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Gulzar Ahmad Nayik  
Amir Gull *Editors*

# Antioxidants in Vegetables and Nuts - Properties and Health Benefits

 Springer

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## Antioxidants in Vegetables and Nuts - Properties and Health Benefits

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Gulzar Ahmad Nayik • Amir Gull  
Editors

# Antioxidants in Vegetables and Nuts - Properties and Health Benefits

 Springer

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## Abstract

Tuber crop (yam, potato, and cassava) is considered an important part of human diet. Among all tubers, yam is enriched with several nutrients and provides benefits for radiant health. It is an abode of nutrition that favors the promotion of health, as it is hypoglycemic, antioxidative, antimicrobial, hypocholesterolemic, and has immunomodulatory activities. Many of its phytoconstituents like phenols, phytic acids, glycoalkaloids, saponins, and proteins are solely accountable for the health benefits. Traditionally, yams were exploited for several medicinal practices; however, now its suitability has been extended with industrial importance and food applications as well. Yam has been potentially used as functional foods and nutraceutical ingredients for nourishing human well-being and reducing disease risk.

## Keywords

Yam · Phytoconstituents · Antioxidant activity · Hypocholesterolemic · Functional foods

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## 15.1 Introduction

Yam (*Dioscorea* species) crop is of utmost importance for farmers, as it efficiently enhances the income of many farmers. The Caribbean Islands, Asia, Africa, South America, and the South Pacific islands are known for cultivation of yam. To a greater extent, it is cultivated mainly to get rid of the food security risks of the emerging population of the world. In West Africa, after cassava and sweet potato, it is the third most hit choice (Asiedu and Sartie 2010) with much better nutritional capacity than even cassava (Table 15.1) (Baah et al. 2009). Nutritional Potential for yam varies significantly where it contribute around 80 to 120 Kcal/100 g energy on consumption (Polycarp et al. 2012). However, yam lacks in some essential sulfur amino acids (methionine, cysteine, and tryptophan) (Bhandari et al. 2003). *Dioscorea dumetorum* yam has been reported to be high in protein with well-sequenced composition of essential amino acids in it (Polycarp et al. 2012). In contrast, consumption of *Dioscorea rotundata* in the African region led to high frequency of kwashiorkor occurrence, owing to least protein scores in that variety (Gladstone et al. 2014).

Ancient back, yam is not adopted for food purpose only, rather it possesses various medicinal features in along with its potential nutrient contribution. Various studies have proved the diverse nutrients and non-nutrients of yams, such as

**Table 15.1** Nutritional value of yam tubers

Nutrition value	Yam tubers (100 g)
Calorific value (kcal)	80–120
Moisture (%)	60–80
Protein (g)	1.5–6
Fat (g)	0.1–0.2
Carbohydrates (g)	15–40
Ash (g)	1.3–7.5
Fiber (g)	0.6–3.5
<i>Vitamins (mg)</i>	
Thiamine	0.10
Riboflavin	0.04
Niacin	0.07
<i>Minerals (mg)</i>	
Potassium	250–1500
Phosphorous	40–160
Calcium	6.5–116
Iron	1.5–9
Copper	0.1–0.4
Sodium	63–100
Magnesium	40–83
Manganese	0.95–3
Zinc	5.4–7.8

Source: Polycarp et al. (2012); Ferraro et al. (2016))

polyphenols and organic acids. Furthermore, during off-seasons, humans prefer to use yams for solving their seasonal food shortage instead of other tubers like cassava and sweet potato (Norman et al. 2012). This crop provides nearly 285 dietary calories/person/day to feed 0.3 billion humans in sub-Saharan Africa (Adejumo et al. 2013).

### 15.1.1 Botanical Description

*Dioscorea* (*Malvaceae*), a genus, includes more than 644 species of perennial herbaceous vines. Its native belongs to Africa, Asia, and Oceania. Among available varieties, white, bitter, and water yams are the hit choices of African inhabitant, whereas, Asian continent is available with Chinese and Water yam varieties. It is widely cultivated among temperate and tropical regions (Table 15.2) (Andres et al. 2017).

### 15.1.2 Morphology

Yam belongs to the family of herbaceous plants and is a woody climber with starchy rhizome. It appears rough and laborious to peel, but softens on heat. Appearance varies from dark brown to light pink. Most interestingly, it contained a soft mass, that is, “meat” of varied colors. This crop is perennial and available throughout the year. The *Dioscorea* develops strong stems, which twin through the trees with leaves of simple, coordinate, and large petioles characteristics. It bears small flowers with separated male and female parts; male shows sterile features for as long as vegetative propagation (Coursey 1983). The growth of the plant stem reaches up to 6–12 m and appears as deep as dense mass. Bulbil is the aerial storage organ of *Dioscoreaceae* family. Yam’s another storage organ is its root, which is a swollen hypocotyl. The shallow (<1 m) fibrous root system concentrates within 30 cm of the topmost soil, depending on the species. The composition of environment genes plays an integral role in determining the shape and size of the tuber. The individual size of tubers may vary from a few grams to 50 kg and the length of tuber range from 2 to

**Table 15.2** Yam classification

Types of yam	Botanical name
White	<i>Dioscorea rotundata</i>
Yellow	<i>Dioscorea cayenensis</i>
Water	<i>Dioscorea alata</i>
Air potato	<i>Dioscorea bulbifera</i>
Bitter	<i>Dioscorea dumetorum</i>
Chinese	<i>Dioscorea opposita</i>
Lesser	<i>Dioscorea esculenta</i>

Source: Andres et al. (2017)

3 m. From commercial concerns, yam tubers are cylindrical in shape and a thick layer of cork covers it (Onwueme 1978).

Storage features vary from species to species and can range from one to four months of storage capacity, which is mainly attributed to its chemical composition. Cultural and climatic factors employed while cultivating also govern the storage efficiency (Soibam et al. 2017).

### 15.1.3 Cultivation

The foremost requirement for any crop is land preparation; here, it can be through manual or automated means into the loosened soil. Seeds of yam tubers are planted on the smooth ground. Tuber size at the time of harvesting varies between 30 and 300 g. Seeds should be treated with thiabendazole (fungicide) and dried in the open air for about 4 hours. To prevent exposure to the sun, yam plants are about 10 cm deep in the soil and spacing depends upon the size of the set. Generally, for commercial production of the yam, spacing about 1 m × 1 m between rows and stands is recommended. Irrigation should be provided to the yam plant regularly for the first 2–4 months. The yam plants stake with the PVC pipes (1–3 m), bamboo sticks, and pruned tree branches. Depending upon the resources and requirements, plants stake individually or in groups of two or three. Harvesting of the yams plants should be done after the 7–8 months of the planting, when yellow leaves have emerged. Harvesting time also depends on the variety of yam. Around the tuber, digging is done to lose the tubers from the soil and then you could lift it and cut it from the vine. Bruising of the tubers should be avoided. According to size and quality, sorting and grading of tubers should be done. The healthy tubers, which are free from bruises, scrapes, insects, cuts, rots and nematodes, should be stored. The freshly harvested tubers are stacked and covered with a canvas tarpaulin. After that, expose the tubers at 29–35 °C temperature/90–95% relative humidity for one week. Emerging tissue and skin thickness form over the injured areas of tubers (Beckford et al. 2011; Asiedu et al. 2003).

