Activation of plant defence mechanisms against plant pathogens on use of vermicompost as soil amendment

Vermicomposting is a non-thermophilic, bioxidative process that involves earthworms and associated microbes. This biological organic waste decomposition process yields the biofertilizer namely the vermicompost. Vermicompost enhances soil biodiversity by promoting the beneficial microbes which in turn enhances plant growth directly by production of plant growth-regulating hormones and enzymes and indirectly by controlling plant pathogens, nematodes and other pests, thereby enhancing plant health and minimizing the yield loss.

In the current study an attempt was made at assessing the microbial population in vermicompost produced from neem and flower waste. In the present study vermicompost samples produced from different substrates were analysed for the microorganisms such as bacteria and fungi. In the study two substrates, neem and flower waste based vermicompost were used, the vermicompost were serially diluted and plated on NA (Nutrient Agar). It was observed, dilution 10^{-2} showed the most number of microbial colonies, and the number of colonies gradually decreased as the dilutions increased with isolated colonies found on dilution 10^{-4} and 10^{-6}. The flower waste based vermicompost also showed similar results. Fungal isolation was also done in the by serially diluting the vermicompost and plating it on PDA (Potato Dextrose Agar). The dilution of 10^{-2} showed the maximum growth of fungal colonies. From the colonies obtained some useful fungal colonies were isolated and subcultured to study antagonism.

The antimicrobial activity was assayed using the vermicompost against two common bacterial plant pathogens (*Xanthomonas* and *Erwinia*). Neem based vermicompost had better antimicrobial potency against both the pathogens in comparison to flower waste based vermicompost. The antagonistic effect between the useful microbes from vermicompost against plant pathogen was elucidated. Comparative analysis indicates all the three fungi isolated from the vermicompost had a suppressive effect against the plant pathogens. It was also observed that *Trichoderma* (both isolates 1 and 2) was able to inhibit the pathogen efficiently than *Aspergillus*. The trend was similar when *F. oxysporum* and *Cladosporium* inhibition is compared. When the growth parameters of *F. oxysporum* and *Cladosporium* was compared it was found that *F. oxysporum* is a slow grower when compared to *Cladosporium*. This could be a possible reason for the variation in percentage of growth inhibition.

Results of the current study indicates that the plants grown in vermicompost amended soil when infected with the soil pathogen was efficiently controlled and also it was able to elicit a strong defence response by increasing the amount of phenol, peroxidase activity and acid invertase activity. The current study paves an alternative way for an eco – friendly approach for control of plant diseases which is a prerequisite at this juncture when the environmental pollution rate is increasing exponentially.