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Production of macrobiotic herbal product with combination of citrus waste and spices

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Abstract
Using spices shows Indian culture which enhances taste, flavor, texture of food and help to improve immunity with good body strength. Spices work like unnamed supplements we add in all food preparation. This research study based on macrobiotic herbal product formation of organic citrus peel and spices. Citrus are widely consumed spices of fruits used in all over world. Processing of citrus fruit enhance waste which is responsible for environmental hazard. Combine process of citrus peel waste and spices manufactured herbal powder which can use be use in food production and macrobiotic herbal pills help to reduce lifestyle disorder. This research study valuable for reuse citrus waste in consumable foam through various processing. Now a day we can find huge review related to reuse citrus peel waste which can help to improve quality of food. This necessary action will play vital iniciative to improve environmental hazardous situation.

Keywords: Macrobiotic, organic, citrus peel, hazard, processing

Introduction
Fruits are the food item from horticulture crops that are most frequently consumed. These foods can be consumed raw, lightly cooked, or cooked, depending on the type and method of preparation. The treatments of horticultural crops and assembly have increased to meet the increasing demand brought about by changes in population and lifestyle. Fruit businesses and home kitchens produce massive amounts of waste, which leads to serious financial and nutritional losses as well as environmental problems.

Just the processing of fruit yields a large amount of waste - between 26 and 30 percent of the final product (FAO, 2017) [35]. The wastes that are most frequently produced are the stems, rinds, and seeds of fruits and vegetables; these materials are rich in bioactive substances such as carotenoids, enzymes, polyphenols, oils, vitamins, and a host of other compounds. (Ayala and others, 2011) [12] These bioactive compounds have applications in many different fields, such as the production of probiotics, edible films, and other useful products (Coman *et al*., 2020) [22]. A viable first step toward long-term sustainability might be to turn these inexpensive horticultural wastes into a value-added product (Rabetafika *et al*., 2014) [50].

Fruit processing produces two types of waste: a liquid waste consisting of juices and wash water, and a strong residue of peel/pores and skin, seeds, stones, etc. (Coman and others, 2020) [22]. Various fruit types produce varying percentages of waste, such as 31% for mangos, 25% for bananas, 41-50% for pineapples, and 32-50% for oranges. Thus, there are numerous severe waste disposal issues that, if left unaddressed, could lead to issues with flies and rats throughout the processing area as well as serve as a breeding ground for various diseases.

The six most common byproducts that can be produced are: Peel candy, extracting oils from peels, Citrus fruit pectin extraction, fruit juices that have been fermented, fruit waste enzyme extraction, and fruit peel wine or vinegar extraction. (K. Selva)

A portion of the world's most popular finished product is made up of sour fruits. They are now found all over the world, especially in areas with warm, temperate climates with temperatures between 20 and 30 degrees Celsius, having originated in Southwest Asia (Xinmiao *et al*., 2015) [47]. This final organization includes the elegant Angiospermae, the subclass dicotyledonous, the unrelated order, and the own circle of relatives to the Rutaceae and Citrus genus. Among the most popular types are orange, mandarins, lemon grapefruit, and lime. Citric acid, a tri carboxylic acid that gives sour fruits their acidic flavor, is abundant in the fleshy end product that makes them unique. Vitamin C is another purpose of this fruit within their own family tree.

This vitamin, an antioxidant that is widely used, is found in large quantities in citrus. A variety of fibres and minerals such as K, Ca, and Mg can also be found in addition to these essential compounds. Each year, the rise in sour juice - which makes up half of the fruit's weight - creates a significant amount of residue; particularly skin (Waseem *et al*., 2019) [48]. Normal agricultural practices and product processing incur little to no costs for those residues. The food, pharmaceutical, and cosmetics industries can only repurpose a small percentage of these wastes to create essential oils. In recent years, it has been discovered that sour fruit waste contains an excessive amount of polyphenols, catholic acids, and flavonoids, specifically poly-methoxylated flavones, flavanones, and glycosylated flavanones. (S. Plazzotta and others, 2017) [49].

The most significant portion of fruits are their peels, which are rich in essential nutrients that are good for human health and from which a variety of active ingredients can be extracted. Peels can also be used to increase the rate at which waste materials are converted into valuable food products. Orange and lemon are examples of citrus fruits, which are members of the Rutaceae family and are a notable source of several nutrients that are beneficial to human health. The main by-products of the citrus processing industry are peels from oranges and lemons, which are rich in dietary fiber, vitamin C, pigments, hemicellulose and cellulose, pectin, and essential oils. They also contain a variety of bioactive substances, including phenolic acids, flavanones, flavones, and polymethoxylated flavones (Rafiq and associates).

Orange peels are a great source of calcium, folic acid, vitamin B6, fiber, and other nutrients. Orange peels contain limonene, a naturally occurring chemical that has anti-inflammatory and anti-cancer properties. In addition to high levels of vitamin A, B, magnesium, and copper, orange peels also contain high levels of phytochemicals, flavonoids, and antioxidants. Orange peel has high carbohydrate content. Peels contain essential oils that have anti-inflammatory and immune-boosting qualities. Calcium, potassium, fiber, vitamin C, healthy enzymes, and flavonoids with anti-inflammatory and anti-cancer effects can all be found in abundance in lemon peels.

They halt the division of many cancer cells and have antibiotic qualities. When it comes to neutralizing free radicals, vitamin C is an excellent scavenger. Additionally, it offers defense against inflammatory diseases like osteoarthritis, asthma, and arthritis. Through immune system enhancement, it plays a significant role in preventing infections, flu, and colds (Times of India, 2019).