### 15.1.4 Utilization of Yam as Traditional Food and Medicine

Yam is utilized in the form of cooked soup, flour, and as raw in the preparation of various foods. Yam powder is utilized to prepare various bakery products (Table 15.3). Yam tubers contain several phytochemical compounds including diosgenin, polyphenols, choline, allantoin, dioscorin, dioscin, mucin, carotenoids, and vitamins (C and E) (Claudius-Cole et al. 2017). Yam mucilage also provides dietary fiber and glycoprotein. Various studies reported the antioxidant activity, antimicrobial, and hypoglycemic activities of yam extracts. Yam tubers somehow favor the intestinal enzymatic efficiency and hence contribute to the production of epithelial cells (Chen et al. 2007).

The tubers also provide essential proteins and micronutrients (vitamins and minerals) and improve health. Yams also have ample amounts of thiocyanate,

**Table 15.3** Utilization of yam for various products

Variety	Product	Reference
<i>Dioscorea alata</i>	Jam	Borela (2018)
<i>Dioscorea rotundata</i> , <i>Dioscorea alata</i> and <i>Dioscorea bulbifera</i>	Bread	Amandikwa et al. (2015)
<i>Dioscorea esculenta</i>	Bread	Ukpabia and Uchechukwu (2001)
<i>Dioscorea purpurea</i>	Bread	Hsu et al. (2004)
Yam	Biscuits	Idowu (2014)
Yam	Cookies	Apotiola and Fashakinly (2013)
Yam	Bread	Liu et al. (2019)

which prevents the sickle cell anemia. This is the reason why urban population of Africa and America develop sickle cell anemia as they competitively less on yam consumption in competition to the rural inhabitants. In addition to this, raw yam and its products were also on hit consumption as a folk remedy to cure various diseases as well. Among the varieties, Chinese yam is also utilized as traditional medicine, owing to its potential to reduce blood sugar levels and treats diabetes. Further, yam boosts the human female by curing and menstrual disorders, rheumatoid arthritis, disorders, and schistosomiasis (parasitic disease). *Dioscorea batatas*, solely of Chinese origin (locally called ‘Shanyao’), have the same medicinal traits. Some others, like ‘Lichwurzeln,’ meaning ‘tuber of light,’ are utilized in the anthroposophist medicine (Simmonds 2006).

## 15.2 Bioactive Compounds in Yam

Bioactive compounds in yam such as polyphenols, antioxidants are secondary metabolite that provides several toxicological and pharmacological effects. These bioactive compounds are formed within the plants as well as the primary biosynthesis linked with development and growth. These phytochemicals possess numerous indispensable functions in plants, such as protecting the plants from detrimental effects, signaling of important functions, and attracting pollinators (Leng et al. 2019).

### 15.2.1 Ascorbic Acid

Ascorbic acid (vitamin C) is a heat-sensitive and water-soluble vitamin. It is abundant in fruits and vegetables. Due to its high heat sensitivity, it could be lost during cooking of vegetables. Vitamin C is present in substantial quantities in many root crops. Conversely, the amount could be decreased during cooking of roots without skins. Yam should be wisely prepared, and can provide a significant amount of the vitamin C content to the diet. The Nutritional Food Survey Committee

reported that root crops such as yam and potatoes serve as the main source of ascorbic acid, contributing to 19.4% of the total requirement in the diet of the British people. Yam provides 6–21 mg /100 g of ascorbic acid. Moreover, the ascorbic acid content of potatoes is almost similar to the cassava and sweet potatoes. The proportion of vitamin C varies among the species, crop year, location, maturity, soil conditions, and nitrogen and phosphate fertilizers (Ola and Opaleye 2019).

### 15.2.2 Bioactive Protein

Bioactive protein such as dioscorin is the main storage protein present in *Dioscorea* variety of yams. In the *Dioscorea* species, it contributes to about 90% of the total protein content. Dioscorin protein has been proved to provide trypsin inhibitor activities and carbonic anhydrase. Additionally, dioscorin in the presence of glutathione participates in *monodehydroascorbate reductase* and *dehydroascorbate reductase* reactions (Hou et al. 2001). Dioscorin also showed antioxidant activity and is further having helpful effects in dropping blood pressure (Hsu et al. 2002).

In addition to this, some clinical trials confirmed antihypertensive effect and angiotensin-converting enzyme (ACE) inhibitory action of Dioscorin as practically revealed in hypertensive rats (Lin et al. 2006). The dioscorin protein showed immunomodulatory, *monodehydroascorbate reductase*, *dehydroascorbate reductas*, trypsin inhibitor, and *carbonic anhydrase* activities (Liu et al. 2007).

### Diosgenin

Diosgenin is a valued concern here; it belongs to the triterpene group that seizes chances for colon cancer from occurring, and lessens cholesterol absorption. Pharmaceutically, it is utilized in drug development, for instance, cortisone, hormonal drugs (Zhang et al. 2014). Diogenin and its glycosides are the typical bioactive compounds in the *Dioscorea* family. These compounds are found in Chinese yam. *Dioscorea dregeana*, *Dioscorea esculeta*, and *Dioscorea rotundata* contain diosgenin, which showed antimicrobial and anti-inflammatory activities to gram +ve and -ve bacteria (Thajunnisha and Anbazhakan 2013).

### 15.2.3 Saponins

Saponins act as natural antibodies, having numerous aqueous foaming properties, hemolytic activity, and cholesterol binding properties. Its antimicrobial traits are utilized sometimes to treating yeast and fungal infections. It has been reported that *Dioscorea bulbifera* contains saponin (Okigbo et al. 2009).

### 15.2.4 Extraction of Bioactive Compounds from Yam

Extraction of bioactive compounds is required to separate the active components from other components. Extraction method and type of solvent depend upon the type

of extraction component. For the utilization of bioactive compounds in the development of nutraceuticals, pharmaceutical, as a dietary supplement, food ingredient and in the cosmetic products, extraction of the component is required. Bioactive components can be extracted from fresh, frozen, and dried plant materials (Lin et al. 2016). The method of extraction comprises conventional and modern method.

#### **15.2.4.1 Conventional Method of Extraction**

Since ancient times, long soxhlet maceration and hydro-distillation are the only means for extraction. Fabricated novelty in soxhlet sense not only works for fat but also for many other phytochemical constituents. As per the present concern, maceration means of extraction of various constituents of commercial grade and healthy attributes from yam are still adopted as an inexpensive mean.

Hydro-distillation was developed long ago and it has the same significance of extraction for bioactive cum phytoconstituents. Extracted essential oils, on the basis of method adopted, are divided into three classes: water distillation, steam distillation, and direct steam distillation. Hot water and steam are used as the main solvents to extract bioactive compounds from yam. These straight methods utilized for yam in assistance with phenol were analyzed and quantified by Eleazu et al. 2013.

