

USDA



The US Department of Agriculture

**USDA Perspective on Agricultural
Utilization of FGD Gypsum**



Related USDA Agencies

- Agricultural Research Service – research, technology transfer
- Cooperative State Research Education and Extension Services – (university system), research, education, extension, grants
- Farm Services Agency – assistance and financial resources to producers
- Natural Resources Conservation Service – technical assistance for producers, cost sharing, financial incentives, technology transfer

USDA Strategic Plan

- Protect and enhance the nation's natural resource base and environment
- Protect watershed health to ensure clean and abundant water
- Enhance soil quality to maintain productive working cropland for food, feed, fiber and energy production



Soil Degradation

- Accelerated soil erosion
- Loss of organic matter
- Soil compaction
- Soil acidification
- Buildup of sodium, other soluble salts, and toxic trace elements



Results of Soil Degradation

- Reduced crop yields
- Greater inputs required for crop production
- Greater risk of environmental damage



Water Quantity and Quality

- Competition for water resources
- Make more efficient use of existing water supplies
- Reuse of wastewater
- Prevent agricultural contaminants from moving to surface and ground water

Benefits of Agricultural, Municipal and Industrial Materials

- Improve soil properties for increased crop production and environmental protection
- Remove contaminants from runoff, drainage water and wastewater
- Provide lower-cost materials to agricultural producers
- Reduce energy use
- Enhance recycling

Agricultural Uses of FGD Gypsum



- Improve water infiltration, storage and use in soils
- Control soil erosion
- Remediate saline and sodic soils
- Nutrient source for crops
- Reduce movement of nutrients, sediment and agricultural chemicals to water and air

Research Activities

- Evaluate benefits and risks of materials for agricultural uses
- Develop and evaluate the effectiveness and economic benefits of management practices and control technologies to (1) improve soils for crop production and environmental protection and (2) remove agricultural contaminants from water

Research Activities

- Document the environmental benefits of the management practices and control technologies to support USDA Conservation Programs and Environmental Credit Trading
- Develop specific guidelines for uses of CCPs

Conservation Issues in the Southeastern US

- Southeastern U.S. has 25 million acres of crop and pasture land
- Many of the soils are of poor quality and highly susceptible to erosion
- Large number of water bodies in the region are impaired by contaminants (sediment, nutrients, agricultural chemicals)
- Many areas in the region are suffering from drought



