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Elaboration of Nutritive Beverage with Tomato (*Solanum lycopersicum*) and Pepinillo (*Cucumis sativus*) as an Eating Supplement for a Healthy Life

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Abstract

We plan to make a nutritious drink using vegetables, bulbs and tubers as a dietary supplement for a healthy life, in which different levels of tomato (28%, 38% and 48%) and pickle (20%, 30% and 40%) were incorporated.) to a cocktail of onions, peppers, carrots and garlic to which was added other ingredients that enhanced sensory attributes to the beverage whose experimental nutritive, microbiological and organoleptic results were analyzed under a completely random design with a combinatorial arrangement. The drinks that were used tomato in a 48% registered a content of 3.10% of protein, 15.55% of fat, 1.76% of fiber, 4.04% of ashes and a pH of 4.61 corresponding to a product acid. And when analyzing the effect of the pickle in 48% in the same way the content of protein, fat, fiber, ashes and pH was 2.74, 15.37, 1.6, 3.73 and 4.56, determining that all the components were increased in both cases, in the same way it should be noted that in all treatments there was presence of molds and yeasts in quantities between 2.67 and 8.33 CFU / ml, being acceptable; in the same way it is indicated that there is a better acceptability on the part of the tasters when using tomato in a 48% since they registered a color, smell, taste, appearance of 6.78, 7.33, 7.44 and 6.00 points / 10 in the same way to use 48% of pickle was determined 6.00, 7.22, 6.77 and 5.66, concluding that the lowest level gherkin and tomato is 48%.

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Keywords

Vegetables, bulbs, tubers, tomatoes, cucumber, drink, acceptability

Introduction

A healthy lifestyle is a direct consequence of the consumption of nutritious and low-fat foods such as fresh vegetables that make up a heterogeneous food group that can be used and consumed from their fruits, flowers, bulbs, tubers, stems, sprouts and leaves that constitute a whole at the level of the plant.

Reason why it is necessary to emphasize that the consumption of vegetables identifies a healthy and balanced way of life corroborated by groups of people

that have experienced positive changes when incorporating this type of products in their daily diet, becoming in this way a group of foods basic for human nutrition. Fruit juices and drinks are commonly found in the market and are intended to be incorporated into the diet of people to contribute to changing their lifestyle, demonstrating that their consumption contributes to reduce the risk of high disease. impact, including cardiovascular, degenerative, child, morbid obesity and cancer as a result of eating foods that do not provide any nutrient in a person's diet which leads to the deterioration of their health.

Because of the above, we want to incorporate a drink based on vegetables, bulbs and tubers into the human diet, from which their nutrients and sensory attributes are used to improve the lifestyle of the people who consume them.

Materials and Methods

Location and duration of the experiment

The research work was carried out in the Industrial Processes Laboratory of ESPOCH's Faculty of Sciences, located at Kilometer 1 ½ of the Panamericana Sur, at an altitude of 2740 meters above sea level with a latitude of 01^{or} 32 'S and a length of 78^{or} 40 'W.

Experimental units

Due to the effect of the gherkin levels (20, 30 and 40%) and tomato levels (28, 38 and 48%) in which 3 repetitions were carried out, 27 experimental units were handled, being the TUE (unit size) experimental) of one (1) liter of the drink.

Treatment and experimental design

The treatments were defined based on two factors:

Factor A with tomato (28, 38 and 48%)

Factor B with pickle (20, 30 and 40%).

The experimental units were modeled under a Completely Random Design (DCA) with combinatorial arrangement.

Statistical analysis and significance tests

The results of the tabulated and processed investigation were subjected to the statistical analyzes that we indicate below:

Analysis of variance (ADEVA) for the differences between treatments.

Multiple comparisons were made using the Duncan test at significance levels $p < 0.05$.

Experimental procedure

The drink was formulated, adding different levels of pickle (20, 30 and 40%) and tomato (28, 38 and 48%) to a mixture of peppers (20%), onions (10%), garlic (1%)

and carrot (1%); Other ingredients that enhanced the flavor of the drink (oil, vinegar, water and salt) were also included, followed by a description of the procedure for obtaining the beverage.

