

THE USE OF WILLOW COPPICE AS A BIOFILTER

Michael Doran
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Michael Doran

- Chairman - International Environment Faculty - Royal Institution of Chartered Surveyors
- Energy Crops Sub Committee to European Commission
- Business Development Director – Rural Generation Ltd
- Work Package Leader ThermalNet



EU Legislation

- The Nitrates Directive 91/676/EEC
- The Sludge Directive, 3rd Draft, April 2000
- The Bio Waste Directive, February 2001, 2nd Draft (DGENV.A.2/LM/BIOWASTE)
- “Towards a Thematic Strategy for Soil Protection” April 2003

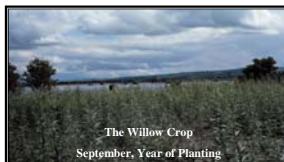


Potential Impact of EU Legislation

- Reduction in maximum permissible levels of sludge added to soil
- Introduction of maximum concentrations of heavy metals which may be contained in sludge applied to land (dry matter basis and P content)
- Maximum permissible concentrations of certain organic compounds
- Maximum permissible concentrations of specific pathogens
- Extension of the above limits to all land application activities



Willows



Risk of Pollution

- Key objective to ensure that waste is disposed of without endangering human health
- Sludge is applied below the surface, potential for run-off is effectively eliminated
- Heavy Metals, Sludge Directive under review, PTE's are controlled
- Organic contaminants. PAH's and PCB's in sludge, maximum limits. Half life of organic substances is short, plant uptake low
- Pathogens. Pathogens found in sludge do not survive in a soil environment
- Nitrate leaching. In short rotation coppice, extremely low



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Recycling of Sewage Sludge



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Limit values for potentially toxic elements in soil, and maximum rates of addition when sludge is used in agriculture

Metal	Soil Limited Value (mg kg ⁻¹ ds)				Maximum average annual rate of PTE addition over a 10 year period (kg ha ⁻¹ yr ⁻¹)	Proposed EC limit values #	
	pH 5<-5.5	pH 5.5<-6	pH 6<-7	pH>7		Annex III	Long Term
Zn	200	250	300	450	15	2500	1500
Cu	80	100	135	200	7.5	1000	600
Ni	50	60	75	110	3	300	100
For pH 5.0 and above							
Cd		3			0.15	10	2
Pb		300			15	750	200
Hg		1			0.1	10	2
Cr		400 ²			15 ²	1000	600
Mo ¹		4			0.2		
Se ¹		3			0.15		
As ²		50			0.7		
F ¹		500			20		

¹ These parameters are not subject to the provisions of Directive 86/278/EEC but are in the DoE Code of Practice

² Provisional

3rd Draft Directive



Crop Requirement

Depending on soil type, ground conditions, climate etc, short rotation coppice can typically remove:-

- 170kg nitrogen/ha/annum
- 45kg phosphorus/ha/annum
- 30kg potassium/ha/annum

Willow typically removes heavy metals according to the concentration in which they occur in the soil.



The Benefits of Recycling Sewage Sludge to Willow Coppice

- Crop can receive sludge when other agricultural crops are inaccessible
- Sludge is a nutrient source, improving crop yield
- High growth rate of willow provides frequent nutrient removal
- Sludge use in renewable fuel crop has environmental benefits
- Sewage Sludge is an energy neutral source of nutrients, unlike inorganic fertilisers