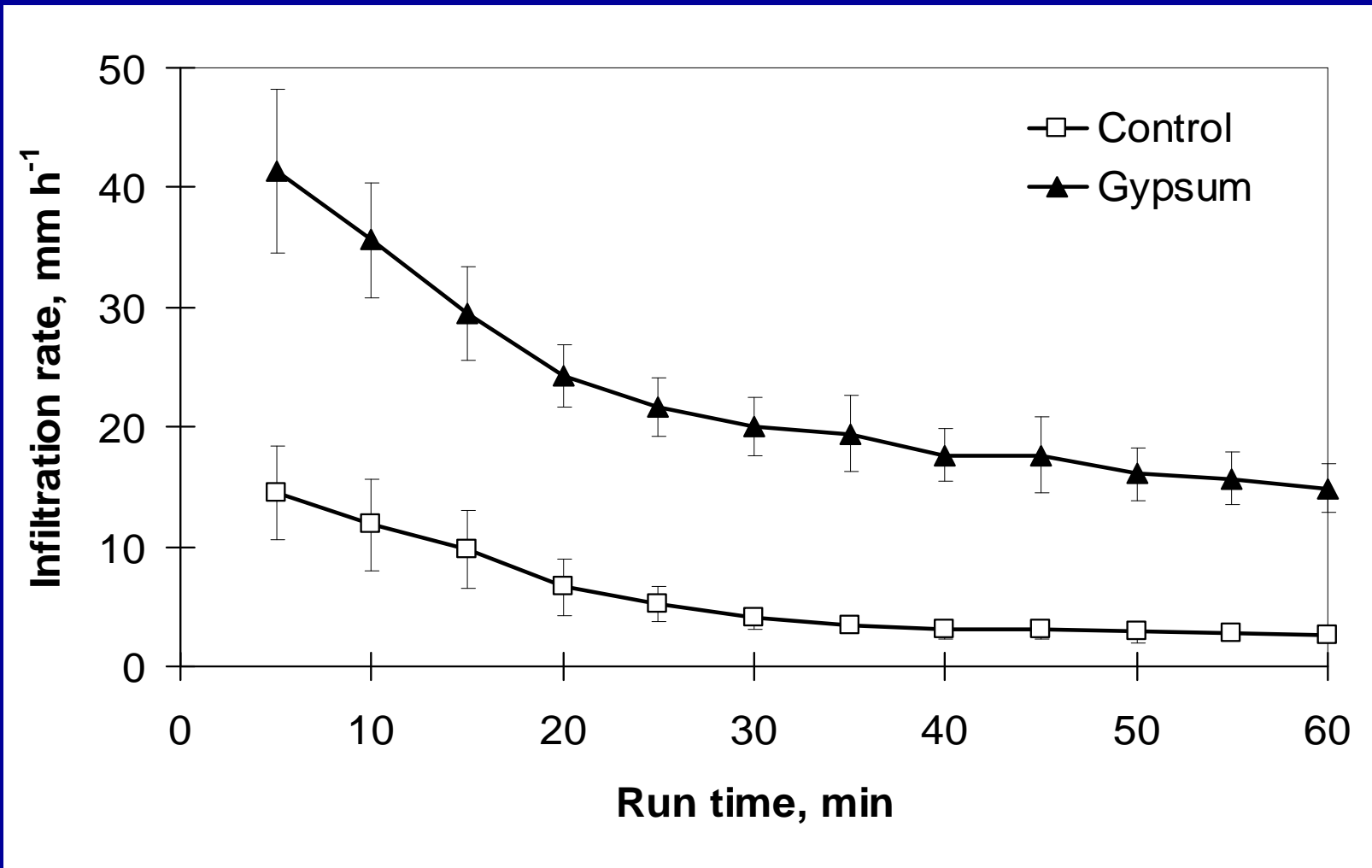
Soil surface sealing and crusting limit water infiltration and reduce seedling emergence

Influence of FGD gypsum applied at different rates, on the dispersion and flocculation of a soil.