#### **15.2.4.2 Modern Methods of Extraction**

These methods were developed due to the several disadvantages of the traditional method of extraction. It comprises surfactant-mediated techniques, solid-phase extraction, microwave-assisted extraction, pressurized-liquid extraction, supercritical-fluid extraction, and solid-phase micro-extraction (Sasidharan et al. 2011). Shah and Lele (2012) extracted Diosgenin from *D. alata* by acidic hydrolysis of the glycosides, followed by the HPTLC analysis. Several techniques and solvents are used for the extraction of polyphenols from plants. The technique which is used for the isolation of phenolic compounds from plant material mainly depends on the type of polyphenolic compound.

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### **15.3 Bioactivities of Phytochemicals in Yam**

#### **15.3.1 Antioxidant Activity**

The various research studies reported that antioxidant compounds in yam play an important role in the prevention of ageing, diabetes, arthritis, neurodegenerative and autoimmune disorders, cardiovascular, and carcinogenic diseases. The internal antioxidant defense system of the body comprising enzymes (*Catalase, superoxide dismutase and glutathione peroxidase*) and other compounds (glutathione, tocopherol, vitamin C, uric acid, and lipoic acid) provides protection to the body. However, when the body is exposed to highly oxidative stress, external sources of antioxidants are required. Various studies reported the antioxidant activities of roots and tuber crops (Liu et al. 2016).



Cornago et al. (2011) reported the total phenolic and antioxidant activities of Philippine yams (lesser and purple yam). Lesser yam (*Dioscorea esculenta*) and purple yam (*Dioscorea alata*) contained 69.9 to 421.8 mg GAE/100 g db of a total phenolic content. The purple yam variety showed the highest total phenolic and antioxidant activities as compared to other varieties. Antioxidants were determined in terms of DDPH, ferrous ion-chelating activity and reducing power assay.

Hsu et al. (2011) reported the antioxidant activity of ethanolic and water extracts of yam peel on tert-butyl hydroperoxide (t-BHP). This encouraged oxidative stress in mouse liver cells (Hepa 1–6 and FL83B). Ethanolic extracts of yam peel showed more protection on t-BHP-treated cells as compared to water-extracted antioxidants. Moreover, ethanolic extract had high catalase activity as compared to water extract.

Heating affected the antioxidants, phenolics, and the stability of dioscorin in the yam. Raw yams contained more bioactive compounds as compared to cooked yams. Moreover, the DPPH radical scavenging activities dropped with elevation in the temperature. In yam cultivars, phenolics and dioscorin content correlated with ferrous ion-chelating effect and DPPH radical scavenging activity. The phytochemicals present in the yams proved to increase the activities of endogenous antioxidant enzymes. Yam has been proved to reduce the levels of triacylglycerol,  $\gamma$ -glutamyl transpeptidase (GGT), and low-density lipoprotein. Yam also enhances the antioxidant activities of hepatic enzymes such as superoxide dismutase and glutathione peroxidase (Chan et al. 2010).

### 15.3.2 Antimicrobial Activity

The antimicrobial potential of various varieties of yam is due to the presence of phenolic compounds. Sonibare and Abegunde (2012) recorded that the methanol extracts of *Dioscorea* yams (*Dioscorea dumetorum* and *Dioscorea hirtiflora*) had higher amounts of both antioxidant and antimicrobial compounds. The determination of antimicrobial activity was done by the agar diffusion method (for bacteria) and for fungi, pour plate method was preferred. Also, *D. dumetorum* reported the highest in vitro antibacterial activity against *Proteus mirabilis*. The methanolic extracts of *D. hirtiflora* showed antimicrobial activity against *Penicillium chrysogenum*, *Aspergillus niger*, *Candida albicans*, *Salmonella typhi*, and *Staphylococcus aureus*.

### Hypocholesterolemic Activity

Worldwide, cardiovascular diseases are the primary causes of death. It has been proved that diet plays a vital role in the prevention of cholesterol homeostasis. Diosgenin, a steroidal saponin of yam, showed hypolipidemic and antioxidative activities. Diosgenin exhibited decreased total cholesterol level, protective effect on liver under high-cholesterol diet, pancreatic lipase inhibitory activity, and prevented the oxidation of polyunsaturated fatty acids (Son et al. 2007).

Hypercholesterolemic rats were fed with yam (*Dioscorea*) which showed that diosgenin decreases the absorption of cholesterol, increases synthesis of hepatic cholesterol, and secretion of biliary cholesterol without effect on the level of serum cholesterol. In agreement with this finding, many studies showed that diosgenin, in some varieties, decreases absorption of intestinal cholesterol (Uchida et al. 1984).

Furthermore, diosgenin stimulated fecal cholesterol excretion which was primarily attributed to its impact on hepatic cholesterol metabolism rather than intestinal cholesterol absorption (Temel et al. 2009).

Native protein of dioscorin purified from *D. alata* (cv. Tainong number 1) (TN1-dioscorin) and its peptic hydrolysates presented ACE inhibitory activities in a dose-dependent manner. With kinetic analysis, it has been reported that dioscorin displayed a mixed non-competitive inhibition against ACE. High blood pressure could be controlled with dioscorin from *Dioscorea* (Temel et al. 2009). Yam as a source of dietary fiber prevents the absorption of fat in the intestine, thus resulting in lowering of LDL.

### 15.3.3 Immunomodulatory Activities

The immune system requires attention, as it is associated with the several chronic diseases. Immunomodulation includes suppression or stimulation of human immune functions. The immune system contains the macrophage, lymphocytes, and dendritic cell, natural cell killer.

Yam dioscorin protein exhibited the in vitro immunomodulatory activities. The dioscorin has effect on native BALB/c mice spleen cell proliferation, which was examined through MTT assay. This was observed that dioscorin in the absence of lipo-polysaccharide encouraged RAW 264.7 cells to produce nitric oxide. Yam dioscorin showed immunomodulatory activities through the innate immunity that protects the host from infection by the other organisms. Dioscorin was found to encourage production of cytokine and to improve phagocytosis (Liu et al. 2007).

Various studies have proved the immune activity of yam mucopolysaccharides. In the presence of mucopolysaccharides, in vitro cytotoxic activity of mouse splenocyte against leukemia cell was improved. Additionally, in the mucopolysaccharides, the release of IFN- $\gamma$  was significantly increased and showed their ability of inducing cell-mediated immune responses. The mucopolysaccharides at a concentration of 50  $\mu\text{g}/\text{mL}$  enhanced lysosomal phosphatase activity and uptaking capability of peritoneal macrophages (Choi et al. 2004).

