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**Phytochemical Screening and Mass Spectrometric Analysis to Unveil the Pharmacological Properties of Weed *Euryops pectinatus***

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**Abstract**

*Euryops pectinatus* ‘Viridae’ weed belonging to the family Asteraceae is commonly known as Golden Euryops or African daisy. Present investigation includes phytochemical analysis of methanol extract of *Euryops pectinatus* weed for the presence of various secondary metabolites. Presence of various secondary metabolites was observed including phenols, flavonoids, alkaloids, steroids, saponins, glycosides, etc. These secondary metabolites are well known for their biological activities like antioxidation, anti-cancerous, antimicrobial, cardiovascular, and anti-aging. After determination of rich secondary metabolites in the methanol extract, mass spectrometric analysis was carried out for the identification of compounds present in *Euryops pectinatus*. Eight compounds were identified in the methanol extract reported for nematicide, antioxidant, analgesic, antitumor, anticancerous and several other important activities. Thus, phytochemical and mass spectrometric analysis would open new doors to natural product research that would be cost effective and safe for the mankind.

**Keywords:** *Euryops Pectinatus;* Phytoconstituents; Bioactives; Mass-Spectroscopy; Anticancer

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**Introduction**

Weeds compete with crops for sunlight, water, nutrients, and space. In addition, they harbor insects and pathogens, which attack crop plants. Furthermore, they destroy native habitats, threatening native plants and animals [1]. *Euryops pectinatus* ‘Viridae’ belonging to the family Asteraceae is a weed and grows easily in full sun on well drained soil. Due to its spreading nature, it affects the growth of other agricultural crops by utilizing available nutrition and space. However, special attention is given nowadays to unwanted weeds as they possess some special properties that make them grow easily under the abiotic stress conditions. Plants are a rich source of phytoconstituents that provide unlimited opportunities for the development of new drug leads. Therapeutic drugs identified from natural products are now acknowledged throughout the world.

Weeds are a serious problem in agriculture and tremendously reduce the productivity of...
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**Materials and Methods**

**Collection and preparation of plant material**

Plant material was collected from Raipur and identified as *Euryops pectinatus* ‘Viridae’ commonly known as Golden euryops. The samples were washed thoroughly in running tap water to remove soil particles and other adhered debris and finally washed with sterile distilled water. The whole plant was air dried for 24 hours and further used for extraction.

**Plant sample extraction**

Fresh leaves of *Euryops pectinatus* ‘Viridae’ (10g) were shade dried for 3-4 days and crushed using mortar-pestle. Extraction was done with methanol thrice for three consecutive days at 28°C (100 ml x 3). The extract was filtered twice with Whatman filter No. 1. Extract was combined and concentrated at 40°C in water bath. The crude methanol extract of *E. pectinatus* was stored at 8°C for further analysis.

**Qualitative phytochemical analysis**

*Euryops pectinatus* ‘Viridae’ methanol extract were tested for the presence of different classes of compounds [9-11]. Qualitative chemical test were used regarding the nature of phytoconstituents present in the methanolic extract (Table 1).
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**Table 1:** Phytochemical analysis of explants of Golden Euryops.

| Compounds          | Test                      |
|--------------------|---------------------------|
| Alkaloids          | Dragendorff’s Test        |
| Glycosides         | Salkowski’s Test          |
| Polyphenols and Tannins | Ferric Chloride Test     |
| Flavonoids         | Lead acetate Test         |
| Proteins           | Ninhydrin Test            |
| Carbohydrates      | Molisch’s Test            |
| Saponins           | Foam Test                 |
| Steroids           | Steroids Test             |
| Quinones           | Quinones Test             |
| Coumerin           | Coumerin Test             |
| Terpenoids         | Salkowski Test            |
| Phlobatannins      | Phlobatannins Test        |
| Phytosterol        | Libermann’s Test          |

**Gas Chromatography- Mass Spectrum analysis (GC-MS)**

Characterization of crude methanol extract of *Euryops pectinatus* ‘Viridae’ was done by Gas Chromatography- Mass Spectrometry. GC-MS was recorded in a GCMS-2010 Shimadzu instrument operating in EI mode at 70ev. A Restek-5MS column (30m x 0.25mm x 0.25µm) was used. The oven temperature program was 100° to 250°C at 5°C min⁻¹ and held for 5 min at 250°C and from 250°C to 280°C at 10°C min⁻¹ and held for 10 min at 280°C. The injector temperature was 250°C with normal injection mode. The flow rate of carrier gas helium was 1.21ml min⁻¹. The identification of methanol extract was confirmed by comparing the mass spectral data with those of authentic compounds and with data obtained from the literature.

**Identification of components**

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The name, molecular weight and structure of the components of the test materials were ascertained.

**Results and Discussion**

The preliminary phytochemical screening of the methanolic extract of leaves of *Euryops pectinatus* ‘Viridae’ showed the presence of various secondary metabolites of which alkaloids, flavonoids, terpenoids, saponin glycosides, tannin and phenolics compounds were the most prominent (Table 2).

**Table 2:** Preliminary phytochemical analysis of the methanol extract of Golden Euryops.

| Compounds          | Golden Euryops (MeOH) |
|--------------------|-----------------------|
| Alkaloids          | +++                   |
| Glycosides         | ++                    |
| Polyphenols and Tannins | +++               |
| Flavonoids         | +++                   |
| Proteins           | +                     |
| Carbohydrates      | ++                    |
| Saponins           | +                     |
| Steroids           | ++                    |
| Quinones           | -                     |
| Coumerin           | +                     |
| Terpenoids         | ++                    |
| Phlobatannins      | -                     |
| Phytosterol        | +                     |

+++ Maximum, ++ Moderate, + Least presence, - Absence of the compound
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**Figure 1**: Mass spectrometric analysis of methanol extract of *Euryops pectinatus* 'Viridae'.

