

IRRIGATION IN MANITOBA PRODUCTION SUSTAINABILITY



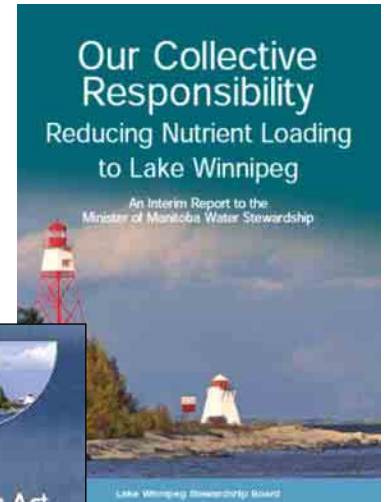
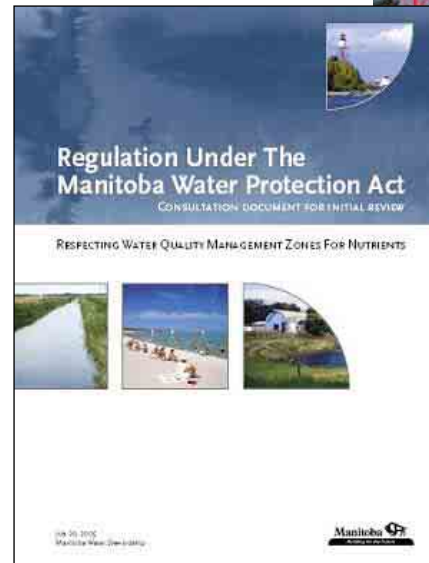
Agriculture and
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Canada

Stewardship and Conservation

- Water Quality
- Water Quantity
- Soil Quality
- Food Safety
- Habitat and Wildlife



1999 Survey

<u>Frequency</u>	<u>Response</u>
17	Maintaining soil quality
14	Crop rotations
14	Market development
11	Disease control
11	Irrigation equipment/application technology
10	Tile drainage
9	Irrigation scheduling
7	Groundwater contamination
6	Fertility practices
3	Surface drainage

Opportunity

2003 Survey

<u>Frequency</u>	<u>Response</u>
31	Fertility practices
28	Disease control
27	Maintaining soil quality
22	Irrigation scheduling
20	Crop rotations
21	Drainage
18	Irrigation equipment innovations
14	Market Development
12	Weed Control
10	Groundwater contamination
9	Insect control



Proper Planning & Management

- Need to know:
 - Soils
 - Climate
 - Crops
 - Water Quality & Quantity
 - Environmental Issues

Soil and land suitability and drainage

- Water deficits
- Salinity
- Management issues
- Erosion
- Water holding capacity
- Irrigation scheduling and management



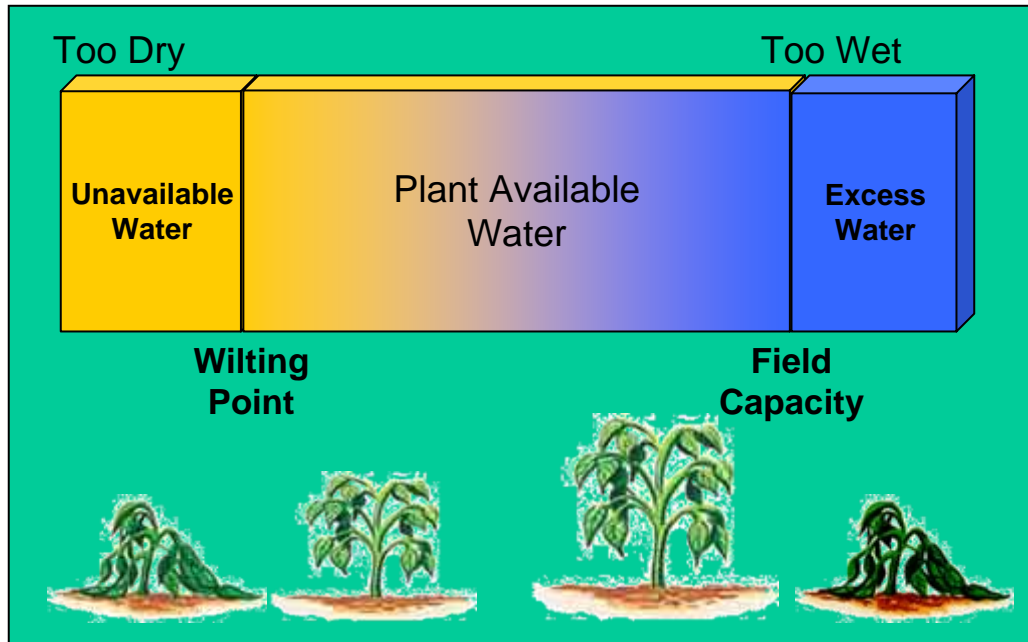
Soil Suitability

- 1:20,000 soil survey
- Irrigation Suitability Rating
- Drainage
- Assessment of soil-landscape resources
- Projected water requirements



