

# Requirements for water reuse in agriculture

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## Challenges

Water reuse for agricultural irrigation has to consider preservation of human health, soil, groundwater and plants. To this purposes the relevant hygienic (mainly indicator organisms) and chemical requirements (mainly salinity, nutrients, heavy metals and organic compounds) need to be classified and assessed.

An irrigation with treated wastewater therefore should always be demand-oriented in order to prevent contamination of ground water. In contrast to the availability of wastewater all year round, there is only seasonal need for irrigation water. Therefore, a short or long term water storage in a reservoir or alike becomes necessary. Another possibility for storage is the groundwater enrichment with treated wastewater and subsequent extraction for agricultural irrigation (see separate factsheet about groundwater enrichment).

## Selected precautionary approach for the agricultural sector

The quality parameters were selected in order to meet the requirements for the irrigation of plants of middle to high salt and boron tolerance (e.g. sugar beets or some varieties of cereals). At low concentration boron is essential for plant growth but it can be toxic at higher concentration. In addition, the respective hygienic quality requirements were defined to ensure that the treated wastewater can be used for irrigation of non-food crops (e. g. fibre and energy plants).

Furthermore, the international and EU hygienic requirements were defined that the water is suitable for the irrigation of food crop that is being processed, as well as for food crop that is suitable for being eaten raw. There are some irrigation limitations though (see below).

## Important regulations/laws/guidelines

### Germany

So far there are no explicit laws or directives in Germany or the EU that regulate the water reuse of treated wastewater for agricultural purposes. In Germany a lot



Figure 1: Irrigation of a potato field (Source: AnRo0002, Wikimedia Commons)

of aspects are regulated in the following laws, regulations or standards (table 1):

Table 1: Relevant guidelines and standards for Germany

Surface water directive (Environmental quality standard)
Water resources act
Drinking water directive
Waste water directive
Groundwater directive
De minimis thresholds – groundwater
DIN 19684-10 „Analysis and assessment of water for irrigation measures“ (Analysis of irrigation water, effects on plants and soil)
DIN 19650 „Irrigation – hygienic aspects of irrigation water“ (Definition of suitability classes)
Recommendations of the Thuringian Regional Institute for Agriculture (Thüringer Landesanstalt für Landwirtschaft) „Irrigation quality – hygienic and chemical aspects“

## EU and international

On an international level different approaches for the minimization of the health risk and a multitude of different national rules have been established. These follow mainly the policy documents of the World Health Order (WHO), the Food and Agriculture Organization of the United Nations (FAO) as well as the Australian guidelines and those of the U.S. Environmental Protection Agency (US-EPA). EU guidelines that are relevant for single aspects of water reuse for agricultural purposes as well as internationally relevant standards are given in table 2:

Table 2: Relevant guidelines and standards for the EU and internationally

Relevant guidelines for the EU
Water Framework Directive 2000/60/EC
Surface water directive (2008/105/EG) with environmental quality standards
JRC-Draft: European Commission – Joint Research: Development of minimum quality requirements for water reuse in agricultural irrigation and aquifer recharge Draft V.3.3. (June 2017)
Urban Waste Water Treatment Directive 91/271/EEC
Groundwater Directive 2006/118/EC
International guidelines and standards
FAO: FAO (1985). Water Quality for Agriculture. FAO Irrigation and Drainage Paper 29, rev. 1. Food and Agriculture Organization of the United Nations, Rome, Italy.
WHO: World Health Organization (2006) Guidelines for the Safe Use of Wastewater, Excreta and Greywater. Geneva, Switzerland.
US EPA: US EPA (2012) Guidelines for Water Reuse 2012. Report EPA/600/R-12/618.
Australia: NWQMS (2006) Australian Guidelines for Water Recycling, National Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1).

- The EU water framework directive aims at the protection of surface- and groundwater. The chemical and ecological state of surface water, or the chemical state of groundwater should not be negatively affected. This has to be ensured when using treated wastewater for irrigation.
- The EU groundwater directive requests that leaching of dangerous substances into the groundwater is avoided, resp. minimized.
- The EU Urban Waste Water Treatment Directive implies that wastewater has to be reused whenever possible while restricting environmental pollution to a minimum.