Egypt. J. Chem. **Vol. 68**, No. 3. pp. 643 - 651 (2025)

Egyptian Journal of Chemistry

http://ejchem.journals.ekb.eg/

Antioxidant and Anticancer Activities of Some Fruit and Vegetable Juice Blends

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Abstract

Fruit and vegetable juices contain bioactive substances such as phenolic and flavonoid compounds and other phytochemicals that have antimicrobial properties and may protect our bodies from oxidative stress. The present study aimed to prepare natural fruit and vegetable juice blends and then the chemical composition, phenolic content, antioxidant activity, sensory quality and antiproliferative activity against MCF-7 breast cancer cells (*in vitro*) of juice blends were performed. Seven natural juice mixtures of various formulations were prepared. The pH, whole acidity, total soluble solids, and ascorbic acid levels were determined. The antioxidative capacity of fresh juice mixes was assessed (in vitro) using DPPH and ABTS scavenging capacity tests. The results ranged from 81.45 to 98.38 % for DPPH and 85.23 to 98.62% for ABTS. Total polyphenols and total flavonoid contents were performed. The results ranged from 75.13 to 77.24 mg GAE/100 ml juice for total polyphenols and 70.16 to 72.79 mg CE/100 ml juice for total flavonoids. The samples were highly effective against breast cancer activity (MCF-7) cell line, where IC50 ranged between 99.86 ± 0.87 and 206.12 ± 9.5 µg/ml. Accordingly, fruit and vegetable juices contain the highest values for polyphenols, total flavonoids, and antioxidative capacity. Besides, act as an antioxidant and antiproliferative effect and supports the traditional use of juice recipes in MCF-7 cell proliferation treatment.

Keywords: cytotoxicity, Antitumor, Orange, ginger, strawberry, red beetroot, lysozyme.

1. Introduction:

Vegetables and fruits are abundant in several biomolecules in curing many diseases such as cardiovascular disease [1]. Mixed drinks have been shown to provide major health advantages by combining nutrients and bioactive components from various fruits and vegetables [2], as well as because they are rich in potassium salts, they also help reduce kidney and gallstones formation. Naturally occurring in juices is vitamin C, which the body needs to create blood vessels, collagen, and cartilage. Moreover, it facilitates iron absorption [3].

So, fruit and vegetable mixes are among the techniques to enhance nutritional quality are fruit and vegetable mixes. Also, through a variety of biological pathways, they can positively influence the pathogenesis of breast cancer, making them significant sources of biologically active compounds [4,5].

Among women, breast cancer continues to be the most common type of cancer diagnosed. There have been 1.3 million new cases worldwide, and 0.5 million fatalities have been linked to them. The expression of certain cancer markers, including as progesterone receptor (PR), Her2 oncogene, and oestrogen receptors (ER), can be used to identify this type of cancer [6]. Organization of the manuscript Ionizing radiation therapy and the use of chemotherapy remain important methods for removing tumor masses. However, there is evidence that the combination of these treatments raises the risk of tumor recurrence, which ultimately leads to the emergence of drug resistance in cancer cells [7].

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Received date 04 July 2024; revised date 08 August 2024; accepted date 12 August 2024
DOI: 10.21608/EJCHEM.2024.301509.9944

Therefore, it must come up with a different strategy to lessen this restriction. Furthermore, a number of epidemiological publications revealed a link between a lower risk of breast cancer and the consumption of fruits, vegetables, and soy products, particularly cruciferous vegetables [8,5].

