THE CONVERSION OF ORGANIC WASTES INTO VERMICOMPOSTS AND VERMICOMPOST 'TEAS' WHICH PROMOTE PLANT GROWTH AND SUPPRESS PESTS AND DISEASES.

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Introduction

Most people are familiar with the principles of thermophilic composting, which is a microbial process that utilizes certain aerobic microorganisms to break down organic materials such as wastes. This process involves an aerobic, microbial heating process, which raises the temperature of the organic materials to 55˚ – 70˚ C for at least 72 hours, followed by a maturation phase of several days. This process depends on keeping the organic materials aerated, either by turning organic piles mechanically, or by injecting air into enclosed systems. The product has a number of uses as field soil amendments, but has a relatively poor structure and comparatively limited amounts of plant-available nutrients. (Edwards and Bohlen, 1996; Edwards and Arancon, 2004).

More recently, there has been considerable world-wide interest and significant technological progress, particularly at The Ohio State University, on the production and optimal uses of vermicomposts. Vermicomposts can be processed from most organic wastes such as animal manures, and particularly, paper and food wastes, through interactions between earthworms and microorganisms, in a mesophilic process (up to 35˚ C), to produce fully-stabilized materials with low carbon to nitrogen ratios. They have high and diverse enzymatic and microbial activities and contents, a fine particulate structure, good moisture-holding capacity and contain nutrients such as nitrogen, potassium, and calcium in forms readily taken up by plants. Vermicomposts can have dramatic effects upon the germination, growth, flowering, fruiting and yields of most crops, particularly fruit and vegetables, which are high value crops.

Because vermicomposts are so rich in plant-available nutrients, they tend to perform best in promoting plant growth and yields, at relatively low application rates into plant growth media or soils. It has been shown conclusively at The Ohio State University, that these plant responses may be due to the production of plant growth regulators such as as indole acetic acid (IAA), kinetin, or gibberellins associated with humic and fulvic acids also acting as plant growth regulators. These materials are produced through interactions between earthworms and microorganisms. We are convinced that the plant hormones produced become adsorbed on to the humates and fulvates, and are released slowly into soils to promote plant growth over the whole growing season or even several growing seasons. (Arancon et al, 2005a).