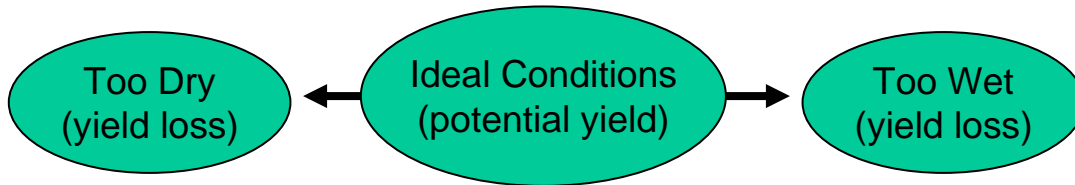
Climate and Crops

Soil Moisture

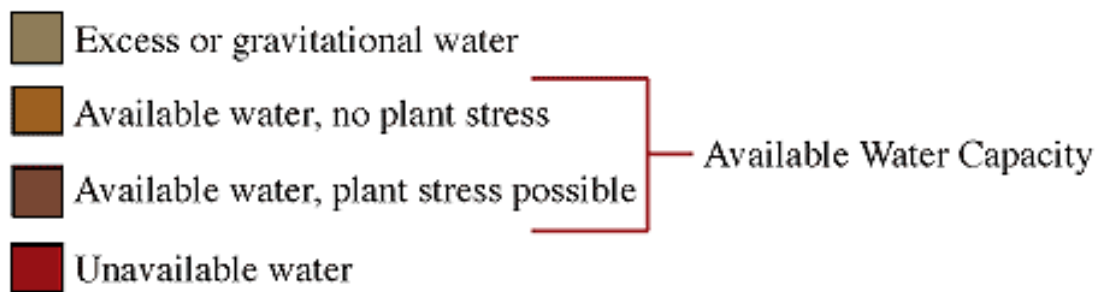
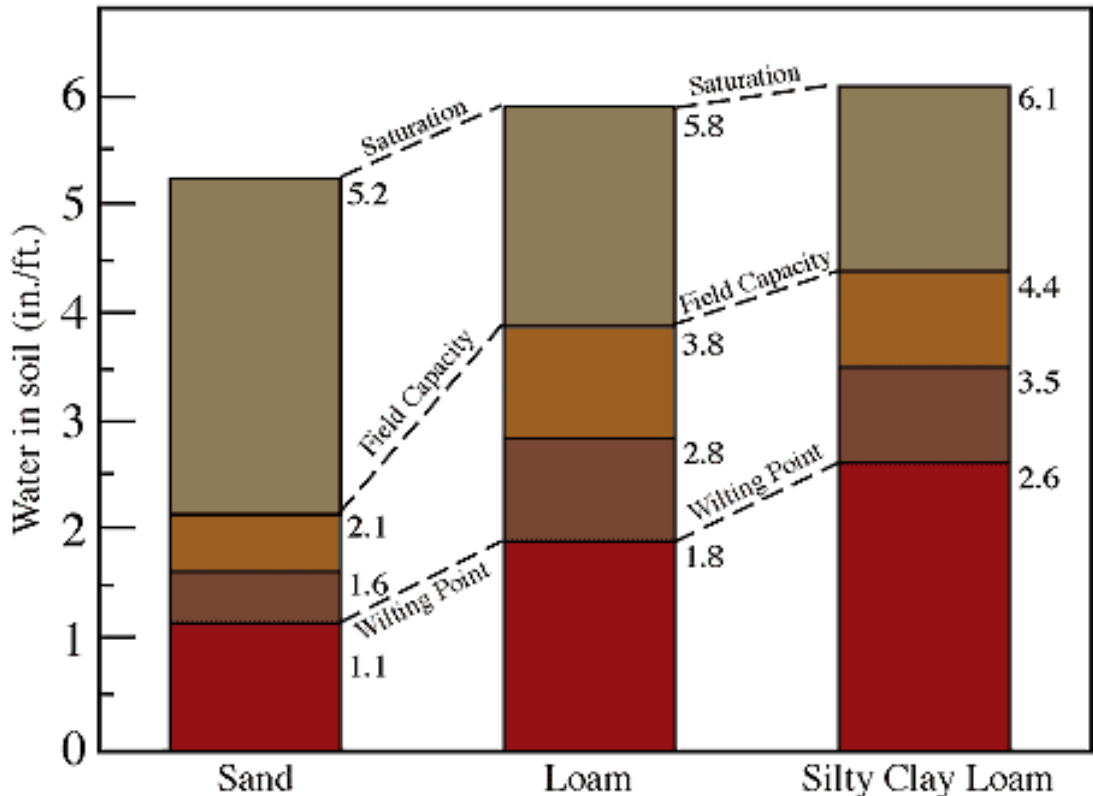


