



## OPEN ACCESS

### Key Words

Lemon, stevia, instant drink powder, nutritional, beverage mix

### Corresponding Author

Khushnoor Fatima,  
Department of Processing and Food  
Engineering, Sam Higginbottom  
University of Agriculture, Uttar  
Pradesh, India

**Received:** 1 February 2023

**Accepted:** 22 February 2023

**Published:** 18 March 2023

**Citation:** Khushnoor Fatima and K. Lakshmi Bala, 2023. Formulation and Quality Assessment of Dehydrated Lemon and Stevia Instant Drink Powder. J. Med. Sci., 21: 1-4, doi: 10.59218/makrjms.2023.1.4

**Copy Right:** MAK HILL Publications

## Formulation and Quality Assessment of Dehydrated Lemon and Stevia Instant Drink Powder

Khushnoor Fatima and K. Lakshmi Bala

*Department of Processing and Food Engineering, Sam Higginbottom University of Agriculture, Uttar Pradesh, India*

### ABSTRACT

Powdered drink mixes, also known as instant drink powders, are processed food products in powder form intended to be mixed with water, resulting in a drink with a flavor similar to fruit juice or soda.. The demand for lemon-flavored drinks increases significantly during the summer season due to their ability to quickly rehydrate and provide a sense of freshness. An instant drink powder including lemon and stevia was developed to meet this need and provide a high-energy, flavourful drink with added vitamins and minerals. The aim of the study sought to assess its sensory, chemical and physical characteristics. To create the instant drink powder, various formulations of lemon, stevia, carom, cumin and black salt were used. A commercially available drink powder (Tang) served as the control sample ( $T_0$ ). The prepared samples underwent multiple physicochemical and sensory tests to assess their nutritional value and shelf life. After a 90-day period, the instant drink powder's proximate analysis showed that it was safe for human ingestion. In terms of sensory properties, sample  $T_{13}$  was found to be as well-liked as the control, based on overall acceptability.

## INTRODUCTION

Lemon holds a prominent position among all citrus fruits, especially within the acidic group. According to the National Horticulture Board (NHB, 2021-22), Andhra Pradesh ranked as the top Gujarat, Maharashtra, Karnataka, Madhya Pradesh, Odisha, Assam, Telangana, Bihar and West Bengal are the top lemon-producing states in India, followed by those states. The cultivation of lemons thrives in warm, moderately dry and moist climates. Although they can grow in various soil types, well-drained light soils are most suitable for their cultivation. The Key lime (*Citrus aurantiifolia*), a hybrid of the citrus species *Citrus medica* and *Citrus hystrix*, is indigenous to tropical Southeast Asia. It produces spherical, 25-50 mm (1-2 in) in diameter fruits. In comparison to Persian limes (*Citrus latifolia*), Key limes are smaller, have more seeds, more acidity, a stronger scent and thinner rinds. Lemons are not only rich in vitamin C, but also include calcium, copper, iron, potassium, vitamins B5, B6, B1 and B2. Their high dietary fiber content and low-calorie nature make them an excellent choice for those aiming to lose weight. Stevia (*Stevia rebaudiana* L.) known variously as sweet leaf, sugar leaf, honey leaf, or candy leaf, has been used as a natural sweetener by the natives of Paraguay and Brazil for a long time. Stevioside, derived from stevia, is considered safe for use as a sweetener. The stevia plant contains various antioxidants like triterpenes, flavonoids and tannins, as well as sterols. Kaempferol, quercetin, chlorogenic acid, caffeic acid, isoquercitrin and iso-steviol are a few of the flavonoid polyphenolic antioxidant phytochemicals that can be found in stevia. Kaempferol may reduce the incidence of pancreatic cancer by 23%, according to studies (American Journal of Epidemiology). Lemon powder is often transformed into a supplement derived from the entire lemon. Although most people typically use only the lemon juice and do so sparingly due to its acidic nature, there has been a recent trend of individuals discovering more economical and convenient ways to incorporate the benefits of whole lemons into their daily routine.