Also, it contains very important phytochemicals, including saponins, alkaloids, sterols, flavonoids and polyphenols [9]. Nowadays, strawberries are regarded as functional foods with a range of health advantages, including anti-inflammatory, anti-hyperlipidemic, anti-proliferative, and antioxidant properties [10]. According to [11], red beetroot juice is high in calories, vitamins, minerals, and antioxidants. There are many therapeutic benefits associated with red beet root, including ant-hypergolic cadmic, anti-microbial, anti-oxidant, anti-cancer, anti-inflammatory, hepatic protective, and diuretic effects [12]. Orange juice is abundant in Vitamin C (ascorbic acid), vitamin B9 (folic acid), potassium, magnesium, iron, and other minerals. When consumed regularly, it can improve immunity, lower the risk of cancer, improve digestive health, protect the cardiovascular system, lower cholesterol, prevent kidney disease, help with weight loss, reduce wrinkles, prevent hair loss, and other health benefits [13].

Pineapple juice is well known to have several health advantages, including the ability to reduce weight, aid in digestion, lower cholesterol, fight cancer, and have anti-aging, anti-inflammatory, and healing qualities [14]. Carrot juice is beneficial for the brain system and can lower the chance of Alzheimer's disease by 76% [15]. It has also been shown to lower the risk of diseases including cancer and cardiovascular diseases [16].

Moreover, because of its high α- and β- carotene (provitamin A) concentration, it offers health benefits by guarding against DNA damage and improving immune function, skin quality, and vision [16,17,18,19]. Lysozyme, an enzyme derived from egg whites (EC 3.2.1.17), is frequently used in many foods to control the growth of lactic acid bacteria [20]. Ginger has biological properties that include antibacterial, antioxidant, and anti-allergic properties. It also has the potential to prevent cancer by improving the expression level of indicators associated with a higher risk of colorectal cancer [21].

Various publications consider that fruit, vegetable and herb juices and extracts may have the potential to address the relationship between their different bioactive components and anti-cancer activity as follows: wheatgrass extract [22], roselle juice [23], Pelingo apple [24], lyophilized limon juice [25], Tomatine- and lycopene-rich green and red tomatoes [26,27], aqueous natural extracts of turmeric, ginger and garlic [28]. Guava pulp extract [29], Lyophilized orange juice [30], Lemon and ginger combination [31], ginger extract [32], Barley bran [33]. Papaya leaves ethyl acetate fraction [34]. beetroot juice [35]. bitter melon extract [36]. So, this study aims to evaluate the antioxidative capacity, sensory quality and inhibitory effect of natural fruit and vegetable juice blends on the MCF-7 breast cancer cell line.

2. Materials and Methods:

2.1. Materials:

Commonly consumed fruits and vegetables (i.e. orange, pineapple, tomato, kiwi, cantaloupe, carrot, red beetroot, strawberry and spinach), ginger and honey were purchased from local markets, Giza, Egypt. Lysozyme (EC 3.2.1.17), isolated from hen egg white was purchased from Sigma- Aldrich Chemical Co., USA. However, lemon grass essential oil was purchased from El-Baraka Co. for Natural Oils Hurghada, Egypt. Dulbecco's Modified Eagle Medium (DEME) was bought from SERANA, Germany.

2.2. Methods:

2.2.1. Extraction and preparation of different juice mixtures:

The fruits and vegetables were thoroughly washed and then juiced using a Kenwood JEM02.A0BK Centrifugal Juicer with Easy Pour Juice Pitcher Model JEM02.A0BK from China. For the spinach juice, only the leaves were utilized, having been washed, combined with the fruit juice, and then blended using a centrifugal juicer after being separated from the stems and washed. Red beetroot and carrots were meticulously cleaned, washed, peeled, cut into small pieces, and then swiftly juiced. Seven distinctive fruit and vegetable juice mixtures were meticulously prepared according to the specifications detailed in Table 1.

Each juice diligently preserved with 1g/L of sodium benzoate and 1g/L of citric acid, following the method described by [37]. The resulting juices were carefully bottled in sterile seconds in a water bath. Subsequently, the were rapidly cooled under running water and stored at 4 ± 1 °C, in accordance with the precise procedure outlined by according to [38].

Table 1: Prepared formulas (g) with their blending ratios.

