DEVELOPMENT OF SQUASH FROM BLACK GRAPE AND CARROT JUICE

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ABSTRACT

Maintenance of optimal nutrition and health of the population through assured nutrient intake continues to be a national priority for a nation to be healthy strong and productive, Blended drinks are a good alternative to the development of new products which combines new taste and improvement in the quality of nutrition. Antioxidant present in black grape juice has strong antiviral & antimicrobial properties. The beta carotene content of juice was found to be increasing the proportion carrot juice. The commercial scope for manufacturing good and nutritious black grape juice blended with carrot juice which also helpful in providing dietry requirement of beta carotene to the consumer. The present investigation was made with an attempt to develop a blended squash by using Black grape and Carrot in different rations. Treatment T_1 was standardized to be 90 % of black grape juice and 10% of carrot juice. T_2 was standardized to 80% of black grape juice and 20% of carrot juice. T_3 was standardized to 70% of black grape juice and 30% of carrot juice, Sugar and citric acid was used for improving the sweetness and lowering the pH respectively. Potassium meta-bisulphate (KMS) was used as preservative. The physicochemical characteristics of squash were found pH (4.10), total soluble solids (40.22^0Brix), acidity (0.73%), moisture (78.00%), ascorbic acid (10.57%), ash (0.43%) and reducing sugar (17.72). physic-chemical analysis was done for estimating its nutritional contents, microbial analysis like SPC (standard plate count), coliform count for product safety and organolepetic characteristics like (flavour and taste, colour and appearance, consistency) by trained planelist using 9 point hedonic scale. The results showed that T_2 containing 80% of black grape juice and 20% of carrot juice got highest score. The black grape and carrot can be very well utilized for preparation of blended squash.

Key Words: Black grape and carrot juice squash, antioxidant , coliforms, Sugar.

INTRODUCTION

In India, cold drinks are in demand practically throughout the year. Among these, fruit juices have an important place. Being rich in essentials minerals, vitamins and other nutritive factors, they are quite popular. Fruits are an important source of energy for human-beings. But their availability is seasonal and they are perishable. Hence, they need to be processed and preserved which also result in value-addition. India produces many varieties of citrus fruits and the project can be set up in states like Maharashtra, Uttaranchal, HP and the North-Eastern states. Squashes are sweetened juice of fruits containing some pulp. They contain at least 25% (by Volume) of fruit juice and are consumed after dilution. Squashes also contain added flavours , Since preservatives are added in adequate quantities,

the shelf life of squashes is fairly longer. Blending of fruit juice is practiced to overcome the high cost of some exotic fruits juices, scarcity or seasonal availability, balancing of strong flavors, high acidity, astringency, or bitterness, improving total soluble solids, bland flavor, improving and stabilizing color. Nutritional or phytochemical properties can be improved by blending which offers to adjust sugar/acid rations and compensate undesirable juice consistency. A large number of fruits and vegetables are grown in our country in almost all seasons of the year. The fruits based squash can be prepared from orange, lime, pineapple, mango, etc. Sometimes two or more juice are mixed to yield a well blanched, rightly flavored highly palatable and refreshing drink. Fruit beverages are easily digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to many synthetic and aerated drinks. Squash is the mixture of the 25% fruit juice, 33-55% sugar, 1-2% acidity and 40% Total soluble solids. Fruit squashes are becoming popular in comparison with synthetic beverages evidently because of their taste, flavor, nutritive value and their storage stability. The beverage product squash has a good demand in this subcontinent as well as many other foreign countries. A number of research worker in different countries investigated the formulations of different fruit based soft drinks, squash, non-carbonated fruit juice drink etc. containing sugar, water, citric acid, KMS, artificial color and flavor.

Health benefits of black grape of grape juice:

With many fruits, the health benefits are best obtained from the consumption of the fruit itself, but with black grapes, the juice too offers medicinal benefits that are just as vast. The juice of black grapes retains the nutritional value of grapes in their raw form, and consequentially offers the same health benefits. Methods of extraction and processing vary however, and the presence of additives and preservatives could compromise the health benefits of the processed product.

- Grapes are rich in polyphenolic phytochemical compound **resveratrol.** Resveratrol is one of the powerful anti-oxidant which has been found to play a protective role against cancers of colon and prostate, coronary heart disease (CHD), degenerative nerve disease, Alzheimer's disease and viral/ fungal infections.
- **Resveratrol** reduces stroke risk by altering the molecular mechanisms inside the blood vessels. It does so, firstly by reducing susceptibility of blood vessel damage through decreased activity of angiotensin (a systemic hormone causing blood vessel constriction that would otherwise elevate blood pressure) and secondly, through increased production of the vasodilator substance, nitric oxide (a beneficial compound that causes relaxation of blood vessels).

