Microbial formula used in reclamation of agricultural and desert soil

A Thesis for master In Microbiology
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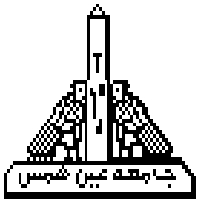

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This Thesis has not been previously submitted for a degree at this university or any other

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Introduction

Effective microorganisms (EM) is a mixed culture of beneficial microorganisms (primarily photosynthetic and lactic acid bacteria, yeast, actinomycetes and fermenting fungi) that can be applied as inoculants to increase the microbial diversity of soils.

EM produce plant hormones, beneficial bioactive substances and antioxidants, while solubilising nutrients **Higa and James, (1994)** . Also help in the fixation of atmospheric nitrogen and also solubilization of insoluble nutrient sources **(Abdel Azeem, 1998)**.

Active microbial formula (AMF) is a mixed culture of beneficial microorganisms that can coexist in mixed cultures and are physiologically compatible with one another, when these cultures are introduced into the natural environment their individual effects are greatly magnified in a synergistic fashion.

AMF is made up of mixed cultures of microbial species that are found in natural environment worldwide. AMF contain (Asymbiotic nitrogen fixing bacteria; Lactic acid bacteria;

Yeast; Actinomycetes; *Bacillus* sp and Fermenting Fungi) that can be applied as inoculants to increase the microbial diversity of soils. This in turn can improve soil quality and health, which enhances the growth, yield and quality of crops **(Abdel – Gawad ,1999).**

Coriander as medicinal plant has been used in medicine for thousands of years **Fakim**, (**2005**) The first medicinal uses of the plant were reported by the ancient Egyptians.

Coriander seed oil has antibacterial properties and is used for treating rheumatism; the oil also counteracts unpleasant odors in pharmaceutical preparations & tobacco. It is used in perfumes; seeds are sometimes used as a flavoring agent to improve taste in other medicinal preparations.

Coriander (*Coriandrum sativum L.;* Umbelliferae) is widely distributed and mainly cultivated for the seeds. The seeds contain an essential oil (up to 1%) and linalool is the main component **Wangensteen, (2003)** Coriander seed is a popular spice and finely ground seed is a major ingredient of curry powder. The seeds are mainly responsible for the medical use of coriander and have been used as a drug for indigestion, against worms, rheumatism and pain in the joints **(Wangensteen, 2003)**.

Volatile components in essential oil, from both seeds and leaves, have been reported to inhibit growth of a range of micro-organisms .

So the main target of this study is to isolate beneficial microorganisms from different sources and purifying them to produce an active microbial formula (AMF) compatible to grow together in synergetic behavior.

The chosen microorganisms were identified and used as biofertilizer on the growth of Coriandrum plant as well as the microbial content under green house conditions. Also, determination the antagonistic effects of Coriandrum oil against different pathogenic microorganisms had been studied.

Review of literature

The term **Biofertilizer** or **Microbial Inoculants** can be generally defined as preparations containing live or latent cells of effective strains of nitrogen fixing, phosphate solubilising or cellulolytic microorganisms which accelerate certain microbial processes that can be easily assimilated by plants **(Subba-Rao, 1988)**.

Asymbiotic nitrogen fixation:

It is well established that *Azotobacter* is universally distributed all over the world, in soil of all geographical regions, *Azotobacter* was isolated from the soil of East Africa and Egypt **(Dobereiner and Day , 1975).**

Dobereiner and Day (1975) reported that nitrogen fixing *Azospirillum sp* could be isolated from all active surface sterilized root species. The importance of *Azospirillum* as an active nitrogen fixer was reported by many investigators .

Shenda *et al.* (1979) found that the beneficial response of crop plants to inoculation with *Azotobacter* can be attributed to growth substances produced by the organism, the fixed nitrogen made available to plants and production of antifungal antibiotics.