

**JUNE 2011 – UPDATE ON PLANT AND VEGETABLE UPTAKE OF SLUDGE BIOSOLIDS POLLUTANTS and PATHOGENS FROM RECLAIMED SEWAGE EFFLUENT USED FOR IRRIGATION:**

**PLEASE NOTE it is common practice to use treated sewage effluent “wastewater” to irrigate food crops**

**<http://www.fao.org/docrep/T0551E/t0551e0b.htm>**

“Beneficial use of wastewater has been practised in *California* since the 1890s, ... Reclaimed wastewater use for spray *irrigation of food crops* must be at all ..... *treated wastewater for food crop irrigation* is safe and acceptable. ... “

**however:**

**<http://www.geoflow.com/wastewater/pathogens.htm>**

**PATHOGENS IN RECLAIMED WATER**

**M. V. Yates    University of California Riverside**

The need to conserve water has resulted in an increase in the use of treated sewage effluent, or reclaimed water, for many non-potable purposes. However, reclaimed water may contain potentially harmful contaminants with which the user must be familiar in order to minimize detrimental environmental or human health effects. The focus of this paper is on human pathogenic (disease-causing) microorganisms that may be present in reclaimed water.

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**THIS STUDY DEALS WITH COW MANURE AS FERTILIZER – BUT THE CONCEPT IS THE SAME – UPTAKE OF PATHOGENS (FROM MANURE OR SLUDGE OR CONTAMINATED IRRIGATION WATER) INTO PLANT AND VEGETABLE TISSUE:**

## Potential Uptake of *Escherichia coli* O157:H7 from Organic Manure into Crisphead Lettuce

Gro S. Johannessen,<sup>1,3\*</sup> Gunnar B. Bengtsson,<sup>2</sup> Berit T. Heier,<sup>1</sup> Sylvia Bredholt,<sup>2</sup> Yngvild Wasteson,<sup>3</sup> and Liv Marit Rørvik<sup>1,3</sup>

National Veterinary Institute, P.O. Box 8156 Dep, 0033 Oslo, Norway,<sup>1</sup> Matforsk—Norwegian Food Research

The transmission of *Escherichia coli* O157:H7 from manure-contaminated soil and irrigation water to lettuce plants was demonstrated using laser scanning confocal microscopy, epifluorescence microscopy, and recovery of viable cells from the inner tissues of plants. *E. coli* O157:H7 migrated to internal locations in plant tissue and was thus protected from the action of sanitizing agents by virtue of its inaccessibility. **Experiments demonstrate that *E. coli* O157:H7 can enter the lettuce plant through the root system and migrate throughout the edible portion of the plant.**

We investigated whether *E. coli* O157:H7 associated with contaminated manure **or irrigation water** can be transported from the root system into the edible portion, putatively by the plant vascular system. In this study, we demonstrated the transmission of *E. coli* O157:H7 to lettuce plants from contaminated manure **incorporated into the soil.** **Furthermore, the contamination of lettuce through flood irrigation with contaminated water was demonstrated.** *E. coli* O157:H7 expressing green fluorescent protein (GFP) was used to facilitate detection of the target organism in association with lettuce tissue.

## HOSPITAL SEWAGE WASTES:

### Abstract

The aim of the study is the evaluation of resistance patterns of *E. coli* in wastewater treatment plants without an evaluation of basic antibiotic resistance mechanisms.

Investigations have been done in sewage, sludge and receiving waters from three different sewage treatment plants in southern Austria. A total of 767 *E. coli* isolates were tested regarding their resistance to 24 different antibiotics. **The highest resistance rates were found in *E. coli* strains of a sewage treatment plant which treats not only municipal sewage but also sewage from a hospital.**

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<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC126537/>

### **Transmission of *Escherichia coli* O157:H7 from Contaminated Manure and **Irrigation Water** to Lettuce Plant Tissue and Its Subsequent Internalization**

Ethan B. Solomon, Sima Yaron, and Karl R. Matthews\*

Department of Food Science, Rutgers University, New Brunswick, New Jersey 08901

The transmission of *Escherichia coli* O157:H7 from manure-contaminated soil and irrigation water to lettuce plants was demonstrated using laser scanning confocal microscopy, epifluorescence microscopy, **and recovery of viable cells from the inner tissues of plants. *E. coli* O157:H7 migrated to internal locations in plant tissue and was thus protected from the action of sanitizing agents by virtue of its inaccessibility.** Experiments demonstrate that *E. coli* O157:H7 can enter the lettuce plant through the root system and migrate throughout the edible portion of the plant.

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<http://www.sciencemediacentre.co.nz/2011/06/03/experts-respond-german-e-coli-worse-than-thought/>

***E. coli* sticks to plant material** Scientists in Birmingham and London have shown that the enteroaggregative strain binds to salad leaves ( Environmental Microbiology Reports (2009) 1(4), 234-239). Thus, it would be very wise to avoid

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raw leaves. *NOTE – There are some nice photos of the bacterium sticking to leaves in that article.*

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<http://www.sciencedirect.com/science/article/pii/004896979290258T>

## **Organic chemicals entering agricultural soils in sewage sludges: screening for their potential to transfer to crop plants and livestock**

References and further reading may be available for this article. To view references and further reading you must view this article

**S.R. Wild<sup>a</sup> and K.C. Jones<sup>a</sup>**

<sup>a</sup>Institute of Environmental and Biological Sciences, Lancaster University, Lancaster LA1 4YQ, United Kingdom

Available online 26 June 2003.

