Phytochemical screening on different plant parts of some succulent plants of Egypt

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Abstract: Succulent plants are good sources of bioactive materials such as saponins, flavonoids, coumarins, alkaloids, anthraquinones, tannins, cardiac glycosides and steroids etc.,. These bioactive materials gave these plants their medicinal importance regarding treatments of many dangerous diseases such as cancer, diseases that caused by bacterial infections and oxidative stress. Different parts of shoot systems of six succulent plants; *Carpobrotus edulis*, *Rumex vesicarius*, *Zygophyllum coccineum*, *Hammada elegans*, *Anabasis articulata* and *Anabasis setiferae* were studied regarding their chemical constituents. Phytochemical screening on different plant parts of these succulent plants revealed variations in phytochemicals under investigation within different plant parts of these plants.
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Key words: Succulent plants - *Carpobrotus edulis* - *Rumex vesicarius* - *Zygophyllum coccineum*, *Hammada elegans* - *Anabasis articulata* - *Anabasis setiferae* - Phytochemical screening

Introduction:

Egyptian deserts have many medicinal plants; such as plants of family Zygophyllaceae, Polygonaceae and Chenopodiaceae etc.,. These plants contain many bioactive substances (such as flavonodis, anthraquinones, tannins, alkaloids, saponins, carbohydrates and /or glycosides, irodoids, coumarins, chlorides and sulphates, sterols and / or triterpenes and cardiac glycosides that gave these plants their medicinal and economic values (Batanouny, 1999). Some of the previously mentioned bioactive phytochemicals (such as polyphenols and flavonoids) have roles as antioxidant and detoxifying agents. The intake of dietary antioxidant phytochemicals like phenolic compounds and flavonoids will lead to the protection against non-communicable diseases in human beings (cancer, cardiovascular diseases and cataract (Rao, 2003 and Matkowski, 2008). Plants containing flavonoids and anthraquinones are good antibacterial agents against many human pathogenic bacteria such as *Escherichia coli*, *Streptococcus sp*, *Staplylococcus aureus* and *Pseudomonas aeruginosa* (Meng *et al.*, 2005; Cushnie and Lamb, 2005; Park *et al.*, 2006 and Stevic *et al.*, 2010). For these and other reasons these plants attracted attention of researchers and still attract them to know more about their medicinal and economic importance (Batanouny, 1999). Our work aims to make a comparative study between different plant parts of some succulent plants to determine the richest organ in each plant regarding investigated phytochemicals.

Materials and Methods:

Plant materials:

Samples of plants were collected from Quatamia-Suez desert road. All samples were authenticated by comparison with voucher specimens in the herbarium of Botany Department, Faculty of Science, Cairo University, Cairo, Egypt, where voucher specimens were deposited.

Methods:

Preliminary phytochemical screening on different parts of shoot systems of investigated plants:

Flavonodis (Mabry *et al.*, 1970); Anthraquinones (Farnsworth *et al.*, 1969); Tannins (Trease and Evans, 1978); Alkaloids (Shellard, 1957); Saponins (Hungund and Pathak, 1971); Carbohydrates and / or Glycosides (Stank *et al.*, 1963); Irodoids (Weiffering, 1966); Coumarins (Feigl, 1960); Chlorides and Sulphates (Islam *et al.*, 1993); Sterols and / or Triterpenes (Claus, 1967 and Schmidt, 1964) and Cardiac glycosides (Balbaa *et al.*, 1981). The previously mentioned substances were investigated for their presence/amount within different plant parts.

Results and Discussion:

Data in Tables (1-6) revealed variations in different plant parts of *Carpobrotus edulis*, *Rumex vesicarius*, *Zygophyllum coccineum*, *Hammada elegans*, *Anabasis articulata* and *Anabasis setiferae* regarding phytochemicals under investigation. Flower of *Carpobrotus edulis* was found to be the richest organ that contains the highest amounts of all phytochemicals under investigation except tannins and anthraquinones and sulphates since leaf was

found to be the richest organ in this regard. Flower of *Rumex vesicarius* was found to be the richest organ that contains the highest amounts of all phytochemicals under investigation except saponins, alkaloids, sulphates and carbohydrates and/or glycosides since leaf was found to be the richest organ in this regard. Leaf of *Zygophyllum coccineum* was a good source of all investigated phytochemicals except carbohydrates and/or glycosides since flowers were more better than leaf in this regard, all plant parts were devoid of saponins. Shoot system of *Hammada elegans* was rich in all investigated phytochemicals except coumarins, cyanogenic glycosides and anthraquinones since these substances were found to be in moderate amounts only. Stem of *Anabasis articulata* and *Anabasis setiferae* was a good source of all investigated phytochemicals except chlorides and alkaloids terminal buds were more better than stem in this regard. These results agreed with others such as Batanouny, 1999 and others, who found that these plants are important medicinal plants.