- Anthocyanins are another class of polyphenolic anti-oxidants present abundantly in the red grapes. These phyto-chemicals have been found to have an anti-allergic, anti-inflammatory, anti-microbial, as well as anti-cancer activity.
- **Catechins**, a type of flavonoid tannin group of anti-oxidants, found in the white/green varieties have also shown to possess these health-protective functions.
- In addition, the berries are very low in calories. 100 g fresh grapes just provide 69 calories but zero cholesterol levels.
- Grapes are rich source of micronutrient minerals like copper, iron and manganese. Copper and manganese are an essential co-factor of antioxidant enzyme, superoxide dismutase. Iron is especially concentrated in **raisins**. In addition, 100 g of fresh grapes contain about 191 mg of health benefiting electrolyte, **potassium**.
- They are an also good source of **vitamin-C**, vitamin A, vitamin K, carotenes, B-complex vitamins such as pyridoxine, riboflavin, and thiamin.

Health benefits carrot of carrot juice:

Naturally sugary, delicious and crunchy, carrots are healthy additions that you can make to the vegetable list in your diet. Indeed, these root vegetables come with wholesome health benefiting compounds such as beta-carotenes, falcarinol, vitamin A, minerals and anti-oxidants in ample amounts. Carrot (***Daucus carota***) is an important root vegetable, and usually used for juice production. In many countries, a steady increase of carrot has been reported After the juice extraction process, thousands of tons of carrot pomace are produced in the juice industry. This agricultural byproduct is generally disposed as feed. Many studies have pointed out that agricultural byproducts from fruits and vegetables could be promising sources of dietary fibers and functional compounds, hence the composition, functional properties, and physiological effects of many byproduct fibers have been investigated to explore their potential applications. The functional properties of fibers might explain their functionality in foods, and would provide clues to their physiological effects as well as industrial applications have suggested that more research still needs to be demonstrated for the exploitation of carrot pomace as sources offibers and functional compounds.

- ✓ Sweet and crunchy carrots are notably rich in anti-oxidants, vitamins and dietary fiber. They provide only 41 calories per 100 g, negligible amount of fat and no cholesterol.
- ✓ They are exceptionally rich source of **carotenes and vitamin-A**. 100 g fresh carrot contains 8285 µg of **beta-carotene** and 16706 IU of vitamin A. Studies have found that flavonoid compounds in carrots help protect from skin, lung and oral cavity cancers.
- ✓ Carotenes are converted into vitamin A in the liver. Beta-carotene is the major carotene that is present in these roots. Beta carotene is one of the powerful natural anti-oxidant that helps protect body from harmful oxygen-free radical injury. In addition, it also has all the functions of vitamin A such as maintaing good eye health, reproduction (sperm production), maintenance of epithelial integrity, growth and development.
- ✓ Carrots are rich in **poly-acetylene antioxidant, falcarinol**. Research study conducted by scientists at University of Newcastle on laboratory animals has found that *falcarinol* in carrots may help fight against cancers by destroying pre-cancerous cells in the tumors.
- ✓ Fresh roots are also good in vitamin C; provide about 9% of RDA. Vitamin C is water soluble anti-oxidant. It helps the body maintain healthy connective tissue, teeth and gum. Its anti-oxidant property helps the human body protect from diseases and cancers by scavenging action on harmful free radicals.
- ✓ In addition, they are especially rich in many B-complex groups of vitamins such as folic acid, vitamin B-6 (pyridoxine), thiamin, pantothenic acid, etc., that acts as co-factors to enzymes during substrate metabolism in the body.
- ✓ Further, They also compose healthy levels of minerals like copper, calcium, potassium, manganese and phosphorus. Potassium is an important component of cell and body fluids that helps controlling heart rate and blood pressure by countering effects of sodium. Manganese is used by the body as a co-factor for the antioxidant enzyme, superoxide dismutase.
- ✓ They are also used in the preparation of healthy baby-foods.

MATERIALS AND METHODS

The present research work **"Development of squash from black grape and carrot juice"** was carried out in food lab of, Warner School of Food and Dairy technology, SHIATS, Allahabad (U.P.).