Ingredients		Different juice blends						
		B_1	B_2	B_3	B_4	B_5	B_6	B_7
Tomato	juices	780	780	780	–	–	–	–
Strawberry	juices	780	780	780	–	–	–	–
Red Beet root	juices	780	780	780	–	–	–	–
Carrot	juices	–	–	–	780	760	–	–
Orange	juices	–	–	–	780	760	–	–
Pineapple	juices	–	–	–	780	760	–	–
Kiwi	juices	–	–	–	–	–	760	780
Spinach	juices	–	–	–	–	–	760	780
Cantaloupe	juices	–	–	–	–	–	760	780
Lemon grass		–	2.4	–	–	–	–	–
Ginger		–	–	–	–	60	60	–
Lysozyme		–	–	2.4	–	–	–	2.4
Honey		60	60	60	60	60	60	60
Total weight		2400	2402.4	2402.4	2400	2400	2400	2402.4

2.2.2. Physicochemical analysis of juice blends: Physico-chemical analysis (crude protein, fat, fibers, total ash and total solids contents, pH value) of fruit and vegetable blends were determined according to the procedures of [39]. Total soluble solids (TSS) were measured as °Brix at 20° C with an Abb Refractometer (Abbemat 3200, Germany). Acidity was determined according to the procedure of [39]. The results were expressed as a citric acid%. pH value was measured using pH meter (Jenway 3510, Germany). Ascorbic acid (vitamin C) content was determined according to [39] using 2,6 di-chlorophenol-indophenol. The data were expressed as (mg/100g) of ascorbic acid.

2.2.3. **Determination of Total phenolic content:** The total phenolics content of all prepared juice blends was determined using the procedure of Folin- Ciocalteu as described by [40]. As a standard, gallic acid was utilized, and data were reported as Gallic acid equivalent (mg GAE /100 ml juice blend).

2.2.4. Determination of Total Flavonoids content: Total flavonoid was determined according to the colorimetric $AlCl_3$ procedure. Total flavonoid content was reported as catechin equivalent (mg CE /100 ml juice blend) according to [41].

2.2.5. Determination of antioxidant activity of juice blends: Using a previously described methodology, [42], the radical scavenging activity was determined
using DPPH. The percentage of radical scavenging activity of juice blends was calculated using the following equation:

$$\textbf{Inhibition (\%)} = \frac{A_{517}(\text{control}) - A_{517}(\text{sample})}{A_{517}(\text{control})} \times 100$$

Where:
- A control represents the absorbance of the control at zero time.
- A sample represents the absorbance of the samples at 30 minutes.

ABTS radical-scavenging assay: A 2, 2-azino-bis-3 (ethylbenzthiazoline-6-sulphonic acid) as stated by [43,44]. Antioxidant activity was expressed as ascorbic acid equivalent antioxidant capacity (AEAC).

2.2.6. Anti-cancer activity: Cytotoxicity of different samples of the fruit and vegetable juices was evaluated *via* Microculture Tetrazolium (MTT) test using cancer breast cell line (MCF-7) and cultured in complete medium containing Dulbecco's Modified Eagle Medium (DEME). Anti-cancer activity experiment was performed at the college of Science, Al-Azhar University, Cairo, Egypt, according to [45,46]. The ninety-six well tissue culture plate was injected with 1 X10^5 cells/ml (100 µl/well), which were treated with various concentrations (31.25, 62.5, 125, 250, 500, and 1000 µg/ml) of juice blends and the drug doxorubicin (as a standard) at various concentrations (31.25, 62.5, 125, 250, 500, and 1000 µg/ml). separately and incubated in 5% CO_2 at 37°C and examined. After adding 20ul MTT, the plate was incubated for 4 hours at 37°C with 5% CO2.Resuspend formazan (MTT metabolic product) in 200ul DMSO. The tubes were shacken at 150rpm for 5 minutes. Then, Absorbance was read at 560nm, the absorbance was measured to evaluate the number of viable cells and the concentrations required to kill 50% of cancer cells (IC50) were calculated. Cell viability percentage was calculated as follows:

Cell viability (%) = [(Control OD – Sample OD)/Control OD] X 100

OD = Absorbance at 590 nm

2.2.7. Determination of the sensory characteristics of juice blends: Eight semi-trained panelists from the staff members of the Food Science Department, Faculty of Agriculture - Cairo University evaluated the organoleptic characteristics for different juice blends. The organoleptic evaluation was performed through evaluating color, odor, taste, mouth feel and overall acceptability according to the procedure mentioned by [47].