Chen et al. (2003) recorded the effects of Taiwan's yam (*Dioscorea alata*) on mucosal hydrolase activity and metabolism of lipids. High level of Tainung yam in the diet (50% w/w) decreased plasma and hepatic cholesterol proportions, but, in mice model, increased fecal steroid excretions. This could happen owing to the bile acid loss in the enterohepatic cycle to fecal excretion. Further, Tainung yam fiber decreased absorption of fat, cholesterol, and bile acid. Tainung yam's short-term consumption (25% in the diet for 3-weeks) could reduce an atherogenic index but no effect on total cholesterol level in non-hypercholesterolemic mice was reported.

Aside from this, some additional dietary yam (50% yam diet) can exert consistent hypocholesterolemic effects. However, in this study, diosgenin was not interpreted, and authors also believed that diosgenin may not be involved in the cholesterol-lowering effect of Tainung yam. Bioactive components such as dietary fibers and viscous mucilage can be beneficial for lowering cholesterol. Furthermore, in mice, 25% of uncooked Keelung yam's short-term consumption (3 weeks) can effectively decrease blood cholesterol levels. Authors elucidated that the active components for lowering lipid effects may be attributed to dietary fiber, mucilage, plant sterols, or synergism of these active components.

### 15.3.4 Hormonal Activities

In postmenopausal women, yam (*Dioscorea*) has the capacity to decrease the risk of cardiovascular diseases and cancer. It was found that the serum estrogen and sex hormone-binding globulin (SHBG) levels hiked gradually with the regular consumption of Yam. Moreover, serum hormone parameters namely, estrogen, estradiol, and SHBG were measured, surprisingly values did not vary in those who were fed with sweet potatoes as compared to control. The risk of breast cancer with increase in estrogen levels may be controlled by the increased SHB and the ratio of estrogen and estradiol to SHBG. Further, studies showed that higher SHBG levels had a counter effect against the occurrence of several coronary heart diseases and Type 2 diabetes mellitus in women (Wu et al. 2005).

During menopause, enhancement in bone strength with the consumption of *Dioscorea* was found, and also in bone remodeling and osteoporosis. Administration of *Dioscorea* decreased the pores in bones and increased the ultimate strength of bones (Chen et al. 2008).

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## 15.4 Storage of Yam Tubers

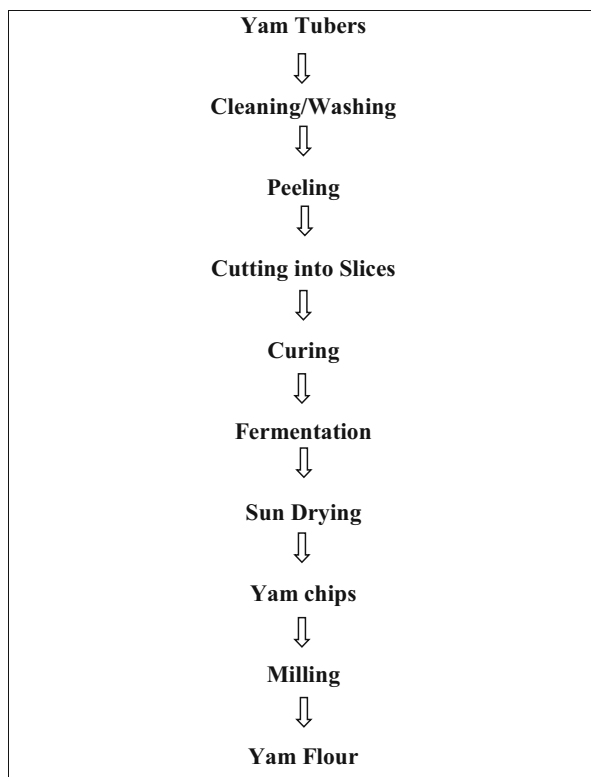
Yam tubers are living organisms and, therefore, they breathe continuously during storage. During respiration process, tuber starch is oxidized and carbon dioxide, water, and heat are produced, resulting in reduction of dry matter. Among the main tuber crops, yam is highly perishable and requires good storage conditions (Opara 2003). Healthy and sound yams are selected, and then curing combined with fungicide should be done. Ventilation in the storage room is required to remove the heat produced by respiration reaction. During storage of yam, regular inspection should be done to remove rotten tubers (Oke 1990). The best storage temperature for yam storage ranges from 14 to 16 °C with 70–80% relative humidity (Chou et al. 2006). In Africa, yam post-harvest losses are very high due to lack of proper storage conditions, as well as insects also cause 25% harvest loss within four months,

## 15.5 Effect of Processing on Nutritional Quality of Yam

Yams are commonly grown for direct consumption. Yam tubers are having seasonal growth cycle. Yam is grown in the rainy season and after harvesting, problem arises regarding storage due to poor storage system which results in scarcity after a few months (Opara 2003). As discussed above, yam storages are a serious concern. In Nigeria, yam has become unaffordable and expensive in urban areas as the great loss of yam after harvesting. Moreover, farmers sell the product immediately after harvest to avoid losses, and hence results in low income and less profits. Therefore, there are numerous restraints to the yam industry (Kleih et al. 2012).

Yam flour, pellets, chips, and starch are currently produced by traditional and industrial methods (Fig. 15.1). For the preparation of chips, yam tubers are peeled, cut into pieces, and parboiled. During parboiling yam is kept in water for 1–4 days. Natural fermentation takes place during this period. After that, yam is dried under sun and chip are prepared that can be further milled into flour (Ojokoh and Gabriel 2010). For the yam-derived products, there is not yet a specification standard (Codex Alimentarius 2005). Yam flour can be reconstituted with hot water to form dough and paste known as kokonte and amala among people of Ghana and Nigeria, respectively. The amala is a popular food in Nigeria. Yam flour can be fortified

**Fig. 15.1** Flow process for yam flour and yam chips



**Table 15.4** Effect of processing on the properties of yam flour

Variety	Processing method	Effect	Reference
Dioscorea dumetorum, Dioscorea alata, Dioscorea alata, Dioscorea cayenensis	Dried under three drying methods (oven, solar and sun drying methods)	Acts as stabilizers or modifiers to enhance product, improves rheological properties	Okeke- Oluka (2018)
Dioscorea rotundata and Dioscorea alata	Sun and oven-drying	High water-binding capacity, reduces the peak viscosity, holding strength, final viscosity, set back and elasticity	Jimoh et al. (2009)
Dioscorea rotundata	Blanching temperature and soaking time	Blanching and soaking of fresh yam cubes Resulted in significantly higher protein content, carbohydrate content, swelling capacity, foaming capacity, and bulk density and has better quality attributes than the control sample	Adejumo et al. (2013)
Yam	Blanching and drying	Total phenol content and the brown index of flour increased	Akissoe et al. (2003)

with other flours, for instance, soya, plantain, and wheat, in order to enhance its nutritional value (Abulude and Ojediran 2006). It has been observed that in the developing countries, there is a lack of supply of instant yam flour, resulting in a high need for ready-to-use and hygienically well-packaged products that are still inaccessible in many areas of African countries.

There are several hydrothermal techniques like boiling, frying, baking, and roasting, dehydration, and fermentation under which yams are processed before consumption. These methods affect the nutritional and functional value of yam (Table 15.4).

