Research into the treatment of landfill leachate

Effects of landfill leachate on biomass production of *Miscanthus*

Summary

This project investigating leachate irrigation onto Miscanthus Grass is part of a series of studies carried out by ADAS on the use of biomass crops on landfill sites. The crop used for irrigation is selected from high yielding species that benefit from high rates of irrigation, that have a known tolerance to potential contaminates and that have a non-food end use. The results of the trials are very encouraging and they may offer a solution to sustainable management of landfill leachate in the future.

The challenge to ADAS

The project involved the development of a field scale trial on an operating landfill, using leachate generated on the site as irrigation water onto a biomass crop. The trial facility was designed with isolated plots, with an infrastructure to allow variable amounts of leachate to be applied to plots, with equipment to monitor and measure inputs of leachate and potential outputs in the soil excess drainage. The trial protocol was designed and effects on the soils and the effects within stems, leaves and roots of the crop were monitored.

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Skills used/Overview

ADAS designed the trial and sixteen 15m x 20m isolated cells were constructed at the Waste Recycling Group Landfill at Cambridge. A Civil Engineering contractor formed the cells, sealed with clay and filled with soils from the site. An irrigation scheme was installed using drip pipe laid on the soil with zone controls to individual cells and a blending system to inject leachate. Each cell had individual drains installed, with sampling sumps and valves for the monitoring programme.

ADAS initially evaluated the effect of leachate on Miscanthus in a pot trial in a glasshouse, and the results were used in the design and management of the field trial on the landfill. *Miscanthus x giganteus* rhizomes grown for the trial were planted out in 2000, and allowed to establish for a period of two years before being irrigated with leachate. The results of the three years of measurements were reported in 2005.

Finally, ADAS engineering specialists carried out an environmental evaluation comparing the resource burden of an engineered treatment scheme, and a scheme including biomass irrigation.

Conclusions

The design of the trial and the trial facility allowed Miscanthus to be grown and monitored in typical landfill soil conditions. The plants grew continuously through each growing season, showing a very similar development to that of crop established on agricultural soils in the locality. The crop used the plant nutrients found in the leachate and potentially harmful elements did not adversely effect plants through the period of the trial. The study on the resource burden of two schemes showed a heavy burden of an engineered treatment scheme when compared to a biomass irrigation scheme.

The project was part funded with Landfill Tax Credits provided by Waste Recycling Environmental (WREN). A copy of the report is available using the email link below.