



Poisonous and Narcotic Flora in the Gaza Strip- Palestine / A Review

Akram Atalla¹ and Ayman Dardona^{1*}

¹*Pharmacy and Biotechnology College, University of Palestine, Gaza, Palestine.*

Authors' contributions

This work was carried out in collaboration between both authors. Author AA contributed in the phytochemical, pharmaceutical and toxicological point of view of the review. Author AD studied the taxonomical, botanical part and took natural photography for the flora in several habitats in the Gaza strip. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/EJMP/2019/v30i130165

Editor(s):

- (1) Dr. Francisco Cruz-Sosa, Professor, Department of Biotechnology, Metropolitan Autonomous University, Iztapalapa, Campus Av. San Rafael Atlixco, México.
(2) Dr. Marcello Iriti, Professor, Plant Biology and Pathology, Department of Agricultural and Environmental Sciences, Milan State University, Italy.

Reviewers:

- (1) Vanessa de Andrade Royo, Montes Claros State University, Brazil.
(2) Syed Umer Jan, University of Balochistan, Pakistan.
Complete Peer review History: <http://www.sdiarticle4.com/review-history/52184>

Review Article

Received 10 August 2019
Accepted 18 October 2019
Published 02 November 2019

ABSTRACT

There are numerous known medicinal plants in the Gaza strip flora, some of them are used in the traditional medicine but despite extensive studies of plants either wild or cultivated in Palestine, only a few articles are reported with the phytochemistry of these plants especially the poisonous flora. The current article presents the most common and important poisoning plants in the Gaza strip flora which are therefore important for the public to know and for research and awareness. This review is considered the first study that working in some details with the poisonous plants in the Gaza strip flora in terms of botany, phytochemistry and herbal medicine. These plants are distributed in several habitats in the Gaza strip, including Wadi Gaza, coastal areas, dunes, roadsides, national parks and the botanical garden in the University of Palestine.

Keywords: Poisonous floras; phytochemistry; traditional medicine; habitats.

*Corresponding authors: E-mail: dardonageo2015@hotmail.com;
E-mail: a.atallah@up.edu.ps;

1. INTRODUCTION

Gaza strip is a small part of the Palestinian southern coast; it is located in the south of Palestine and surrounded from the east and north with the armistice line and from the west with the Mediterranean Sea and from southern Egypt. The Gaza strip geographic coordinates are 31 25 N, 34 20 E. It is about 365 km² area but with high population density, around 1.8 million people are living in this small spot in Palestine. Due to its location among three contents, the diversity in topography and climate, Palestine is considered rich place in both flora and fauna, and the Gaza strip is distinguished by a diversity in flora that occurs mainly in the sand and coastal habitats such as the *Cakile maritima* and *Urginea maritima*. The total area of Palestine including Gaza and West Bank comprises 2225 species of which 165 are endemically representing 7.4% of the total flora [1]. The West Bank and the Gaza strip contain 2076 species of plants. 1959 species (in 115 families) are growing in the West Bank and 1290 species (in 105 families) are growing in the Gaza Strip. The most dominant families in both areas are the Leguminosae, Compositae and Poaceae [2]. A poisonous plant is defined as a plant which, using toxic substances it contains, produces adverse effects in humans or economic animals such as livestock, laboratory animals, pets, wild animals, birds, fish, and bees. Most poisoning cases result from ingestion or another type of exposure to a plant for nutritional, therapeutic, or recreational intent [3]. Plants are chemical factories of several chemicals harmful or toxic to bacteria, fungi, insects, herbivores and even humans. Fortunately, this chemical diversity of active principles is beneficial to humans including vitamins, antioxidants, anticarcinogens and antimicrobial agents. Plants are natural sources of medicinal compounds such as alkaloids, terpenoids, phenolic compounds and flavonoids, which play a vital role in the maintenance of human health since ancient times [4]. Any part of the plant can be toxic; in some species, the poisonous compounds occur throughout the whole plant, in others, they are concentrated in one or more parts [5]. Plant toxins are substances produced as secondary metabolites that are identical to extracellular bacterial toxins in their properties, they show both useful and harmful effects in human beings and animals, they show a wide range of side effects from minor itching, nausea, vomiting to adverse effects like psychosis, paralysis and arrhythmias.

