Research Paper :

Evaluation of rhizospheric fungi and extract of *Melissa officinalis* for antimicrobial and proteolytic activities

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SUMMARY

The antimicrobial activity of root and shoot extract of *Melissa officinalis* extracted in different solvents and potential effect of rhizospheric fungal strains against most serious plant pathogens of agricultural crops as well as human diseases were investigated during the year 2008-09. The petroleum ether root extract of *Melissa officinalis* was highly active against *Bacillus* sp. (+ve) bacterium whereas root and shoot extracts from chloroform and methanol extraction were proved more antagonistic to *Klebsiella* sp. at higher concentrations within 13.67 –15.39 mm diameter range of zone inhibition. However, hydrophobic plant extracts were more effective towards *Fusarium, Alternaria* and *Penicillium* sp. Maximum antagonistic activity was pronounced at higher concentration in petroleum ether, methanol and chloroform solvents. The cell free supernatant of three rhizospheric fungi *Aspergillus fumigatus, Mycelia sterilia* (white) and *Penicillium* MP-2 showed good antibacterial effect against *Pseudomonas* sp., *Salmonella typhi*, *S. paratyphi* and *Shigella* sp. while *Aspergillus fumigatus* and *Penicillium* sp. MP-3 showed inhibitory effect against pathogenic fungi. Only one isolate, *Mycelia sterilia* (black) amongst 8 rhizospheric fungi was able to produce good amount of proteolytic activity that can be exploited for enzyme production in different types of industries.

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Microorganisms and medicinal plants are rich source of secondary metabolites which are potential sources of useful products (Vining, 1990). The advantage of microbial systems in the search of novel and commercially important components is defined by rapid growth, low cost and extreme sensitivity. Fungi play an essential role in the soil environment as major decomposers of plant residues, releasing nutrients that sustain and stimulate plant growth in the process. Some fungi possess antagonistic properties toward plant pathogens (Nascimento *et al*., 2002, Smith *et al*., 1999) which make them beneficial to agriculture and industry.

Melissa officinalis commonly known as lemon balm member of Lamiaceae family is considered one of the important medicinal plant species (Lauk *et al*., 2003). Today it is used in different branches of industry such as medicine, perfume, cosmetic and food etc. in many countries of the world. The main components of lemon balm essential oil ranged from 0.01 to 0.25%, 39% citronellal, 33% citral (*Citransellol linalal*), thymol (0.4-11.94%), β-caryophyllene (5.91-7.27%), Spathulenol (2.06%) and geraniol (2.2%). It is traditionally used as mild sedative, spasmolytic and antibacterial agent (Adinee *et al*., 2008, Cosge *et al*., 2009). This particular composition comprising of *Melissa* leaf extract can be used for cosmetic and pharmaceutical dietric Schnitzler *et al*., 2008) exerting direct antiviral effects. Though today also plant derived source components remain a significant fraction of pharmaceuticals employed clinically. Soil under medicinal plants can also be considered a novel enrichment environment because of presence of plant litters, residues and secretion going continuously into the soil, biodegraded and remained there. Microorganisms adapted to this type of environment may have the potential to yield idiolites and unexpected biological activities.