International Journal of Home Science 2024; 10(2): 32-35

International Journal of Home Science

ISSN: 2395-7476
IJHS 2024; 10(2): 32-35

www.homesciencejournal.com
Received: 04-04-2024
Accepted: 10-05-2024

Punjasthala Ravindrasingh Negi
Research Scholar, Faculty of Science, Department of Home Science, Banasthali Vidyapith, Rajasthan, India

Dr. Navita Pareekh
Associate Professor, Department of Home Science, Banasthali Vidyapith, Rajasthan, India

Bhavya Chopra
Research scholar, Faculty of Science, Department of Home Science, University of Delhi, India

Palak Tiwari
Research Scholar, Faculty of Science, Department of Home Science, Banasthali Vidyapith, Rajasthan, India

Corresponding Author:
Punjasthala Ravindrasingh Negi
Research Scholar, Faculty of Science, Department of Home Science, Banasthali Vidyapith, Rajasthan, India

Evaluation of proximate composition, antioxidant activity and phytochemical potential of organic and inorganic spices

Punjasthala Ravindrasingh Negi, Dr. Navita Pareekh, Bhavya Chopra and Palak Tiwari

Abstract
Consumer's concern on healthy living and good lifestyle has increased lately. Majority of the population is trying to be healthy by making modifications in their dietary pattern and food selection. Many people are now shifting their food selection from conventional to organic foods. It has been observed in researches that extensive and long-term application of chemicals used in inorganic farming may result in the accumulation of salts, nutrients, and heavy metals that could cause adverse effects on soil, plant growth, water quality and human health. In view of the above aspects, the present work strives to estimate and compare the nutritional and antioxidant properties of organic and inorganic spices: turmeric and coriander powder and its use in the recipe formulation. The study revealed that moisture, ash and fibre content of organic spices was significantly higher than inorganic spices at $p \leq 0.05$. On the contrary, the antioxidant properties of inorganic turmeric were higher than the organic turmeric at $p \leq 0.05$, but total phenols content of organic coriander powder was quite high than the inorganic coriander powder at $p \leq 0.05$. Additionally, the calcium content of organic turmeric was quite high than inorganic turmeric at $p \leq 0.05$. Six recipes: 3 using turmeric (organic & inorganic) - Kadhi, poha and lemon rice and 3 using coriander powder (Organic & inorganic) - Panjiri, masala bhindi and masala Mirchi were formulated. Out of all the recipes prepared, the recipes made out of organic spices were most acceptable by the panel as compared to the recipes made out of inorganic spices. Hence, it can be concluded that organic spices are more nutritious and palatable as compared to the inorganic ones. Also, it can be used to make commercial products as it may satisfy few determinants like sensory quality and positive health image, which are the concerns of modern consumers these days.

Keywords: Organic, inorganic, spices, consumer preferences, healthy lifestyle, antioxidant properties

1. Introduction
Spices and condiments have been consumed since the prehistoric times to enhance the flavour and taste of food. Spices are aromatic and pungent, generally used in small quantities, whereas Condiments are the herbs used for complimenting food and usually added in more quantity compared to spices. Since times immemorial, spices and condiments have been traditionally utilized as curative and preventive agents. As stated by researchers, spices and condiments can combat oxidative damage and prevent the occurrence of a number of diseases by developing innate immunity if consumed appropriately. They have a traditional history of use in countries like India, China and South East Asia, with strong roles in cultural heritage. The pharmacological potential of the essential oils and concentrated extracts obtained from these elements contain strong bioactive compounds, exhibiting potential antimicrobial activities (Kanchanashri *et al*., 2017) [4]. *Curcuma longa* L. (Turmeric) is the most exceptional spice crop of India and is used in religious ceremonies and for culinary purposes as well. Since the ancient times, turmeric has been used as colouring and flavouring agent and is also well known for its medicinal properties. The primary pigment of turmeric is curcumin which is responsible for providing colour. Also, it has been evidenced to possess numerous therapeutic properties including treatment for various skin problems. Turmeric is also rich in many nutrients such as iron, potassium, magnesium and vitamin B6 (Sarma *et al*., 2015; Kanchanashri *et al*., 2017) [8, 4]. *Coriandrum sativum* L. (Coriander) is a herbal plant belonging to the family Apiceae, which is valued for its culinary and medicinal uses.

All parts of this herb are used as flavouring agent and/or for the treatment of different disorders. The plant is a potential source of lipids (Petroselinic acid) and an essential oil (Linalool) which are isolated from the seeds and the aerial parts (Norman, 1990) [7]. Due to the presence of a multitude of bioactive compounds, a wide array of pharmacological activities has been ascribed to different parts of this herb, which include anti-microbial, anti-oxidant, anti-diabetic, anti-epileptic, anti-depressant, antimutagenic, anti-inflammatory, anti-dyslipidemic, anti-hypertensive, neuroprotective, diuretic and lead-detoxifying agent (Varier, 1994) [10].