They are useful in the production of cosmetics, ulcers, menstrual cramping, cancer and in treatment of several ailments and diseases. Toxins may enter into the body by inhalation, swallowing or by contact. The action is based on toxic principles which may be alkaloids, glycosides, proteins, oxalates, anti-vitamins and tannins, etc [5]. Toxin concentrations can be dramatically affected by environmental stress on the plant (drought, heat/cold, mineral deficiencies, etc.) and disease. Different varieties of the same plant species can also have different levels of toxins [6]. Toxicity has several levels, the peak one is known as severe toxicity which may cause symptoms that could be life-threatening, for example, irregular heartbeat, breathing distress, seizures, shock, or paralysis. The middle one is known as moderate toxicity which may cause symptoms such as hallucinations, severe stomach irritation, agitation or severe dermatitis. The last one is called mild toxicity which may cause symptoms that generally not life-threatening, such as nausea, vomiting, diarrhoea, or skin rashes.

2. REVIEW

Based on several studies in the Gaza strip flora, mainly (Dardona, 2016) and (Abou auda et al.,2009) [1,7]. Based on the author's tours and survey, around 17 toxic flora were well identified and studies in the Gaza strip. Table (1) shows the main information for these plants which are belonging to (9 Orders) and (10 Families).

Based on this review, 17 species of narcotic and toxic flora were reviewed in the Gaza strip in terms of toxic principles and medicinal effects. The species are belonging to 9 main orders, each order comprises only 1 family but Gentianales had 2 families. Thus, the species are belonging to 10 families, each of them includes only 1 species except *Solanaceae* had 8 species. In terms Genus diversity, there are 14 genera each had only 1 Species except *Datura* with 2 species and *Solanum* with 3 species. *Solanum elaeagnifolium* is the most dominant species where it grows like weeds in the agricultural areas and the roadsides, followed by *Nerium oleander* where it is cultivated as ornamental plant almost in every square along the Gaza strip cities, the other plants are distributed everywhere in the Gaza strip, but *Calotropis procera* is less dominant, followed by *Hyoscyamus aureus* which needs specific habitats to grow like limestones and rocks [1].

Table 1. List of Poisonous and narcotic plants in Gaza flora

Order	Family	Botanical name	Arabic name	Life form
Asterales	Compositae	<i>Xanthium spinosum</i> L.	لزيق /شبيط عريض	Annual
Cucurbitales	Cucurbitaceae	<i>Ecballium elaterium</i> (L.) A.Richard.	فقوس الحمار	Perennial
Fabales	Leguminosae	<i>Caesalpinia gilliesii</i> (Hook.) D.Dietr.	أبوشوارب	Shrub
Gentianales	Apocynaceae	<i>Nerium oleander</i> L.	دقلة	Shrub
	Asclepiadaceae	<i>Calotropis procera</i> (Aiton) Aiton f.	عُشْر/عُشَار	Tree
Lamiales	Verbenaceae	<i>Lantana camara</i> L.	وردة الذيب	Shrub
Liliales	Liliaceae	<i>Urginea maritima</i> (L.) Baker.	عيصلان بحري	Geophyte
Malpighiales	Euphorbiaceae	<i>Ricinus communis</i> L.	خروع	Shrub
Sapindales	Meliaceae	<i>Melia azedarach</i> L.	زنزلخت	Tree
Solanales	Solanaceae	<i>Datura innoxia</i> Mill.	داتورا أنوكسا	Annual
	Solanaceae	<i>Datura stramonium</i> L.	داتورا صفراوية	Annual
	Solanaceae	<i>Hyoscyamus aureus</i> L.	بنج / سكران ذهبي	Perennial
	Solanaceae	<i>Nicotiana glauca</i> Graham.	تمباك شجيري	Tree
	Solanaceae	<i>Solanum elaeagnifolium</i> Cav.	باننجان بري	Annual
	Solanaceae	<i>Solanum nigrum</i> L.	عنب الذيب الأسود	Perennial
	Solanaceae	<i>Solanum villosum</i> (L.) Mill.	عنب الثعلب الصوفي	Perennial
	Solanaceae	<i>Withania somnifera</i> (L.) Dunal.	عيبع منوم-سم الفراخ	dwarf shrub



Plate 1. Common cocklebur taken at Wadi Gaza /Gaza strip [28]