Agro-Climatic Risk...

- Production Risks:
 - VARIABILITY in WEATHER
 - Flooding, drought, freezing, heat, timing of weather...



Soil Texture and AWHC



Soils Data – AWHC - PWP

Sample Location	Hor	Thick	% OM	Texture	Sand	Silt	Clay	FC	PWP	AWHC mm/mm
EY01	Ap	14	4.1	Sandy Loam	55.4	35.8	8.8	32.2	15.4	0.17
	Bf1	12	4.4	Sandy Loam	57.4	34.3	8.3	37.7	18.6	0.19
	Bf2	12	1.7	Sandy Loam				36.3	17.8	0.18
	C	12		Sandy Loam	54.4	34.4	11.2	35.0	17.1	0.18
NT05	Ap	12	3.6	Loam	48	36.8	15.2	32.3	15.0	0.17
	Ah	8		Loam				33.3	15.2	0.18
	Bf	16	1.3	Sandy Loam	56.4	30.6	13	34.4	15.5	0.19
	BC gj	12		Loam				32.9	17.3	0.16
	Cgj	27		Sandy Loam	55.4	25.9	18.7	31.4	19.1	0.12



Why manage irrigation?

- To produce optimum yield
- To apply water efficiently
- Avoid over-watering
 - Waterlogging and yield losses
 - Excess water use = waste
 - Leaching events resulting in loss of nutrients and environmental impacts



Steps to Irrigation Sustainability

- **Efficiency:** select the most efficient system possible
- **Uniformity:** design the system to achieve the best uniformity
- **Water Quality/Quantity:** ensure source is adequate and compatible with system, crop and soils
- **Scheduling:** apply irrigation to match crop and soil conditions



Weather & Soil Monitoring

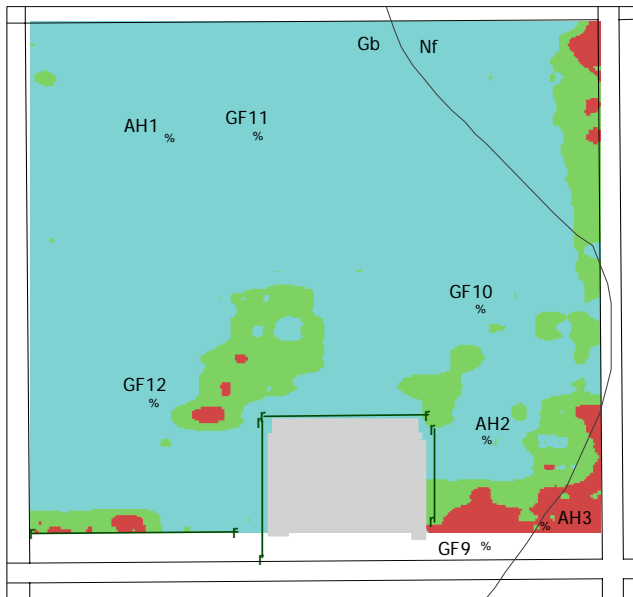
- Wind speed & direction
- Temperature
- Rainfall
- Evapotranspiration (ET)
- Soil Moisture Probes



Salinity

Veris and EM38 technology

Interpreted EM38 Readings Fauschou Farms (SE 12-12-8 w1)
Horizontal Mode (to 0.75 m)



Salinity Class



LEGEND



Problems from Excess Soil Water

- Crop response to poor aeration
 - Crop emergence problems
 - Stunted crop growth with wet conditions early & late
 - Higher yr-to-yr yield variability (weather)
- Timeliness of field operations affected
- Traffic patterns interrupted
- Buildup of salts in crop root zone
- Soil compaction worsened on wet soils

