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Preliminary Study of Physiology and Biochemistry of Root, Fruit and Leaves of Olive (Olea europaea) located in Soon valley and amaltas (*Casia fistula*) in University of Sargodha

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Abstract

Medicinal plants are very important in all over the world to cope against different types of diseases. Medicinal plants are utilized as folk medicine to heal injuries and cure diseases. Therefore, the aim of present study was to compare the biochemical and physiological attributes of root, leaves, fruits and seed of olive (Olea europaea) and Amaltas (Casia fistula). In this regard, different parts of olive plants such as root, fruit, seed and leaves were collected from soon valley and different parts of amaltas were collected from University of Sargodha and analyzed. Biochemical and Physiological attributes such as protein, amino acid, total sugar, reducing, non-reducing sugar and different mineral ions such as Na^{+}, K^{+}, Ca^{2+} were analysed. In olive and amalatas plants, sodium and potassium were observed high in fruits, roots, leaves and seeds. The presence of these minerals helps in plant growth and fruits production. Concentration of reducing and non-reducing sugar was observed high in leaves and fruits of olives and amaltas and minimum in seed of olives and root of amaltas. The protein contents were observed high in root of olives and minimum in seed of olive plant while maximum in leaves and fruit of amalats. Potassium and calcium contents were observed high in seed of olive plants while calcium were observed high in leaves of olive plants. The comparison of physiological and biochemical status of root, leaves, fruits and seeds of olive plants indicated the important values of different parts of the olive and amaltas and their significance. This study helps to recommend the different parts about their medicinal values.

Keywords; Amaltas, Olive, Medicinal plants, Soon valley

Introduction

The olive (Olea europaea) belongs to family Oleaceae and is an evergreen tree, the local and arabic name is Zaitoon while the amaltas (Casia fistula) belong to family fabaceae and called golden shower tree. The olive has a history almost as long as that of Western civilization since over 6000 years. The olive trees have been cultivated for fine wood and olive fruits (Bailey, 1914). The amaltas is widely growing ornamental plant and medicinal plant of immense importance .The specie is native to Indian subcontinent and adjacent region of Southeast Asia. It is national plant of Thailand and the flower of cassia fistula is national flower of Thailand (Gupta, et al., 2008). Flower of Cassia fistula possess properties of astringent, purgative, decoction of flower of Cassia fistula is given for stomach troubles. Root of Cassia fistula is used against various diseases such as cardiac disorder, hemorrhages, and various skin diseases. Pulp of cassia fistula is used as safe purgative for children and pregnant women. Pulp of cassia fistula is also used against dysentery, blood poisoning and for the removal of abdominal obstruction. Leaves and ripe pods of cassia fistula are used as laxative drug (Kumar et al., 2006).

The physiological and biochemical processes that enable olive plants adaptation and acclimation to the environment stress. Different physiological and biochemical attributes are involved in olive to adopt the freezing resistance (Bartolini et al. 1994; Bartolini et al. 1999).
There are several uses of olive plants to control different diseases in human such as stabilizing blood sugar levels, boosting immune functions, minimize parasitic diseases, increasing resistance to disease in human body (Nighat and Nighat, 2004).

Medicinal uses of Olive are Strengthen body muscles, slowdown aging, clear the blood, remove the measles spot, piles, tuberculosis, eczema, baldness, kidney pain, pancreas pain, maleness, common cold, stomach and respiratory diseases (Hazrat Abu Hurairah). The main objective of the current study to investigate the physiology and biochemical variations in different parts (leaves, seed and root) of olive and amaltas plants and to investigate the phytochemistry of different parts of olive and amaltas and to determine the important medicinal uses of olive and amaltas.

Materials and Methods

The present research was carried out to assess the physiological and biochemical characteristics of Olive and Amaltas. For this purpose, root, leaves and fruit of Olive were collected from the olive tree located in soon valley, Pakistan and Amaltas from University of Sargodha.

Data collection

Growth parameter

Data of different parameters such as fresh and dry weight of root, leaves and fruit were collected.

Biochemical Parameters

chlorophyll a, b, total chlorophyll, protein, total amino acids, total sugar, reducing and non-reducing sugar, concentration of different ions such as Na, K, Ca were measured.

Protein

Proteins were determined according to the method of Lowery et al. (1979).