3. COMMON COCKLEBUR

Xanthium Strumarium (Cocklebur) is a genus of flowering plants in the family Asteraceae, native to the Americas, Eastern Asia, South Africa and Australia. Its seedlings and seeds contain the glycoside carboxyatractyloside and can be poisonous to animals, including cattle, horses and pigs. Carboxyatractyloside poisoning causes multiple organ dysfunctions and can be fatal [8]. Mature plants contain less of the toxin. Pigs are the animals most commonly poisoned. The root up and ingest the two-leaf stage of the plant in the springtime. Chickens and other livestock have also been poisoned [9]. There are a few case reports about *Xanthium Strumarium* poisoning in humans. Those patients presented

with acute onset abdominal pain, nausea and vomiting, drowsiness, palpitations, sweating and dyspnea. The plant also has been used for medicinal properties for Cancer tuberculosis, wounds, headache, malaria, rheumatism and antibacterial activity against *Staphylococcus aureus* species [8]. The plant grows like weeds in most of the Gaza habitats, especially in the agricultural areas.

4. SQUIRTING CUCUMBER

Ecballium elaterium is a perennial fleshy plant commonly known as Squirting cucumber belonging to Cucurbitaceae. It is an indigenous species of the south of Europe and the Mediterranean basin. The plant is widely distributed in the Mediterranean countries. It grows wild in many places including the roadsides and cultivated areas [10]. The common name of the plant means that the fruit jets liquid along with the seeds on ripening, by exploding the high pressure developed within the fruit [11]. The fruit juice of the plant contains several active principles such as cucurbitacins which are tetracyclic triterpenoids compounds, they are important medicinally because of their cytotoxic, antitumor and anti-jaundice properties. The cucurbitacins have several pharmacological effects, as they are purgatives, analgesics and used to treat haemorrhoids [10]. *Ecballium elaterium* extract may have the potential to induce genotoxicity, allergic reactions, renal and heart failure. The Cucurbitacins contents cause

diarrhoea and enteritis. Exposure to the juice of undiluted form may irritate mucous membranes [12]. The plant grows in several habitats in the Gaza strip, including Wadi Gaza.



Plate 2. Squirting cucumber at east Wadi Gaza /Gaza strip [28]

5. BIRD OF PARADISE

Caesalpinia gilliesii is a shrub known commonly as Bird of Paradise plants belonging to Leguminosae family, it is not a native plant but cultivated in some areas in the Gaza strip. The seeds are the most poisonous part of this plant, the toxic principles are tannins, protein precipitants that are gastrointestinal irritants. The toxic effects of the plant producing, nausea, vomiting, abdominal cramping, diarrhoea, and dehydration can be resulted [13].



Plate 3. Bird of Paradise taken at east Wadi Gaza /El-Moghraqa [28]

6. OLEANDER

Nerium oleander L is ornamental shrub commonly known as Adelfa belonging to Apocynaceae family. Oleander is native to the

Mediterranean. It is widely cultivated outdoors in warm climates and as a tub plant elsewhere, the whole plant is toxic [13]. The toxic principles are two glycosides, oleandroside and nerioside, which can be isolated from all parts of the plant [9].

Poisoning has been reported from inhaling smoke from burning Nerium, use of the sticks to roast marshmallows and drinking the water in which the flowers have been placed. Poisoning produces clinical findings typical of cardioactive steroid poisoning. Toxicity has a variable latent period that depends on the quantity ingested. Dysrhythmia is usually expressed, as sinus bradycardia, premature ventricular contractions, atrioventricular conduction defects, or ventricular tachydysrhythmias. Hyperkalemia, if present, may be an indicator of toxicity [13].