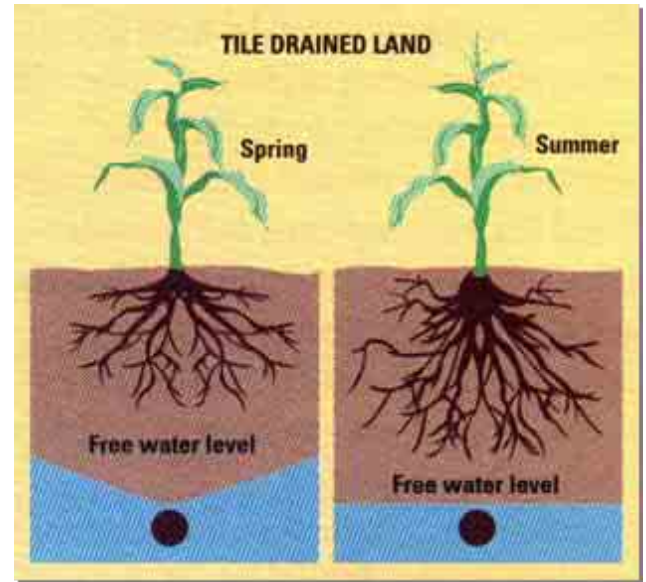
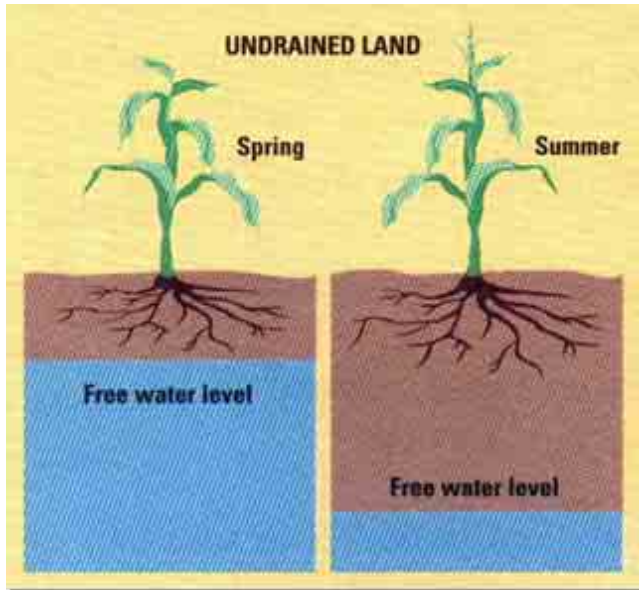


Drainage

- Surface Drainage
- Tile Drainage



Benefits of Drainage

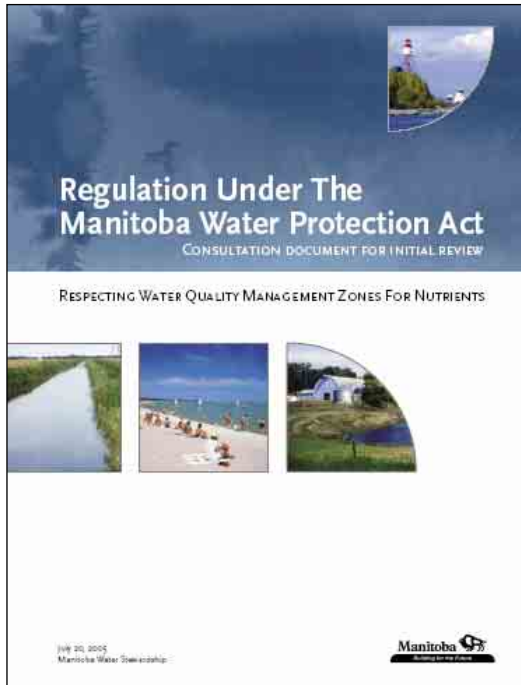


Tile – Water Quality

- **Conductivity**
 - Max. 5070 uS/cm (May)
 - Min. 1140 uS/cm (Aug)
- **Nitrate-N**
 - Max. Conc. 59 ppm (Jul)
 - Min. Conc. 3 ppm (Aug)
- Water recycled to reservoir !



