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# Chelating power activity of leaf essential oil of *Chaerophyllum villosum* Wall. ex DC. From Western Himalaya of Uttrakhand

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**Abstract:** Antioxidants are agents which scavenge the free radicals and stop the damage caused by them. They can greatly reduce the damage due to oxidants by neutralizing the free radicals before they can attack the cells and prevent damage to lipids, proteins, enzymes, carbohydrates and DNA. Plant secondary metabolites such as polyphenols, have properties including antioxidant, antimugenic, anticarcinogenic, antiflammatory and antimicrobial effects that might preventing diseases. The present study was under taken to investigate the chelating of ferrous ions by the essential oil of leaves of *Chaerophyllum villosum* Wall. ex DC. (Family: Apiaceae).
**Keywords**: *Chaerophyllum villosum*, Apiaceae, essential oils, γ-terpinene.

## Introduction

The genus *Chaerophyllum*, belonging to Apiaceae family, comprised of about 110 species which includes annual and perennial herbal plants widely distributed in temperate and sub temperate zones of Asia, Africa and Europe[1-3]. *Chaerophyllum villosum* Wall. ex DC. was widely distributed in E. Asia Himalayas from India to Bhutan, Nepal and China and widely grows in moist shady places, road sides or open grassy places at elevations of 2100-3500 m. In high altitude tribes of Uttarakhand Himalaya (India) it was commonly known and sold in the name of 'Ganjari' widely used by people in food, spice and also as medicine[4-6]. Antioxidants are agents which scavenge the free radicals and stop the damage caused by them. They can greatly reduce the damage due to oxidants by neutralizing the free radicals before they can attack the cells and prevent damage to lipids, proteins, enzymes, carbohydrates and DNA[7]. Antioxidants can be classified into two major classes i.e., enzymatic and non-enzymatic. The enzymatic antioxidants are produced endogenously and include superoxide dismutase, catalyses, and glutathione peroxidase. The non-enzymatic antioxidants include tocopherols, carotenoids, ascorbic acid, flavonoids and tannins which are obtained from natural plant sources[8]**.** In India use of the different parts of several to cure specific ailments has been in vogue from ancient times. The indigenous system of medicine, namely, Ayurvedic, Siddha and Unani, has been in existence for several centuries. Some

drug from Ayurveda approaching modern diseases, have already reached the market place[9]. Present study revealed the chelating power activity of essential oil of *Chaerophyllum villosum.*

## Materials and methods

### Plant collection and identification

The fresh leaves of *C. villosum* were collected from Milam glacier (Uttarakhand, India) at an altitude of 3600 m in the month of August at mature stage in 2008. The identification was done from Botany Department, Kumaun University, Nainital and BSI, Dehradun. The voucher specimens (No.Chem08/DST/CV) have been deposited in the Phytochemistry lab of the Chemistry Department, Kumaun University, Nainital.

### Isolation of essential oil

The fresh planting materials (2 kg each) were subjected to steam distillation using a copper electric still, fitted with spiral glass condensers. The distillates were saturated with NaCl and extracted with *n*-hexane and dichloromethane. The organic phase was dried over anhydrous sodium sulfate and the solvents were distilled off in a rotary vacuum evaporator at $30^0$C and the percentage oil content was calculated on the basis of fresh weight of plant materials.

### Chelating Power activity

The chelating of ferrous ions by the essential oil and standards was estimated by the method of Dinis, Madeira, and Almeida[10]. Essential oil was added to a solution of 2m M $FeCl_2$ (0.05 ml). The reaction was initiated by the addition of 5mm ferrozine (0.2 ml) and the mixture was shaken vigorously and left standing at room temperature for 10 min. After the mixture had reached equilibrium, the absorbance of the solution was then measured spectrophotometrically at 562 nm in a spectrophotometer. All test and analyses were run in triplicate and averaged. The percentage of inhibition of ferrozine $Fe_2$ þ complex formation was given below formula.

$$\text{Absorbance \%} = \frac{(\text{Ao-A1})}{\text{A1}} \times 100$$

Where Ao was the absorbance of the control and A1 was the absorbance in the presence of the sample of essential oil and standards. The control contains $FeCl_3$ and ferrozine, complex formation molecules. Higher absorbances of the reaction mixture indicated greater reducing powers.

