of different treatments and control, the highest mean consistency percentage was recorded in the sample T_1 (7.82) and lowest was found in control T_0(6.64). It may be concluded that the Date palm Ready to serve (RTS) beverage by using whey and soy protein powder can be successfully prepared by using whey, date palm pulp and soya protein.

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