

Evaluating Cover Crops' Ability to Reduce Phosphorus Runoff through Meta-Analysis

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Clover cover crop - Dave Robison

Introduction



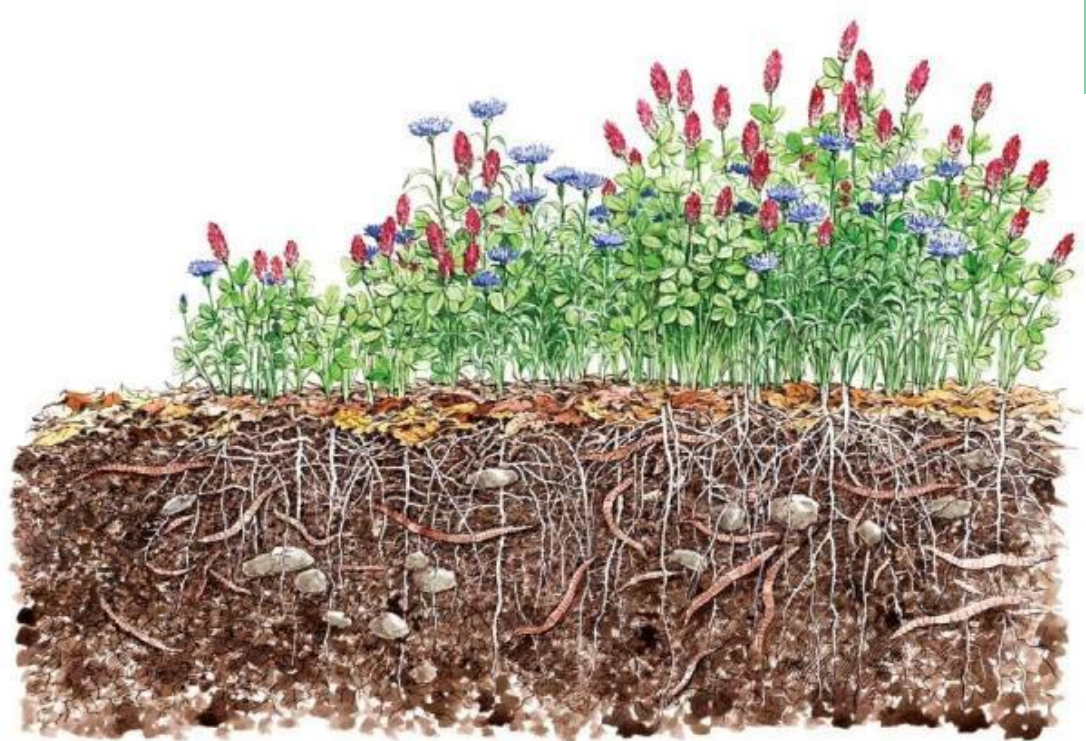
Blue-green algae - Vermont Department of Health



Toxic Algae in Missisquoi Bay - Seven Days

Cover Crops

1. Enhance soil structure
2. Increase soil organic matter
3. Improve pest management
4. Improve environmental quality



Cover crops - Elaine Sears

Research Question & Purpose

What is the efficacy of cover crops to reduce phosphorus loss from agricultural soil?

Important because...

- P is limiting factor for some watersheds EG. Lake Champlain
- Eutrophication is a growing problem
- Limited resources exist to combat it