Plate 4. Oleander took at Rasheed street (Sea area west Gaza city) [28]

7. SODOM'S APPLE

Calotropis procera (Aiton) Aiton fil is a tree commonly known as Sodom's Apple, Dead Sea Apple belonging to Asclepiadaceae family. All parts of the plant contain a cardioactive steroid and calcium oxalate crystals. Ingestion of calcium oxalates causes a painful burning feeling of the lips and mouth [13]. All parts of the plant exude white latex when cut or broken. Latex or rubber: The liquid latex of the plant can be used as a renewable source of hydrocarbons and intermediate energy resources. Latex contains 11-23% of rubber. Tannin or dyestuff: A macerated bark extract can be used for dehairing hides and tanning. Additional minor uses include dyes [14]. The latex has a direct irritant action on mucous membranes, particularly in the eye. Skin reactions to this plant may be caused by allergy

rather than to a direct irritant action [13]. The bark and the latex are widely used as arrow and spear poisons. The latex is cardiotoxic with the active ingredient calotropin. Latex is 80% effective in inhibiting the activity of the tobacco mosaic virus. The leafy branches are said to prevent ants. Compounds derived from the plant have emeto-cathartic and digital properties. The active principles gave these effects are asclepin and mudarin. Other compounds have bactericidal and vermifugal properties. The latex contains a proteolytic enzyme called calotropaine [14]. The plants are observed only in one place in the Gaza strip near Al-rasheed street in Gaza beach.

8. LANTANA

Lantana camara L. is an invasive vine plant belonging to Verbenaceae family known

commonly as Lantanas which are sprawling shrubs with squarish prickly stems, lantanas are native to tropical America [13]. The phytochemistry of this ornamental shrub contains lantantin, a triterpenoid, and other compounds irritating to the mucosa of the gastrointestinal tract, all parts of the plant are toxic, and poisoning may occur year-round but is most common in summer and fall [9]. The immature berries are poisonous. No toxicity has reported for the ingestion of mature fruit. The leaves are also toxic to livestock. Reports of human toxicity are rare. Effects may be delayed for 2 to 6 hours after ingestion. Effects are most commonly gastrointestinal, including nausea, vomiting, abdominal cramping, and diarrhoea [13]. These ornamental plants are cultivated in several places in the Gaza strip, especially in the garden parks.



Plate 5. Sodom's Apple taken close to Rasheed street (Sea area, west Gaza city) [28]



Plate 6. Lantana took at Mawasii area in the west of Khanounes city /Gaza strip [28]

9. SQUILL

Squill is the common name of *Urginea maritima* (L) belonging to Liliaceae family and distributed in Mediterranean countries. It is an important medicinal plant that has been used for medicinal purposes such as cardiovascular diseases and asthma since ancient times. Its bulb is the main part used in medicine and usually gathered in September after the appearance of flowers. Cardiac glycosides are the main active principle of squill, they are responsible for its cardiac effects. Cardiac glycosides are divided into cardenolides and bufadienolides. In addition to cardiovascular properties, other biological effects such as antitumor, antioxidant, insecticidal activity have been reported from this plant [15]. *Urginea maritima* is producing cardiac glycosides bufadienolide Glucoscillarene A, proscillaridine A, scillarene A, scilliglucoside and scilliphaeoside act as Na⁺/K⁺ ATP ase Blockers. Its toxicity causes bradycardia and completes atrioventricular heart block [16]. Toxicity has a variable latent period that depends on the quantity ingested. Dysrhythmias are usually expressed as sinus bradycardia, premature ventricular contractions, atrioventricular conduction defects, or ventricular tachydysrhythmias. Hyperkalemia, if present, may be an indicator of toxicity [13]. The plant grows in coastal habitats in the Gaza strip.



Plate 7. Squill took at Zytoon area, east of Gaza city [28]

10. CASTOR BEAN

Ricinus communis L is a shrub commonly known as Castor Bean belonging to Euphorbiaceae family. The poisonous principle is a phytotoxin called ricin. The plant is commonly planted not only as an ornamental but also in vegetable

gardens to repel moles. Horses are most susceptible to poisoning, but all livestock and humans can be affected. All parts of the plant are toxic, especially the seeds. Toxicity is seen most often in spring and summer [9]. The toxin is contained within the hard, water-impermeable coat of the seeds. The toxin is not released unless the seed coats are broken and the contents digested. The toxin is absorbed by intestinal cells causing mild to severe gastrointestinal toxicity. Effects depend upon the amount of toxin exposure and include nausea, vomiting, abdominal cramping, diarrhoea, and dehydration. Variations in the severity of toxicity may be related to the degree to which the seeds are ground or chewed before ingestion [13].