**Table 3**: Bioactive compounds identified in the methanol extract of leaves of Golden Euryops.

| S. No. | R. Time | Name                                                                 | Mol. Formula       | Mol. Weight | Area% |
|-------|---------|----------------------------------------------------------------------|--------------------|-------------|-------|
| 1     | 10.576  | 1,4-Diacetyl-3-acetoxymethyl-2,5-methylene-1-rhamnitol               | C_{13}H_{22}O_{8}  | 318         | 0.53  |
| 2     | 12.870  | 7,7A-dimethyl-3A,4,5,7A-tetrahydro-3H-benzofuran-2-one              | C_{10}H_{14}O_{2}  | 166         | 1.91  |
| 3     | 15.667  | Propionamide, N-(3-fluoro-2-methylphenyl)-3-(4-fluorophenyl)         | C_{14}H_{13}F_{3}NO | 275         | 0.30  |
| 4     | 16.217  | Tau-Murolol                                                           | C_{19}H_{26}O      | 222         | 0.76  |
| 5     | 16.580  | Patchoulane                                                           | C_{15}H_{26}       | 206         | 1.06  |
| 6     | 18.722  | Aniline, N-(2-(diethylamino)ethyl)-2,4-dinitro-                      | C_{12}H_{16}N_{4}O_{4} | 282         | 1.64  |
| 7     | 25.010  | Morpholine, 4,4'-phenylmethylenedibis                                | C_{16}H_{25}N_{2}O_{2} | 262         | 0.49  |
| 8     | 25.173  | 1,2-benzenedicarboxylic acid, bis(2-ethylhexyl) ester               | C_{24}H_{18}O_{4}  | 390         | 8.00  |
Figure 2: Compounds identified in the methanol extract of leaves of *Euryops pectinatus* 'Viridae' by GC-MS.

| Name                                                                 | Activity*                                                                 |
|----------------------------------------------------------------------|--------------------------------------------------------------------------|
| 1,4-Diacetyl-3-acetoxyethyl-2,5-methylene-1-rhamnitol                 | Anticancer (oral), Antitumor (Ovary), Inhibit Production of Tumor Necrosis Factor |
| 7,7A-dimethoxy-3A,4,5,7A-tetrahydro-3H-benzofuran-2-one              | Anti-HIV Integrase, Antidote (Hydrazine, Heavy Metals, Hypoglycin A)      |
| Propionamido, N-(3-fluoro-2-methylphenyl)-3-(4-fluorophenyl)         | Antitumour, Anaphylactic, Increase NK cell activity, Narcotic, Nematicide, Neuroinhibitor, Neuroprotective, Neurostimulant, Neurosedative |
| Tau-Muurolol                                                          | Anticancer (skin, stomach), Antidiabetic, Antidote (snake venom, strychnine, Salicylate), Antioxidant synergist, Antitumor (Skin, stomach) |
| Patchoulane                                                           | Anti-HIV Integrase, Antidote (Hydrazine), Anaphylactic, Analgesic, Antiaging, Anti-IgE, Antiacne, Anticancer |
| Aniline, N-(2-(diethylamino)ethyl)-2,4-dinitro-                        | Nematicide, Anaphylactic, Antitumor , Increase NK cell activity, Narcotic |
| Morpholine, 4,4'- (phenylmethylene)bis                                | Increase SOD Activity, Disinfectant, Antidote (Diazepam, Digoxin)         |
| 1,2-benzenedicarboxylic acid, bis(2-ethylhexyl) ester               | Arachidonic acid- Inhibitor                                               |

*Source: Dr. Duke’s Phytochemical and Ethnobotanical Databases (online database).
For the pharmacological as well as pathological discovery of novel drugs, the essential information regarding the chemical constituents are generally provided by the qualitative phytochemical screening of plant extract [12]. The spectrum for the phytocomponents of the methanolic leaf extract of Golden euryops was determined using GC-MS (Figure 1).

Eight compounds are reported to have biological activity (Figure 2, Table 4). The activity prediction is based on Dr. Duke’s Phytochemical and Ethnobotanical databases and available literature. Compound 1,4-Diacetyl-3-acetoxyethyl-2,5-methylene-l-rhamnitol is also reported in the methanol extract of Aspergillus terreus that showed antibacterial and anti-fungal activity [13]. Similarly another compound a Patchoulane-type Sesquiterpene, 6-Acetoxy Cyperene isolated from Cyperus rotundus rhizomes is reported to induce caspase-dependent apoptosis in human ovarian cancer cells [14].

Conclusion

In the present study, methanolic extract of Euryops pectinatus ‘Viridae’ commonly known as Golden euryops, a weed was analysed using mass spectrometry. Through these results, we can conclude that E. pectinatus can be exploited to isolate and characterize important bioactive compounds for pharmaceutical and industrial applications. Several phytochemicals from plants have recently attracted a great deal of attention, mainly due to their role in anticancerous, antimicrobial, antioxidant properties etc. At present there are so many economically important plant species that are being utilized for their important secondary metabolites. Plants contain secondary metabolites meant for defense against various pathogens. Identification of local weeds belonging to Asteraceae family containing bioactive potential against microorganisms, cancer, etc would open new doors in the field of pharmacology, as use of plants are safe and cost-effective.

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