Agricultural runoff - Pennsylvania State University

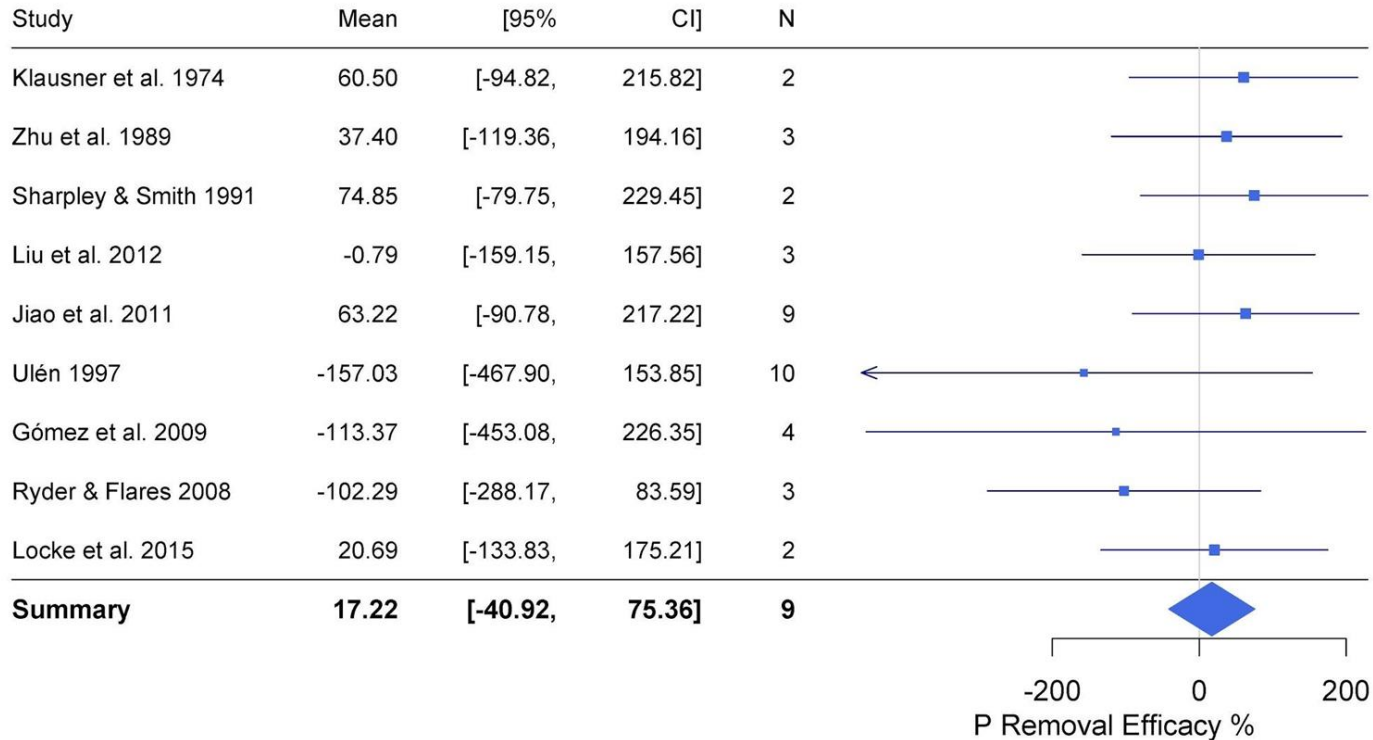
Methods

1. Conduct literature review
2. Record relevant study data points
3. Apply statistical analysis
4. Calculate P reduction efficacy

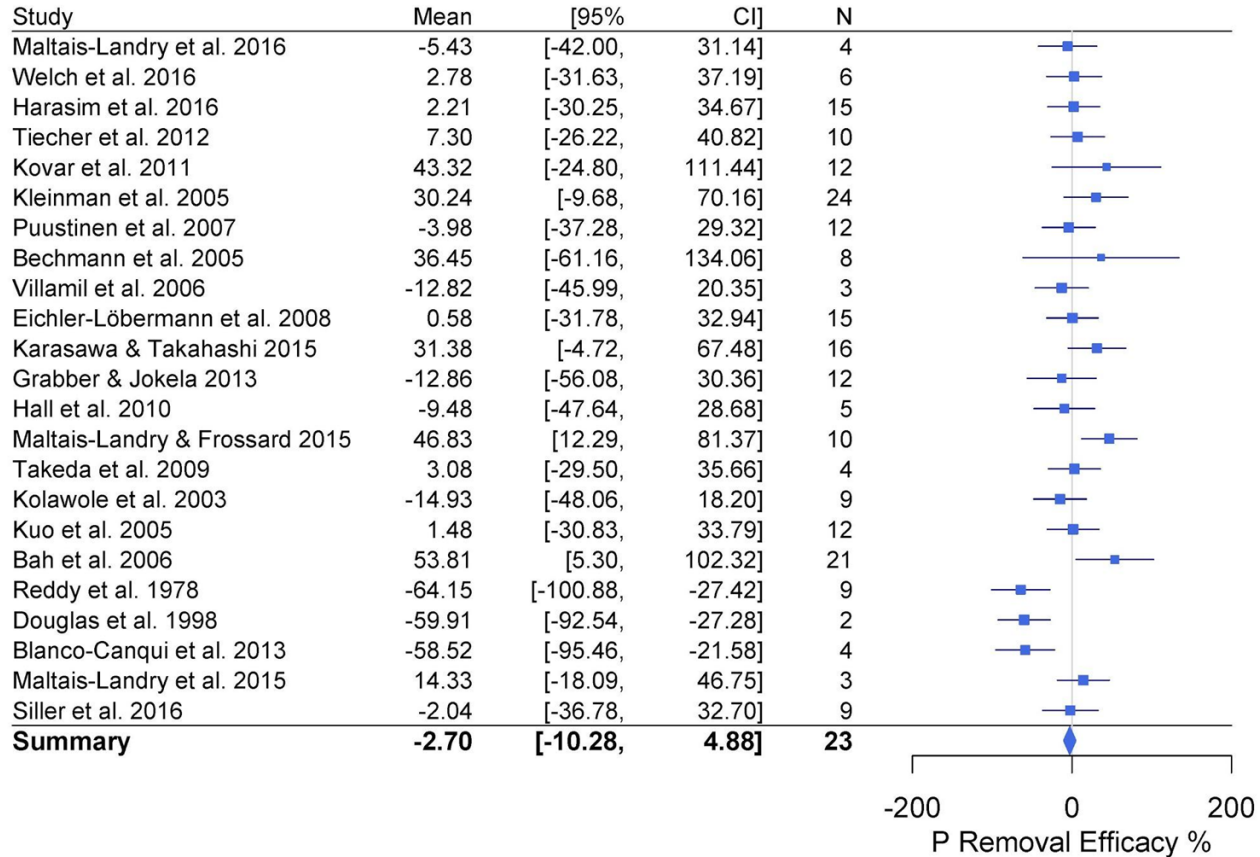
Efficacies varied greatly

Study	Measurement Method	P Type	E (%)
<u>Tiecher et al. 2012</u>	Soil	TP & SMBP	7.30%
Jiao et al. 2011	Runoff	TP, TDP, PP	63.22%
Kovar et al. 2011	Soil	TP & DRP	43.32%
Kleinman et al. 2005	Soil	<u>DRP</u>	30.24%
Puustinen et al. 2007	Soil	PP & DP	-3.98%
Ulén 1997	Runoff	TP	-157.02%
Gómez et al. 2009	Runoff	DP	-113.37%
Bechmann et al. 2005	Soil	TP & DRP	36.45%
Villamil et al. 2006	Soil	AP	-12.82%

Runoff Results



Soil Results



Discussion

- Effect sizes indicate that cover crops may reduce P loss
- However, results are **not statistically significant**
- Extreme weather events or increased rainfall may have affected studies in which P loss increased
- Soil may reach P saturation after many seasons
- Total P loss does not necessarily indicate increased eutrophication potential
 - Cover crops may reduce algae by utilizing bioavailable inorganic P

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Questions



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