## Results and discussion

The chelating capacity of $Fe^{2+}$ was comparable with EDTA, CA, GA (Table & Fig 1).We can see that in fig 1 as concentration increases the chelating power of essential oil also increases with compared to standard used. This pattern is not seen in case of EDTA, CA and GA. Highest absorbance was seen in the concentration of 20 mg for essential oil of *C.villosum*. Our results were in agreement with previous studies not to chelating power activity but other antioxidant activities were shown by different species of *Chareophyllum*. The extracts obtained from *Chaerophyllum hirsutum* was tested using the reaction with the stable radical 1,1 diphenyl-2-picrylhydrazyl (DPPH),[11] *Chaerophyllum libanoticum* Boiss. et Kotschy from Turky, essential oil scavenged 1,1-diphenyl-2-picrylhydrazyl radical (DPPH). In addition, the effect on inhibition of lipid peroxidation of the essential oil was assayed using b-carotene bleaching and haemoglobin induced linoleic acid peroxidation methods resulting in 16% antioxidative activity[12].The essential oil of *C. macropodum* showed effective antioxidants for DPPH radical scavenging.[13] To the best our knowledge, this is the first report on chelating power activity of essential oil *Chaerophyllum villosum* being reported.

**Table 1Chelating power activity shown by leaf essential oil of *C. villosum***

| Oil/standard | (mean) 5mg | 10 mg | 15 mg | 20 mg |
|---|---|---|---|---|
| Cv | 87.18±0.00 | 88.39±0.09 | 89.32±0.00 | 99.13±0.00 |
| EDTA | 89.32±0.06 | 87.63±0.86 | 88.04±0.00 | 88.11±0.88 |
| CA | 86.18±0.26 | 87.04±0.02 | 89.36±0.00 | 89.56±0.02 |
| GA | 84.48±0.00 | 85.65±0.05 | 85.93±0.08 | 85.95±0.05 |

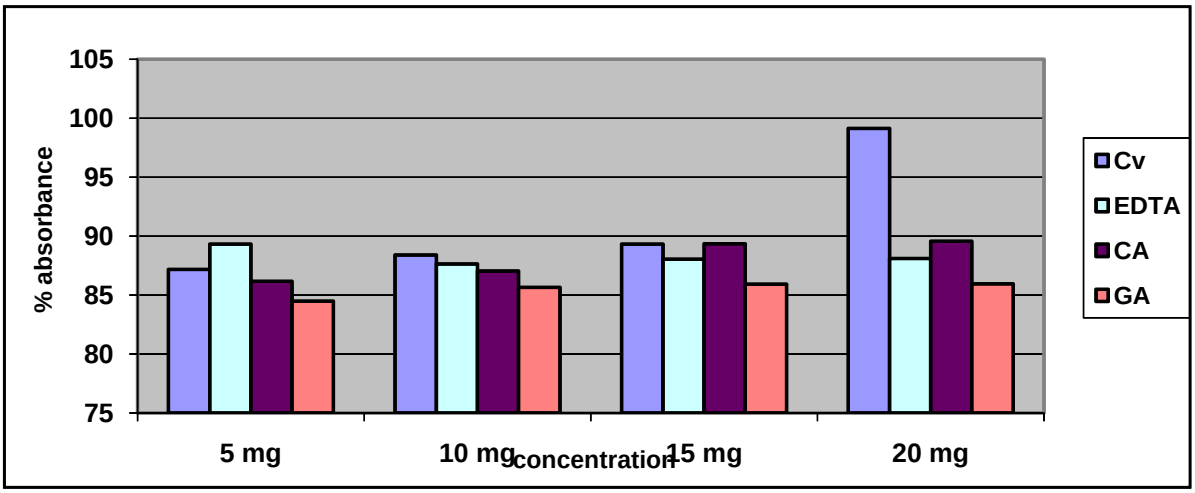


Fig.1 Chelating power activity shown by leaf essential oil of *C. villosum* (Cv= *Chaerophyllum villosum*, EDTA=ethlenediamenetetraacetic acid, CA=citric acid GA=gallic acid.)

## Conclusion

The present investigation reveals that the chelating power activity of essential oil of *C. villosum* and it is also found to be good natural antioxidant. In addition to this activity of the *C. villosum* can be used in food and other materials in the next future.

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