2.2.8. Statistical analysis: All data were statistically analyzed and presented as (Means± Standard error). Analysis of variance (ANOVA) was performed on the data the significance level was set at $p \leq 0.05$ [48].

3. Results and Discussion

3.1. Chemical composition and physicochemical properties of juice blends: Proximate chemical fiber contents which ranged between (16.95- 47.99 mg/100g) and (1.35- 2.19), respectively. The TSS (brix) and pH values recorded for different juice blends are within the recommended ranges for juice to maintain the juice quality as stated by [51]. Composition of fruit and vegetable juice blends is presented in Table 2. The moisture content of all tested juice samples ranged from87.39 to 89.68%, however, total ash content of juice blends ranged between 0.56 and 0.76 %. Fruit blends (**B_5**) recorded the highest ash content with non-significant ($p \geq 0.05$) difference with **B_1**, **B_2**, **B_6**, **B_7**. The highest crude protein content was noticed in **B_3** blends (1.32%), with significant ($p \leq 0.05$) difference among the rest samples. The highest protein content in **B_3** blend, followed by **B_1** (1.24), such finding may be due to the high content of protein in red beetroot juice as reported by [49]. however, tomato and strawberry fruits as well as red beet root juice had low content from fat as mentioned by [49,50]. The Total Soluble Solid (TSS) of all tested juice samples ranged between 7.27 and 8.23%, however the pH values of juice blends ranged between 3.44 and 3.82%. Also, acidity ranged between 2.13-2.76% as citric acid, respectively. Juices of various blends were characterized by their high ascorbic acid and crude fiber contents which ranged between (16.95- 47.99 mg/100g) and (1.35- 2.19), respectively. The TSS (brix) and pH values recorded for different juice blends are within the recommended ranges for juice to maintain the juice quality as stated by [51].

Table 2: Chemical composition and physicochemical properties of the prepared natural juice blends.