Selection of the raw material (tomato, cucumber, pepper, onion, carrot and garlic).

Once the raw material is selected, it is cleaned and disinfected in order to eliminate the superficial microbial load.

We make a conditioning of the vegetables by cutting and peeling and that will be done manually.

Subsequently we proceed to weigh and standardize the raw materials and ingredients.

Once the raw materials are heavy we mix them and acidify them with the use of ascorbic acid.

Then we add olive oil and mix.

We let the vegetables macerate for 24 hours and in refrigeration.

When we add water, salt and the rest of the ingredients, we process it.

Later we pack in glass bottles.

We sterilize the product in an autoclave pot at 115 °C for 15 - 20 minutes

Finally, cool the product for later storage.

Results and Discussion

Bromatological Analysis

The results obtained from the bromatological analyzes that were performed on the beverages are reported in the Data Tables, so they were analyzed according to each chemical physical variable under study and is detailed below:

Humidity

The moisture content of the drink elaborated with gherkin and different levels of tomato (28%, 38% and 48%), according to the ADEVA, were highly significant differences ($P < 0.01$), due to the effect of tomato levels

used, determining the highest content of humidity 81.12% when 48% of tomato was used, however it is also observed that there is a lower content of humidity 80.62% when 28% of tomato was used, while considering the factor gherkin also established highly significant differences ($P < 0.01$), by effect of the levels used (20%, 30% and 40%), finding the highest content of moisture 80.95% when 40% was used and the lowest content 80, 78% when used in the 20% gherkin drink formulation.

In other studies conducted on the water content of whey-based food drinks with the inclusion of three levels of pitahaya pulp, Yumisaca, C. (2009) reports that it fluctuates between 74.54% and 72.68% compared to with the obtained ones in the present investigation they are inferior since the vegetables bulbs and tubers used like raw material for the drink have great content of water unlike the fruit used in the cited investigation.

Lipids

The mean fat content of the drink made with pickle and different levels of tomato (28%, 38% and 48%) showed highly significant differences ($P < 0.01$), with the highest fat content being 15.55% when it was used 48% of tomato, however it is also observed that there is a lower fat content of 15,01% when 28% tomato was used in the formulation of the drink, also highly significant differences were found ($P < 0.01$),

By effect of the gherkin levels (20%, 30% and 40%) used, reporting the highest fat content of 15.37% when 40% of pickle was used and a lower content of 15.19% when it was used in the formulation of the drink 20% of gherkin.

The fat content in vegetable-based soups and beverages, according to (Fálder Rivero 2004), indicates that it is at a minimum percentage of 0.4% that unlike the results obtained in the drink based on vegetables bulbs and tubers are obtained very high values ranging from 15.55% to 15,01%, because in the formulation of drink was used as ingredient extra virgin olive oil in considerable quantities, which enhanced the organoleptic properties of the drink and It influenced the high lipid content reported, without neglecting to consider a dietary drink as this variable, according to (Fader Rivero 2004) the fats of this oil is vegetable fat with 99% monounsaturated fatty acids and the remaining 1% formed by Vitamin E and natural antioxidants necessary for our body.

Proteins

The protein content of the drink elaborated with gherkin and different tomato levels (28%, 38% and 48%), highly significant differences were reported ($P < 0.01$), due to the effect of the tomato levels used, finding the highest content of protein 3.10% when 48% tomato was used, however it is also observed that there is a lower protein content of 2.02% when 28% tomato was used in the formulation of the beverage, while in the formulation of the drink made with tomato and different levels of gherkin (20%, 30% and 40%), highly significant differences were found ($P < 0.01$), due to the effect of the same, finding the highest protein content 2.74% when 40% was used and the lowest content was 2.38% when 20% of pickle was used.

According to (Cedeño 2005), states that the value of protein in nutritional drinks based on fruit and vegetables with milk should be between 3.0% and 3.45, values that measured with those obtained in the vegetable-based drink, bulbs and tubers, are superior due to the presence of a dairy product that increases the percentage of protein in the drink, in the same way Crocco Alicia (2014), publishes that the vegetable soup has up to 2% of proteins compared with The results obtained in the present investigation show values ranging from 2.02% and 3.10% being higher due to the combination of nutrients taken from the raw materials of the study.

