

Wastewater quality guidelines for agriculture use

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In the past, wastewater treatment has been widely adopted as the major control measure in controlled effluent use schemes, with crop restriction being used in a few notable cases. A more integrated approach to the planning of wastewater use in agriculture will take advantage of the optimal combination of the health protection measures available and allow for any soil/plant constraints in arriving at an economic system suited to the local socio-cultural and institutional conditions.

Health protection measures which can be applied in agricultural use of wastewater include the following, either singly or in combination:

- Wastewater treatment
- Crop restriction
- Control of wastewater application
- Human exposure control and promotion of hygiene

A WHO (1989) Technical Report on 'Health Guidelines for the Use of Wastewater in Agriculture and Aquaculture' discusses the integration of the various measures available to achieve effective health protection. To achieve greater flexibility in the use of wastewater application as a health protection measure, irrigation systems must be developed to be capable of delivering low quality wastewater and restrictions on irrigation

Table 1 : Recommended microbiological quality guidelines for wastewater use in agriculture^a

Category	Reuse condition	Exposed group	Intestinal nematodes ^b (arithmetic mean no. of eggs per litre ^c)	Faecal coliforms (geometric mean no. per 100 ml ^c)	Wastewater treatment expected to achieve the required microbiological quality
A	Irrigation of crops likely to be eaten uncooked, sports fields, public parks ^d	Workers, consumers, public	< 1	< 1000 ^d	A series of stabilization ponds designed to achieve the microbiological quality indicated, or equivalent treatment
B	Irrigation of cereal crops, industrial crops, fodder crops, pasture and trees ^e	Workers	< 1	No standard recommended	Retention in stabilization ponds for 8-10 days or equivalent helminth and faecal coliform removal
C	Localized irrigation of crops in category B if exposure of workers and the public does not occur	None	Not applicable	Not applicable	Pretreatment as required by the irrigation technology, but not less than primary sedimentation

^a In specific cases, local epidemiological, socio-cultural and environmental factors should be taken into account, and the guidelines modified accordingly.

^b *Ascaris* and *Trichuris* species and hookworms.

^c During the irrigation period.

^d A more stringent guideline (<200 faecal coliforms per 100 ml) is appropriate for public lawns, such as hotel lawns, with which the public may come into direct contact.

^e In the case of fruit trees, irrigation should cease two weeks before fruit is picked, and no fruit should be picked off the ground. Sprinkler irrigation should not be used.

Source: WHO (1989)

technique and crops irrigated must become more common.

Human exposure control:

Of the health protection measures mentioned above, only human exposure control is not dealt with in greater depth. The objective with this approach is to prevent the population groups at risk from coming into direct contact with pathogens in the wastewater or to prevent any contact with the pathogens leading to disease. Four groups are at risk in agricultural use of wastewater:

- agricultural workers and their families
- crop handlers
- consumers of crops, meat and milk
- those living near the areas irrigated with wastewater and different methods of exposure control might be applied for each group.

Control measures aimed at protecting agricultural field workers and crop handlers include the provision of protective clothing, the maintenance of high levels of hygiene and immunization against (or chemotherapeutic control of) selected infections. Examples of these measures are given in the WHO (1989) Technical Report mentioned. Risks to consumers can be reduced through cooking the agricultural produce before consumption and by high standards of food hygiene, which should be emphasized in the health education associated with wastewater use schemes. Local residents should be kept fully informed on the use of wastewater in agriculture so that they, and their children, can avoid these areas. Although there is no evidence to

suggest that those living near wastewater-irrigated fields are at significant risk, sprinklers should not be used within 100 m of houses or roads.

Special care must always be taken in wastewater use schemes to ensure that agricultural workers or the public

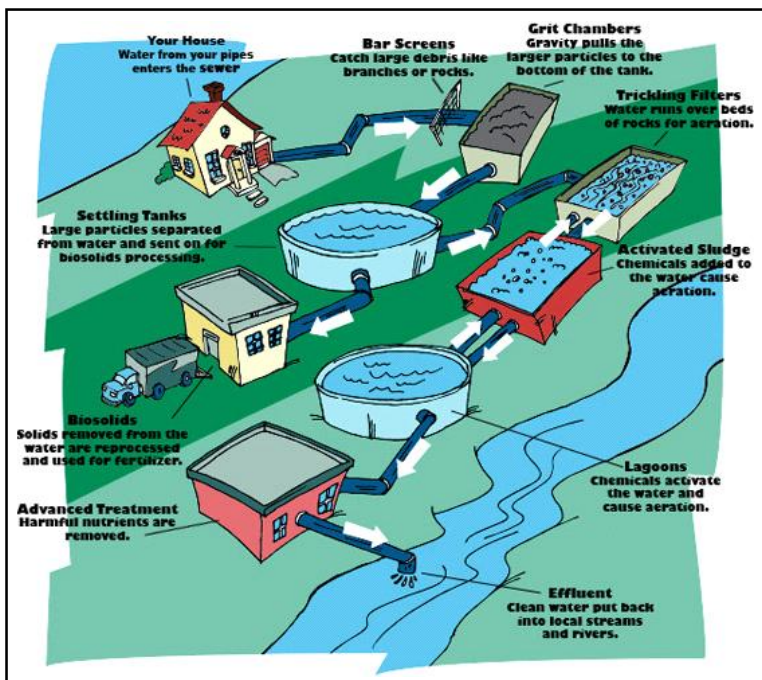
do not use wastewater for drinking or domestic purposes by accident or for lack of an alternative. All wastewater channels, pipes and outlets must be clearly marked and preferably painted a characteristic colour. Wherever possible, outlet fittings should be designed/selected so as to prevent misuse.

Effluent quality guidelines for health protection:

Following several meetings of environmental specialists and epidemiologists, a WHO Scientific Group

on Health Aspects of Use of Treated Wastewater for Agriculture and Aquaculture arrived at the microbiological quality guidelines for wastewater use in agriculture shown in Table 1. These guidelines were based on the consensus view that the actual risk associated with irrigation with treated wastewater is much lower than previously thought and that earlier standards and guidelines for effluent quality, such as the WHO (1973) recommended standards, were unjustifiably restrictive, particularly in respect of bacterial pathogens.

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