Among all fruits and vegetables, lemon stands out as one of the most abundant sources of vitamin C, an essential antioxidant that protects against free radical damage. Free radicals can contribute to various diseases, including cancer, heart disease and osteoarthritis. A study conducted in 2014 indicated that regular consumption of dried lemon can significantly improve blood pressure, aid digestion and alleviate common issues like clogged sinuses. Stevia serves as a sugar alternative and has been recognized for its potential to lower blood sugar levels. It is commonly used as an herbal supplement. Instant powder drinks are meal preparations in powdered form that dissolve effortlessly in water. Because they contain little water, they are easy to serve and have a long shelf life. The focus of the present study was to create an instant drink powder using dehydrated lemon and stevia leaves. Additionally, the study examined the physicochemical and sensory properties of the prepared instant drink powder.

## MATERIALS AND METHODS

**Raw materials and their formulation:** The raw materials used were whole key lime, stevia leaves, black salt, cumin and carom that were mixed in different compositions into 13 treatment samples ( $T_1$  to  $T_{13}$ ) where dehydrated stevia and lemon powder were the variables and rest of the ingredients had the same quantity in every sample. Sample  $T_0$  was the control sample or commercial sample (tang drink powder) purchased from market. Formulations of various samples is presented in Table 1.

**Preparation of the instant drink powder:** The lemons were washed and then cut into uniform slices and then dried for 5 hrs at 75°C in a hot air oven. The dried slices were then put into a mixer grinder and ground powder was obtained. The powder was sieved to remove impurities and coarser particles. Stevia leaves were picked and sorted. Then dried at ambient temperature. They were put in mixer grinder in order to obtain a ground powder and the sieved to remove coarser

Table 1: Formulation table

z	Std	Run	Treatment	Variable		Constant		
				Factor 1 A: Lemon powder (gm)	Factor 2 B: Stevia (gm)	Factor-3 Rock Salt (gm)	Factor-4 Cumin powder (gm)	Factor-5 Carom powder (gm)
9	1	T1		87.5	1.125	7.19	1.5	2.5
6	2	T2		105.178	1.125	7.19	1.5	2.5
4	3	T3		100	1.25	7.19	1.5	2.5
13	4	T4		87.5	1.125	7.19	1.5	2.5
2	5	T5		100	1	7.19	1.5	2.5
1	6	T6		75	1	7.19	1.5	2.5
5	7	T7		69.8223	1.125	7.19	1.5	2.5
8	8	T8		87.5	1.30178	7.19	1.5	2.5
7	9	T9		87.5	0.948223	7.19	1.5	2.5
12	10	T10		87.5	1.125	7.19	1.5	2.5
3	11	T11		75	1.25	7.19	1.5	2.5
11	12	T12		87.5	1.125	7.19	1.5	2.5
10	13	T13		87.5	1.125	7.19	1.5	2.5

particles. Then the powders were mixed according to various formulations given in Table 1 in different air tight pouches and stored at room temperature.

**Physicochemical and Sensory Analysis of the instant drink powder:** The instant drink powder was analysed for various physicochemical properties and sensory attributes. The moisture, ash, carbohydrate, protein, crude fiber were measured according to AOAC.<sup>[1]</sup> standard methods. The method described by Ranganna<sup>[2]</sup> was used to calculate the vitamin C concentration. For sensory properties, a panel of nine judges from Dept of Processing and Food engineering, SHUATS, Prayagraj was selected and the scores were obtained with the help of 9-point hedonic scale<sup>[3-4]</sup>.

## RESULTS AND DISCUSSION

The prepared samples of dehydrated lemon and stevia instant drink powder are shown in Fig. 1.