Plate 8. Castor bean has taken at east agricultural areas in the Gaza city [28]

11. CHINABERRY

Melia azedarach L is a tree commonly known as Chinaberry; it is native to Asia but is cultivated as ornamentals in warmer regions of the world. The fruit and bark are poisonous. There are genetic variations in toxin content. The fruit may be eaten with impunity in some areas [13]. The toxic principles are tetranortriterpene neurotoxins and unidentified resins. The berries are the most toxic part of the tree. The leaves, bark, and flowers are only mildly toxic and usually cause no problem [9]. There are no adequately documented human poisonings, and clinical descriptions are derived primarily from animal reports [13]. Pigs and sheep are most often affected. Toxicity may occur after the consumption of more than 0.5 per cent of body weight. Poultry and cattle can be poisoned, but larger amounts are required. Children have been poisoned by eating the berries [9]. This tree is cultivated widely as ornamental plants in the Gaza strip roadsides.



Plate 9. Chinaberry took at Mawasii area in the west of Khanounes city /Gaza strip [28]



Plate 10. Datura innoxia took at west Gaza city [28]

12. DATURA SPECIES

Toxic, hallucinogenic, and medicinal effects caused by *Datura* species are due to Tropane alkaloids atropine, hyoscyamine and scopolamine. These principles are used in medicine when taken in small doses while they are harmful in large quantities causing hallucination, spasms and have certain fatal dose. These alkaloids are found in all parts of the plant, in root, stem, leaves, flowers, fruits, and seeds. The three major alkaloids found in *Datura* species (Atropine, hyoscyamine and scopolamine) are working in the same mechanism by inhibiting the action of acetylcholine at nerve synapses so they are classified as anticholinergic drugs. Atropine is a neurotoxin disrupts the workings of the nervous system. It is highly poisonous and used in medicine as a muscle relaxant. Scopolamine is a viscous liquid used for the prevention of nausea and vomiting associated with motion sickness and recovery from anaesthesia. Hyoscyamine is used in medicine under several brand names but also as a broad compound. It is used to control symptoms associated with disorders of the gastrointestinal tract. It works by decreasing the motion of the stomach, intestines and the secretion of stomach fluids [17].

Datura innoxia belongs to the family Solanaceae, which is known for its importance as a source of drugs in medicine and pharmacology. It is also itemized as one of the poisonous house plants. Various species of *Datura* are known and widely employed for their medicinal and toxic properties that are based upon more than 30 alkaloids. Owing to their funnel form, fragrant nocturnal blooms, species such as *Datura innoxia* and *Datura stramonium* are cultivated as ornamental plants [18].



Plate 11. Datura stramonium has taken at Gaza beach in west Gaza city [28]

Datura stramonium L is an invasive wild plant belonging to the Solanaceae family, is broadly distributed and easily available. It contains a variety of toxic tropane alkaloids such as atropine, hyoscyamine, and scopolamine. It has been used for treating several ailments such as ulcers, wounds, inflammation and rheumatism. The seed is smoked to achieve hallucinogenic experiences. *Datura stramonium* is toxic when consumed wrongly. *Datura* plant generates a characteristic odour that acts as a repellent for various insects and pests. It has been reported that the ethanol extracts of *Datura stramonium* leaf and seed showed potent acaricidal, repellent, and oviposition deterrent activity against species of a spider under laboratory conditions. All parts of *Datura stramonium* have toxic effects which resulted from the tropane alkaloids. Each part varies in the concentrations of alkaloids and other active substances. *Datura*

stramonium poisoning includes hallucination, nervousness and seizures, mydriasis, hazy vision, photophobia, dry mouth and mucous membranes, extreme thirst, nausea and vomiting [19].



Plate 12. Golden henbane taken at Ancient Gaza square [28]

13. GOLDEN HENBANE

Genus *Hyoscyamus* is well-known for the production of anticholinergic tropane alkaloids, which constitute one of the largest groups of pharmaceutically and economically important plant secondary metabolites. These are secondary metabolites produced by a few genera of the family Solanaceae, such as *Atropa*, *Datura* and *Hyoscyamus* [20]. *Hyoscyamus aureus* L is chamaephyte plant belonging to Solanaceae, it is known as golden henbane, it is a plant grows on the Cliffs and old walls, it is distributed in several habitats in Palestine, including the Mediterranean Woodlands. All parts of the plant are poisonous. The leaves are one source of the drug hyoscyamine [19]. It is a rich source of tropane alkaloids, mainly hyoscyamine and scopolamine, which are widely used for their mydriatic, antispasmodic, anticholinergic, analgesic and sedative properties [21]. Hyoscyamine and scopolamine, commercially important anesthetic and antispasmodic drugs, are the two most important Solanaceae alkaloids produced in roots and then translocated to the aerial parts of the plant where they accumulate in the cell vacuoles at high levels. Both compounds are used as anticholinergic agents that act on parasympathetic nervous system but hyoscyamine has undesirable effects on the