Ashes

According to the Analysis of variance that reports the results of the ash content of the drink in study elaborated with gherkin and different levels of tomato (28%, 38% and 48%), highly significant differences are found ($P < 0.01$), by effect of the levels of tomato used, finding the highest ash content 4.03% when 48% tomato was used, however it is also observed that there is a lower content of ashes 3.13% when it was used in the formulation of the drink 28% of tomato, whereas when considering the factor gherkin (20%, 30% and 40%) in the formulation of the drink with tomato, highly significant differences were found ($P < 0.01$), due to the effect of the gherkin levels, finding the highest ash content 3.73% when 40% pickle was used and a lower content 3,43% when 20% of gherkin was used in the formulation of the drink.

Taking as a reference the studies of Limones, K and García, M (2011), who when making an instant soup from chopped flour determined an ash content in the product of 9.11% which is a value higher than this one.

investigation may be due to the fact that more solids were obtained than those obtained in this investigation.

pH

Regarding the pH of the drink elaborated with gherkin and different tomato levels (28%, 38% and 48%), according to the statistical analyzes and according to the ADEVA, highly significant differences were reported ($P < 0.01$), due to the effect of the tomato levels, finding a pH of 4.61 when 48% tomato was used, however it is also observed that there is a lower pH 4.35 when 28% tomato was used in the formulation of the drink, in the formulation of the drink with tomato and different levels of gherkin (20%, 30% and 40%), no statistical differences were found ($P < 0.05$), due to the effect of the gherkin levels used, a higher pH 4.56 was reported when 40% of gherkin and a lower pH 4.449 when 20% was used in the formulation of the drink.

The pH is a very important factor that was taken into consideration as a control point in the process, which compared with the studies conducted by Yumisaca, C. (2011), who when producing nutritious drinks from whey and fruit concentrates reported values between 4.7 and 6.5 compared to those obtained in this research are within this range because both beverages are slightly acidic by the addition of whey and vinegar in the formulation of the vegetable-based drink, bulbs and tubers is one of the reasons why the product is preserved for longer.

Fiber

According to the statistical analyzes carried out regarding the fiber content of the drink elaborated with gherkin and different levels of tomato (28%, 38% and 48%) there are highly significant differences ($P < 0.01$), due to the effect of the levels of tomato used with a higher fiber content of 1.76% when 48% tomato was used, and a lower fiber content of 1.29% when 28% tomato was used in the formulation, whereas when considering the factor gherkin in the tomato formulation and different gherkin levels (20%, 30% and 40%), highly significant differences were found ($P < 0.01$), due to the effect of the gherkin levels, with the highest fiber content 1.6%. when 40% of gherkin was used and a lower content of 1.443% when 20% of pickle was used in the formulation of the drink.

The fiber content present in the soups and broths of vegetables and vegetables according to (Fálder Rivero

2004) have a high fiber content that can go from 1.4% to 8.3% depending on the vegetable to be used compared to the

The results reported in this research range from 1.29% to 1.76% because the vegetables bulbs and tubers used to make the drink have a higher water content than solids.

Microbiologic Analysis

The results of the microbiological tests and according to the ADEVA determined that in the different treatments there was absence of Total Coliforms (NTE INEN 1529 - 7) UCF / ml, Absence of Escherichia Coli (NTE INEN 1529 -8) UCF / ml and Absence of Salmonella (BETAS STAR METHOD) UCF / ml of the analyzed beverages, while tabulating the analysis of molds and yeasts (NTE INEN 1529-10) according to the report, statistical differences were found. According to the results obtained, it can be deduced that there was no contamination due to the asepsis with which the product was made through the implementation of an adequate sanitary hygiene program before and after the processing, also influencing the thermal treatment applied to the product that guaranteed that the drinks lengthen their shelf life, the presence of the molds and yeasts found in the product was minimal taking the reference (NTE INEN 1529-10) in which the presence of 100 UCF / ml is accepted of product determined according to the reports that in no sample of the product under study were values higher than 8 UCF / gr.

