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Discrepancy in biological efficacy of the essential oils and plant extracts of cultivated and wild ecotypes of *Origanum vulgare* L., thriving across north western Himalaya

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Essential oil and plant extracts of cultivated and wild accessions of *Origanum vulgare* plants from Indian Himalaya were evaluated for biological efficacy. Antioxidant potential was analyzed using various assays like scavenging of free radical DPPH, FRAP, inhibition of linoleic acid oxidation and ABTS+radical via methanolic extracts and the essential oil of *O. vulgare*. Results demonstrate that methanolic extract act as a potential free radical scavenger providing IC50 at only 19.9 µg/ml, while as oil exhibited lower activity displaying IC50 at 10 µg/ml. Ethanolic extract were comparatively ineffectual in inhibition of linoleic acid oxidation and only 46.72% inhibition was acquired at 3 µg/ml concentration, extreme lower than that BHT reference standard at the same concentration. Results procured against anti-microbial assays revealed essential oil of wild and cultivated accessions of *O. vulgare* L., exhibited immense prospective of antimicrobial activity against all 39 bacteria and 16 fungi and 2 yeast species tested. On the contrary, the methanolic and ethanolic extract of *O. vulgare* plant revealed no antimicrobial activity. Results illustrate essential oil of wild accessions of *O. vulgare* containing substantial content of carvacrol and thymol display high antimicrobial potential plus antioxidant activity and consequently can be utilized as organic stabilizer in daily food preservation and medicinal decoctions. The antioxidant potential of varied wild and cultivated accessions of *O. vulgare* L., were determined via radical-scavenging activities and inhibition of tyrosinase activity via C6 cell line; Rattus norvegicus glioma derived cell line tissue. Ethanolic extracts exhibited maximum 88.54-99.02% inhibition of reactive oxygen species (ROS) in H2O2-treated cells was as those in H2O2-treated cells. The depigmentation potential of methanolic extracts of cultivated accessions of *O. vulgare* L. was relatively higher as revealed by 81.0% and 87.0% inhibition of tyrosinase activity with methanolic and ethanolic extracts, respectively.

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