Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(6): 627-629
Received: 19-08-2020
Accepted: 10-10-2020

GV Kore
Asst. Professor,
M.Sc. Biotechnology,
M.G.M. College of Agricultural Biotechnology Aurangabad, (M.S), India

VM Shukre
Asst. Professor,
M.Sc. Plant Biotechnology
M.G.M. College of Agricultural Biotechnology Aurangabad, (M.S), India

TS Tope
Asst. Professor,
M.Sc. Biotechnology
M.G.M. College of Agricultural Biotechnology Aurangabad, (M.S), India

GV Kore
Asst. Professor,
M.Sc. Biotechnology,
M.G.M. College of Agricultural Biotechnology Aurangabad, (M.S), India

Extraction of flavonoid from sweet orange (*citrus sinensis*) peels by using different organic solvent

GV Kore, VM Shukre and TS Tope

Abstract
Flavonoid are aromatic secondary plant metabolites, belong to a group of polyphenolic compound and are widely distributed in plants. They are frequently found in fruits (e.g. Orange, Grapefruit, Apple, and Strawberry etc.), vegetables (i.e Onion, Broccoli, Green pepper and Tomato), cereals (Soybeans and different Herbs), common foodstuffs as well as in herbal remedies and dairy products. However, red-wine, tea, dark chocolate, grapes and apples are the common and regularly consume source of Flavonoid. Over 5000 naturally occurring Flavonoid have been characterized from various sources including plant and dairy products.The research entitled resulted that Methanol give the highest flavonoid content i.e. 34.23 mg/g as compared to Ethanol, Ethyl Acetate, Petroleum Ether and Acetone. The highest amount of flavonoid content was obtained by using Methanol (T3), resulted 34.23 mg/g, as compare other organic solvents 24.33 Petroleum Ether (T1), 23.22 mg/g Acetone(T4), 22.54 mg/g Ethanol(T2), 14.72 mg/g Ethyl Acetate.

Keywords: Flavonoid, Sweet orange, peels, exaction, methanol, ethanol

Introduction
Flavonoid are aromatic secondary metabolites, belong to a group of polyphenolic compound and are widely distributed in plants. They are frequently found in fruits (e.g. Orange, Grapefruit, Apple, and Strawberry etc.), vegetables (i.e Onion, Broccoli, Green pepper and Tomato), cereals (Soybeans and different Herbs), common foodstuffs as well as in herbal remedies and dairy products. However, redwine, tea, dark chocolate, grapes and apples are the common and regularly consume source of Flavonoid. Over 5000 naturally occurring Flavonoid have been characterized from various sources including plant and dairy products. Flavonoid play a vital role in plant physiology as they inhibit exocytosis of auxin indolyl acetic acid (IAA) which play major role in plant growth regulation (Chaudhri VK, 2016)

Sweet orange originated in ancient China and the earliest mention of the sweet orange was in Chinese literature in 314 BC. Sweet orange trees are widely grown in tropical and subtropical climates for their sweet fruit taste. The fruit of the orange tree can be eaten fresh, or processed for its juice or fragrant peel. As of 2012, sweet oranges accounted for approximately 70% of citrus production. Most of the citrus fruits are utilized for the production of juice and peel of the citrus fruit is remain unutilized (constituting about 50% of fresh fruit weight) which is becoming a major problem and demands urgent attention. Usually, citrus industries dry the residue and sell it either as raw material for pectin extraction or pelletize it for animal feeding (Londoño J, *et al*., 2010) [6] Recently, research has been focused upon increasing the capacity and sophistication of waste management systems, such as making value-added conversions and isolation of bioactive compounds or high value-chemicals from these agricultural wastes, in addition to their typical uses as raw materials for fertilizers, soil modifiers and animal feeds. 2 Bioactive compound like vitamin C, carotene (β-carotene), Flavonoid, limonoids, essential oil, acridone alkaloids, fibers, minerals, vitamin B and other related nutrients like thiamine, riboflavin, notice acid, pantothenic acid, pyridoxine, folic acid etc are present in citrus fruits (Cong li, *et al*., 2011; Giannuzzo AN *et al*., 2003) [3, 5]. Flavonoid are also of interest owing to their observed biological effects *in vitro* such as free-radical scavenging, modulation of enzyme activity, inhibition of cellular proliferation, their potential utility as antibiotic, anti-allergic, antiulcer, and anti-inflammatory agent (Lonodono J, *et al*., 2010; Mamma D, *et al*., 2008; Madeira Jr JV *et al*., 2015) [8, 7]. Due to their high flavonoid content, citrus peels could be exploited by both pharmaceutical and food industries (Londoño-Londoño *et al*., 2010) [6]. Thus, extraction of Flavonoid from citrus peel is attracting the attention of researchers to use them as natural food supplements to enhance the quality of life. Functional compounds from CPW (Citus processing wastes) such as Flavonoid and their further processing can be of great interest to the food and pharmaceutical industry as they retard oxidation of low-density protein,

