The effect of Foray 48B (Bacillus thuringiensis subsp. kurstaki, Btk) on indigenous soil micro-organisms was assessed in a pot trial in which four rates of Foray were applied. Foray had no impact on the genetic diversity of the indigenous soil eubacterial community, as measured by PCR-DGGE. Using Bacillus-specific PCR primers, bands corresponding to Btk were detected within the natural soil populations of bacilli only at 100 and 1000× field rate (where field rate = 5 L/ha of Foray 48B). After 2 weeks, bacterial functional diversity (estimated by BIOLOG™ ecoplates) was similar in all treatments and total fungal and bacterial populations were greater in the 1000× FR treatment only.

Btk products such as Foray 48B are typically applied to foliage for controlling leaf-feeding insect pests. When repeated applications of biopesticide are made, for example to control exotic pests, high numbers of spores and crystals can reach the soil, leading to concerns about potential non-target effects of Btk products on soil microflora. The impact of Bt on other micro-organisms is largely unknown. In vitro antibiotic activity of Bt species other than Btk has been reported (9), but no effect of Dipel (Btk) application was found on soil microbial respiration and biomass when used at the recommended field rate (8). Similarly, more recent studies have not detected any effects of Bt toxins on culturable soil microorganisms (1, 4, 7).

In a greenhouse trial, pots containing perennial ryegrass (Lolium perenne) and white clover (Trifolium repens) grown in field collected soil were treated with Foray 48B (Abbott Laboratories) at four rates (0 – water only, 1x, 100x, and 1000x field rate), where field rate was 5 L/ha (Foray 48B). After 2 weeks, bacterial functional diversity (estimated by BIOLOG™ ecoplates) was similar in all treatments and total fungal and bacterial populations were greater in the 1000× FR treatment only.

DNA fingerprinting patterns showed that Foray 48B application had no impact on the diversity of the indigenous soil bacterial community (Fig. 1). Community analysis of the soil eubacteria revealed highly complex fingerprints in all treatments. The four replicate samples showed almost identical fingerprints, demonstrating low variability between pots and a high reproducibility of DNA extraction, by PCR and DGGE procedures. Using Bacillus-specific PCR primers (2), bands corresponding to Btk were detected within the natural soil populations of bacilli only at 100x and 1000× FR (data not shown).

In conclusion, application of very high amounts of Foray 48B (1000x FR) caused only transient effects on bacterial functional diversity and the total numbers of culturable bacteria and fungi. The addition of Foray 48B even at very high rates (1000× FR) had no effect on diversity of predominant eubacterial populations present in soil, as determined by PCR-DGGE. When Bacillus-specific
primers were used, bands corresponding to Btk were visible at 100x and 1000x FR 1 week after application; no corresponding bands were detected in the control or in the 1x FR treatment.

References