Chemical composition	Blends						
	B_1	**B_2**	**B_3**	**B_4**	**B_5**	**B_6**	**B_7**
Moisture (%)	$87.42^{f}\pm0.01$	$87.42^{e}\pm0.01$	$87.39^{g}\pm0.01$	$88.72^{a}\pm0.01$	$89.68^{b}\pm0.01$	$87.76^{c}\pm0.01$	$87.72^{d}\pm0.01$
Ash (%)	$0.76^{a}\pm0.01$	$0.75^{a}\pm0.01$	$0.76^{a}\pm0.01$	$0.56^{e}\pm0.00$	$0.58^{d}\pm0.00$	$0.74^{b}\pm0.00$	$0.72^{c}\pm0.00$
Protein (%)	$1.24^{b}\pm0.04$	$1.23^{b}\pm0.02$	$1.32^{a}\pm0.04$	$0.95^{d}\pm0.02$	$1.01^{c}\pm0.01$	$0.93^{d}\pm0.01$	$0.95^{d}\pm0.02$
Fat (%)	$0.39^{d}\pm0.01$	$0.45^{c}\pm0.02$	$0.40^{d}\pm0.02$	$0.58^{b}\pm0.01$	$0.61^{a}\pm0.01$	$0.33^{e}\pm0.01$	$0.31^{f}\pm0.01$
Crude fiber(%)	$1.89^{d}\pm0.01$	$1.90^{d}\pm0.01$	$1.93^{c}\pm0.03$	$1.35^{f}\pm0.01$	$1.39^{e}\pm0.01$	$2.19^{a}\pm0.01$	$2.12^{b}\pm0.02$
pH value	$3.46^{de}\pm0.02$	$3.44^{d}\pm0.03$	$3.82^{b}\pm0.01$	$3.77^{b}\pm0.01$	$3.78^{a}\pm0.02$	$3.58^{c}\pm0.01$	$3.60^{c}\pm0.01$
Acidity (%)	$2.15^{d\ e}\pm0.01$	$2.17^{d}\pm0.02$	$2.13^{e}\pm0.02$	$2.76^{a}\pm0.04$	$2.71^{b}\pm0.02$	$2.53^{c}\pm0.02$	$2.49^{c}\pm0.02$
TS (%)	$10.19^{f}\pm0.01$	$10.12^{e}\pm0.01$	$10.13^{g}\pm0.01$	$9.19^{a}\pm0.01$	$9.12^{b}\pm0.01$	$10.24^{c}\pm0.01$	$10.13^{d}\pm0.01$
TSS (%)	$8.23^{\frac{a}{e}}\pm0.02$	$8.10^{d}\pm0.02$	$8.09^{d}\pm0.01$	$7.38^{e}\pm0.01$	$7.27^{f}\pm0.01$	$8.19^{b}\pm0.02$	$8.13^{c}\pm0.02$
Vitamin C (mg/100 g)	$16.95^{c}\pm0.01$	$16.97^{c}\pm0.01$	$16.92^{c}\pm0.02$	$39.57^{b}\pm0.05$	$39.59^{b}\pm0.02$	$47.99^{a}\pm0.07$	$47.93^{a}\pm0.02$

Mean values (n=3 ±SD) with different superscripts within rows are significantly different at $p \leq 0.05$

B_1= Tomato, Strawberry and Red Beetroot. **B_2**= **B_1**+Lemon grass.

B_3= **B_1**+Lysozme. **B_4**= Carrot, Orange and Pineapple. **B_5**= **B_4** +Ginger.

B_6= Kiwi+ Spinach+ Cantaloupe +Ginger. **B_7** = Kiwi+ Spinach+ Cantaloupe + Lysozyme.

3.2. Total phenolic, total flavonoid contents and antioxidant activity of different juice blends:

Components with antioxidant potentials (i.e., polyphenols components) in food have a significant protective effect on health. Thus, total phenols content was determined in different juice blends as Gallic Acid Equivalent (GAE) mg/100 ml of juice and total flavonoid content was determined as Catechin equivalent (mg CE/100 ml). Table 3 showed that the highest total phenolic content (77.24 mg GAE/100 ml) was found in formula (**B_2**), these results agreed with those found by [52,53], followed by formula (**B_6**) (77.11 mg GAE/100 ml) then formula (**B_5**) (76.95 mg GAE/100 ml). Similar trend was observed in the total flavonoid contents in different juice blends, where they were 72.79 followed by 72.71 than 72.58 and 70.16 mg CE/100 ml juice, in **B_6**, **B_3**, **B_2 and B_1**, respectively.the results are agreed with those obtained by [37]. Concerning the antioxidative capacity (DPPH), it is regarded as one of the mechanisms for determining the antioxidant activity. Table 3 shows the scavenged DPPH radicals (%) in different formulas of juice blends. The DPPH radical values of formula (**B_2**) exhibited the highest DPPH value (98.38%), while formulas **B_3**, **B_1**, **B_6**, **B_5**, **B_4** and **B_7** contained low DPPH activities as follows98.38, 96. 93, 95.80, 92.16, 86.55, 85.4 and 81.45 %, respectively. The same trend was observed in A 2,2-azino-bis-3(ethylbenzthiazoline-6-sulphonic acid) (ABTS) in juice blends of different formulas, where they were 98.62 followed by 97.53 then 97.48% in **B_2**, **B_3** and **B_1**, respectively. The obtained results agreed with those found by [54]. The results are matching with both phenols and flavonoids contents, as previously mentioned.