there by reducing the risk of heart disease.

Material and Methods

The Sweet Orange fruits were collected from the local market, peeled and their edible portions were carefully separated. The peels were dried in hot air oven (45-50 °C) for 48 hours and grinded to fine powder using warring blender. 12.5grams of powder sample was extracted with 100ml different organic solvents (Methanol, Ethanol, Ethyl Acetate, Petroleum Ether, Acetone) by soxhlet extraction method. The mixture was filtered through whatman filter paper 25mm. The residue was re-extracted twice to ensure complete extraction. The extract were stored in refrigerator at 4 °C in dark bottles.The stock solution (1ml) was taken in a test tube and added few drop of dilute NaOH solution. An intense yellow colour was appeared in the test tube. It became colourless when on addition of few drop of dilute acid that indicated the presence of Flavonoid.

Result and Discussion

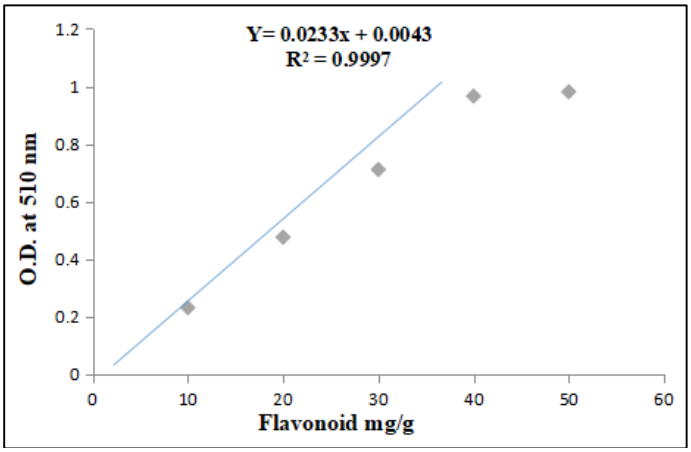

Fig 1: Total flavonoid content using different organic solvent in sweet orange (*Citrussinensis*).

Most naturally occurring secondary metabolite which is Flavonoid. The highest amount of flavonoid content was obtained by using Methanol (T_3), resulted 34.23 mg/g, as compare other organic solvents 24.33 Petroleum Ether (T_1), 23.22 mg/g Acetone(T_4), 22.54 mg/g Ethanol(T_2), 14.72 mg/g Ethyl Acetate (T_5) respectively.

Fig 2: Drying Process

Fig 3: Powder of Sweet Orage Peel

Fig 4: Soxhelt Extraction Process

Fig 5: Extracted Filtrate Flavonoid

Fig 6: Sodium Hydroxide Test of Flavonoid

Fig 7: Ferric Chloride Test of Hesperidin

In concern to research work conducted and result elucidated, Methanol give the highest flavonoid content i.e. 34.23 mg/g as compared to Ethanol, Ethyl Acetate, Petroleum Ether and Acetone. In addition to this flavonoid may be especially important in protecting against human disease. They represent a positive potential in our diet that requires further research to improve our understanding of their mechanism of action. Among the important property of Flavonoid, it can be used in anti-cancer therapeutic agent in breast cancer therapy. Also flavonoid can be used in health benefits and diet treatment also.

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