Mini Review
Volume 11:12, 2022

Irrigation & Drainage Systems Engineering

ISSN: 2168-9768 Open Access

Control of Irrigation for Greenhouse Vegetable Crops in Europe

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Abstract

The majority of vegetables grown in greenhouses in Europe are grown in soil. Where soilless frameworks are utilized, aside from in The Netherlands, Belgium and France, they are generally free-depleting frameworks, in which supplement arrangements are not recycled. Large losses in nitrate (NO^3) leaching are common in free-draining soilless systems as well as soil-grown ones. Water system is a significant contributing element to NO^3– draining misfortune. To lessen the significant nitrogen loss to surface and subterranean water bodies, irrigation management of greenhouse vegetable crops must be improved. In order to maximize irrigation management of both soil-grown and soilless vegetable crops grown in greenhouses, this article examines the most recent methods and tools currently in use or in development. The FAO56 method for calculating crop water requirements is reviewed in light of its adaptations to cropping cycles and greenhouse conditions. The Penman–Monteith FAO56 equation as well as simpler equations for calculating reference crop evapotranspiration (ETO) and crop coefficient (Kc) values under greenhouse conditions, where cropping cycles may differ significantly from those of outdoor crops, are the subjects of this study. The different classes of soil/substrate dampness sensors that have been utilized in nursery crops are explored, with respect to their overall reasonableness and down to earth use. The effects of salinity and the use of some sensors to measure the salinity of the growing media are also taken into consideration, as are their applications in substrate and soil.

Keywords: Agricultural water • Electrical conductivity • Agricultural management schemes

Introduction

In a greenhouse, the application of various plant sensors to vegetable crops is discussed. The survey's findings on the use of various irrigation management techniques and irrigation systems for both soil-based and soilless production of greenhouse vegetable crops in Europe are presented. Following the revision of this information, suggestions are made regarding the available tools and technologies' scientific and practical value in assisting greenhouse vegetable crop growers in optimizing irrigation management. The production of vegetables in greenhouses frequently results in significant nitrate (NO^3) leaching and NO^3 contamination of aquifers. Growers of vegetables are under increasing social and legislative pressure to lessen the loss of NO^3-leaching and other nutrients to water bodies. NO^3 leaching is largely caused by excessive irrigation. For greenhouse vegetable production to significantly reduce NO^3 contamination of aquifers, optimal irrigation management is required. To significantly improve greenhouse vegetable production's water productivity (or water use efficiency), optimal irrigation management is required. Considering the increasing scarcity of fresh water resources in many of the regions of Europe where greenhouse vegetable production is concentrated, such as southern Europe, this is especially significant [1,2].

Discussion

Over the most recent thirty years, the reception of specialized improvements has added to diminish supplement draining misfortune from European nursery vegetable creation. Dribble and sprinkler water system are presently standard procedures. The excessive irrigation that is typically associated with surface irrigation systems has significantly decreased as a result of their widespread adoption in recent decades. In a similar vein, the use of soilless systems with nutrient solution recirculation in protected vegetable production has significantly reduced nutrient losses in northwest (NW) Europe, particularly in The Netherlands and Belgium. Irrigation of greenhouse vegetable crops, at least in southern Europe, typically exceeds crop requirements and is based on the experience of growers and advisors, despite these technical advancements providing a sound infrastructure. In order to ensure that greenhouse-grown vegetable crops receive the best irrigation possible for their crop- and site-specific requirements, effective and farmer-friendly management techniques and tools are required. Growers of greenhouse vegetables should be able to determine when and how much to irrigate with the help of these tools and methods. In recent years, a variety of strategies and tools designed to assist greenhouse vegetable growers have been developed and evaluated. These are categorized as (a) direct methods and (b) indirect methods, respectively. Climate-based indirect methods use equations to estimate the crop's atmospheric demand to anticipate irrigation needs or replenish soil and substrate reserves. The integration of these equations into automatic irrigation controllers, simulation models, decision support system (DSS) apps, and publicly accessible information provided by extension services are examples of practical applications. To help growers make decisions or automate irrigation, direct methods involve measuring a parameter. Soil and plant sensors, drainage trays, and weighing trays are the direct methods that have received the most attention and research. Utilizing biostimulants and beneficial as well as mulching, grafting, and other practices may also be beneficial [3-5].

Conclusion

The primary goal of this review is to provide an overview of the scientific studies that have been conducted on the tools and techniques that are available to optimize irrigation in European greenhouse vegetable crops in order to cut down on drainage losses, which are a factor in the contamination of natural

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Received: 02 December 2022, Manuscript No. idse-22-84118; **Editor assigned:** 05 December 2022, PreQC No. P-84118; **Reviewed:** 17 December 2022, QC No. Q-84118**; Revised:** 23 December 2022, Manuscript No. R-84118; **Published:** 31 December 2022, DOI: 10.37421/2168-9768.2022.11.362

water bodies. Moreover, this audit reports the consequences of a review led among specialized partners and scientists to grasp the level of execution of these strategies and devices in the main locales of nursery vegetable creation in Europe. The review is relevant to ornamental crops grown in greenhouses as well as vegetables grown in greenhouses.

Acknowledgement

None.

Conflict of Interest

None.

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How to cite this article: Zhou, Xunbo. "Control of irrigation for Greenhouse Vegetable Crops in Europe." Irrigat Drainage Sys Eng 11 (2022): 362.