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VERMICOMPOST AS A COMPONENT IN POTTING MIXES FOR ORNAMENTAL CROPS

Introduction

With the progressive increase in the size of the world's population and the adoption of intensive animal husbandry production, large volumes of organic wastes produced all over the world are creating a serious disposal problem and a major source of environmental pollution. These wastes require large quantities of land for disposal, release odor and ammonia into the air, could contaminate ground water with pollutants, and might present a healthy risk (Inbar et al. 1993).
However some form of treatment of these wastes can make them suitable for land application and for safe disposal into the environment (Atiyeh et al 2000).
The ability of some earthworms to consume a wide range of organic residues such as sewage sludge, animal wastes, crop residues, and industrial refuse have been fully established (Mitchell et al. 1980; Edwards et al. 1985; Chan & Griffiths 1988; Hartenstein & Bisesi 1989). Vermicomposts are products of organic matter degradation through interactions between earthworms and microorganisms.

Several researchers have examined the physical and chemical properties of vermicomposts and reported that vermicomposts are finely divided peat like materials with high porosity, aeration, drainage, and water holding capacity.

Materials and Methods

Experiment 1: Watercress & lettuce assays

Objective

To study the auxin and gibberellin- like activities of the extracts from different composts.
The auxin and gibberellin-like activities of the composts/ peat extracts were assessed by checking the growth reduction of water-cress (Lepidium sativum L) roots and the increase in the length of lettuce (Lactuca sativa L.) shoots, respectively (Audus 1972) but also shoot length in watercress and roots in lettiuce were also observed. The results were recorded as concentrations of indoleacetic acid or gibberellic acid.

Experiment 2:

Objective

To study the natural occurring auxin in extracts of different composts.
The mungbean seeds were then planted in the moistened vermiculite in the plastic trays. After the incubation period, the numbers of roots (longer than 1mm) were counted on each hypocotyl. The number is directly proportional to the auxin concentration within assay range.

Experiment 3:

Objective

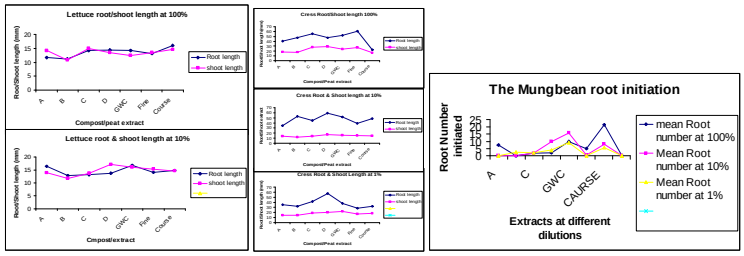
To study the effect of extracts from different composts on growth and development of selected model plants by checking if the extracts really do promote the uptake of fertilizers applied.
The plant materials were Helianthus annuus sinspot, Sunflower plants& *Tomato fandango F1 tmv resistant*, tomato plants were used in this study. Plants were grown from seeds in standard sterilized potting soil and were placed in the greenhouse. These were subjected to: water (control), extract of vermicompost, green waste compost & peat. These treatments were combined with the factor 'fertilization' at 2 levels: Five replicates were used for each treatment combination. The experiment was splited into 2 sub-experiments, one for each plant species. Each sub-experiment was consisted of: 2 substrates * 4 treatments * 2 fertilization levels * 5 replicates = 80 pots

Results and Discussion

Root branches, or lateral roots, are an integral component of root-system architecture and play an important role in enlarging the root system to facilitate the absorption of water and micro- and macronutrients. Lateral root growth and development is greatly influenced by complex interactions among different hormonal, developmental, and environmental factors (Casimiro et al., 2003-; Lòpez-Bucio et al., 2003-; Malamy, 2005-)

Left: The roots and shoots elongation of lettuce seeds as influenced by different extracts dilutions
middle: The Roots and shoots elongation initiation of Watercress seeds as influenced by different compost/ Peat extracts of different dilutions.

Right: The effect of different compost/peat extracts on root formation at different dilutions/ percentages



On the side of extracts the roots and shoots formed by the lettuce were almost of the same height or all the compost/peat extracts, but on the side of watercress roots were longer than the shoots, indicating that in all the extracts there was small amounts of auxin as in experiments with IAA where roots lengths increased with decrease in the [IAA]. So there could have been an interaction of these two kinds of hormones in these extracts causing formation of both roots & shoots on both these kind of seedlings.
Results presented in figure 6 pointed out that compost A did not initiate any roots at both 10% & 1%. This could be as a result of very very little amount of natural auxins present in this compost so that by making any dilution just made the effect of the hormone undetectable to initiate any roots.
Results presented in table 3 of plant bioassay pointed out that the control had plants with higher heights than all pots treated with extracts so treated pots showed lower heights than the control. This could be as a result of competition for available nutrients which were not enough at this stage resulting in competing for the light especially on the part of control pots. It could also be possible that the stage for extracts volume was not enough to make nutrients available for the plants at this stage of growth.

Conclusion

Based on the results of this study the following conclusions can be drawn:
Vermicomposts/ peat extracts may be containing plant growth regulators/hormones.
The effects of extracts on plant growth almost certainly may be due to plant growth regulators (PGRs) or hormones produced by the high microbial activity in composts/peat. Low application rates of IAA usually promote plant growth, due to formation of roots which can help in absorption of both macro & micro nutrients, but higher application rates can actually depress plant growth, so it must be ensured that the dilutions used are tested critically to avoid such adverse effects.
Peat could have performed better but due dilution which might have been very high it was not possible..

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