### Abstract

This paper presents a review and assessment of the pathways and transfers of organic contaminants applied to agricultural soils in sewage sludge. The purpose of the assessment has been to develop a simple screening approach to highlight different chemical fates of organic chemicals in soil and their potential transfers from soil to groundwaters, **crop plants and grazing livestock** using data on the physico-chemical properties of the compounds of interest. The fate of 46 compounds known to be present in sewage sludges are compared to illustrate the applicability of the procedure. Compounds are screened for their potential to adsorb, volatilise, degrade and leach in **soils and to be transferred to plants via retention by root surfaces, root uptake and translocation and foliar uptake and to transfer to animal tissues via soil and herbage ingestion.** Recommendations for experimental and field studies are made. It is envisaged that this screening approach can be applied to other chemicals and that it will focus research and aid risk assessments of organic compounds in sewage sludge following land application.

**Keywords: sewage sludge; organic compounds; environmental fate**

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US EPA - PATHOGENS IN SLUDGE BIOSOLIDS DOCUMENT 2011

<http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=231964#Download>

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Chale-Matsau J.R. and H.G. Snyman. 2006. The survival of pathogens in soil treated with wastewater sludge and in potatoes grown in such soil. Water Sci. Technol, 54(5):269–277. (Chale-Matsau and Snyman, 2006, 459031)

”Other than E. agglomerans, all the other species identified were found to be mainly either plant or soil pathogens. The E. agglomerans are not primary pathogens but secondary opportunistic pathogens, particularly in immunocompromised individuals. These results suggest that growing high risk crops using wastewater sludge contaminated soil may lead to limited infestation of produce with primary pathogens. “

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from Maureen Reilly:

AUSTRALIA

<http://www.dailytelegraph.com.au/news/experts-warn-consumers-to-wash-sewage-farm-produce/story-e6freuy9-1226064803426>

**Experts warn consumers to wash sewage farm produce**

**Jane Hansen**

**From: The Sunday Telegraph**

**May 29, 2011**

**HEALTH** authorities have warned consumers to wash their fruit and vegetables after acknowledging that recycled human waste is being used as fertiliser on farms.

**The Sunday Telegraph has obtained a video proving biosolids, the controversial recycled human waste linked to gastrointestinal bugs, is being used on dairy farms and sugar cane crops throughout NSW and Queensland.**

**"We were told this blastocystis could not survive biosolid processing; (The Sunday Telegraph) report proves that is untrue and there needs to be an independent and complete analysis," Dr Phelps said."**

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<http://www.bloggernews.net/126578>

**Statistics on Food-borne Related Illnesses and Death Caused by Salmonella, E. Coli, Listeria, Toxoplasma, Campylobacter Bacteria, Calicivirus, or Norwalk-like Virus Emanating from Factory Farms (CAFOs), Genetically Modified Foods from Monsanto and the Poor Processing of Food in America**

### **Excerpts:**

**"According to WHO, the list is expanding. Most are infections which are caused by a variety of microorganisms, viruses, bacteria, parasites, protozoa, worms and prions that can be found in the food. The most significant of the new agents may be "prions" which have been linked to the cause of mad cow diseases. There has been an increase in known, unknown, infectious and noninfectious illnesses, including E. coli infections. "**

**"Now Salmonella can be found intact inside perfectly normal looking Grade A eggs. Current strains silently infect the ovaries of healthy looking hens. Eggs are contaminated even before the shells are formed. Infected hens can lay many normal eggs while only occasionally laying contaminated eggs. Raw or half-cooked eggs from factory farms are now detrimental to your health. "**

**“It is no longer safe to handle the factory farmed meats you bring home without carefully washing your hands. You may consider wearing gloves while handling any raw meat from a factory farm. Butchers and other meat preparers almost always wear them. “**

**“But the one common thread is the oral-fecal route of passing the illnesses to humans. “**

**“Human waste, on the contrary, is treated to reduce contamination in sewerage plants before disposal. “**

**(comment: Bull ! EPA allows land applied class B sewage sludge to contain 2 million colony forming units of fecal coliform per gram of total solids, dry weight - the presence of easy-to-kill fecal coliform indicates the presence of other more virulent pathogens. . . ) “**

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<http://www.inpharm.com/news/157481/uptake-pharma-chemicals-crops-environmental-concern>

## **Uptake of pharma chemicals by crops "an environmental concern"**

**Published on 24/05/11 at 08:50am**

Excerpts . . . pharmaceutical and personal care product (PPCP) chemicals.

**“Chemicals which enter the environment in the wastewater of pharmaceutical production facilities can be taken up by crops and other plant species and are a "real concern", according to researchers in China and the USA. “**

**“Previous research suggests that many PPCPs are not removed efficiently from wastewater using typical treatment processes and - because effluents and sewage sludge are commonly re-used as irrigation water, contaminants are introduced to the terrestrial environment.”**

**“A key cause for concern is recent research indicating that current pharmaceutical manufacturing practices can result in pharmaceutical concentrations one to three orders of magnitude higher than concentrations typically detected in wastewater treatment plant effluent, they noted.**

Water from pharma production facilities **should be treated separately** and not combined with municipal wastewater at standard treatment plants, they recommend “

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