**Physicochemical properties:** The mean (%) of various physicochemical properties is given in Table 2.

Food items' moisture content is an important factor in determining both their quality and shelf life since increased moisture levels encourage microbial development, which shortens the shelf life of food goods. The overall moisture content of the instant drink powder was marginally greater than that of the instant mango powder published by Akhter *et al.*<sup>[5]</sup> and the vegetable soup powder reported by Farzana *et al.*<sup>[8]</sup>. Food products with a greater ash content likely come from richer mineral sources. According to Adefemi *et al.* findings, the instant drink powder had a greater ash level than the instant mango juice powder reported by Akhter *et al.*<sup>[5]</sup>. When a carbohydrate source isn't available, the body can store and use fat as a concentrated source of energy. It also acts as a protective cushion for heart, kidneys, lungs, intestines and other internal organs<sup>[4]</sup>. The instant drink powder had a higher fat content compared to that reported by Akhter *et al.*<sup>[5]</sup> for instant mango drink powder. The results concerning crude fiber content align with the findings of Akhter *et al.*<sup>[5]</sup> for instant mango drink powder. The results suggests that the

vitamin C supplement instant drink powder could be a useful source of ascorbic acid. According to Susanti *et al.*, this study observed that the drying process can have an impact on the stability of vitamin C, resulting in decreased levels of vitamin C in the treatments. Fruits and vegetables often have modest crude fat and protein contents. which was also noted by Akhter *et al.*<sup>[5]</sup>. However, the present study's results indicated higher protein and crude fat content compared to that reported by Akhter *et al.*<sup>[5]</sup> for instant mango juice powder. The carbohydrate content of the formulated instant drink powder was shown to be less than a commercial brand of instant drink powder. Nevertheless, the carbohydrate content in the formulated powder was considered acceptable and can serve as a reliable supply of power. The instant drink powder had more carbohydrates than what Mohammed *et al.*<sup>[5]</sup> reported for instant sorrel (Zobo) drink.

**Sensory properties:** The mean score of sensory properties of various treatments is given in Table 3.

Color, taste, flavor, texture, appearance and overall acceptability are key factors in a food item's acceptance and these factors are also reliable indications of physicochemical changes that occur during storage<sup>[6]</sup>. According to Table 3, Sensory



Fig. 1: Various formulations of Instant drink powder

Table 2: Physicochemical properties of the instant drink powder

Sample	Moisture	Ash	Protein	Crude fiber	Vitamin C	Fat	Carbohydrate
T1	9.24	12.67	1.81	15.13	22.84	2.12	74.15
T2	9.85	16.44	1.88	15.29	23.01	2.15	69.65
T3	9.95	16.13	1.85	15.23	23.10	2.13	69.93
T4	9.24	12.67	1.81	15.13	22.84	2.12	74.15
T5	9.95	16.13	1.85	15.23	23.10	2.13	69.93
T6	9.97	12.21	1.76	15.06	22.24	2.08	79.94
T7	9.89	11.77	1.73	15.02	21.51	1.88	74.92
T8	9.24	12.67	1.81	15.13	22.84	2.12	74.15
T9	9.24	12.67	1.81	15.13	22.84	2.12	74.15
T10	9.24	12.67	1.81	15.13	22.84	2.12	74.15
T11	9.97	12.21	1.76	15.06	22.24	2.08	79.94
T12	9.24	12.67	1.81	15.13	22.84	2.12	74.15
T13	9.24	12.67	1.81	15.13	22.84	2.12	74.15

Table 3: Sensory properties of the instant drink powder

Sr. No.	Sample	Color	Flavor	Texture	Taste	Appearance	Overall acceptability
1.	T <sub>0</sub>	9.8	9.8	10	10	10	10
2.	T <sub>1</sub>	5.3	4.6	5.2	6.3	6.3	6.3
3.	T <sub>2</sub>	4.5	5.5	6.3	5.2	6.4	5.7
4.	T <sub>3</sub>	5.1	5.5	6.1	5.7	5.4	5.5
5.	T <sub>4</sub>	6.3	5.5	5.5	6.4	5.7	5.4
6.	T <sub>5</sub>	7.3	6.4	6.5	5.6	6.8	7.1
7.	T <sub>6</sub>	7.2	7.5	7.5	7.4	6.1	7.5
8.	T <sub>7</sub>	8.5	7.7	7.8	8.5	7.7	6.6
9.	T <sub>8</sub>	8.3	8.2	8.3	8.2	8.2	8.5
10.	T <sub>9</sub>	9.2	8.5	9.2	9.2	8.7	9.2
11.	T <sub>10</sub>	9.5	8.8	9.5	9.4	8.7	9.6
12.	T <sub>11</sub>	9.7	9.4	9.4	9.1	9.6	9.4
13.	T <sub>12</sub>	9.3	9.0	9.7	9.7	9.7	9.5
14.	T <sub>13</sub>	8.7	9.8	9.1	10	10	10

