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Biochemistry 2020: 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- Sumira Jan- Central Institute of Temperate Horticulture, India

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Plant extracts and Essential oil of cultivated and wild accessions of *Origanum vulgare* plant 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 by 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. The ethanolic extract was 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 *Origanum vulgare* L., exhibited immense perspective of antimicrobial activity against all 39 bacteria and 16 fungi and 2 yeast species tested. On the contrary, the methanolic and ethanolic extract of *Origanum vulgare* plant revealed no antimicrobial activity. Results illustrate essential oil of wild accessions of *Origanum vulgare* containing substantial content of carvacrol and thymol display high antimicrobial potential plus antioxidant activity and consequently can be utilized as an organic stabilizer in daily food preservation and medicinal decoctions. The antioxidant potential of varied wild and cultivated accessions of *Origanum 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 *Origanum vulgare* L. was relatively higher as revealed by 81.0% and 87.0% inhibition of tyrosinase activity with ethanolic and methanolic extracts, respectively.

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. Origanum known by the common name oregano is a herbaceous perennial indigenous to Europe, North Africa, and temperate regions of Asia. Origanum species grow copiously on mountainous areas and hilly areas with extensive ranges of altitudes. The immense variability in volatile as well as nonvolatile fractions of the genus Origanum that can thrive in varied climatic belts gives them a strong utility in agriculture, medicine, and cosmetics, as a flavouring and aromatic agent. In addition to relevance in medicine and agriculture, essential oil from Origanum vulgare can be used as a food disinfectant. Food infestation caused by microbes is a major predicament in the world, including in well-developed countries such as the USA. Numerous bacteria [*Escherichia coli*, *Enterobacter spp*., *Bacillus spp*., *Salmonella spp.*, *Staphylococcus aureus*, *Listeria monocytogenes*, *Klebsiella pneumonia*, and *Campylobacter jejuni*, *yeast ICandida spp.* and *Zygosaccharomyces spp.*], and *fungi* [*Fusarium spp.*, *Aspergillus spp.*, *Rhizopus spp.*, and *Penicillium spp*.] are common food pathogens that cause food spoilage. Oregano has been assessed for its antioxidant and antimicrobial characteristics with particular relevance to food preservation. The popularized naturally preserved meat is camarilla containing the major fraction of oregano. Moreover, oregano essential oil has been used as a major food additive in the European Union for health benefits

Chemical preservatives have used to avoid food spoilage; however, from chemical preservation leads to constraints in consumer acceptability and other health-related issues, researchers have begun to investigate the use of organic and natural preservatives

Oregano is a flowering plant in the mint family Lamiaceae. It is native to temperate western and South-western Eurasia and Mediterranean region. Oregano is a perennial herb, growing from 21–81 cm in height with alternate leaves 2-4 cm. The flowers are purple, long, produced in erect spike. Indeed, the tribal people of western Himalayan belt use Origanum vulgare against flatulence, diaphoresis, and cough, to promote menstrual discharge, energize the body, increase appetite, and as a tonic. This herb possesses enough potential, if utilized to its maximum potential through specific breeding and laboratory techniques, to meet the present nutritional needs and secure the future demands.Keeping in mind the significance of the herb, the present research was conducted to determine discrepancies in essential oil components in diverse ecotypes of Origanum vulgare using GC and GC-MS and (2) to evaluate variation and validate the divergence in biological efficacy of plant extracts and essential oils procured from diverse ecotypes of Origanum vulgare L. Due to the introduction of exotic species of oregano into the Himalayan western belt, there exists a huge amount of phytochemical variation and genetic polymorphisms between Origanum vulgare plants and no precise data are present . The

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goal of the current research was to determine the comparative biological efficacy of *Origanum vulgare* essential oil and extracts procured from diverse wild and cultivated accessions thriving in the mountains fields of western Himalayan belt. Although there are 44 species of genus Origanum, its ecotype from Kashmir has not yet been subjected to phytochemical characterization, and its biological efficacy has not been studied. Moreover, the imprecise taxonomy and assessment of genus Origanum extracts and its essential oils utilized as dietary supplements or for medicinal purposes in developed countries have made it necessary to screen our native species to verify its validity and product quality so that it can be used as a valuable nutraceutical. Oregano is a flowering plant in the mint family Lamiaceae. It is native to temperate western and South-western Eurasia and Mediterranean region. Oregano is a perennial herb, growing from 21–81 cm in height with alternate leaves 2-4 cm. The flowers are purple, long, produced in erect spike. Indeed, the tribal people of western Himalayan belt use Origanum vulgare against flatulence, diaphoresis, and cough, to promote menstrual discharge, energize the body, increase appetite, and as a tonic.

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