Effects of Drainage Water Management on Crop Yield, Drainage Volume, and Nitrate Loss in Southeastern Iowa

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Introduction and Rationale

Subsurface drainage removes excess water from agricultural land especially during the rainy spring months when the timeliness of field operations, such as planting, are important.

The objective of this study was to determine the impact of shallow drainage(SD), controlled drainage (CD), conventional drainage (DD), and no drainage (ND) on crop yields, depth to water table, subsurface drainage volumes, and nitrate loss through subsurface drainage.

Experimental Procedure

This research was conducted at the Iowa State University Southeast Research Farm (SERF) located near Crawfordsville, Iowa. Each plot is planted so that half is in corn and half is in beans every year. There are two replications for every drainage treatment.

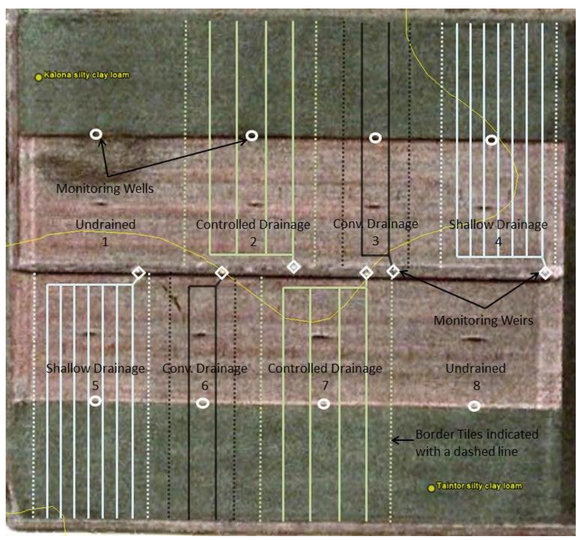
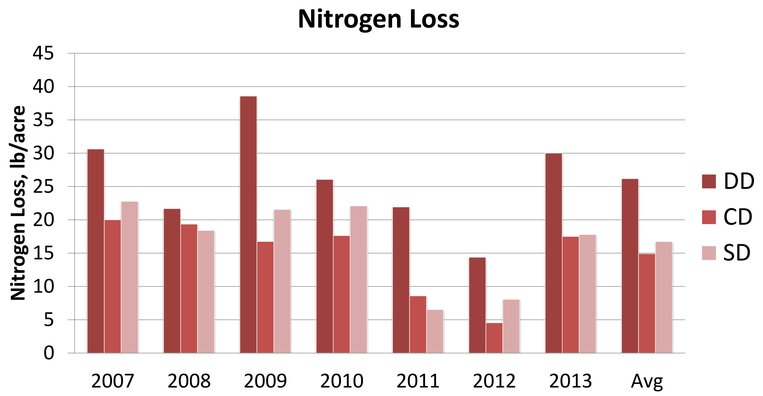
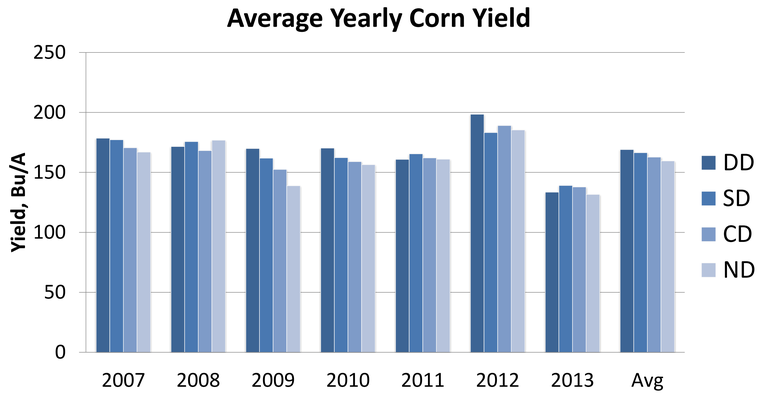
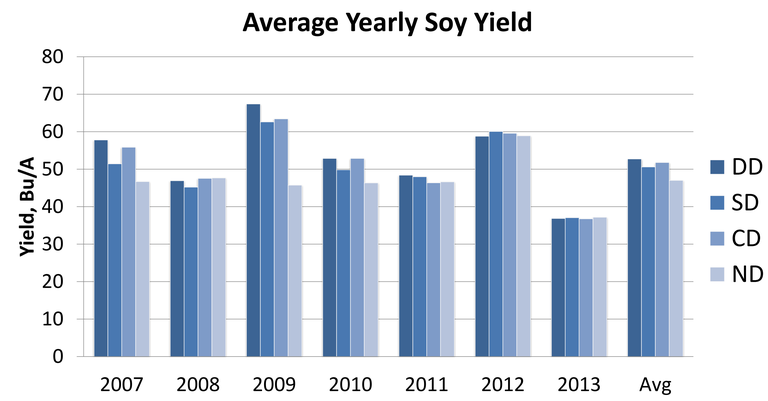


Figure 1: Drainage plot layout at SERF showing border tiles, monitoring wells, monitoring weirs, and crop rotation.

Results and Discussion







Results and Discussion

- CD and SD plots retained 20% more annual precipitation.
- CD and SD plots reduced N loss by 43 and 36%, respectively.
- On average, drainage increased corn yield by 10.5 bu/acre and 5.5 bu/acre for soy, but no difference was seen between drainage techniques.
- Drainage reduced the number of days during the growing season that the water table was within 1 ft of the ground surface (table below).

Drainage	2007	2008	2009	2010	2011	2012	2013
ND	2	7	46	38	1	6	19
SD	1	1	0	0	0	1	1
CD	0	0	0	0	0	1	0
DD	0	0	0	0	0	1	0

Conclusions

- DD plots drain more water and lose more N, which can negatively impact yield and cause downstream pollution.
- Draining agricultural land has the potential to increase yields, especially in wet years.
- ND plots tended to have a higher water table, which can cause excess plant water stress and decrease field trafficability.
- Therefore, drain water management, such as SD or CD, should be considered.

Acknowledgements

We would like to thank Myron Rees and the other employees of SERF for their work on this project.

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This research is part of a regional collaborative project supported by the USDA-NIFA, Award No. 2011-68002-30190 "Cropping Systems Coordinated Agricultural Project (CAP): Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems"
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