Fang et al. (2011) discovered the abundant phenolic compounds in Chinese purple yam and various changes during vacuum frying. Anthocyanin value after vacuum frying and blanching reported was 63% and 40%, respectively. Apart from this, hydroxycinnamic acids (sinapic acids and ferulic acids) showed higher stability than anthocyanins. Phenol content was not influenced by short freezing time. Several dehydration procedures were used to produce yam flours, which could further affect their antioxidant properties. The strongest antioxidant activities were reported in freeze-dried yam flours in comparison to drum-dried yam flours or hot air-dried (Chen et al. 2008).

Chen and Lin (2007) also found that temperature negatively affects phenol, dioscorin, and antioxidant content of yam products. Chen et al. (2008) further reported impact of pH on phenols, antioxidants, and dioscorin stability in various yam tubers. At pH 5, total phenols recorded were the highest, which further decreased with gradual increase in the pH. For phenols, similar trend was found in

terms of DPPH radical scavenging activity of yams at pH 5, but chelating capacity of ferrous ion was found to be high at pH 8 for all yams.

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## 15.6 Safety Concern for Yam

Pesticides, heavy metals, and mycotoxin are high safety concerns. In developing countries, accurate data on the amount and use of pesticide for major cropping systems are rarely available (Williamson et al. 2008). Highly inefficient practices include poorly maintained and non-calibrated equipment, timing and targeting of application, incorrect dosage and the usage of inappropriate products.

In recent years, the utilization of yam-derived food products is rising and the accurate assessment for the metal contamination in the resulted yam products, as well as through the food manufacturing, is essential (Shin et al. 2013). The level of heavy metals is different depending on the growing area. In some parts of Africa, be 0.11 and 0.10–0.20 mg/kg of cadmium concentration in yam has been reported by the EU and WHO, respectively, whereas Pb was not detectable and Ni should be lower than 0.5 mg/kg in the most foods (IARC 1990).

Aflatoxin contamination of yam is very common due to the high moisture content. These molds affect nutrient contents of the food and produce mycotoxins which cause serious health hazard to humans and animals (Djeri et al. 2010). Due to inadequate storage facilities, contamination occurs (Adebayo-Tayo et al. 2006). Pathogenic molds detected in yam were *Rhizopus nodosus*, *Trichoderma viride*, *Penicillium oxalicum*, *Rhizoctonia*, *Penicillium chrysogenum*, *Fusarium solani*, *Fusarium oxysporum*, *Botryodiplodia theobromae*, *Aspergillus niger* and *Aspergillus flavus* (Aidoo 2007). Yam flour is commonly contaminated by the species of *Penicillium*, *Rhizopus*, *Mucor* and *Aspergillus*, whereas *Fusarium* in the case of yam chips. Among 18 different types of aflatoxins that have been identified, major ones are aflatoxin B1, B2, G1, and G2, where aflatoxin B1 is the most toxic and causes cancer in human. Occurrence of aflatoxin B1 has been identified in some food commodities including maize flour, cassava flour, and yam chips. The Codex Alimentarius Commission fixed the concentration above the tolerance level of 15 mg/kg total aflatoxin (Somorin et al. 2012).

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## 15.7 Conclusion

For humans, yam is the one of the most important components of diet that provides energy and bioactive compounds. These bioactive compounds exhibit excellent antioxidative, anti-mutagenic, anti-inflammatory, and anti-carcinogenic properties. Various kinds of foods could be prepared with yam, and its usage varies among different countries and regions. Different properties such as the nutritional and functional properties are affected with processing of constituent compounds. Yam might act as a functional and nutraceutical ingredient to combat non-communicable chronic diseases and to enhance wellness.

On the other side, post-harvest losses of yam are the major issue in African countries, although the peeled and other waste of yam is mainly utilized for feeding poultry and livestock. The losses related to the crop threaten food security, affect the potential income of the farmers, and worsen conditions of poverty among rural households. In the developing countries, one of the greatest challenges of food industries is the conversion of traditional processing methods into modern industrial operations. Traditional means of yam based product utilization vary among the geographical locations all around the world and is mainly due to available variety, consumption habits, and through adopted processing methodological terms too. Therefore, there is need to develop highly efficient techniques for the proper utilization of yam in various products and resolve the issue of food security.

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**Raj Pal Singh  
Kuldeep Yadav  
Meenu Rathi  
Shikha Jaggi**

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# Beneficial Effects of Arbuscular Mycorrhizal Symbiosis

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## Abstract

Arbuscular mycorrhizal (AM) fungi are obligate biotrophs, which are remarkably successful and remain integral components of plant root systems, despite their obligate nature. They improve plant growth performance in a variety of ways: improve nutrient & phosphorus uptake, maintain water balance, help in seedling establishment, increase ecological and physiological fitness of the plants, protect against biotic and abiotic stress and above all, help in the ecosystem stability. These functions of the symbiotic organisms in agricultural soils can be crucial to the maintenance of soil health and plant production. Therefore, a better understanding of the nutrient uptake system of the crops could be a biological solution for the crops. This can also help in saving the resources and provide sustainable agricultural options to the farmers. Screening various strains of mycorrhizal fungi is necessary to identify the best combination for maximum benefits, because not all strains of fungi are beneficial; many of them are known to even depress plant growth.

**Keywords:** Mycorrhiza, Biofertilizers, Symbionts, Crop production

## Introduction

The term 'Mycorrhiza' literally means fungus-root which describes the symbiotic association between the plant roots and certain non pathogenic soil fungi. Brundrett (2004) defined mycorrhiza as '*a symbiotic association essential for one or both the partners, between a fungus (specialized for life in soil and plants) and a root (or other substrate-containing organ) of a living plant, that is primarily responsible for nutrient transfer*'. Mycorrhizas occur in a specialized plant organ where ultimate contact results from synchronized plant-fungus development.

Frank (1885) classified this broad group into ectotrophic and endotrophic on the basis of trophic levels. According to the relative association of the fungi with the roots, the mycorrhiza was classified as endomycorrhiza, ectomycorrhiza and ectendomycorrhiza (Peyronel *et al.*, 1969). It was further recognized that the VAM, Ericoid and Orchidaceous mycorrhiza were unrelated types of endomycorrhizal

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## 16

## Extractive spectrophotometric determination of Zirconium with 6-chloro-2-(2'-furyl)-3-hydroxy-7-methyl-4-oxo-4H-1-benzopyran (CFHMB)

Monika Rani

### Abstract

An extractive spectrophotometric method is developed for the trace determination of zirconium. A yellow colored complex is formed by 6-chloro-2-(2'-furyl)-3-hydroxy-7-methyl-4-oxo-4H-1-benzopyran (CFHMB) with zirconium(IV) which is quantitatively extracted into dichloromethane. The method obeys Beer's law in the range 0.0-5.5  $\mu\text{g Zr mL}^{-1}$ , having molar absorptivity, specific absorptivity and Sandell's sensitivity of  $6.10 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}$ ,  $0.645 \text{ mL g}^{-1} \text{ cm}^{-1}$  and  $0.00157 \mu\text{g mL}^{-1} \text{ cm}^{-2}$  respectively at 421nm. The method is free from the interferences of Be(II), La(III), Dy(III), Cr(VI), Ba(II), Se(IV), Re(VII), Mn(II), Bi(III) Co(III), Ce(IV), Hg(II), Ca(II), Sr(II), Cd(II) and many other analytically important elements. The method has good reproducibility and can be satisfactorily applied to determination of zirconium in various samples of different complexity.