Table (1): Preliminary phytochemical screening on *Carpobrotus edulis.*

Experiment	Plant parts		
	Stems	Leaves	Flowers
1- Saponins	++	+	++
2- a- Chlorides	+	+	+
2- b- Sulphates	+	++	+
3- Coumarins	+	+	+
4- Flavonoids	+	++	+++
5- Alkaloids	+	+	++
6- Anthraquinones	++	++	+
7- Irodoids	-	-	-
8- Cyanogenic glycosides	+	+	+
9- Cardiac glycosides	++++	+++	++++
10- Carbohydrates and / or Glycosides	+	+	+
11- Unsaturated sterols and / or Triterpenoids	+	+	+
12- Tannins	++	+++	+++

Table (2): Preliminary phytochemical screening on *Rumex vesicarius.*

Experiment	Plant parts		
	Stems	Leaves	Flowers
1- Saponins	+	++	-
2- a- Chlorides	+	++	++
2- b- Sulphates	+	++	+
3- Coumarins	+	+	+
4- Flavonoids	++++++	+++++	++++++
5- Alkaloids	++	+++	++
6- Anthraquinones	+++	+	+++
7- Irodoids	+	+	+
8- Cyanogenic glycosides	+	+	+
9- Cardiac glycosides	++	+++	++++
10- Carbohydrates and / or Glycosides	+++	+++	+
11- Unsaturated sterols and / or Triterpenoids	+++++	+++	++++++
12- Tannins	++++	++++	++++

Table (3): Preliminary phytochemical screening on *Zygophyllum coccineum.*

Experiment	Plant parts		
	Stems	Leaves	Flowers
1- Saponins	-	-	-
2- a- Chlorides	+	++	++
2- b- Sulphates	+	+	+
3- Coumarins	+	+	+
4- Flavonoids	+++	++++	+++
5- Alkaloids	+++	+++	+++
6- Anthraquinones	+	++	++
7- Irodoids	++	++	++
8- Cyanogenic glycosides	+	+	+
9- Cardiac glycosides	+++	+++	+++
10- Carbohydrates and / or Glycosides	+	+	++
11- Unsaturated sterols and / or Triterpenoids	+++	++++	+++
12- Tannins	+++	++++	++++

Table (4): Preliminary phytochemical screening on *Hammada elegans.*

Experiment	Shoot system
1- Saponins	+++
2- a- Chlorides	++
2- b- Sulphates	+++
3- Coumarins	+
4- Flavonoids	+++++
5- Alkaloids	+++
6- Anthraquinones	+
7- Irodoids	++
8- Cyanogenic glycosides	+
9- Cardiac glycosides	+++
10- Carbohydrates and / or Glycosides	+++
11- Unsaturated sterols and / or Triterpenoids	+++
12- Tannins	++++

Table (5): Preliminary phytochemical screening on *Anabasis articulata.*

Experiment	Plant parts		
	Stems	Leaves	Terminal buds
1- Saponins	+++	++++	++
2- a- Chlorides	++	+	++
2- b- Sulphates	++	+++	+
3- Coumarins	+	+	+
4- Flavonoids	++	++	++
5- Alkaloids	++	-	+++
6- Anthraquinones	-	-	-
7- Irodoids	++	++	++
8- Cyanogenic glycosides	+	+	+
9- Cardiac glycosides	++	+++	++
10- Carbohydrates and / or Glycosides	+	+	+
11- Unsaturated sterols and / or Triterpenoids	++++	-	+
12- Tannins	++	+++	+

Table (6): Preliminary phytochemical screening on *Anabasis setiferae.*

Experiment	Plant parts		
	Stems	Leaves	Terminal buds
1- Saponins	+++	++	++
2- a- Chlorides	+	+	++
2- b- Sulphates	+++	+++	+
3- Coumarins	+	+	+
4- Flavonoids	+++	+++	++
5- Alkaloids	-	-	+++
6- Anthraquinones	+	+	-
7- Irodoids	++	++	++
8- Cyanogenic glycosides	+	+	+
9- Cardiac glycosides	+++	++	+
10- Carbohydrates and / or Glycosides	+++	++	++
11- Unsaturated sterols and / or Triterpenoids	++	++	++
12- Tannins	++++	+++	++

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