Table 3: Phenolic and flavonoid contents and the antioxidative capacity of juice blends

parameter	Juice blends						
	B_1	B_2	B_3	B_4	B_5	B_6	B_7
Total phenols (mg GAE/100 ml juice)	$75.13^d \pm 0.04$	$77.24^a \pm 0.05$	$75.19^d \pm 0.07$	$76.28^c \pm 0.05$	$76.95^b \pm 0.04$	$77.11^a \pm 0.02$	$76.83^b \pm 0.03$
Total flavonoids (mg CE/100 ml juice)	$70.16^d \pm 0.07$	$72.58^a \pm 0.04$	$72.71^a \pm 0.08$	$71.76^b \pm 0.24$	$70.75^c \pm 0.04$	$72.79^a \pm 0.00$	$71.73^b \pm 0.14$
Antioxidant activity (%)							
DPPH (%)	$95.80^b \pm 0.08$	$98.38^a \pm 0.10$	$96.93^b \pm 0.14$	$85.40^e \pm 0.46$	$86.55^d \pm 0.35$	$92.16^c \pm 0.00$	$81.45^f \pm 0.05$
ABTS (%)	$97.48^b \pm 0.10$	$98.62^a \pm 0.05$	$97.53^b \pm 0.09$	$93.69^d \pm 0.10$	$89.22^e \pm 0.10$	$94.35^c \pm 0.10$	$85.23^f \pm 0.10$

Means (n=3 ±SD) within rows followed by different letter are significantly different at $p \leq 0.05$.

B_1= Tomato, Strawberry and Red Beetroot. **B_2**= **B_1**+Lemon grass.

B_3= **B_1**+Lysozme. **B_4**= Carrot, Orange and Pineapple. **B_5**= **B_4** +Ginger.

B_6= Kiwi+ Spinach+ Cantaloupe +Ginger. **B_7** = Kiwi+ Spinach+ Cantaloupe + Lysozyme.

3.3. Anti-cancer activity of juice blends:

In vitro cytotoxic activity of different juice blends against breast cancer cell line (MCF-7) was determined. The results of cytotoxicity assessment of the different juice blends (31.25, 62.5, 125, 250, 500, 1000 µg/ml) using the MTT protocol against breast cancer cell line (MCF-7) compared to doxorubicin drug are shown In Table (4). The **B_1** (Tomato, Strawberry and Beetroot) blend exhibited the highest and significant concentration -dependent anti-proliferative activity (79.42%) at 250 µg/ml in comparing to doxorubicin drugs a control and IC_{50} value of 162.27 against MCF-7. The anti-proliferative activity of **B_1** blend may be due to the inhibitory effect of lycopene in tomatoes [27], phenolic compounds and flavonoids in red beetroot [35] and strawberry [55]. The obtained results agreed with those found by [56,57]. Also, **B_2** (Tomato, Strawberry, Red beet and lemon grass) blend showed the highest significant concentration- dependent anti- proliferative activity (93.79%) at 500 µg/ml in comparing to doxorubicin drug as a control and IC50 value of 190.49 vs MCF-7. Lemon grass essential oil exhibited strong antitumor characteristics and can be effective against MCF-7 breast cancer [58]. While, **B_3** (Tomato, Strawberry, Red Beetroot and Lysozyme) blend exhibited the highest and significant concentrations - dependent anti-proliferative activity were 29.88, 56.36 and 78.29 % at 62.5, 125 and 500 µg/ml, respectively and IC50 value of 109.55. [30] reported that lysozyme has strong anticancer activity against breast cancer. Likewise, **B_4** (Carrot, Orange and Pineapple) blend showed the best and significant concentration - dependent anti-proliferative activity were 97.47 and 97.64 % at 500 and 1000 µg/ml, respectively in comparing to doxorubicin drug and IC_{50} value of 107.87 against MCF-7. [59] stated that freeze dried orange juice showed antioxidant and anticancer activities against breast cancer. Also, the efficiency of bromelain, peroxidase and flavonoids in pineapple juice against breast cancer cell was proved [60,61,62]. Also, **B_5** (Carrot, Orange, Pineapple and ginger) and **B_6** (Kiwi, Spinach, Cantaloupe and Ginger) blends exhibited the highest and significant concentration dependent anti- proliferative activity were 28.39, 40. 67 and 97.25 % at 62.5, 125 and 1000 µg/ml and 21.58, 29.40 and95.24 % at31.25, 62.5 and 1000 µg/ml, respectively and compared to doxorubicin drug and IC_{50} values206.12 and 159.58 respectively against MCF-7. The cytotoxic effect of ginger's organic pungent vallinoid components was proved [63,32]. Also, kiwi juice has phenolic and flavonoid compounds and it exhibited a cytotoxic effect [64]. Furthermore, **B_7** (Kiwi, Spinach, Cantaloupe and Lysozyme) blend showed the highest and significant concentrations – dependent anti- proliferative activity were 70.99 and 94.41 % at 125 and 1000 µg/ml, respectively compared to doxorubicin and the best IC_{50} value 99.86 against MCF-7. From the above- mentioned results, it could be concluded that **B_7** (99.86 %) exhibited the best IC_{50} followed by **B_4** (107.87 %) and **B_3** (109.55%) than **B_6** (159.58) and **B_1** (162.27%) against breast cancer cell line (MCF-7). These findings confirmed the results of [65].