**Keywords:** Zirconium (IV), 6-chloro-2-(2'-furyl)-3-hydroxy-7-methyl-4-oxo-4H-1-benzopyran spectrophotometry.

### INTRODUCTION

Though various organic reagents<sup>1-7</sup> have often been employed for the spectrophotometric determination of zirconium, but their applicability is seriously impaired mainly due to gross interferences and for want of sensitivity too. There is still a great demand for more specific methods of analysis with improved sensitivity and selectivity for the analysis of metal ion in various technical samples.

Keeping in mind the idea of sensitivity and selectivity, a benzopyran derivative 6-chloro-2-(2'-furyl)-3-hydroxy-7-methyl-4-oxo-4H-1-benzopyran(CFHMB) is used for improving the desirable characteristics of the spectrophotometric methods for the determination of zirconium (IV) employing extractive techniques.

### EXPERIMENTAL

**Reagents and solutions:** A stock solution of zirconium (IV) containing  $1 \text{ mg mL}^{-1}$  was obtained by dissolving an accurately weighed amount of  $\text{ZrOCl}_2 \cdot 8\text{H}_2\text{O}$  in minimum volume of conc. HCl and

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# COVID-19 PANDEMIC

## A GLOBAL CHALLENGE



Editors

Dr. Raj Pal Singh

Dr. Anupama Sihag

Dr. Rakesh Kumar

## COVID-19 Pandemic: A Global Challenge

© Contributors

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## Effects of Corona Virus Disease (COVID-19) on Indian Economy

*Dr. Naresh Kumar*

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### **Abstract**

*The present paper focuses effects of COVID-19 on Indian Economy. COVID-19 affected almost every economic activity of India as well as other countries. It muffled activities of trade and industry because the spread of the disease encouraged social distancing which led to the block down of all economic activities such as commercial offices, financial markets, businesses and other economic events. Several chemical plants have been closed in China. Consequently, there will be bans on shipments. It was observed that twenty per cent of the production has been affected because of the disturbance in supply of raw material. Indian electronic industry may face supply troubles, manufacture, decrease impact on manufactured goods prices because of heavy dependence on electronics part supply and local manufacturing. The poultry industry in dissimilar areas of the nation has been hit hard along with rumors that the corona virus disease*

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(Hisar)

### Conclusion

Thus, it can be concluded that COVID-19 has affected almost every sector of the Indian economy positively or negatively. Policy makers in India are under pressure to respond to the pandemic. Government made fast policy decisions that had far-reaching negative effects on the economy. The immediate actions are needed to alleviate the impacts of the outbreak on internship programs, job offers and research projects etc. Government should use the pandemic as an opportunity to fix the financial system and the economic system with the planned centralized stimulus package.

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# Social Awakening in North India

## Voice of Protest

Atul Yadav



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# **Voicing the Vacuum in Indian Diaspora**

*Edited & Compiled by*

**Dr. Sushmindarjeet Kaur**

**Dr. Mandeep Kaur**



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# Transnationalism and Diaspora: A Critical Analysis of Cyber-spatial Poetry of Rupri Kaur

KUSUM BHATIA

The term Diaspora was originated from the Greek word meaning 'to disperse'. The term was used initially in the 3<sup>rd</sup> century BCE in Septuagint, which was actually a translation of the Hebrew scriptures in the Greek language. These scriptures described the plight of Jewish people who were forced to disperse from Palestine. After the Jewish Mass dispersion, another Diaspora event was the slave trade in the sixteenth century. When slavery became illegal, the demand for workers was satisfied by indentured labor. It means that the manpower was transported legally from highly populated countries like China and India to the plantation economy countries.

Later on, the term Diaspora is used to refer to all kinds of "dislocation from the nation-state or geographical location of origin and relocation in one or more nation-states, territories, or countries" (Braziel, Mannur, 1). The inauguration of *Diaspora: A Journal of Transnational Studies* in 1991 has made the term Diaspora relevant to many kinds of dislocations caused by wars, economic crises and so on. As J. Evans Braziel and Anita Mannur in their book "*Theorizing Diaspora: A Reader*" elaborates the term 'Diaspora' to refer to communities that are dislocated or displaced from their homeland. Braziel and Mannur said that "diasporic individual should be marked by hybridity and heterogeneity-cultural, linguistic, ethnic, national." Postcolonial theorist Homi Bhabha also refers to the diaspora as "unhoming" and the state of being a 'Diasporic individual or 'Diasporic Community' as an "unhomeliness". As Diaspora is a lived human experience, it allows people to evolve and cope with the fear of migration and multiculturalism. It also provides a chance to reconsider the concept of nation and citizenship. To ground my analysis on Diaspora, I will look into the works of Indian immigrant poet: Rupri Kaur.

Rupri Kaur is a Punjabi-Sikh poet, illustrator, and author, who is born in India and then immigrated to Canada at the age of three. She started her career by sharing poetry on Instagram and Tumblr. Her first collection of poetry "*Milk*

*and Honey*" was published in 2014. She has a very unique style of writing. Her poems are always brief and she never uses uppercase letters or any kind of punctuation mark in her poetry. Her writing style shows a kind of resistance to amalgamation which is a core area of analysis of this paper. Through her poetry, Kaur describes the racialized and gendered experience of diasporic individuals as well as tried to recover diasporic subjectivity by asserting sovereign power over her body. The main focus of this research paper is the Indian Diaspora and especially the Sikh Diaspora. Rupri Kaur and her family are the representatives of the Sikh diaspora who left the country of their origin for a better future, but the scares of this rootlessness can be located easily in the personality of her parents. She locates changes in her parents by saying:

My parents never sat us down in the evening  
to share stories of their younger days.  
one was always working. the other too tired.  
perhaps being an immigrant does that to you.  
the cold terrain of the north engulfed them.  
their bodies were hard at work paying in blood  
and sweat for their citizenship. perhaps  
the weight of the new world was too much.  
and the pain and sorrow of the old were better left buried. [...]

(*The sun and her flowers*, 138)

The aim of this research paper is to analyze how the concept of 'home' is reworked in the poetry of Rupri Kaur, which is very popular in the discourse of diaspora. The research intends to explore the term 'hybridity' in the context of the works of Rupri Kaur. An attempt is also made to explore the transformative capacity of hybridity in this contemporary era of neoliberal multiculturalism. Kaur's use of illustrated imagery in her poetry clearly depicts how space is used as a tool to produce a gendered diasporic subject that is 'unhomed'. Kaur's cyberspatial narration resists diasporic 'unhoming' by adding an important dimension to the colonial project of space, which is central to the 'racist, heterosexist and gendered foundations of nations, nation-states and diaspora'. By applying the theories of Gayatri Gopinath, Victoria M. Bañales, Chandra Talpade Mohanty, Lisa Nakamura and Arjun Appadurai an attempt has been made to analyze Rupri Kaur's poetry.

