WATER MANAGEMENT

Agricultural Drainage

AUTHORS & INSTITUTIONS

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SECTIONS

Section 1: Drainage

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INTRODUCTION

Efficient water management is crucial for agricultural productivity and environmental sustainability. This guide provides beginner farmers with a structured approach to understanding and implementing effective drainage systems, focusing on both surface and subsurface methods.

How to Get Started

Starting with drainage planning involves assessing your field's specific conditions, including soil type, topography, and existing water issues. Utilize the DrainTool and consult resources provided by Michigan State University's Biosystems & Agricultural Engineering Department to design a system tailored to your needs.

SECTION 1

DRAINAGE

Primary Considerations

Soil Type:

Determines how fast water can move through the soil and affects the choice of narrower or wider drain spacing.

- Soil with more clay content requires narrower drain spacing than a soil with more sand content.

Topography:

Influences water flow and drainage design.

- Water moves from high spots to low spots of the field. Drainage design should be in such a way to intercept the water movement downslope.

Crop Type:

Different crops have varying tolerance levels to water saturation.

- Field crops (corn, soybean, wheat) have a greater tolerance to water saturation than truck crops (fruits and vegetables). Thus, truck crops need narrower drain spacing than field crops to provide suitable crop growth conditions.

Environmental Impact:

Consider potential nutrient loss and implement practices to mitigate negative effects.

- Consider designing the system with a conservation-focused approach, allowing for future retrofitting with conservation drainage practices such as controlled drainage.

Process for Getting Started

Field Assessment:

Evaluate soil conditions, drainage classification, water issues, and crop requirements.

- Soils classified as somewhat poorly drained, poorly drained, or very poorly drained typically require subsurface drainage. In some cases, even moderately well-drained soils may benefit from drainage.
- Low yield areas on a yield map may indicate water stress in the crop, suggesting a potential need for subsurface drainage.

Design Selection:

Choose if you need subsurface drainage based on assessment.

Tool Utilization:

Use the DrainTool to get the optimum drain spacing.

Implementation:

Install the chosen drainage design with proper materials and techniques.

Maintenance:

Regularly check system performance.

Disclaimer: For a specific list of resources in the above description, view the Necessary Resources area of this section.

DRAINAGE

COMMON QUESTIONS

01 What is the difference between surface and subsurface drainage?

Surface drainage removes excess water from the soil surface, while subsurface drainage (tile drainage) removes water from the soil profile. In some cases, surface drainage complements subsurface drainage when the subsurface system alone cannot remove water quickly enough.

02 How does drainage affect crop yield?

Proper drainage can increase corn yields by 20% to 80%, with a payback period ranging from 2 to 6 years. Use the DrainTool to estimate the site-specific payback period based on your local conditions.

03 What are the environmental concerns associated with drainage?

Drainage can lead to nutrient loss, particularly nitrate and phosphorus, which may cause algae blooms in surface water.

04 How do I determine the appropriate drain spacing?

Use the DrainTool to calculate the optimal spacing that maximizes economic return on investment.

05 What maintenance is required for drainage systems?

Regular inspection for clogging, sediment buildup, and system performance is essential to ensure long-term effectiveness. For more information about maintenance requirement, see “Inadequate maintenance” heading on this webpage: https://www.canr.msu.edu/drainage/conventional-drainage/drainage-under-performance/index

RESOURCES & PARTNERS

Necessary Resources

www.canr.msu.edu/drainage

- **Tools:**

  Includes DrainTool, Drain Sedimentation Tool, and others.

- **Educational Publications:**

  Access bulletins and guides on drainage practices.

- **Workshops and Field Days:**

  Participate in events like the Drainage Workshop for hands-on learning.

Partners

- **Michigan State University Extension:**

  Provides research-based information and support.

- **USDA NRCS:**

  Offers technical and financial assistance for conservation practices.

- **Local Conservation Districts:**

  Assist with planning and implementing drainage conservation solutions.

- **Michigan Land Improvement Contractors of America:**

  For hiring a drainage contractor.