But, in the present agricultural scenario, crop yield is declining day by day despite technological advancements. The excessive use of pesticides and fertilizers has led to the entry of harmful compounds into the food chain, deterioration of surrounding ecology and serious health implications to humans and the environment (Chitale *et al*., 2012) [3]. Hence, enhancement and maintenance of system productivity and resource quality is essential for sustainable agriculture and better health status of the humans. Organic farming is mostly envisaged as the stoppage of synthetic inputs and their replacement by organic alternatives i.e. use of organic manures and natural methods of plant protection instead of using synthetic fertilizers/pesticides. But this is not true (Bhattacharyya and Chakraborty, 2005) [2]. However, organic farming is a far deeper concept than mere non-chemicalization. According to IFOAM, "Organic agriculture is a production system that sustains the health of soil, ecosystem and people". It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. So, this study is carried out to estimate the nutrient content, phytochemical potential and antioxidant activity of the foods grown through organic and inorganic farming and to formulate products made from them.

2. Materials and Methods

2.1 Collection of raw material

Organic and inorganic spices: Turmeric and Coriander powder were collected from local market of Ramnagar, Uttarakhand. Spice powders were screened through a 0.25 mm sieve and stored in plastic containers until usage.

2.2 Proximate composition

Proximate analysis of organic/inorganic Turmeric and Coriander powder was performed using standard AOAC (2009) [1], Sharma (2007) [9] and NIN (2008) methods.

2.3 Mineral estimation

Aliquots were prepared and mineral analysis (Iron and Calcium) of organic/inorganic Turmeric and Coriander powder was performed.

2.4 Antioxidant estimation

Aqueous extracts of organic/inorganic Turmeric powder and Coriander powder were prepared using 1:10 ratio of sample and water respectively, by evaporating the mixture on hot water bath to drying till powder formation.

2.5 Phytochemical analysis

Aqueous extracts of organic/inorganic Turmeric powder and Coriander powder were prepared using 1:10 ratio of sample and water respectively and were tested for the qualitative estimation of tannins, steroids, alkaloids, saponins, flavanoids, and glycosides.

2.6 Development of Products

Products like Kadhi, Poha and Lemon rice were prepared using organic/inorganic Turmeric powder. And products like Panjiri, Masala bhindi and Masala Mirchi were prepared using organic/inorganic Coriander powder. Each recipe was made by using both organic and inorganic form of spices in same quantity and same method of cooking in order to check their acceptability.

2.7 Sensory evaluation of developed products

Selection of panel members involved the screening of 20 postgraduate students from the department of Home Science, Banasthali Vidyapith, Tonk, Rajasthan. All of these were subjected to triangle difference test and 15 students having sharp discrimination, discretion and communication powers were selected for further evaluation as they identified cumin seeds as a difference factor. In the present study, the panellists evaluated the developed products from organic/inorganic spices according to the Five-point composite rating scale and 9-point Hedonic scale.

2.8 Statistical analysis

The analysis of data was done with the help of mean, standard deviation and t-test.

3. Results and Discussion

3.1 Proximate composition of organic and inorganic spices

The moisture content of organic turmeric (9.5±0.05) was found to be of higher value than that of inorganic turmeric (7.1±0.09). Similarly, the moisture content of organic coriander (5±0.05) was reported to be of higher value than that of inorganic coriander (2.3±0.15). So, if we compare organic spices with the inorganic ones, then it can be safely stated that inorganic spices are less perishable than organic spices and possess an increased shelf life as low moisture content prevents microbial attacks.

Table 1: Proximate Composition of Organic & Inorganic Turmeric *(Curcuma longa* L.) And Organic & Inorganic Coriander seed powder (*Coriandrum sativum*). Values are expressed as Mean ± SD of triplicate determinations

Proximate Analysis	Turmeric powder		Coriander seed powder	
	Organic	Inorganic	Organic	Inorganic
Moisture (g/100 g)	9.5±0.05	7.1±0.09	5±0.05	2.3±0.15
Ash (g/100 g)	3.5±0.05	1.1±0.15	18.5±0.1	7±0.11
Fat (g/100 g)	7.6±0.05	5.5±0	5.4±0.05	5.5±0
Protein (g/100 g)	0.3±6.8	0.3±6.8	0.3±0	0.3±0
Fibre (g/100 g)	15±0.55	12.8±0.37	32.9±0.15	30±0.11
Carbohydrate (g/100 g)	63.8±0.6	73±0.45	37.6±0.25	54.7±0.2

Amount of protein was found to be the same in both organic and inorganic spices. The data delineated that organic spices have significantly high value of ash content at $p \leq 0.05$ level in comparison to the inorganic spices. The high ash content in

organic spices is due to organic farming techniques where they focus on maintaining healthy soil ecosystems that enhance nutrient availability for plants. As the organic spices are rich in minerals, they are more nutrient dense and may offer better health benefits as compared to those inorganic spices.

