Anthocyanin content in different parts of *capparis spinosa* growing wild in Tafresh/Iran

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Abstract: ***C****apparis spinosa* has been introduced as a specialized culture in some countries for its anthioxidant properties during the last four decades..It contains a number of chemically active and diverse secondry metabolities, in particular, anthocyanin. In this study the content of anthocyanin was quantitatively determined in different plant parts of C.spinosa at the full flowering stage using spectrophotometric analysis. Collection of plant material was made from Tafresh, Iran Plant were separated into root,stem, leaves, flower bud, full flower, fresh fruit which were dried separately, and subsequently assayed for total anthocyanin contents.The content of anthocyanin varied from 74 mg/100g to 266 mg/100g Among different parts of caper. Flower, leaves and fruit had higher content of anthocyanin respectively. The significant amounts of these antioxidants confirm the nutritional and medicinal value of caper.
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Key words: Caper, anthocyanin, medicinal use, nutritional value

1. Introduction

Capparaceae are a medium-sized family of approximately 40–45 genera and 700–900 species, whose members present considerable diversity in habit, fruit, and floral features (Pieroni, 2000) (kara et al 1996) (Özer,2005).*Capparis spinosa* is an important species for our natural surroundings and economy (Baytop,1984) Being a rich source of minerals and vitamins caper buds are essential component of several Mediterranean cuisines (Rodrigo,1992).It grews from the Atlantic coasts of the Canary Islands and Morocco to the Black Sea to the Crimea and Armenia, and eastward to the Caspian Sea and into Iran(Romeo,2007). Different parts of caper plant can be used as a drug or a cosmetic (Afsharypuor, 1998).

C.spinosa has been subjected to many phytomedicinal studies. Its extract can be used as anti-oxidative (Germano, 2002) antihepatotoxic (Gdgoli and Mishra, 1996), "antifungal,anti-diabetic antileishmania, anti-inflammatory (Rajesh et L,2009), antiallergic (Trombetta et al,2005) and anticancer (Esiyok, 2004). It is also used for the treatments of cardiovascular diseases and diabetes mellitus (Eddouks et al, 2005). Capers have been used or still being used in reducing flatulence, in the treatment of rheumatism, anemia, arthritis and gout (Peter, 2004). More researches about capers proved that principal form of tocopherol detected in leaves is alpha-tocopherol. In buds and flowers, there were both alpha and gamma-tocopherol (Tlili et al,2009). *C. spinosa* contained an appreciable level of vitamin C. The significant amounts of these antioxidants confirm the nutritional and medicinal value of caper (Tlili et al, 2010).

The phytochemicals in plant tissues responsible for the antioxidant capacity can largely be attributed to the phenolics, anthocyanins and other flavonoid compounds (Cao,1997). Anthocyanins are considered secondary metabolites as a food additive with E number E163 (INS number 163); they are approved for use as a food additive in the EU(28) and Australia and New Zealand(2). A growing body of evidence suggests that anthocyanins and anthocyanidins may possess analgesic properties in addition to neuroprotective and anti-inflammatory activities (Pieroni, 2000) Anthocyanins also fluoresce; combined with their antioxidant properties, this can be a powerful tool for plant cell research, allowing live cell imaging for extended periods of time without a requirement for other fluorophores (Ozer, 2005) Anthocyanin structural was shown in figure 1.

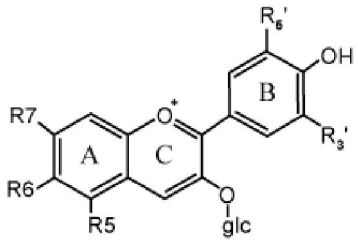

Fig 1: Anthocyanin structure

2. Materials and methods

Capparis spinosa were collected from Tafresh, Iran,in july at fresh fruiting stage of plant development. Collections were done in these population by a randomized collection of 10 indivituals within fresh fruiting stage. After collection plants were separated into fruit, floral, flower bud,leaf,stem and root.The plant materials

were dried in shade separately.extraction were done by the method as explained by (Guisti et al,1999) Methanol: Aceticacid:Water in the ratio 49:1:50 was added to the powdered flower sample and incubated at 4C for 20-24 hours. The extract was filtered with Whatmann no.1 filter paper and the residual extracts were rotary evaporated under vacuum at 30 C.