Details of experimental techniques to be employed during the course of investigation were studied under the following heading:

1. Procurement and collection of the ingredients for manufacturing experiment squash from black grape and carrot juice.
2. Equipment used for experimental squash from black grape and carrot juice.
3. Detailed procedure for manufacturing experimental squash from black grape and carrot juice.
4. Technical program for manufacturing experimental squash from black grape and carrot juice .
5. **Experimental Plan:**

Treatements	**Black grape +carrot juice(ml.)**	**Citric acid (g)**	**Sugar(g)**	**Preservative(g)**	**Water(ml.)**
T_0	(100%+0%)	2	40	0.19 KMS	100
T_1	(90%+10%)	2	40	0.19 KMS	100
T_2	(80%+20%)	2	40	0.19 KMS	100
T_3	(70%+30%)	2	40	0.19 KMS	100

Treatment combination :

T_0 – Squash was prepared by 100% black grape juice.

T_1 – Squash was prepared by 90% black grape and 10% carrot juice.

T_2 – Squash was prepared by 80% black grape and 20% carrot juice.

T_3 – Squash was prepared by 70% black grape and 30% carrot juice.

FLOW CHART PROCESSING OF BLACK GRAPE JUICE

Selection of Black grape (1 kg Mature, fresh, ripe and firm)
↓
Washing
↓
Removing scally portions
↓
Crushing
↓
Juice Extraction
↓
Filtration
↓
Grape Juice

FLOW CHART FOR PROCESSING OF CARROT JUICE

Selection carrot (1 Kg, Mature, fresh, ripe and firm)
↓
Removing scaly, core portions
↓
Washing
↓
Juice Extraction
↓
Filtration
↓
Carrot Juice

PLAN OF WORK

Flow diagram adopted for manufacturing control & experimental squash

Selection of Black grape & carrot(Mature, fresh, ripe and firm)

↓

Removing scally portions

↓

Juice Extraction

↓

Blending of juice(Black grape & Carrot)

↓

(Control)	**(Experimental)**		
Black grapes	Mixed juice		
↓	↓	↓	↓
(T_0)	**T_1**	**T_2**	**T_3**
(100:0)	**(90:10)**	**(80:20)**	**(70:30)**
(BG: - CA)	(BG : CA)	(BG :CA)	(BG :CA)

↓

Clarification (muslin cloth)

↓

Preparation of sugar syrup
(Sugar + citric acid + water)

↓

Filtration (muslin cloth)

↓

Cooling (syrup)

↓

Mixing the syrup with fruit juice

↓

Addition of preservative (0.6gm KMS/ lit. squash)

↓

Filling in bottles (head space 2 cm)

↓

Crown corking

↓

Pasteurization at 80°C for 30 minutes

↓

Cooling

↓

Storage (Room temperature)

B G - Black grape, **CA**- Carrot

RESULT AND DISCUSSION

The present study was carried out to **"DEVELOPMENT OF SQUASH FROM BLACK GRAPE AND CARROT JUICE".**

The data collected on different aspects were tabulated and analyzed statistically using analysis of variance and critical difference. The significant and non-significant differences observed have been analyzed critically within and between the treatment combinations.

The results obtained from the analysis are presented in this chapter under the following headings:

1. Chemical characteristic of squash from black grape blended with carrot juice.
2. Organoleptic characteristic of squash from black grape blended with carrot juice.
3. Microbiological characteristic of squash from black grape blended with carrot juice.
4. To estimate the cost of squash from black grape blended with carrot juice.

RESULT

Average Percentage

1. CHEMICAL ANALYSIS

Parameters	T_0	T_1	T_2	T_3	C.D. Value
Moisture %	76.40	76.88	77.56	78.00	0.99
Ascorbic acid %	9.7	10.14	10.34	10.57	0.214
TSS (^{0}BRIX)	39.32	39.64	40.06	40.22	0.66
Ph	3.96	4.06	4.04	4.1	096
Acidity%	0.65	0.70	0.72	0.73	0.23
Ash %	0.36	0.40	0.42	0.43	0.017
Reducing sugar %	14.44	15.39	16.92	17.72	0.45

2. ORGANOLEPTIC SCORE(9 point hedonic scale)

Parameters	T_0	T_1	T_2	T_3	C.D. Value
Colour & Appearance	8	7.54	7.54	7.56	0.91
Flavour & Taste	7.98	7.76	8.26	7.88	0.29
Consistency	7.24	7.60	8.60	7.62	0.57
Overall Acceptability	7.77	7.79	8.36	7.81	0.24

3. MICROBIAL ANALYSIS

Parameters	T_0	T_1	T_2	T_3	C.D. Value
SPC ($x10^3$ /ml)	7.80	9.60	10.80	13.80	2.25
Coli form count	Nil	Nil	Nil	Nil	-

4. COST ANALYSIS

Cost in Rs.(/ litre)	122.98	115.98	108.98	101.98	-

SUMMARY AND CONCLUSION

The present investigation **" Development of squash from black grape and carrot juice"** was planned and carried out in the research laboratory of Warner School of food and diary technology, Sam Higginbottom Institute Technology and Science (Deemed to be university), Allahabad (U.P).