Nutrient Management



“Special irrigated crops” means the inclusion of Classes 3M, 3MW, 4M, and 5M soils if under irrigated production, and if specifically under potato production as long as they are rated Class 1, 2, or 3 under the Suitability of Land for Potato Production rating system, with the provision that all nitrogen be applied during the growing season and the applications of available N are split so that no more than 67 kg/ha is applied at seeding for row crops or early spring for perennial crops, and that no more than 67 kg/ha is applied in any single subsequent application with total applications not to exceed 67 kg/ha over any three (3) week period.



Schedule A

NITROGEN APPLICATION RATES AND MAXIMUM SOIL RESIDUAL VALUES FOR ZONE 1

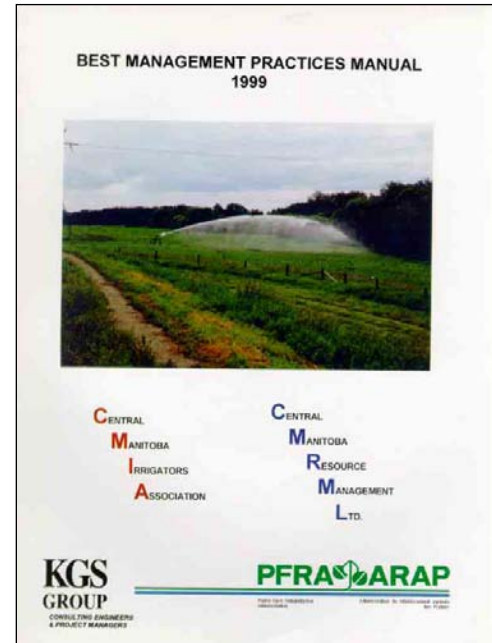
ZONE 1		
CROP	CLASS 1, CLASS 2, AND CLASS 3, EXCEPT CLASS 3M AND 3MW SOILS, AND SPECIAL IRRIGATED CROPS	
	NITROGEN APPLICATION	
All crops	Maximum residual soil nitrate nitrogen as N in 0 to 0.61 m soil depth to be no more than 157 kg/ha.	
Alfalfa; Perennial grasses, or alfalfa/grass mixtures; and Solid seeded annual crops	Annual application rate of available nitrogen as N (kg/ha) to be based upon soil testing and only the additional amount needed to achieve a realistic crop yield or crop removal capability for nitrogen	Nitrogen must not exceed a total annual application of available N of 280 kg/ha
Pasture	Annual application rate of available nitrogen as N (kg/ha) to be based upon soil testing and only the additional amount needed to achieve a realistic crop yield or crop removal capability for nitrogen	Nitrogen must not exceed a total annual application of available N of 224 kg/ha
Row crops (including irrigated potatoes on Classes 3M, 3MW, 4M, and 5M soils)	Annual application rate of available nitrogen as N (kg/ha) to be based upon soil testing and only the additional amount needed to achieve a realistic crop yield or crop removal capability for nitrogen	Nitrogen must not exceed a total annual application of available N of 336 kg/ha

Note: To convert metres to feet multiply by 3.2808 (e.g., 0.61m = approximately 2 feet)

To convert kg/ha to lbs/acre multiply 0.892 (e.g., 157 kg/ha = approximately 140 lbs/acre).

Nitrogen Management BMPs

- alternatives to fall application
- lower rates at planting
- split applications
- petiole testing, tissue analysis
- soil testing to 4 feet
- crop rotations
- irrigation scheduling
- realistic target yields relative to natural soil productivity



Erosion Management

- Rotation
- Residue Management
- Fall seeded cover crops
- Forages
- Shelterbelts/Annual Barriers



National Farm Stewardship Program (NFSP) - \$32 million - Opportunity

18	Irrigation Management	1801	irrigation equipment modification/improvement to increase water use or nutrient efficiency
		1802	equipment to prevent backflow of altered irrigation water into water sources
		1803	improved infiltration galleries and irrigation intake systems
29	Irrigation Management Planning	2901	consulting fees for planning of irrigation equipment modification and improvements to increase water use or nutrient efficiency



Related BMPs to Irrigation

- Improved Cropping Systems
- Integrated Pest Management
- Erosion Control, Soil Management
- Nutrient Management Planning
- Integrated Pest Management Planning

- Package BMPs related to Irrigation and water management



Summary – Production Sustainability

- Know your Soils
- Know your Climate – assess Risk
- Know your Crops
- Develop a Water Management Plan

- Provincially/Regionally/On-Farm

PLANNING AND MANAGEMENT are KEY

