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water spouts

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Mark Your Calendar for These Irrigation Workshops

Dec. 8, 2005 – Best Western Ramkota Hotel, Bismarck

This workshop is for experienced irrigators and will cover improved irrigation management options, as well as developments in irrigation. This workshop is held in conjunction with the North Dakota Water Users' annual convention scheduled for Dec. 7-8. The Missouri Slope Irrigation Development Association, NDSU Extension Service and North Dakota Water Users sponsor this workshop. The convention will include an exposition where irrigation suppliers demonstrate their products and services.

Jan. 4, 2006 – Ernie French Center, Williston Research Extension Center

This workshop is for current irrigators. Contact person is Chet Hill, Extension area value-added specialist, Williston, (701) 774-4315, chill@ndsuxt.nodak.edu.

Jan. 10, 2006 – Cando

This workshop is for current irrigators and will focus on the Devils Lake irrigation demonstration project and high-value crops. Contact is Mike Liane, (701) 662-1364, mliane@ndsuxt.nodak.edu.

Jan. 11, 2006 – Jamestown

This workshop is for new or potential irrigators, but current irrigators will find much of the information is useful.

More information about the workshops will be mailed in November and December. If you have any suggestions for topics to cover at the workshops, please give me a call or send an e-mail or letter.

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NDSU
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Tillage and Residue Under Irrigation

Residue management of irrigated crops such as potatoes and edible beans is very important to reduce soil erosion. Residue management provides a means of limiting soil particle detachment and removal from the field as vegetative residues protect the soil from impact by dissipating the energy of raindrops. Residue also creates diversion dams that slow the runoff water rate and reduce the amount of soil particle detachment. Slowing the runoff rate reduces the water's capacity to transport soil particles from the field. Moisture conservation also occurs as more time is available for water to infiltrate the soil and residue cover reduces evaporation from the soil surface.

Research has shown that leaving as little as 30 percent of the soil surface covered with crop residue can reduce soil erosion by about 65 percent of what it would be from residue-free conditions. This is shown in Figure 1. Larger amounts of residue cover further limit soil erosion.

Conservation tillage is an effective method of controlling erosion. The critical erosion period is from seedbed preparation to crop canopy establishment. In North Dakota, tillage often occurs in the fall soon after harvest, so the critical erosion period may extend from September to May, or from eight to nine months.

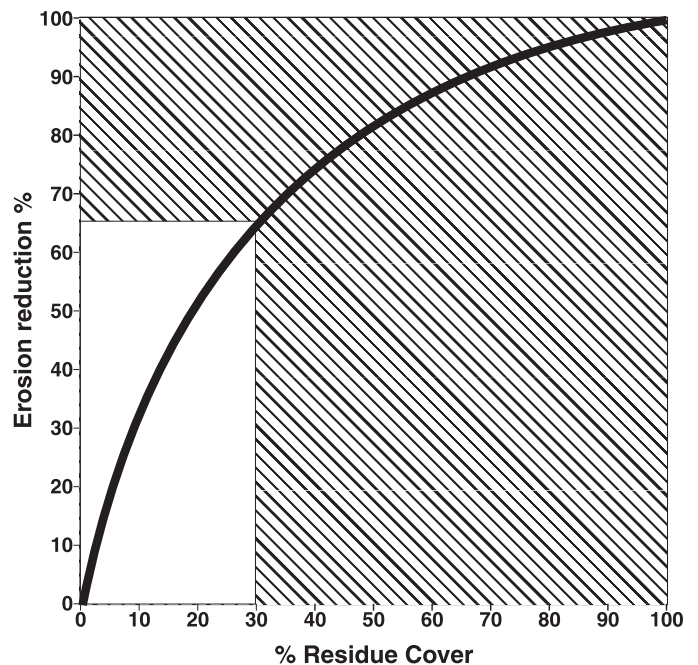


Figure1. Residue cover effect on reducing erosion.

Most tillage practices reduce residue cover. The amount of residue lost varies considerably due to the type of implement used, depth of operation and speed of travel. Tillage is done for a number of reasons. They are:

1. Weed control
2. Residue reduction
3. Seedbed preparation
4. Incorporation of fertilizer and pesticides
5. Dry out the soil

The approximate percentage of residue cover remaining on the soil surface after a single pass of tillage and planting equipment is listed in the following table.

Table 1. Influence of tillage and other practices on residue cover.

Operation	% Residue Left After Each Operation
Spraying (Chem. fallow)	100
Undercutter (Sweeps 24 inches or wider)	70-90
Chisel plow	
Sweeps	50-80
Straight spikes	40-70
Twisted spikes	20-50
Disc (tandem or offset)	
Blade less than 23-inch diameter	40-70
Blade 23- to 28-inch diameter	20-50
Blade more than 28-inch diameter	10-40
Field cultivator	40-70
Knife fertilizer applicator	50-70
Moldboard plow	5-10
Drill	
Disc	60-80
Hoe	40-70
Overwinter weathering	70-80

A chisel plow can leave as little as 20 percent or as much as 80 percent of the crop residue, depending on tillage point, speed and depth. This means that if a 30 percent residue cover is to be maintained, it easily could be missed.

A chisel plow with wide sweeps operating at a slow speed and shallow depth may be able to maintain a 70 percent to 80 percent cover. If twisted spikes are operated 8 to 10 inches deep and at 5.5 to 6 mph, only 20 percent to 30 percent of the residue may be retained on the surface.