The present experiment was taken with the following objectives:

- To prepare squash by using Black grape and carrot in different rations.
- To assess the chemical, organoleptic and microbiological characteristics of squash.
- To estimate the cost of production of squash.

PARAMETERS

Chemical parameters:

Moisture percentage

Significant differences in the moisture were observed in different treatment combinations. Maximum moisture of squash 78.00% was found in the T_3 followed by T_2 (77.56), T_1 (76.88), & T_0 (76.40).

The difference in moisture was due to the compositional difference of grape and carrot which were used in different proportions in different treatments.

Ascorbic acid percentage

Significant differences in ascorbic acid were observed in different treatment combinations. Maximum ascorbic acid of squash 10.57% was found in the T_3 followed by T_2 (10.34), T_1(10.14), & T_0(9.7).

The difference in ascorbic acid was due to the compositional difference of grape and carrot which were used in different proportions in different treatments.

TSS Percentage

Significant differences in TSS were observed in different treatment combinations. Maximum TSS of squash 40.22% was found in the T_3 followed by T_2 (40.06), T_1 (39.64), & T_0 (39.32).

The difference in TSS Was due to the compositional difference of grape and carrot which were used in different proportions in different treatments.

pH percentage

Singnificant differences in pH were observed in different treatment combinations. Maximum pH of squash 4.1 was found in the T_3 followed by T_1 (4.06), T_2 (4.04), & T_0 (3.96).

The difference in pH was due to due to the compositional difference of grape and carrot which were used in different proportions in different treatments.

Acidity percentage

Significant differences in acidity were observed in different treatment combinations. Maximum acidity of squash 0.73% was found in the T_3 followed by T_2 (0.72), T_1 (0.70), & T_0 (0.65).

The difference in acidity was due to the compositional difference of grape and carrot which were used in different proportions in different treatments.

Ash percentage

Singnificant differences in ash were observed in treatment combinations. Maximum ash of squash 0.43% was found in the T_3 followed by T_2 (0.42), T_1(0.40),& T_0 (0.36).

The difference in acidity was due to the compositional difference of grape and carrot which were used in different proportions in different treatments.

Reducing sugar percentage

Significant differences in reducing sugar were observed in different treatment combinations. Maximum reducing sugar of squash 17.92% was found in the T_3 followed by T_2 (16.92), T_1 (15.39), & T_0 (14.44).

The difference in total solid was due to the compositional difference of grape and carrot which were used in different proportions in different treatments.

Organoleptic parameters:

Colour and appearance

Significant differences was found in average colour and appearance score of different treatment combination. T_0 had the highest average score of 8 followed by T_2 (7.84), T_3 (7.56) & T_1 (7.54).

Flavor and taste

Significant differences was found in average flavour and taste score of different treatment combination. T_2 had the highest average score of 8.26 followed by T_0 (7.98), T_3 (7.88) & T_0 (7.76).

Consistency

Significant difference was found in average consistency score of different treatment combination. T_2 had the highest average score of 8.60 followed by T_3 (7.62), T_1 (7.60) & T_0 (7.24).

Overall acceptability

Significant differences was found in average colour and appearance score of different treatment combination. T_2 had the highest average score of 8.36 followed by T_3 (7.81), T_1 (7.79) & T_0 (7.77).

Microbial parameters:

SPC($\times 10^3$ per ml)

From the perusal of data on standard plaate count in sample of different treatment and control the highest mean for SPC recored in squash inT_3 (13.80) followed by T_2(10.80), T_1(9.60), & T_0 (7.80).

Colifrom count

In each treatment of squash the colifrom count was nil.

CONCLUSION

In view of experimental result obtained during the present it may be concluded that Black grape juice and carrot juice can be satisfactorily blended together for making blended squash. According to due analysis of different treatments T_2 (80% grape juice & 20% carrot juice) was found to be best in terms of organoleptic, chemical, microbial and cost analysis,(highest flavour & taste, consistency, & overall acceptability), & T_3 was found best in chemical characteristic. Therefore, blended squash is said to have enhanced material properties better taste, with various health benefits if is good for all age group people.

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