

Genetically Modified Organisms

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Life in earth: the impact of GM plants on soil ecology?

Soils are inadequately characterised (chemistry, physics, biology and rheology) and the interactions between key variables are not understood. Whether or not changes in soil microorganisms would be deemed harmful is not predictable. Commercially relevant soil properties are routinely recorded and could affect land values. There is no mechanism which allows foreseeability of the effects of GM agriculture on land values.

There is an intimate link between plants and the soil ecosystem. The relationship is complex and highly dynamic. The long term effect of any change in planting, harvesting and soil conditioning is not precisely predictable at any level of detail e.g. types and populations of bacteria present, water content, rate of change of nutrient content etc...yet concerns have been suggested that the introduction of GM crops could lead to important changes in soils.

GM crops could without doubt, alter the demands made upon soils and the chemicals integrated into soils. For example, crops which generate novel biologically active compounds would leave these in the soil either through diffusion from roots or in decaying organic matter when soil is turned after harvest. The question is whether change is important and/or harmful and/or beneficial?

Certain soil microorganisms that are central to it's utility have been identified. These include arbuscular mycorrhizal fungi, plant growth-promoting rhizobacteria (PGPR), wood lignin-decomposing fungi and nitrogen fixing and nitrifying bacteria. But any short term change in the populations of these could be coincidental, long term changes could also have nothing to do with the precise genetic makeup of the crop. It cannot be stated that any change in actual or relative levels of microbe populations is consistent with a macroscopic change in soil use, some populations could increase while others decrease. Even if such understanding was available, whether it represented a beneficial change or not could not be determined.

Farmers and growers continually monitor their soil in terms of nutritional status, pH, structure (i.e. does it become waterlogged or compacted), and function (do crop residues fail to decompose, are there problems with pests and pathogens). These practical observations are related to wider issues of soil quality and provide a set of workable indicators related to essential (commercially relevant) soil services. They do not have an equal interest in the soil of surrounding lands.

Comment

Studies of microbes in the soil cannot (yet) provide general commercially valuable information. Macroscopic variables, such as water retention, are recorded routinely but linking them and any changes in them with GM agriculture remains speculative.

Some changes would be described as contamination, some as changes in biodiversity (both would be of interest to the regulator in charge of remediation).