Utilizing fruit processing industry waste is currently the most difficult problem in the world. This is because fruit and vegetable production and processing rates are rising daily, and fruit and vegetable disposal rates are falling because of microbial deterioration, transportation, and the prohibitively expensive costs of laboratory processes like drying and storing plant materials.(Chavan and others, 2018) [20]. Since fruit and vegetable wastes are a great source of many essential nutrients that are beneficial to human health, turning them into valuable food products is one of the best ways to lessen the negative effects that wastes have on the environment. It also helps the fruit processing industry. In 2019, the National Academy of Agricultural Sciences

The purpose of this research is to create herbal product with natural flavors, aromas, and longer shelf lives by utilizing fruit waste - specifically, orange and lemon peel. It is hoped that the study's findings will help manage the waste from food processing industries, where fruit pulp is used to make candies. They may also help small businesses become more productive by helping them make the most of their fruit supply by using fruit peels, which are wasted but contain a variety of vital nutrients.

Spices have been an integral part of some people's diets and lifestyles since ancient times. Throughout history, they have played a variety of functions, such as those of flavoring, coloring, preservative, food additive, and medication. These spices' active phytochemicals have given these actions their molecular foundation. A spice is a small amount of dried fruit, bark, seeds, fruit, or flowers from plants or herbs that are used for flavor, color, or preservation. Numerous of these ingredients are also found in conventional medical practices. Due to globalization, these spices are now more widely available and are becoming more and more popular.

Methodology

Phase 1 has been described under following heads

1. **Procurement of raw material**
   The material for herbal supplements collected from organic fruit and grocery store situated at Sonipat, Haryana.
2. **Apparatus required for the experiment**
   Instruments & equipment used in the study were mixer grinder, knife, plates, electronic balance, hot air oven, muffle furnace, digital pH meter, Autoclaves, Incubator etc.
3. **Method for preparation of orange and lemon peel powder**
   The good quality lemons and oranges were collected from the local market, then washed 5-6 medium sized lemons and 3-4 medium sized oranges carefully and completely, and dry with the help of cotton cloth. Peel them by using a clean sharp knife, and chop the peels into thin slices so that they can dry faster.
   On a tray spread both types of peels and place them under the sunlight to dry and also cover the tray with thin cloth or net to prevent the dust and insects from getting into contact with them. They took around 2-3 days to dry completely under direct sunlight. After that pour dried peels into a dry food blender and grind them to make fine powder.
4. **Method for preparation of orange and lemon peel herbal product**
   Ingredients: Used for herbal product formation

- Sugar - 100 g
- Lemon juice- 2 tsp
- Water - 80 ml
- Orange /lemon peel - 30 g
- Sodium benzoate - 2 pinch

Phase 2 has been described under the following heads:

1. **Analytical methods**

- Determination of moisture content.
- Determination of Ash content.
- Determination of pH content.
- Determination of crude fibre content.

2. Sensory evaluation of samples

The herbal products were subjected to sensory evaluation for acceptance of all three samples. The sensory attributes were measured by using a 9 point hedonic scale sensory evaluation form. Scoring was given by 25 panelists on different attributes.

Phase 3 has been described under the following heads:

1. Analysis of shelf life of new developed products

Microbial analysis was done to determine the total plate count on the sample for bacterial count and analyze the shelf life.

Result and Discussion

The chapter consists of results that are found by testing the samples and discussing them. The results were based on physical and chemical analysis of the developed product. The results were also based on the sensory evaluation testing of the prepared products.

Proximate composition of citrus peel powder

Parameter	Products		
	Orange peel powder	Lemon peel powder	Sweet lime peel powder
Moisture (%)	12.42±0.34^a	12.47±0.41^a	12.73±0.62^c
Total ash (%)	5.27±0.06^a	5.19±0.08^b	4.51±0.02^c
Crude oil (%)	3.12±0.08^a	3.04±0.05^b	3.34±0.06^c
Protein (%)	5.72±0.05^a	5.56±0.04^b	5.23±0.09^c
Crude fiber (%)	13.40±0.23^a	13.40±0.71^a	11.92±0.21^b
Total carbohydrate	78.54±0.21^a	77.52±0.21^b	80.81±0.13^c

*Values are the means of triplicates and the results are expressed in dry basis except for moisture content.

All data are the mean ± Standard Deviation of triplicates; Values with same superscripts in the same row are not significantly different (p>0.05) statistically.

Table 1: Mean acceptability score of attributes between the samples: Herbal product by composite scoring

Parameters	Standard	T_1	T_2	T_3	F value	P value
Appearance	15.3±2.5	16.3±1.41	14.5±1.64	12.7±1.94	6.19	0.02
Texture	6.6±1.26	7.0±1.33	6.1±0.87	6.1±0.87	1.54	0.21
Color	6.80±1.98	7.50±0.84	6.8±0.78	6.5±1.43	0.97	0.41
Taste	16.2±2.82	16.8±1.81	14.7±2.21	14.1±1.59	3.4	0.02
Aroma	6.7±1.25	7.2±0.78	6.9±0.07	6.0±1.15	2.55	0.07
Mouthfeel	6.4±1.71	7.3±1.33	6.1±1.10	5.7±1.49	2.26	0.97
Overall Acceptability	15.5±2.99	15.6±2.79	14.2±2.18	13.7±1.8	1.50	0.23

*Significance at p<0.05

Standard sample: Normal product.
Sample T_1: Orange peel product incorporated with 15 gms of peel powder.
Sample T_2: Lemon peel product incorporated with 7.5 gms of peel powder.
Sample T_3: Sweet lime peel product incorporated with 10 gms of peel powder.

Table depicts the mean acceptability score of attributes between the samples: Herbal product by composite scoring. In appearance, there was statistically significant difference between the samples (p<0.05) as determined by one-way.

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