

Phytochemical Analysis of Carrot, Red Pepper, Spinach and Lettuce Cultivated at Ajiwa, Batagarawa, Lambun Sarki and Dankama Vegetable Farms, Katsina State, Nigeria

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Abstract

Katsina state for long has been a major aggregation centre for cash crops including vegetables due to the availability of suitable land and adequacy of water supply, phytochemical analysis of vegetables cultivated at , batagarawa, lambun sarki and dankama vegetable farms were investigated, This study investigates the metabolites present in sample, the presence of tannins, flavonoids and saponins were tested. The results of the study showed the presence flavonoids, and tannins in lettuce, red pepper showed the presence only flavonoids, carrot showed the presence flavonoids, saponin and tannins, spinach showed the presence of tannin and saponin, while lettuce showed the presence Tannins, Saponins, Flavonoids. Therefore, lettuce, spinach and carrot could serve as potential source of natural antioxidants, red pepper could serve as a source of both antioxidant and anti-inflammatory.

Keywords: Phytochemical, Vegetables, Antioxidant and Anti-Inflammatory

INTRODUCTION

Fruits and vegetables are widely regarded as healthy. Fruits and vegetables are a wide range of plant foods with varying levels of energy and nutrients. Furthermore, fruits and vegetables include dietary fiber, which is associated to a lower risk of cardiovascular disease and obesity. Fruits and vegetables also provide vitamins and minerals to the diet, as well as phytochemicals that act as antioxidants, phytoestrogens, and anti-inflammatory agents, among other protective mechanisms. Diets rich in fruits and vegetables are generally advised due to their health benefits. Fruits and vegetables have long been included in dietary guidelines due to their high amounts of vitamins, particularly vitamins C and A; minerals, including electrolytes; and, more recently, phytochemicals, particularly antioxidants. Additionally, fruits and vegetables are suggested as sources of dietary fiber.

The nutritive value of lettuce is very high but rests largely upon a good content of minerals and moderate storage of vitamins in the human diet plus a substantial amount of fiber and that of water. Lettuce is popular for its delicate, crispy, texture and slightly bitter taste in fresh condition (Shittu, A. M., *et al.*, 2022).

Carrot (*Daucus carota* L.) within the succulent vegetable grouping, carrots rank second in popularity in the world after potato. Apart from their nutritive value, carrots are economically important due to their: popularity and low cost for consumers, relative ease of production, ability to be harvested over a short period of time, comparative ease of shipment and long storage life under appropriate low temperatures. Countries that have high carrot production in terms of area planted and volume include China, United States of America, Russia, Japan, France and the United Kingdom. Carrots are amongst vegetables that contribute one of the highest levels of carotene in the human diet. Carotene, a source of pro vitamin A, has a wide range of protective effects in the human body.

Spinach extract use has been shown to benefit a variety of cancers, including ovarian, lung, prostate, breast, and colon (Ramesh et al., 2016). Nazik et al., (2013) reported on the extraction of ferredoxin from spinach leaves. Purification and identification of spinach ferredoxin. The effect of heat on ferredoxin (from latin ferrum: iron + redox) as a support for anaerobic bacterial growth was measured using surface viable count. The fate of ferredoxin while utilizing supernatant as a growth medium. (Nazik et al., 2013) reported on the extraction of ferredoxin from spinach leaves. Purification and identification of spinach ferredoxin. The effect of heat on ferredoxin

(from latin ferrum: iron + redox) as a support for anaerobic bacterial growth was measured using surface viable count. The fate of ferredoxin while utilizing supernatant as a growth medium.

Lettuce (*Lactuca saliva* L.) belongs to the Composite family and is one of the most popular salad crops in the world. It is a leafy herb that produces milky juice. It produces a slender stem early in the season, followed by a cluster of leaves that vary greatly in shape, character, and color amongst types. Later in the season, a seed stock is created. It is primarily a cold-loving crop. The optimal temperature range for lettuce cultivation is 18°C to 25°C, with a night temperature of 10°C to 15°C. Lettuce is appreciated for its delicate, crunchy texture and slightly bitter taste when fresh (Shittu, A. M., *et al.*, 2022).

Red pepper cultivars are the most commercially grown peppers in the world. Capsicum fruits vary greatly in color, shape, and size across and within species. Traditionally, red pepper formulations are indicated for the treatment of gastro-intestinal issues, skin diseases and arthritis, wound healing, and as a blood purifier (Adam, A. B., *et al.*, 2023). Red peppers are part of the *Capsicum annum* family, which also contains jalapeño, cayenne, chili, and other spicy peppers.

MATERIALS AND METHODS

Distilled water, ferric chloride (FeCl_3), hydrochloric acids (HCl), (sigma Aldrich). All reagents were used as received.

Sampling Area

The study was conducted in Katsina State, Northern Nigeria. Katsina State is located between latitudes 11°08'N and 13°22'N and longitudes 6°52'E and 9°20'E. The state covers an area of 23,938 sqkm and lies in the Northern Nigerian Sahelian Savannah. The state is bordered by Niger Republic to the North, Jigawa and Kano States to the East, Kaduna State to the South and Zamfara State to the West. The state has 34 Local Government.

Samples Collection

Five vegetable samples were obtained from farms within Batagrawa, Ajiwa, Kofar Marusa and Lambun Sarki vegetable Gardens. They were taken to the Department of Biological Sciences Umaru Musa Yar Adua University for identification. The samples were dried in chemistry laboratory for six weeks.

Sample Preparation

Samples were crushed and powdered using pistol and mortar and kept in air tight containers for further analysis. The samples were digested using Nitric and hydrochloric acids, and the digested were analyze using Microwave Plasma Atomic Emission Spectroscopy.

Determination of Taninin Carrot, red pepper, Lettuce, and Spinach samples

The extract (2ml) plus few drops of 10% ferric chloride (FeCl_3) to give a deep bluish or greenish color is the positive result and the absence of the deep color is negative result. (Trease and Evans, 1986)

Determination of Saponin in Carrot, red pepper, Lettuce, and Spinach samples

1ml of the extract is added to 4ml of distilled water and a vigorous shaken. Formation of froth indicate the present of saponin (Trease and Evans, 1986)

RESULTS AND DISCUSSION

Table 1: Phytochemical Analysis of vegetable from Faringada Vegetable Farm

Sample	Tannin	Saponin	flavanoid
Carrot	+	+	+
Red pepper	-	-	+
Lettuce	+	-	+
Spinach	+	+	-

Key:

- = Absence
- + = present

The phytochemical analysis of vegetables from the ajiwa, batagarawa, lambun sarki, and dankama vegetable farms in Katsina state, Nigeria, reveals the presence of tannin, saponin, and flavanoid contents in carrot samples, flavanoid in red pepper samples, tannins, and flavonoid in lettuce samples, and tannin and saponin in spinach samples.

CONCLUSION

It was concluded that carrot, red pepper, and lettuce exhibit remarkable antiviral and anti-inflammatory activity due to the presence of flavonoid content, spinach and carrot could help decrease blood lipids, lower cancer risks, and lower blood glucose response due to the presence of saponin content, while carrot, lettuce, and spinach could help to accelerate blood clotting, reduce blood pressure, decrease serum lipid levels, produce liver necrosis, and modulate immunoresponses.

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