The data outlines that fat content of organic turmeric (7.6±0.05) is higher than that of inorganic turmeric (5.5±0). The fat content of organic and inorganic coriander is same at $p \leq 0.05$ level. In general, the fat content of spices (both organic or inorganic) are relatively low and they are not a significant source of dietary fat.

The data also indicates that the carbohydrate content of organic spices is low at $p \leq 0.05$ level when compared to inorganic spices. Also, the type of carbohydrate affects the health to a great extent. Complex carbohydrates have numerous health benefits like giving satiety, improving gut microflora. The fibre content of organic spices have high value at $p \leq 0.05$ level when compared to inorganic spices. So, it can be stated that products made out of organic spices can be helpful in providing relief from constipation, give satiety and keep gut microflora healthy.

3.2 Antioxidant and Phytochemical properties

The data depicts that organic spices contain significantly lower value of Vitamin C, total flavonoid and DPPH content at $p \leq 0.05$ level when compared to the value of the inorganic spices.

Table 2: Antioxidant properties and Phytochemical screening of organic and inorganic Turmeric And organic & inorganic Coriander seed powder on Dry Weight Basis. Values are expressed as Mean ± SD of triplicate determinations of organic and inorganic Turmeric and Coriander seed on dry weight basis

Antioxidant and Phytochemical Properties	Turmeric (*Curcuma longa* L.)		Coriander (Coriandrum sativum)	
	Organic	Inorganic	Organic	Inorganic
Total Phenols Content (mg GAE/100g)	50.2±0.03	391.2±0.02	58.4±0.55	27.6±0.02
Vitamin C (mg/100g)	3.3±5.43	3.9±0.11	5.9±0.11	8.3±0
DPPH	56.4±0.45	94±0.17	63.5±0.02	66.6±0
Total Flavonoid Content	733.9±0.03	1385±0.11	59.4±0.82	118.3±0.03

High value of vitamin C, total flavonoid and DPPH content in the inorganic spices can be due to the conventional farming practices where farmers use chemical pesticides and also fortify crops during farming with certain antioxidants. The organic turmeric had significantly lower value of total phenols at $p \leq 0.05$ level when compared to the inorganic turmeric but the organic coriander seed powder had significantly higher value of total phenols at $p \leq 0.05$ level when compared to the inorganic coriander seed powder.

The above data showed that inorganic spices are richer in terms of antioxidants content than the organic spices. These antioxidants have been fortified during conventional farming to inhibit oxidation. These antioxidants are effective in improving the shelf life of the spices. Therefore, inorganic spices may have a better shelf life as they will not get oxidised readily.

3.3 Mineral content

Table 3: Mineral content of organic and inorganic turmeric and organic & inorganic coriander seed powder on dry weight basis

Mineral	Turmeric		Coriander	
	Organic	Inorganic	Organic	Inorganic
Calcium (mg/100 g)	19.1±0.1	13±0.01	18±0.03	25±0.1
Iron (mg/100 g)	7.8±1.08	10.6±0.02	8.7±0.0	23.6±0.05

The data indicated that organic turmeric (19.1±0.1) has significantly high calcium content at $p \leq 0.05$ level in comparison to the inorganic turmeric (13±0.01) but organic coriander seed powder (18±0.03) has lower amount of calcium as compared to the inorganic coriander powder (25±0.1). The data also shows that the iron content of organic spices is low at $p \leq 0.05$ level when compared to inorganic spices. As calcium and iron are two important micronutrients required by the human body for various functions nowadays, farmers have been fortifying their crops with these nutrients for better nutrient content of their crops through conventional farming. But in organic farming only original content is brought to their maximum with no use of fertilizers and making the proper absorption and utilisation of the original nutrient present in the crop.

3.4 Sensory evaluation of developed products

Table 4 and 5 show that the sensory panellists mostly accepted the products made out of organic turmeric and coriander powder over products made out of inorganic turmeric and coriander powder. Developed products were evaluated on the basis of colour, texture, appearance, taste and overall acceptability.