Queer theorist Gayatri Gopinath in *Impossible Desires: Queer Diasporas and South Asian Public Cultures* describe how "discourses of female sexuality are central to the mutual constitution of diaspora and nation" (10). According to the transnational feminist theorist Chandra Talpade Mohanty, "women are not only mobilized in the 'service' of the nation, but they become the ground on which discourses of morality and nationalism are written," ones that are, "embodied in the normative policing of women's sexuality" (133). These theorists have demonstrated how women's body plays a key role in nationalist

discourse. These theorists also suggest that the body of a woman is not her own but, serves as a site for the state's negotiations of nationalism. However, Kaur through her poems "Welcome" and "Did You Think I Was a City" reasserts dominion over her own sexuality by reoccupying her body. Rupi Kaur in her poem "Welcome" criticized how women's body is treated as a penetrable place for men. She described:

You  
 have been  
 taught your legs  
 are a pitstop for men  
 that need a place to rest  
 a vacancy, a body empty enough  
 for guests 'cause no one  
 ever comes is  
 willing to  
 stay. (*Welcome*)

Similarly in "Did You Think I Was a City", Kaur compares her body to a town, a home and a crackle of the fireplace. She has tried to illustrate that her body is not meant to be colonized. She also privatizes her personas' bodies publicly. Victoria M. Bañales' in an article, "The Face Value of Dreams": Gender, Race, Class, and the Politics of Cosmetic Surgery," has described gendered and racial hierarchies remapping beauty norms – "as according to racist, Western standards of feminine beauty" – are used in projects of empire (133). But Rupi Kaur has challenged this western standard of Beauty in her poem "The Next Time". She asserts:

The next time he  
 points out the  
 hair on your leg is  
 growing back remind  
 that boy your body  
 is not his home  
 he is a guest  
 warn him to  
 never outstep  
 his welcome  
 again. (*the next time*)

She considers it an attempt to colonize her body. She is trying to portray that a women's body is not a site for nation's projections or for male antagonists. She has complete authority over her body. Thus, Rupi Kaur through her poetry attempts to re-territorialize women's bodies so as to achieve humanness.

The concept of 'home' in diasporic studies is a very complex term. It has two meanings: one is the bond that migrants share with their 'original home'

and the other is the 'feelings of being at home' of descendants of migrants towards their 'new home'. The relationship between these two domains of the home is the ties of bond and attachment. The former shares transnational ties with the original homeland, while the latter successfully integrate him/her in the new land. This concept of 'remembered home' always remains a part of one's imaginations, nightmares, memories. This domain of 'remembered home' gets further complicated in second and third-generation migrants who have no direct relationship with the 'past home' and who have developed a feeling of belongingness with the 'new land'. The most phenomenal consequence of this dilemma, social trauma and the pain of disintegration is the ignition of creative expressions in the diasporic writers. As Hanif Kureishi put it: "the only way I could make sense of my confusing world was to write." (145). Thus, the Diasporic writers start describing their "confused worlds" in their works in order to find what Home meant for them. Rupi Kaur also writes about the concept of home in her poetry. She expressed this dilemma by saying:

So when I first started to travel to perform spoken word poetry.... family and friends always ask me don't you ever get homesick? And on the plane rides to and from I ponder that question because the truth was I never really got homesick.... the reason I never felt homesick was that for me home was wherever I was. so let me explain I'd moved over a dozen times in my short life so this concept that home is some physical structure just stop making sense a long time ago. how can I place the idea of home on places that kept on changing, on temporary roofs, houses were structures, the home was here (referring to herself) .... and then the dozen-plus moves that followed that. the only constant I had under each of those roofs was my art, it was my writing, my expression. so naturally writing became like a limb. it became an extension of my being. (Kaur 2016)

The poet herself being the daughter of two refugees has experienced this state of 'in-between'. She has encouraged others also who might find themselves in the same situation as hers. She justifies it through her poetry that there is nothing wrong in carrying two worlds within oneself.

My voice is the offspring of two countries colliding what is there to be ashamed of if English and my mother tongue made love my voice is father's words and mother's accent what does it matter if my mouth carries two worlds.

Rupi Kaur has also reconfigured the concept of 'Unhome' or 'Rehome' by illustrating the concept of self-love in her poetry. She has recovered diasporic subjectivity by extending her body and self, outside the margins of anything in her poems "*My Name is Kaur*" and "*Searching for Home*".

The name Kaur  
makes me a free woman  
it removes the shackles that  
try to bind me

uplift me  
 to remind me I am equal to ...  
 that I am my own woman and  
 I belong wholly to myself  
 and the universe  
 Kaur (*a woman of Sikhi*)

Through her poetry, she has tried to remind us that home lies solely within ourselves. She explains: "it [is] when [we] stop searching for home within others" that we find the "foundations of home within [ourselves]" (1-2). Technological advancement and the advent of the internet have created new conditions of neighbourliness. It also allows the Indian Diaspora to shift its paradigms and take a more definite shape. An important tool of this shifting paradigm is the imagination. If we talk about the Indian Diaspora, imagination plays a vital role in this era of globalization. The very concept of 'Being Indian' is based on imagination as it depends on the notion of birthplace, citizenship and patriotism. So Indian Diaspora is characterized by the homogenous group, in which members imagine themselves to be related to one another culturally, socially and ethically. Thus imagination allows Indian migrants to build social connections with each other in a trans-national context.

Anthropologist Arjun Appadurai in his book *"Modernity at Large: Cultural Dimensions of Globalization"* (1996) has proposed a framework that aims at understanding what imagining a world means, and what an imagined world is like. He proposed five dimensions of an imagined world, which are: ethnoscape, mediascape, technoscape, financescape and ideoscape. An individual's imagined world is influenced by the interaction of these dimensions. According to Appadurai, ethnoscape refers to the landscape of persons which includes: tourists, immigrants, refugees, exiles, guest workers. By technoscape Appadurai describes how technology plays an important role in connecting the diasporic communities with their homeland and also involves them with the activities associated with their homeland. A third element taken into consideration by Appadurai is financescape, which refers to "the disposition of global capital is now a more mysterious, rapid, and difficult landscape to follow than ever before" (Appadurai, 33). Next, the term mediascape indicates "the distribution of the electronic capabilities to produce and disseminate information (newspapers, magazines, television stations, and film production studios), which are now available to an increasing number of private and public interests throughout the world, and to the images of the world created by these media" (Appadurai, 33). The elements of imagination as proposed by Appadurai also appear in the Indian Diaspora. The Indian Diaspora is also characterized by a trans-national homogenous group, whose members share an imagined cultural and social belonging to one another.