0	3.36	6.72	13.44
Mg ha ⁻¹	Mg ha ⁻¹	Mg ha ⁻¹	Mg ha ⁻¹

Infiltration rate of water into soil with and without surface-applied gypsum



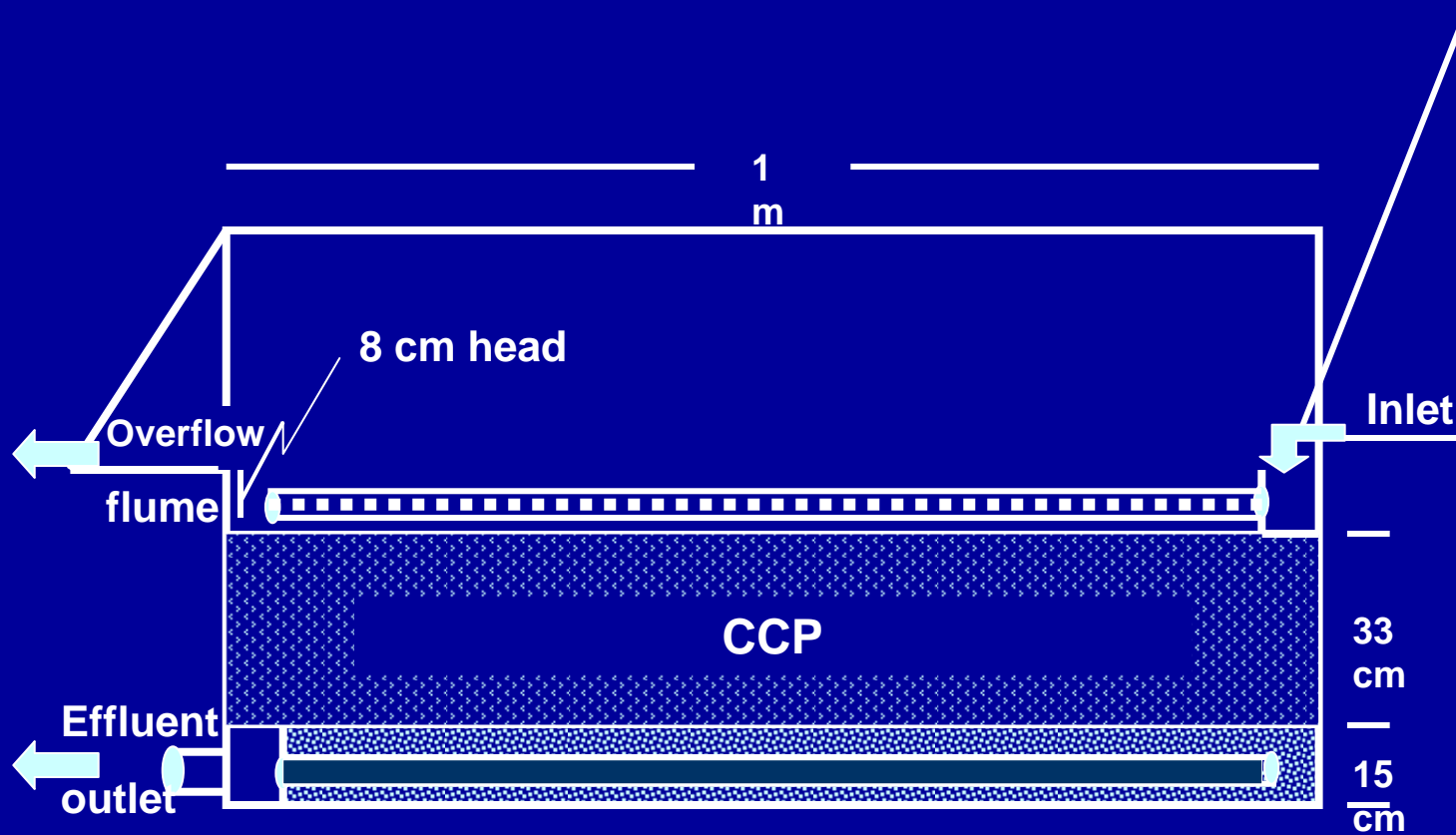
The effect of gypsum application on soil erosion

Gypsum added	Infiltration	Runoff	Soil Loss
Mg ha ⁻¹	mm	mm	Mg ha ⁻¹
0	7	50	20.9
3.36	13	44	12.0
6.72	21	36	8.2
13.44	24	32	5.4