Sensory Evaluation

For the sensory evaluation of the drink, the respective statistical analyzes and the ADEVA were made, based on the following numerical scale: Bad (0-4 points), Good (5-7 points), Very Good (8-9 points) and Excellent (10 points).

The panel of tasters rated the drink under the following predefined parameters: Color (0-10 points), Smell (0-10 points), Taste (0-10 points), Appearance (0-10 points).

Color

Regarding the color of the drink, it was rated on 10 points, made with pickle and different tomato levels (28%, 38% and 48%), highly significant differences were reported ($P < 0.01$), due to the effect of tomato levels employees obtaining the highest score 6.78 when 48% tomato was used,

Table.1 Physico-chemical composition of the drink made with gherkin and different levels of tomato

Parameter	Levels of tomato,%			EE	Prob.
	28	38	48		
Humidity,%	80.62 c	80.87 B	81.12	to 0.010	0,000 **
Protein,%	2.02 c	2.56 B	3.10	to 0.020	0,000 **
Grease,%	15,01 c	15.28 B	15.55	to 0.010	0,000 **
Fiber,%	1.29 c	1.52 B	1.76	to 0.009	0,000 **
Ashes,%	3.13 c	3.58 B	4.03	to 0.017	0,000 **
pH	4.35 b	4.55 TO	4.61	to 0.031	0,000 **

Prob. <0.01: There are highly significant differences (**).

Stockings with different letters in the row, differ statistically according to Duncan's test.

Source: Vallejo Sonia 2015

Table.2 Physico-chemical composition of the drink made with tomato and different levels of pickle

Parameter	Gherkin levels,%			EE	Prob.
	28	38	48		
Humidity,%	80,787 TO	80,877 B	80,953 C	0.010	0,000
Protein,%	2.38 C	2.56 B	2.74 TO	0.020	0,000
Grease,%	15,19 C	15.28 B	15.37 TO	0.010	0,000
Fiber,%	1,443 C	1,522 B	1.6 TO	0.009	0,000
Ashes,%	3.43 C	3.58 B	3.73 TO	0.017	0,000
pH	4,449 TO	4,503 TO	4.56 TO	0.031	0.060

Prob. <0.01: There are highly significant differences (**).

Stockings with different letters in the row, differ statistically according to Duncan's test.

Table.3 Microbiological evaluation of the drink made with different levels of tomato and gherkin

Levels,%		Parameters, CFU / ml				
Gherkin x	Tomato	Total coliforms	Escherichia coli	Molds and yeasts	Salmonella	
twenty	28	Absence	Absence	4.33	bc	Absence
twenty	38	Absence	Absence	5.33	b	Absence
twenty	48	Absence	Absence	3.33	CD	Absence
30	28	Absence	Absence	2.67	d	Absence
30	38	Absence	Absence	3.33	CD	Absence
30	48	Absence	Absence	5.33	b	Absence
40	28	Absence	Absence	2.00	d	Absence
40	38	Absence	Absence	8.33	to	Absence
40	48	Absence	Absence	3.33	CD	Absence
EE				0.497		
Prob.				0,000		

Prob. <0.01: There are highly significant differences (**).

Stockings with different letters in the column, differ statistically according to Duncan's test.

Source: Vallejo Sonia 2015

Table.4 Organoleptic evaluation of the drink made with gherkin and different levels of tomato

Parameter	Levels of tomato,%			EE	Prob.
	28	38	48		
Color, 10 points	5.78	b 5.00	C 6.78	to 0.157	0,000 **
Smell, 10 points	6.89	to 7.33	TO 7.33	to 0.181	0.164 Ns
Taste, 10 points	6.89	b 6.33	desde 7.44	to 0.240	0.015 *
Appearance, 10 points	5.11	b 5.00	B 6.00	to 0.143	0,000 **
Total valuation, 40 points	24.67	b 23.67	B 27.56	to 0.458	0,000 **

Prob.> 0.05: There are no statistical differences (ns). Prob. <0.01: There are significant differences (*).

Prob. <0.01: There are highly significant differences (**).