This concept of mental imagery is clearly depicted in the poem "The Healing" by Rupri Kaur. It is in this poem, Kaur described the power of imagination. She claimed that her identification as an Indian as well as a Sikh woman is because of the power of imagination. It is because of her family history and her ancestors that she is able to develop a link with her community. It is indeed through imagination that the poet is able to create an imagined community and is able to connect herself to all those who have similar diasporic identities. Though, she is not very open about the political conditions of Punjab and the treatment that Sikhs undergo as a minority group. But she underlines the reason behind her father's decision to flee from Punjab in one of her blogs. This shows her sensitivity and the bond she shares with her homeland.

Rupri Kaur in her poetry also describes how the Sikh diaspora is still felt like a current issue of anxiety and confusion amongst the youngest generations of Sikhs, who were either born abroad or raised abroad. In the poem "Milk and Honey" she explained in detail the effect of diaspora on her family members. She describes that her mother becomes overtly loving and caring. While her father shows utter disillusionment. A series of events such as fleeing from their native land, fear of being imprisoned or even killed in his motherland made her father devoid of feelings. Due to his experience as a young migrant, he fails to show any kind of tenderness toward her daughter. Then in the last stanza of the same poem, she identifies herself as: "a war / the border between two countries / the collateral damage / the paradox that joins the two / but also splits them apart" (32). These lines show how her own life is also deeply affected by the diaspora. She considers herself as divided between two and is unable to make a clear identity of her own. She describes her status, as belonging to neither of the two nations.

Instagram, a photo-sharing mobile app was launched in 2010. Rupri Kaur has used this social media platform to express her visual narratives in an effective manner so that they can align with her daily experiences as a diasporic female subject. Professor Lisa Nakamura, in her collection *Digitizing Race: Visual Cultures of the Internet*, declares that the internet has always been a visual technology – "a protocol for seeing that is interfaced and networked in ways that produce a particular set of racial [and gendered] formations" (202). The use of the digital platform to express emotions, feelings have made the poetry of Rupri Kaur legible within the context of diaspora. It is through visual technology that Rupri Kaur evoked communal resistance and makes a space for herself and her readers. The lines: "Stories/no books have /the spine to /carry". It shows that Kaur's poetry also evokes sisterly solidarity through her visual poetry that ultimately results in cyberspatial sisterhood. These lines claim resistance from the attitude of men/states where they claim the space of the female body as their own.



Indian-American Post-colonial theorist Radhakrishnan explains how immigrants might follow a specific narrative of ethnicity after moving into their adoptive country: "During the initial phase, immigrants suppress ethnicity in the name of pragmatism and opportunism. To be successful in the New World, they must actively assimilate and, therefore, hide their distinct ethnicity" [...] gives way to a Du Boisian period that refuses to subsume political, civil, and moral revolutions under mere strategies of economic betterment" (Radhakrishnan, 121). During this first stage of culture re-adaptation, an immigrant analyzes one's original culture and tries to find a positive sense of estrangement. During the second stage of culture re-adaptation, an immigrant starts perceiving the negative side of host cultures. He/She starts imagining his/her homeland as a divine aura and considers the newly adopted country as full of injustices. In this second phase of cultural re-adaptation, "immigrants reassert ethnicity in all its autonomy" (Radhakrishnan 121).

This second stage is very destructive because mind tricks detach the person to the truths and facts. As a result, immigrant starts idealizing his/her homeland. The second phase also leads to self-realization. It is followed by the last stage called a cultural adjustment. During this last phase, an individual creates a hyphenated identity by amalgamating ethnic and national identity. Post-Colonial theorist Radhakrishnan described the impact of migration and diaspora on the second generation. He is of the view that such assimilation of two societies and cultures results in a double life. Sociologist Stuart Hall elaborates the concept of cultural identity in two different ways. The first view defines cultural identity as a sort of one's collective true self, which includes many layers of superficial or artificial imposed selves. The other way of describing cultural identity revolves around the concept of 'becoming'. It is not related to something that already exists but a process of constant transformation. Stuart Hall defines cultural identity as "a production which is never complete, always in process, and always constituted within, not outside, representation" (Hall, 234). In Rupi Kaur's poetry, we can find a glimpse of the second view of cultural identity. The concept of cultural identity is not something to be read and understood. It can be built when one comes across one's native culture as well as has to deal with other cultures. The process of cultural evolution can be seen in Rupi Kaur's poem. She describes: "the world/ gives you/ so much pain /and here you are /making gold out of it -/ there is nothing purer than that" (*Milk and Honey* 185).

In this poem, Rupi Kaur defines cultural identity as an ever-evolving process. In this process, the immigrants get a chance to not only know about their native culture but also get an opportunity to transform their original story. Thus, Rupi Kaur's poetry celebrates the freedom of expressing one's own culture. Moreover, Kaur highlights the importance of accepting who you are

even physically. Kaur has also tried to unify all those who are struggling with the cultural problem of self-identification through her poetry.

To sum up, the discourse of the scholars that have been quoted in this research paper has proved Rupri Kaur's situation as a Sikh immigrant girl who, after being born in Punjab, was brought to Canada by her family, with the hope of offering her a better life. Since Rupri Kaur's poetry addresses social issues, so themes like feminism, post-colonialism and diaspora become necessary elements in the discourse. Moreover, Kaur's poetry collections are also proof of how poetry can be a helpful tool in the reconfiguration of one's traumatic or post-traumatic memories.

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<b>Sl. No.</b>	<b>Name of the teacher</b>	<b>Title of the book/chapters published</b>	<b>Title of the paper</b>	<b>Title of the proceedings of the conference</b>	<b>Name of the conference</b>	<b>National / International</b>	<b>Year of publication</b>	<b>ISBN/ISSN number of the proceeding</b>	<b>Affiliating Institute at the time of publication</b>	<b>Name of the publisher</b>
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# *A Deep Neural Network based disease detection scheme for Citrus fruits*

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**Abstract** - One of the most significant factors is the quality evaluation of agricultural products in supporting their marketability and controlling waste management. To classify the fruits into healthy and defected class, deep learning algorithms have been implemented to perform citrus disease detection. This study aims to use the dense CNN algorithm to detect and provide an effective method for detecting the apparent defects of citrus fruit. Citrus fruit images are collected and put in two classes of good and damaged ones, to recognize and categorize the image dataset. Firstly, a dense CNN model was used without doing preprocessing and data augmentation on 150 images and

are retrieved from the dataset of the biospeckles and further identified the oranges. The classifiers included soft independent class modeling simulation, linear discriminant analysis, quadratic discriminating analysis, Artificial neural network (ANN), and Support Vector Machine (SVM) [2]. The algorithm for the detection of citrus greening disease is implemented by deep learning for the extraction of the sub-images of citrus fruits from the dataset of the tree images and the authors use a qualified machine learning method to decide if the fruit shows signs of Huanglongbing disease [3]. Even in



## Enhancing accuracy of long contextual dependencies for Punjabi speech recognition system using deep LSTM

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### Abstract