Total Amino acids

Total amino acids were determined according to the method of Moor and Stein (1948).

Sugar Analysis

Total Sugar

Total sugar contents were determined according to the method of Yemm and willis (1954).

Non-Reducing Sugar

The method of Shahid and Tabbasm (2007) was used to determine the non-reducing sugar.

Chemical Analysis

Determination of (K^+, Na^+ and Ca^{2+}) in fruit, root and leaf.

Digestion

Dried ground material (0.1 g) was taken in each digestion tube and 2ml of concentrated H_2SO_4 were added, and then incubated it overnight at room temperature. Then, 0.5 ml of H_2O_2 (35%) was poured down the sides of digestion tube. ported the tubes in digestion block and heated at 35°C until fumes were produced and continued to heat for another 30 minutes. The digestion tubes from block were removed and cooled. Then 0.5ml H_2O_2 was slowly added and placed the tubes back into digestion block. The above step was repeated until the cooled digested material was colorless. The volume of the extract was maintained up to 50ml in volumetric flasks. The extract was filtered and used to determine the concentration of K^+, Na^+ and Ca^{2+}.

Results

The results of physicochemical analysis of different parts of Olea europaea and Casia fistula (fresh and dry weight, reducing and non-reducing sugar, amino acid, and protein, K+, Ca2+ and Na+) were indicated in table 01 and 02.

Table. 1 : Physicochemical analysis of different parts of Olea europaea (fresh and dry weight, reducing and non-reducing sugar, amino acid, protein, K+, Ca2+ and Na+)

	Root	Seed	Leaves	Fruits
Fresh weight (g)	0.31±0.008	0.29±0.004	0.30±0.005	6.0±0.07
Dry weight (g)	0.21±0.006	0.24±0.005	0.25±0.006	2.0±0.04
Reducing sugar (mg/ g d.wt)	3.0±0.06	2.5±0.003	2.0±0.005	3.0±0.02
Non-reducing sugar (mg/ g d.wt)	2.5±0.007	0.2±0.005	1.5±0.007	4.0±0.03
Amino acid (mg/g d.wt)	0.035±0.008	0.04±0.006	0.02±0.004	0.05±0.001
Protein (mg/g d.wt)	0.16±0.005	0.26±0.003	0.02±0.001	0.05±0.002
Potassium (mg/g d.wt)	4.9±0.006	4.0±0.004	2.5±0.002	7.0±0.06
Calcium (mg/g d.wt)	6.2±0.007	4.0±0.007	1.0±0.001	1.7±0.006
Sodium (mg/g d.wt)	0.6±0.003	0.059±0.00	0.7±0.001	0.67±0.004

Table. 2. Physicochemical analysis of different parts of Casia fistula (fresh and dry weight, reducing and non-reducing sugar, amino acid, protein, K+, Ca2+ and Na+)

	Leaves	Root	Fruit
Fresh weight (g)	0.314±0.01	0.294±0.05	0.304±0.02
Dry weight(g)	0.21±0.008	0.24±0.04	0.25±0.01
Reducing sugar (mg/ g d.wt)	2.6±0.015	1.2±0.02	2.7±0.0067
Non-reducing sugar (mg/ g d.wt)	1.6±0.01	2.5±0.03	2.4±0.01
Amino acid (mg/g d.wt)	2.2±0.013	1.4±0.02	2.5±0.01
Protein (mg/g d.wt)	0.042±0.003	0.035±0.001	0.05±0.002
Potassium (mg/g d.wt)	4.5±0.02	4.1±0.012	3.8±0.03
Calcium(mg/g d.wt)	6±0.015	5±0.012	2.5±0.03
Sodium (mg/g d.wt)	0.6±0.01	0.75±0.02	0.4±0.01