central nervous system, scopolamine is preferred over hyoscyamine [20]. Toxicity resulted in the dry mouth with dysphagia and dysphonia, tachycardia, and urinary retention. Elevation of body temperature may be accompanied by flushed, dry skin. Mydriasis, blurred vision, excitement and delirium, headache, and confusion may be observed [13].

14. TREE TOBACCO

Nicotiana glauca Graham is a wild shrub belongs to family Solanaceae. It has been reported to have both toxic and medicinal properties. It is known by the common name tree tobacco, a fast-growing shrub or small tree, native to Argentina [4]. It has been naturalized in the Mediterranean area, including Palestine and the Gaza strip. The high toxicity of tree tobacco is due to its primary alkaloid anabasine content which acts as an agonist at peripheral nicotinic receptors. Anabasine produces a nicotinic-cholinergic syndrome with muscle weakness and autonomic instability as the main index, it is reported a rare case of human poisoning by ingestion of boiled leaves of *Nicotiana glauca* complicated by abrupt acute respiratory failure and coma. Anabasine momentarily stimulates after that depresses the CNS. Stimulation of concerned ganglia and the adrenal medulla combined with the discharge of catecholamines from sympathetic nerve endings and chromaffin tissues of different organs are assumed to be responsible for the cardiovascular signs [22].



Plate 13. Tree tobacco taken at west Gaza strip [28]

15. NIGHTSHADES (*Solanum* genus)

Nightshades refer to *Solanum* genus with several species so the *Solanum* species are plants

belonging to Solanaceae. *Solanum* genus is one of the largest and most variable of this group. Various parts of many of the species belonging to *Solanum* genus are widely used medicinally, especially *Solanum nigrum*, are mentioned and often illustrated in all of the early Herbals, is one of the first to record their medicinal properties. Since then this species has continued to be widely acclaimed for its medicinal effects in every country in which the taxon is found [23]. Most species of *Solanum* are poisonous to both humans and livestock, the widely reported toxicity of *Solanum* species and especially *S. nigrum* is due to alkaloid solanine causing varying degrees of poisoning in humans, cattle, pigs, goats, ducks and chickens, with death resulting in some cases. The effects of solanine poisoning effects in humans are including nausea, vomiting, diarrhoea, colic, headache, dizziness, convulsion, fever, sweating and reducing heartbeat [23]. High concentrations of solanine, a glycoalkaloid is found in most parts of *Solanum* species, but highest levels are found in unripe berries. However, when ripe, the berries are the least toxic part of the plant and are sometimes eaten without ill effects. Similarly, the solanine increases in the leaves as the plant matures [24]. The occurrence of the steroidal alkaloid solasodine and solasodine-like alkaloids in most species belonging to the genus *Solanum* has reported having toxicity and medicinal effects of these plants [23].



Plate 14. *S. nigrum* took at the botanical garden /University of PALESTINE /Gaza city [28]

16. *Solanum nigrum*

As most of *Solanum* species, it has several toxic principles such as solanine and solasodine

where Small unripe fruits of *S. nigrum* have a high concentration of solasodine, but this concentration decreases with fruit maturation. *S. nigrum* contains two mains cytotoxic glycoalkaloids, solanine and solasodine, when taken in large quantities with high concentrations of solanine, these toxic principles may accumulate in case of daily consumption and that may affect damagingly on the liver since glycoalkaloids concentrate mainly in the liver [24].

17. *Solanum villosum*

S. villosum have been shown to contain active compounds such as alkaloids, flavonoids, steroids, tannins, phenols and reducing sugars. *Solanum villosum* contains two mains cytotoxic glycoalkaloids, solanine and solasodine, thus are poisonous when taken in large quantities. *Solanum villosum* can be administered at a dose range of 200 mg/kg/bw without any side effects [24].