Table 4: Cytotoxicity percent of juice blends on cell line (MCF-7).

Drug doxorubicin	**MCF-7 cells at different concentrations (µg/ml)**						**IC_{50}**
	3.125	**6.25**	**12.50**	**25.00**	**50.00**	**100.00**	
	$30.68^{a}\pm3.41$	$57.45^{a}\pm1.58$	$71.20^{a}\pm1.18$	$84.43^{a}\pm0.66$	$94.86^{b}\pm0.53$	$95.01^{b}\pm0.47$	5.4
Juice blends	**31.25**	**62.5**	**125**	**250**	**500**	**1000**	
B_1	$1.22^{d}\pm0.73$	$13.98^{c}\pm1.02$	$39.49^{d}\pm0.26$	$79.42^{b}\pm0.73$	$88.77^{c}\pm0.66$	$90.21^{d}\pm0.62$	162.27 ± 3.18
B_2	$0.26^{d}\pm0.33$	$12.89^{c}\pm0.65$	$27.48^{e}\pm0.91$	$69.59^{d}\pm0.20$	$93.79^{b}\pm0.32$	$95.33^{b}\pm0.42$	190.49 ± 1.28
B_3	$11.10^{c}\pm1.12$	$29.88^{b}\pm0.54$	$56.36^{b}\pm0.60$	$78.29^{b}\pm1.53$	$82.13^{d}\pm1.21$	$92.44^{c}\pm0.31$	109.55 ± 1.34
B_4	$0.61^{d}\pm0.16$	$14.29^{c}\pm0.60$	$62.78^{d}\pm0.45$	$65.53^{e}\pm0.27$	$97.47^{a}\pm0.04$	$97.64^{a}\pm0.08$	107.87 ± 0.42
B_5	$7.82^{c}\pm0.65$	$28.39^{b}\pm1.06$	$40.67^{d}\pm0.53$	$55.22^{f}\pm1.04$	$77.06^{e}\pm0.45$	$97.25^{a}\pm0.08$	206.12 ± 9.5
B_6	$21.58^{b}\pm0.95$	$29.40^{b}\pm0.69$	$43.78^{C}\pm0.42$	$68.28^{d}\pm0.27$	$94.76^{b}\pm0.30$	$95.24^{b}\pm0.11$	159.58 ± 4.16
B_7	$1.97^{d}\pm0.57$	$13.37^{c}\pm0.20$	$70.99^{a}\pm0.39$	$72.44^{c}\pm1.15$	$82.74^{d}\pm0.46$	$94.41^{b}\pm0.39$	99.86 ± 0.87
LSD at $p \leq 0.05\%$	**4.14**	**2.65**	**1.93**	**2.58**	**1.77**	**1.09**	