Table 4: Acceptability Evaluation of recipes made by using organic and inorganic Turmeric powder (*Curcuma longa* L.) by 5 point composite test. Data are reported as MEAN ± SD from a group of 15 panel members

Attributes	Kadhi		Poha		Lemon Rice	
	Organic	Inorganic	Organic	Inorganic	Organic	Inorganic
Colour	3.8±0.51	3.6±0.95	3.8±0.51	3.6±0.95	4.2±0.45	4.2±0.88
Appearance	3.8±0.63	3.8±0.91	3.8±0.63	3.8±0.91	4.2±0.45	4.2±0.7
Flavour	3.4±0.63	3±1.09	3.4±0.63	3±1.09	4±0.79	4.4±0.73
Texture	3.6±0.61	3.5±0.91	3.6±0.61	3.5±0.91	4±0.7	4.4±0.83
Taste	3.9±0.45	3.2±0.96	3.9±0.45	3.2±0.96	4.3±0.48	4.4±0.91
Overall Acceptability	8±0.65	7.4±0.63	8±0.65	7.4±0.63	8.2±0.45	8.4±0.74

Table 5: Acceptability Evaluation of recipes made by using organic and inorganic Coriander Seed Powder (*Coriandrum sativum*) by 5 point composite test. Each recipe was made by using both organic and inorganic form of spices in same quantity and same method of cooking

Attributes	Panjiri		Masala Bhindi		Masala Mirchi	
	Organic	Inorganic	Organic	Inorganic	Organic	Inorganic
Colour	4.6±0.5	4.4±0.63	4.4±0.63	4.4±0.63	4.4±0.63	4.4±0.63
Appearance	4.4±0.74	4.1±0.74	4.5±0.51	4.5±0.51	4.5±0.51	4.5±0.51
Flavour	3.8±0.83	3.8±0.91	4.1±0.74	4.5±0.51	4.1±0.74	4.5±0.51
Texture	4±0.75	3.9±0.59	4.6±0.5	4.1±0.51	4.6±0.5	4.1±0.51
Taste	4.2±0.77	3.8±1.26	4.6±0.63	4.6±0.5	4.6±0.63	4.6±0.5
Overall Acceptability	8.4±0.51	8.2±0.59	8.5±0.51	8.2±0.77	8.5±0.51	8.2±0.77

Conclusion

Spices produced through organic farming are safer as compared to the spices produced through inorganic farming as they do not make use of chemical fertilizers and pesticides which are harmful for the human health as well as the environment. Organic spices contain higher amount of moisture, ash and fibre content as compared to the inorganic spices. In case of antioxidant and phytochemical properties, inorganic spices have reported to higher values as compared to the organic spices. This might be due to the addition of some nutrients and antioxidants synthetically to the crops in order to increase the nutrient content of the spices grown conventionally. Organic foods are better for the people who have chemical allergies. As foods grown conventionally make use of chemicals and some people are allergic to some chemicals, they prefer organic foods over inorganic foods as organic foods are grown naturally without any use of chemicals. It is evident from the study that organic recipes made out of organic spices were more acceptable as compared to recipes made out of inorganic spices. The recipes made out of organic spices recipes were liked and preferred more over the inorganic spice recipes. Hence, the study demonstrated that products made from organic spices can serve as good nutritious snacks helping people to better their health while consuming tasty food.

References

1. AOAC. Official Methods of Analysis, Association of Official Analytical Chemists; c2009.
2. Bhattacharyya P, Chakraborty G. Current Status of Organic Farming in India and other Countries. Indian J Fertil. 2005;1(9):111-123.
3. Chitale S, Bhoi S, Tiwari A. Organic rice production technology. Model training course on rice production technology; c2012. p. 22-29.
4. Kanchanashri B, D'Souza P, Chavannavar S. Pharmaceutical Perspectives of Spices and Condiments as Alternative Antimicrobial Remedy; c2017. Available from: 10.1177/2156587217703214.
5. National Institute of Nutrition, Indian Council of Medicinal Research. A manual of laboratory technique, principles of biochemistry. Hyderabad: National Institute of Nutrition; c2008. p. 183.
6. National Institute of Nutrition, Indian Council of Medicinal Research. A manual of laboratory technique, principles of biochemistry. Hyderabad: National Institute of Nutrition; c2003.
7. Norman J. The Complete Book of Spices. London: Dorling Kindersley Limited; c1990.
8. Sarma I, Phukon M, Borgohain R. Effect of organic manure, vermicompost and neem cake on growth, yield and profitability of turmeric (*Curcuma longa* L.) variety Megha Turmeric-1. Asian J Bio Sci. 2015;2(10):133-137.
9. Sharma S. Estimation of proximate chemicals composition. In: Experiments and Techniques in Biochemistry. New Delhi: Galgotia Publication Pvt Ltd.; c2007. p. 55-60.
10. Varier P. Coriandrum sativum in Indian medicinal plants: A compendium of 500 species. Chennai: Orient Longman Ltd.; 1994:(2):416-417.