Anthocyanin contents of sample were determined using the PH-differential method described by Giusti and Wrolstad (Guisti et al,2001).The extraction were brought to PH1.0 and 4.5 and allowed to equilibrate 1h.The absorbance of each equilibrate solutions was then measured at 520nm (λ_m) and 700nm (λ_m) for haze correction,using an UV-Vis spectrophotometer (Shimadzu 1100, japan). All samples were tested in triplicate and the mean value was calculated.

3. Result and discussion

There were significant differences among different parts of plant in regard to their anthocyanin content. The mean for anthocyanin content in different plant parts is given in(table 1). It is apparent that leaves contain the highest anthocyanin content. Anthocyanin content values ranged from 74 mg/100g for stem to 266 mg/100g in the leaves (figure2).

Plant Part	Anthocyanin content(mg/100g)
Leaf	266
Flower	253
Flower bud	224
Root	194
Stem	72

Table 1: Anthocyanin content of different parts of caper

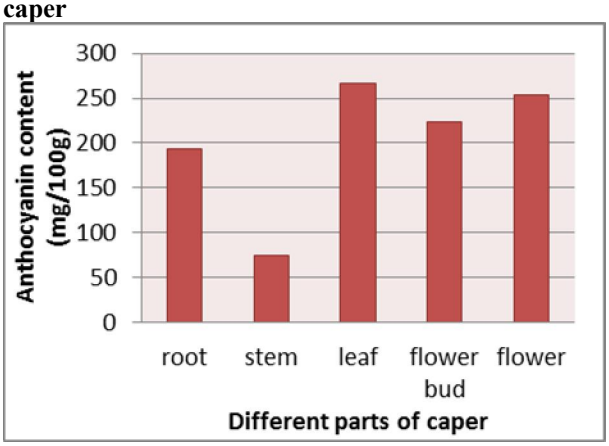

Figure 2: Anthocyanin fluctuation in different parts of caper plant

4. Discussion:

Similar to primary metabolites tissue-dependence of secondry metabolites is very common among medicinal plants. Many medicinal plants contain anthocyanins (Wu and Prior,2008).anthocyanin content caper plant (266mg/100g) in leaves and(253mg/100g) in flower in comparesion with orange (200 mg/100g), raspberry (365 mg1/100g), blackcurrant (190-270 mg/100g) is considerable. It is proved that anthocyanin is synthesized as a protection against environmental condition,especially heat and light (Ünal et al,2003).Due to the important physiological roles they play in both pollination and seed dispersal, anthocyanins are mainly distributed in skin of fruits and flower petals(Wu and Prior,2008). More anthocyanin was found in the root of the violet-flowered plant, also under its leaf petiol,under pedicel and corolla. while anthocyanin under petiole,in pedicel here is red,it turns to violet in the corolla.and this is a good example that anthocyanin yields different colors in different parts of the same organ, depending on the PH of vascuolar of epidermal cells(Ünal et al,2003). Estimation of anthocyanin levels in different parts of *cranberry* plant suggested that anthocyanins were present only in red fruit skins, and not in peeled fruits, green fruits, green leaves, green stems, roots and seeds(Zhou and Singh, 2002). Also there is large amount of anthocyanin in the leaf stalk and pedicel where they are near to the root both of which come out of the same point of the rosette stem of white-flowered *Primula* (Ünal et al,2003). The composition of the sub-classes of green bladed plants disclosed that the colour genes, which act as complementary to produce purple colour all over the plant, individually have different capacities to produce anthocyanin pigment in various parts of the plant and the inhibitor suppresses development of colour of some of them(Kadam,1974)Anthocyanin accumulation in immature *C. annuum* fruit was simply inherited with modifying gene action (In Stommel and Griesbach,2008). Contrast with fruit color, inheritance of leaf color in anthocyanin accumulating foliar mutants was complex, involving the action of multiple genes (Lightbourn et al, 2007) (Stommel and Griesbach,2008).

5.Conclusion

It can be concluded that there is a close relationship between anthocyanin content and plant tissue. Cosidering the pharmacological significance of anthocyanin their possible use in therapeutics and the growing interest in analytical data on natural anthocyanin in plants it is important to find the different sources of these compound. At this point,

anthocyanin content in caper plant encourages the cultivation, and biological evaluation of this plant in Iran.

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