Evaluation indicated that, treatment commercial treatment T<sub>0</sub> had the highest score for colour followed by T<sub>11</sub> and others. For Flavour the commercial treatment T<sub>0</sub> tied with T<sub>13</sub> at a score of 9.8. In case of texture the commercial treatment T<sub>0</sub> had the best score followed by T<sub>11</sub> which had 10 and 9.7 respectively. For taste and appearance, the commercial treatment T<sub>0</sub> tied with T<sub>13</sub> at a score of 10. As far as overall acceptability is concerned, the commercial treatment T<sub>0</sub> and Treatment T<sub>13</sub> had the highest score i.e., 10<sup>[7,8]</sup>.

## CONCLUSION

It can be concluded from the present study that the lemon and stevia instant drink powder has a long shelf life and high proximate constituents that makes it safe for consumption. The nutritional composition was found to be higher in treatment T<sub>2</sub>, moisture (13.12%), Ash (15.25%), Protein (1.95%), Fat (2.29%), crude fibre (15.42%). In case of carbohydrate composition, the highest was found in T<sub>7</sub> (74.35%) and Vitamin C content in case of control sample T<sub>0</sub> (35%) was the highest. On the basis of proximate analysis sample T<sub>2</sub> was the best and from sensory evaluation sample T<sub>13</sub> was the best out of all the prepared samples. The product does not contain any sort of preservatives and it has not gotten spoiled yet as of 90 days and counting. The nutritional value of powdered drinks has only been the subject of a relatively small amount of research. More research is also required on the nutritional characteristics, bioaccessibility and consumption restrictions of drinking powders.

## REFERENCES

1. AACC., 2000. Approved Methods of the AACC. 10th Edition, American Association of Cereal Chemists, St. Paul.

2. Minah, F.N. and S. Astuti, 2018. Study of packaging variations on the quality of instant tomato powder drinks. Conference: Seminar Nasional Kimia-National Seminar on Chemistry (SNK 2018).
3. Mohammed, S.F., I.K. Gimba and E.J. Bahago, 2017. Production and quality evaluation of instant sorrel (Zobo) drink produced by infusion, dehydration and size reduction methods. J. Nutr. Health Sci., 4: 1-10.
4. Ranganna, S. 1986. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Akhter, S., H. Abid, A. Yasmin and S. Masood, 2010. Preparation and evaluation of physical and chemical characteristics of instant mango juice powder. Pak. J. Biochem. Mol. Biol., 43: 58-60.
6. Alam, S., T. Bari, M. Sohany, F. Nayem and Shakil, 2020. Formulation and quality evaluation of instant soft drink powder prepared from hog plum (*Spondius mangifera*) and mint (*Mentha spicata*). Int. J. Food Sci. Nutr., 5: 33-37.
7. Akhter, S., M.A. Alim, M.R. Badsha, A. Matin, M. Ahmad and S.M.Z. Hoque, 2020. Formulation and quality evaluation of instant mango drink powder. Food Res., 4: 1287-1296.
8. Farzana, T., S. Mohajan, T. Saha, M.N. Hossain and M.Z. Haque, 2017. Formulation and nutritional evaluation of a healthy vegetable soup powder supplemented with soy flour, mushroom and moringa leaf. Food Sci. Nutr., 5: 911-920.