Plate 15. *S. villosum* took at the botanical garden /University of PALESTINE /Gaza city [28]

18. *Solanum elaeagnifolium*

Solanum elaeagnifolium belongs to the Solanaceae family, commonly called silver- leaf nightshade, bitter apple and tomato weed. The Phytochemistry of silver-leaf nightshade berries showed the presence of kaempferol 8-C- β -galactoside that possess medicinal proprieties including hepatoprotective and curative effects against histopathological and histochemical damage induced by paracetamol in the liver. Steroidal glycoalkaloids (solanidine) in the root

and fruit part of the plant are characterized and be effective in a variety of medical applications, including limiting the growth of certain cancer cells, treating herpes complex viruses and commercially used in the preparation of contraceptive and corticosteroid drugs [25].



Plate 16. Silver- leaf nightshade taken at east Wadi Gaza /Gaza strip [28]



Plate 17. Ashwagandha is taken at east wadi Gaza [28]

19. ASHWAGANDHA

Withania somnifera (L) Dunal is a medicinal plant commonly known as Ashwagandha. It has several therapeutic actions, including anti-inflammatory, sedative, hypnotic and narcotic. The roots contain alkaloids steroids, glycosides and withaniol and the leaves contain 12 withanolides, 5 unidentified alkaloids, many free amino acids, chlorogenic acid, glycosides, glucose, condensed tannins, and flavonoids [26]. The herb is considered an adaptogen works on a nonspecific basis to normalize physiological function, working on the HPA axis and the neuroendocrine system. It is effective for insomnia, it produces energy which makes the body to settle and sleep, so it helps the body to

address a stress-related condition rather than masking it with sedatives [27].

20. CONCLUSIONS

Biological resources are one of the valuable source drugs and toxins in the Gaza strip flora ,The poisonous and narcotic plants are represented significantly in the floristic biodiversity in Palestine and Gaza strip, These plants are source of crude drugs and toxic principles, though these plants are mostly toxic and they should be cautiously processed , but depend on processing and does , they are playing a vital role in medications, also the toxic principle could have several applications as narcotic, pesticidal, insecticidal and herbicides. This article may be the preliminary point for further research working in these valuable plants. Also, the further applied researches, public awareness and education with these plants, their importance and effects properly should be addressed. It is concluded that the narcotic and poisonous plants are a major component of the floristic biodiversity in Palestine and Gaza strip , it is perceived that minor people know more about the status and careful processing of these plants , this may be because there is no comprehensive study about that , this current study may be the first in the Gaza strip dealing in some details about these plants , though more researches and study about the possible applications of each plant should be taken , the possible uses could be using some of them as a source of natural products with several medical applications, using them as techniques for biological controls of pests, beside the possibility of using them in biotechnological applications.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Dardona AWY. Floristic biodiversity and phytogeographical study in few sites of Gaza strip, Palestine.