Stockings with different letters in the row, differ statistically according to Duncan's test. Source: Vallejo Sonia 2015

Table.5 Organoleptic evaluation of the drink made with tomato and different levels of pickle

Parameter	Gherkin levels,%			EE	Prob.
	twenty	30	40		
Color, 10 points	5,333	B 6,222	TO 6	to 0.157	0.002 **
Smell, 10 points	7,111	TO 7,222	TO 7,222	to 0.181	0,883 ns
Taste, 10 points	6,889	TO 7	TO 6,778	to 0.24	0,809 ns
Appearance, 10 points	4,889	B 5,556	TO 5,667	to 0.143	0.002 **
Total valuation, 40 points	24,222	B 26	TO 25,667	to 0.458	0.031 *

Prob.> 0.05: There are no statistical differences (ns). Prob. <0.01: There are significant differences (*).

Prob. <0.01: There are highly significant differences (**).

Stockings with different letters in the row, differ statistically according to Duncan's test. Source: Vallejo Sonia 2015

Table.6 Organoleptic assessment of the color, appearance and total of the drink made with different levels of tomato and gherkin

Gherkin x	Tomato	Color	Appearance	Total valuation
twenty	28	5.67 Bc	4.67 B	23.67 c
twenty	38	5.67 Bc	5.00 B	24.00 c
twenty	48	4.67 D	5.00 B	25.00 c
30	28	5.67 bc	5.33 B	24.67 c
30	38	5.00 CD	5.00 B	23.67 c
30	48	8.00 TO	6.33 TO	29.67 to
40	28	6.00 B	5.33 B	25.67 bc
40	38	4.33 D	5.00 B	23.33 c
40	48	7.67 TO	6.67 TO	28.00 desde
EE		0,272	0,248	0.793
Prob.		0,000	0.038	0.038

Prob.> 0.05: There are no statistical differences (ns).

Prob. <0.01: There are significant differences (*).

Prob. <0.01: There are highly significant differences (**).

Stockings with different letters in the column, differ statistically according to Duncan's test.

Source: Vallejo Sonia 2015

However it is also observed that there is a lower score 5.00 when 38% tomato was used in the formulation of the drink, while in the formulation of the drink with tomato and different levels of pickle (20%, 30% and 40%), highly significant differences were found ($P < 0.01$), due to the effect of the gherkin levels, obtaining a higher score of 6.22 when 30 were used. % and a lower score of 5.33 when 20% was used in the formulation of the drink.

Odor

The odor of the drink valued at 10 points, made with pickle and different tomato levels (28%, 38% and 48%), it was reported that there are no statistical differences ($P > 0.05$), due to the effect of the levels of tomato employees obtaining the highest score 7.33 when 48 and 38% tomato was used, however it is also observed that there is a lower score of 6.89 when 28% tomato was used in the formulation of the drink, while in the formulation of the drink with tomato and different levels of gherkin (20%, 30% and 40%), it was reported that there are no statistical differences ($P > 0.05$), due to the effect of the gherkin levels, obtaining a higher score 7.22 when 30 and 40% of gherkin was used and a lower score of 7.11 when 20% of pickle was used.

Flavor

The flavor of the drink in study valued at 10 points, elaborated with gherkin and different levels of tomato (28%, 38% and 48%), according to the statistical analyzes and according to the ADEVA, significant differences were reported ($P < 0.01$), due to the effect of tomato levels, obtaining the highest score of 7.44 when 48% was used and a lower score of 6.33 when 38% was used in the formulation of the drink, while in the formulation of the drink with tomato and different gherkin levels (20%, 30% and 40%), no statistical differences were found ($p > 0.05$), due to the effect of the gherkin levels, obtaining a higher score 7 when 30% of pickle was used and a lower score of 6.77 when 40% of pickle was used in the formulation of the drink.

Appearance

In the evaluation of the appearance on 10 points of the drink elaborated with gherkin and different levels of tomato (28%, 38% and 48%), according to the statistical analyzes and according to the ADEVA highly significant differences were reported ($P < 0.01$), by effect of the tomato levels used, obtaining the highest score 6 when

48% tomato was used, also observing that there is a lower score 5 when 38% tomato was used, while in the drink with tomato and the levels of gherkin (20%, 30% and 40%), employees were highly significant differences ($P < 0.01$), due to the effect of the gherkin levels achieving a higher score of 5.67 when 40% was used and a lower score 4, 88 when 20% of gherkin was used in the formulation of the drink.

