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# Guidelines for treated wastewater use for irrigation projects —

## Part 6: Fertilization

*Lignes directrices pour l'utilisation des eaux usées traitées en irrigation —*

*Partie 6: Fertilisation*

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# Contents

Page

**Foreword** ... **iv**
**Introduction** ... **v**
**1 Scope** ... **1**
**2 Normative references** ... **1**
**3 Terms and definitions** ... **1**
**4 Source of macronutrients and trace elements in TWW** ... **2**
4.1 General ... 2
4.2 Nitrogen (N) ... 2
4.3 Phosphorus (P) ... 2
4.4 Potassium (K) ... 3
4.5 Trace elements ... 3
**5 Concentration of macronutrients at various levels of wastewater treatment** ... **3**
**6 Nutrient cycle and reactions in soil** ... **4**
6.1 General ... 4
6.2 Nitrogen ... 4
6.3 Phosphorus ... 6
6.4 Potassium ... 7
6.5 Micronutrients ... 7
**7 Fertilizer requirements** ... **8**
7.1 Nutrient requirement by crops ... 8
7.2 Soil fertility assessment ... 9
**8 Calculation of nutrient contribution by TWW** ... **9**
8.1 General ... 9
8.2 Nitrogen ... 10
8.3 Phosphorus ... 10
8.4 Potassium ... 11
**9 Scheduling of nutrient supply rate by TWW according to crops' needs** ... **11**
9.1 Growth season total nutrient application ... 11
9.2 The distribution of nutrient application throughout the irrigation season ... 11
**10 Adjusting fertilizers for use with TWW** ... **13**
**11 Combining organic amendments and fertilizers in plots irrigated with TWW** ... **14**
**12 Monitoring in the context of nutrient value of TWW** ... **14**
12.1 Water monitoring ... 14
12.1.1 Sampling ... 14
12.1.2 Analysis ... 16
12.2 Soil ... 16
12.2.1 Soil sampling ... 16
12.2.2 Frequency of the soil sampling ... 17
12.2.3 Sampling procedure ... 17
12.2.4 Sample preparation ... 17
12.2.5 Soil test methods ... 17
12.2.6 Suction cups ... 17
12.3 Plants ... 18
12.3.1 General ... 18
12.3.2 Frequency of monitoring ... 18
**13 Short guide to schedule fertilization in plots irrigated with TWW** ... **18**
**Bibliography** ... **20**

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# Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 282, *Water reuse*, Subcommittee SC 1, *Treated wastewater reuse for irrigation*.

A list of all parts in the ISO 16075 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.


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# Introduction

Treated wastewater (TWW) contains nutrients that are essential for the proper development of various crops irrigated with it, but can also have a detrimental effect on crops, soil, natural water sources and the environment in general.

There are several reasons why it is critical to optimize TWW and additional amendments (e.g. manure, sludge, synthetic fertilizers):

— Using excessive quantities is costly and wasteful.

— Leaching excess nutrients that the crops do not utilize can pollute groundwater and add additional treatment costs and health risks to drinking water supplies.

— Climate change phenomena that cause drought or storm cycles can overwhelm infiltration capacity and runoff to pollute streams and waterways.

— Phosphorus excess in diffuse or point source runoff causes eutrophication of water bodies and upsets the balance in wetlands and other valuable environmental resources.

— Current scientific knowledge, as provided in this document, enables users to balance nutrients and forecast their impact more accurately to enhance crops and their profitability.

Thus, it is very important to create a plan of the types and amounts of fertilizers that should be added to various crops, taking into account the amounts of nutrients that already exist in the TWW that is used to irrigate the crops.

The concentration of nutrients found in TWW depends, among other things, on the source of the wastewaters and on the level of treatment given to the wastewater, with concentration decreasing at each stage, in the initial, secondary, tertiary and advanced treatment stages.

The fertilization plans of the various crops should take into consideration the nutritional value found in TWW, with awareness that, along with the positive contribution of the nutrients in TWW, there are other aspects that should be considered when developing the fertilization plans, such as:

— the total amount of each nutrient applied during an irrigation season;

— synchronization between nutrient application with TWW irrigation and crop needs;

— availability of nutrients to the crops according to the chemical forms existing in TWW, in comparison with nutrient availability in inorganic fertilizers.

Understanding all these factors will contribute to reducing or eliminating the negative effects that excess nutrients can produce on soils, crops, natural water sources and the environment, adjusting or reducing the amounts of nutrients supplied to the various crops by inorganic fertilizers. The fertilization programme should also take into account nitrogen and phosphorus from other sources that crops can use, such as soil or crop residue.

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# Guidelines for treated wastewater use for irrigation projects —

# Part 6: Fertilization

## 1 Scope

This document provides guidelines for the evaluation of the fertilizer value of treated wastewater (TWW) at different treatment levels, for an effective fertilization of crops irrigated with TWW. This document covers:

— evaluation of the nutrient quantities provided by TWW and the synchronization between crop needs and the nutrients applied with TWW;

— availability of nutrients to crops irrigated with TWW;

— monitoring nutrients in water, soil and crops irrigated with TWW;

— matching between TWW quality and fertilizer properties.

Risk assessment and risk management for the safe use of TWW in irrigation projects are addressed in ISO 20426[1] and ISO 16075-2[2].

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20670, *Water reuse — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20670 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

**3.1**
**denitrification**
reduction of nitrate and/or nitrite to nitrogen or dinitrogen monoxide, usually by the action of bacteria

[SOURCE: ISO 6107:2021, 3.160[3]]

**3.2**
**micronutrients**
elements which are required by plants in only very small amounts

Note 1 to entry: Although these are present in plants at very low rates, such macronutrients as nitrogen and potassium, they are essential for normal plant growth.

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