The analysis of variance indicated the significant difference in fresh and dry weight of leaves, root and fruits of olive and amaltas (Table.01and Table. 02). Low fresh weight was indicated in fruit of amaltas and high fresh weight was indicated in fruit of olive plants (Table.1and Table. 2). Reducing and non-reducing sugar also ranged from 1.6 to 4.0 mg/ g d.wt. High concentration of reducing and non-reducing sugar was observed in olive and low was observed in amaltas. Amino acid concentration was ranged from 0.02 to 2.5 mg/ g d.wt but the high concentration of amino acid was observed in amaltas as compared to olive. Protein concentration ranged from 0.02 to 0.05 mg/ g d.wt but the high concentration of protein was observed in fruits of olive and amaltas and lowest concentration was observed in leaves of olive plants. Potassium concentration was ranged from 2.5 mg/ g d.wt to 4.9 mg/ g d.wt in olive and amaltas. Calcium concentration ranged from 0.1 mg/ g d.wt to 6.2 mg/g wt and sodium concentration ranged from 0.4 mg/ g d.wt to 0.7 mg/ g d.wt. Calcium concentration was observed lowest in leaves of olive and high calcium contents were observed in leaves of amaltas.

Discussion

Currently, the use of medicine has become a global trend for survival. Screening of medicinal plants for their importance is necessary and the studies of olive have become valuable for the conservation in different parts of the world and health care (Said, 1996). Variation in physiological study of *cassia fistula* under temperature stress has been noted by Plant et al., (2014). Flower of *cassia fistula* is used to treat skin disease and wound healing, fever, abdominal pain and leprosy (Wojciechowski, et al., 2000). *Cassia fistula* has great economic and medicinal

values. Different parts of *Cassia fistula* are responsible for treating different kinds of diseases for example; the tea prepared from the leaves is used in chronic fever and fruits are used as antihelminthic (Porter, 993; Hartwell, 2006). *Cassia fistula* also has maximum protein contents in fruit that are used as safe purgative for pregnant women and treatment of various skin and abdomen diseases. Pulp of seed of *cassia fistula* is used for anthrax, blood poisoning, black water fever, dysentery and malaria (Agaceta et al., 2000).

The study of physiology and biochemistry indicated that different parts of olive plants are very important in medicine field. Among them most important such as Olives is a good source of the nutrients, sugar, vitamins. The best studied antioxidant phytonutrient found in olives has been shown to function as an antioxidant nutrient to decrease oxidation of cholesterol and to help protect nerve cells from oxygen-related damage. An olive phytonutrient, hydroxytyrosol that has been linked to cancer prevention is also having the potential to help us prevent bone loss. (Owenet et al., 20004). Olive is also the best source of nutrients (Marin, 1997). One of the polyphenols found in olives is thought to act as an anti-inflammatory, and olives are good source of iron, copper and dietary fiber. (Montedoro et al., 1992-1993).

Olive polyphenols have also been found to reduce activity in a metabolic pathway called the arachidonic acid pathway, which is central for mobilizing inflammatory processes (Pacheco et al., 2007). Patients with diabetes may get benefits in regard to normalize the blood glucose level (Trichopoulou et al., 1995; Fathia A, 2012). Oleuropein that is one of the unique phytonutrients found in olives, has been shown to decrease the activity of inducible nitric oxide synthase, which is an enzyme whose over activity has been associated with unwanted inflammation (George et al., 2004). Myers and Mittermerier during the year 2000 noted that amino acid, protein, reducing and non-reducing sugar used as a medicinal supplements and important diet. Olea europaea also has maximum protein contents. The ripe fruit of the olive tree yields a very important commercial product with many health benefits. Olive leaves provide the sought an herbal medicine found in the polyphenol compound known as Oleuropein**.** Islamic point of view eat the olive oil and applied it on the body, it is cure of seventy diseases (Nighat, 2004).

Maximum level of potassium as has been indicated by Simeos et al., 2002. He noted high level of potassium in trees located in mountainous area as compared to the peripheral soil. The plants located in mountainous area have designed a cell in such a way that these plants have the

capacity to absorb maximum potassium as compared to other minerals. High concentration of potassium in medicinal plants leads to regulate stomatal opening and closing. Potassium is required for plants to regulate many physiological processes (Soing, 1999).

The study of physiology and biochemistry has revealed new and interesting areas of investigation. These studies pointed out some of the physiological biochemical investigation to explore uses of olive plants and their importance.

Conclusion

The present study was conducted to compare the olive and amaltas about their physiological and biochemical gradients. These attributes of both plants amaltas and olive s help us to categories the medicinal plants. This study will help the local people to use these plants for different types of diseases. This study will also help the pharmaceutical industries to prepare different types of drugs.

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