Total valuation

In the total valuation on 40 points of the drink elaborated with gherkin and different levels of tomato, according to the statistical analyzes, highly significant differences were reported ($P < 0.01$), due to the effect of the tomato levels used (28%, 38% and 48%) obtaining the highest valuation 27.56 when 48% tomato was used, however it is also observed that there is a lower valuation 23.67 when 38% tomato was used in the formulation of the drink, while in the formulation of the drink with tomato and different levels of pickle (20%, 30% and 40%), significant differences were found ($P < 0.01$), due to the effect of the gherkin levels used, obtaining a higher valuation 26 when 30% was used of gherkin and a lower score 24,22 when 20% of gherkin was used in the formulation of the drink.

Due to the effect of the interaction between the gherkin and tomato levels used, highly significant differences were found between the determined means, showing a greater acceptance by the coloration of the drink elaborated with 30% of the pickle and 48% of the tomato reaching a score of 8 points out of 10, with similar behavior when the 40 and 48% levels of pickle and tomato were used, with a score of 7.67 points;

On the other hand, the drink that received the least acceptance was the one elaborated with 20% of gherkin and 48% of tomato, receiving an evaluation of only 4.67 points.

The study by Clavijo and Forero (2013) who report formats of acceptance and rejection criteria for raw materials and packaged and canned products and compared with the results obtained in this research are in accordance with the acceptance criteria that were considered for the elaboration of the drink.

Due to the effect of the gherkin levels (20%, 30% and 40%) it was determined that when using the level with 40% of pickle in the drink, the moisture content increases 80.95% with respect to levels 20 and 30%, in

the same way increases the content of protein 2.74%, fat 15.37%, fiber 1.6%, ash 3.37% and pH 4.56 at this level and with respect to the other levels, because the gherkin It has a high water content close to 96% and macronutrients that make the drink highly nutritious.

In the same way, when evaluating the beverages studied for the effect of the gherkin levels, it was determined that in the total valuation over 40 points the drink with the highest acceptance was the one in which the 30% of gherkin was used, obtaining a total score of 26 points registering the highest values in comparison with the levels 20 (24,22) and 40% (25,66) respectively, of each variable rated over 10 we have that in coloration we obtained 6,22 points, 7,22 points of smell and 7 points of flavor, except for the appearance in which a score of 5.55 is obtained lower than the drink with 40% of pickle 5.66 but higher than the drink with 20% of pickle 4, 89, because the vegetable -based drink is a new product the acceptance of the reflected in the results reported in the variables that significantly influenced the color, smell, taste and appearance of the product.

Effect levels tomato (28%, 38% and 48%) was determined by using the level 48% tomato moisture content to 81.12% increases as the protein content 3.10%, fat 15.55%, fiber 1.76, ash 4.03% and pH 4.61 with respect to the levels 28 and 38% of tomato used, results similar to the above because tomato is also one factor results high water content and nutrients that contributed to the expected nutritional value.

Regarding the organoleptic evaluation of the drink in which the different levels of tomato were evaluated, it was determined that in the total valuation on 40 points the drink most accepted was the one that reached the score of 27.56 points in which used 48% of tomato variables valued over 10 points registered the highest values with respect to tomato levels 28 and 38%, because the tomato provides better sensory characteristics of color, smell, taste and appearance.

In the microbiological evaluation and according to the results of the statistical analyzes to determine the significance of the presence of the molds and yeasts found in the product, it was taken as a reference that the presence of 100 UCF / gr is acceptable. of product, it was determined that in no sample of the product under study were values higher than 8 UCF / gr, which means that the thermal treatment applied to the finished product was done correctly, which will guarantee that the product has a long useful life.

It is recommended to make the cold and moisturizing drink based on vegetables, bulbs and tubers using the formulation with pickle and 48% tomato which was the drink with the greatest acceptance by consumers and the one with the best nutritional value according to the chemical structure analyzed.

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