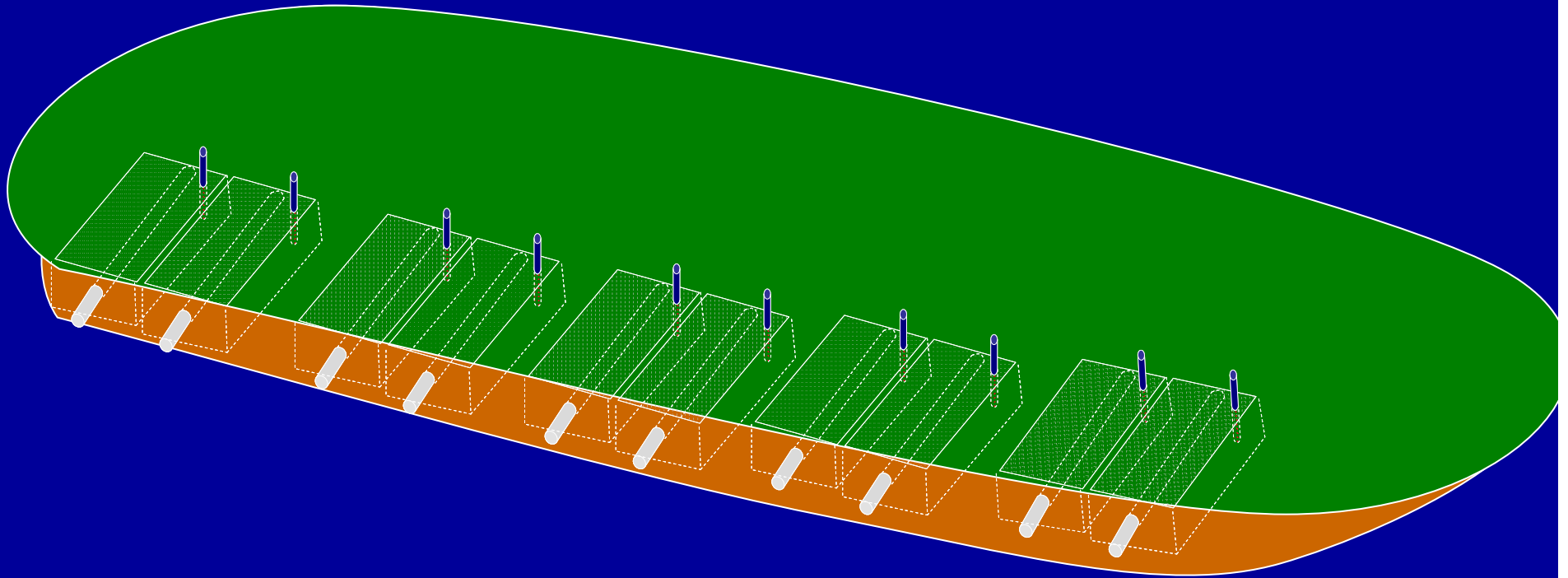
Removal of Contaminants from Water

- Many agricultural areas in the United States require surface and subsurface drainage
- Runoff and water from these drainage systems can transport contaminants (nutrients, sediment, pesticides, pathogens, and pharmaceuticals) to critical bodies of water
- Methods are needed to intercept runoff and drainage water to remove contaminants

Ditch filter



Turf grass experiments



CCP filter







Remediation of Marginal Land for Biomass Production

- Concern that cropland currently used for food and feed production will be converted to biomass production
- May be pressure to bring marginal lands into biomass production
- In some situations FGD gypsum may be useful to improve soil properties to enhance biomass production while protecting environmental quality

Agricultural Sustainability



USDA Conservation Programs

- Agricultural producers receive technical assistance, cost-sharing and financial incentives to adopt management practices that protect the environment
- Conservation Programs (Environmental Quality Incentives Program, Conservation Security Program)



Conservation Program Funding

- Practice demonstrated to be effective
- Environmental benefits of the practice documented
- Practice recognized as a “standard practice” by the Natural Resources Conservation Service
- Each state distributes Conservation Program funds to address the highest priority environmental problems with the most effective practices

Environmental Credit Trading

- Green Payments: Market Based Approach to Conservation – private funds to complement federal Conservation Programs
- Producers sell “offsets” associated with environmental benefits (water quality improvement, greenhouse gas emission reduction, soil carbon sequestration) from agricultural practices
- Research to document the environmental benefits of management practices to provide the scientific basis for environmental credit trading

Partnerships

- No single group has the resources to bring about rapid expansion of beneficial agricultural uses of CCPs
- Cooperation among a variety of groups including: EPA, state regulatory agencies, utilities, American Coal Ash Association, Electric Power Research Institute, DOE, universities and USDA will be required