LSD is the least significant difference. The IC50 values were determined from dose – effect curves by linear regression
B_1= Tomato, Strawberry and Beet root**.** **B_2= B_1**+Lemon grass**.** **B_3= B_1**+Lysozme
B_4= Carrot, Orange and Pineapple**.** **B_5= B_4** +Ginger
B_6= Kiwi+ Spinach+ Cantaloupe +Ginger. **B_7=** Kiwi+ Spinach+ Cantaloupe + Lysozyme

3.4. Sensory Evaluation:

The sensory qualities of juice play a crucial role in assessing consumer attitudes and how they affect food acceptance and decision. Therefore, juice samples of different blends were sensory evaluated and data are presented in Table 5. Our findings showed that, juices of formula **B_1**, **B_3**, **B_4** and B_7 exhibited the highest score in all the parameter (i.e. color, taste, odor, mouth feel and overall acceptability), followed by formulas **B_4** and **B_2**. The obtained results agreed with those found by [66].

Table 5: Sensory characteristics of different juice blends.

Juice blends	**Sensory attributes**				
	Color (25)	**Odor (25)**	**Taste (25)**	**Mouthfeel (25)**	**Overall acceptability (100)**
B_1	$24.63^{a}\pm0.19$	$24.50^{b}\pm0.19$	$24.5^{a}\pm0.19$	$24.63^{a}\pm0.18$	$99.25^{a}\pm0.25$
B_2	$24.63^{a}\pm0.19$	$24.50^{ab}\pm0.18$	$24.63^{a}\pm0.18$	$24.63^{a}\pm0.18$	$99.00^{a}\pm0.27$
B_3	$24.75^{a}\pm0.16$	$24.75^{a}\pm0.16$	$24.63^{a}\pm0.18$	$24.75^{a}\pm0.16$	$99.25^{a}\pm0.25$
B_4	$24.63^{a}\pm0.18$	$24.50^{ab}\pm0.19$	$24.63^{a}\pm0.18$	$24.63^{a}\pm0.18$	$99.25^{a}\pm0.25$
B_5	$24.63^{a}\pm0.19$	$24.63^{ab}\pm0.18$	$24.38^{a}\pm0.18$	$24.38^{a}\pm0.26$	$99.25^{a}\pm0.25$
B_6	$24.63^{a}\pm0.18$	$24.63^{ab}\pm0.18$	$24.63^{a}\pm0.18$	$24.38^{a}\pm0.26$	$99.13^{a}\pm0.30$
B_7	$24.75^{a}\pm0.16$	$24.63^{ab}\pm0.18$	$24.63^{a}\pm0.18$	$24.75^{a}\pm0.16$	$99.25^{a}\pm0.25$
LSD at $p\leq0.05$	**0.50**	**0.61**	**0.52**	**0.58**	**0.74**

Means (n=8 ±SD) within a column followed by different letter are significantly different at $p\leq0.05$.
B_1= Tomato, Strawberry and Beet root. **B_2**= **B_1**+Lemon grass. **B_3**= **B_2**+Lysozme.
B_4= Carrot, Orange and Pineapple. **B_5**= **B_4** +Ginger.
B_6= Kiwi+ Spinach+ Cantaloupe +Ginger. **B_7**= Kiwi+ Spinach+ Cantaloupe + Lysozyme.

5. Conclusion:

From the above-mentioned results, it could be concluded that fruit and vegetable juices can be considered as rich sources of biomolecules such as ascorbic acid, phenolic compounds, flavonoids and fibers with protective effect against MCF-7 breast cancer cell line. **B_7** (Kiwi, Spinach, Cantaloupe and Lysozyme) exhibited the best IC50 against the breast cancer cell line (MCF-7).

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