2. ARIJ. Statues of the environment in the occupied Palestinian territories. Applied Research Institute Jerusalem (ARIJ); 2007. [ISBN 978-9950-304-00-0]
3. Wagstaff DJ. International poisonous plants checklist: An evidence-based reference. CRC Press; 2008.
4. Hassan H, El-Hameed TZA, Nasr E. Ecological and phytochemical studies on *Nicotiana glauca* from Egypt. Egyptian Journal of Experimental Biology (Botany). 2014;10:87-95.
5. Sekhar JC, Sandhya S, Vinod KR, Banji D, Sudhakar K, Chaitanya RSNACK. Plant toxins-useful and harmful effects. Hygeia-Journal for Drugs and Medicine. 2012;4(1): 79-90.
6. Ayuba VO. Toxicities and sedative effects of toloache, *datura innoxia miller*, on the African Catfish *Clarias Gariepinus* Burchell, Fingerlings (Doctoral dissertation); 2004.
7. Abou Auda M, Mdeeb NY, El-Sahhar KF. Flora and plant life forms of Wadi Gaza area, Middle governorate, Palestine. Proceedings of 4th Conference on Recent Technologies in agriculture. 2009;5.
8. Saidi H, Mofidi M. Case Report: Toxic effect of *Xanthium strumarium* as an herbal medicine preparation; 2009.
9. Everest JW, Powe TA, Freeman JD. Poisonous plants of the southeastern United States. Poisonous plants of the southeastern United States; 1996.
10. Salhab AS. Human exposure to *Ecballium elaterium* fruit juice: Fatal toxicity and possible remedy. Pharmacology & Pharmacy. 2013;4(05):447.
11. Abbassi F, Ayari B, Mhamdi B, Toumi L. Phenolic contents and antimicrobial activity of squirting cucumber (*Ecballium elaterium*) extracts against food-borne pathogens. Pakistan Journal of Pharmaceutical Sciences. 2014;27(3): 475-479.
12. Bauer B, Kavrakovski Z, Kostik V. An ethno-pharmacological and toxicological review of *Ecballium elaterum* (L.) A. Rich; 2013.
13. Nelson LS, Shih RD, Balick MJ, Lampe KF. Handbook of poisonous and injurious plants. New York Botanical Garden; 2007.
14. Hassan LM, Galal TM, Farahat EA, El-Midany MM. The biology of *Calotropis procera* (Aiton) WT. Trees. 2015;29(2): 311-320.
15. Bozorgi M, Amin GR, Ostad SN, Samadi N, Nazem E, Shekarchi, M. Toxicological, chemical and antibacterial evaluation of squill vinegar, a useful product in Persian Traditional Medicine. Research Journal of Pharmacognosy (RJP). 2017;4(1):33-39.
16. Sundaragiri S, Tandur S. Electrocardiographic profile of cardiotoxic plants and animals. International Journal of Medical Research and Health Sciences. 2016;11:719-725.
17. Setshogo MP. A review of some medicinal and or hallucinogenic *Solanaceous* plants of Botswana: The genus *Datura* L. Int. J. Appl. Res. Nat. Prod. 2015;1:15-23.
18. Christiana KA, Iloka GS, Bulama JS, Dashak AD. Chemical composition of the seeds of *Datura innoxia*. International Journal of Innovative Science, Engineering & Technology. 2016;3(2).
19. Gaire BP, Subedi L. A review on the pharmacological and toxicological aspects of *Datura stramonium* L. Journal of Integrative Medicine. 2013;11(2):73-79.
20. Beshar S, AL-Ammouri Y, Lawand S. Determination of tropane alkaloids in golden henbane (*Hyoscyamus aureus*) in vitro. Вісник Українського товариства генетиків і селекціонерів. 2012;10(2): 331-336.
21. Bahmanzadegan A, Sefidkon F, Sonboli, A. Determination of hyoscyamine and scopolamine in four *Hyoscyamus* species from Iran. Iranian Journal of Pharmaceutical Research. 2010;65-70.
22. Hassen FM, Sik Ali BH, Jaoued O, Ayed S, Tilouche N. Severe *Nicotiana glauca* poisoning: A case report. J Clin Toxicol. 2014;4(216):2161-0495.
23. Edmonds JM, Chweya JA. Black nightshades: *Solanum nigrum* L. and related species. Bioersity International. 1997;15.
24. Venkatesh R, Kalaivani K, Vidya R. Toxicity assessment of ethanol extract of *Solanum villosum* (Mill) on wistar albino rats. International Journal of Pharma Sciences and Research. 2014;5(7):406-412.
25. Houda M, Derbré S, Jedy A, Tlili N, Legault J, Richomme P, Saidani-Tounsi M. Combined anti-ages and antioxidant activities of different solvent extracts of *Solanum elaeagnifolium* Cav (*Solanacea*) fruits during ripening and related to their

- phytochemical compositions. Excli Journal. 2014;13:1029.
26. Uddin Q, Samiulla L, Singh VK, Jamil SS. Phytochemical and pharmacological profile of *Withania somnifera* Dunal: A review. Journal of Applied Pharmaceutical Science. 2012;2(01):170-175.
27. Umadevi M, Rajeswari R, Rahale CS, Selvavenkadesh S, Pushpa R, Kumar KS, Bhowmik D. Traditional and medicinal uses of *Withania somnifera*. The Pharma Innovation. 2012;1(9, Part A): 102.
28. Personal archive (Collections of Natural photos taken by Ayman W Dardona through several tours along the Gaza strip during the period from 2016-June; 2019.

© 2019 Atalla and Dardona; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/52184>