An undercutter with a 24-inch or wider blade usually will leave 70 percent to 90 percent of the residue.

A tandem disc with small blades operated at a slow speed (3 to 4 mph) and shallow depth (3 to 4 inches) may retain 50 percent to 70 percent of the residue.

But operating a heavy disc with large blades at a fast speed (6 mph) may retain only 20 percent of the cover.

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A Checklist for Fall Irrigation Equipment Maintenance

We all know that proper maintenance will extend the useful life of equipment. Fixing small problems is less expensive than repairing a major breakdown. To winterize your irrigation system, consult the service manuals and the following checklist. If you don't feel confident doing the maintenance or you don't have the time, contract with an irrigation dealer to do the service.

Water delivery system

If your water source is a well, fall is the proper time to chlorinate it. Chlorine will control iron bacteria that, if left unchecked, will plug the screen and reduce the production capability of the well. The chlorination procedure is outlined in NDSU Extension publication AE-97, "Care and Maintenance of Irrigation Wells." You can obtain a copy from your county Extension office or the NDSU Agricultural Communication Distribution Center, (701) 231-7882. You also can find it online at www.ext.nodak.edu/extpubs/irrigate.htm.

Pipes, valves, tanks, centrifugal pumps, etc., should be drained or pumped out to prevent damage from freezing during the winter. Underground pipelines need to be pumped or drained. If possible, drain underground pipelines into a sump filled with gravel but **NOT** into the well. Draining into the well provides a source of pollution for the aquifer. Drains or pump-out risers should be sealed following draining or pumping to keep water from seeping back into the line. Pipeline pump-out locations should be checked a couple of days after pumping. If the pipe is full of water, it will need to be pumped again. Protect pump-out risers and other equipment from livestock. Close or cover any openings that might invite rodent entry.

Electrical motors and control panels

- Lubricate all bearings and rotate motor.
- Check all motor openings to make sure they are screened properly to keep rodents out. If a screen is damaged or missing, replace with ¼-inch metal mesh screen. This screen can be left in place during operation without plugging with dust and debris. Electric motors do not need to be covered. They are best left open to free air movement to keep moisture condensation in the motor to a minimum.
- Lock the control box in the "OFF" position.
- Spraying electrical contacts with contact cleaner will displace dirt and moisture to prevent corrosion.
- Replace panel door seals if hard or broken to keep moisture and dust out.
- Change oil in the reservoir if discolored.

Pumps

- Lubricate all bearings. If oil lubricated, after the pump is cold, open the oiler and let oil drip into the line shaft bearings. Rotate the shaft to distribute the oil over the entire bearing. The cold oil will adhere to the cold bearings and provide good winter protection.
- Drain water from the pump and connecting pipelines. Replace the plugs.
- Loosen the packing gland if used.
- Lubricate the shaft.
- Loosen any belts. Insert grease-proof paper between the belts and pulleys.
- If possible, remove the flow meter and pressure gauges and cover the holes. If the flow meter or pressure gauges do not work, this would be a good time to have them repaired or replaced.

Aluminum pipe

Pipes should be stored on racks so that one end is above the ground to permit drainage and air circulation. Protect from livestock. Remove gaskets, and inspect and obtain replacements for any that are damaged or leaked during use. Store the gaskets in clean water in a place where the water will not freeze. This prevents them from cracking and drying out. **Do not** store gaskets on a nail or hook. If they cannot be stored in water, place them over a tube the same size as the gasket and keep out of direct sunlight. Covering the gaskets to restrict air movement also will help prevent drying out and cracking. Loosen connectors of pipe remaining in the field.

Sprinkler systems

- Each sprinkler head should be inspected. Make sure the nozzle is not chipped or broken. Look for any broken parts on the sprinkler. Note the location of damaged sprinkler heads and replace or fix before the next growing season.
- Check all gearboxes for moisture accumulation and make sure each contains the proper amount of grease. Drain off any moisture. If excessive moisture is evident, drain and replace the grease because water mixed with the grease will decrease its lubrication ability and not provide the needed protection.
- Lubricate all fittings.
- Check the water drain valve at each span of a center-pivot system.
- Remove and clean the system end cap. Here is where sand, scale and other debris collects during the summer. Remove the sand trap, flush the system and replace the trap. Drain all water-carrying lines. Drain the booster pump case.

- Inflate tires to recommended pressure.
- Park system into or with the prevailing wind, either the northwest or southeast direction. If livestock will be in the field with the system, fence it from the livestock. Cattle can damage sprinkler drop tubes and exposed wiring.

Chemical injector pumps

- Flush with water. Loosen belt if belt driven. If transportable, store in a clean, dry place.
- Drain and refill gearbox. Lubricate pump.

Internal combustion engines

Internal combustion engines need special attention to lubrication, cooling system, ignition, engine openings and fuel system. Winterizing and housing would be ideal. Where providing housing is impossible, proper winterization is especially important.

- Change the oil and filter when the engine is warm, then run the engine briefly to circulate the oil. Clean and replace the air cleaner.
- Remove and clean the spark plugs. Pour 2 ounces of oil into each plug hole and replace plugs. Rotate the crankshaft several turns to allow the oil to coat the cylinder walls thoroughly.
- Flush the cooling system and refill it with the proper antifreeze solution. This will prevent rust and scale from forming in the cooling system.
- Fuel: For gasoline engines, add fuel stabilizer and run engine, or drain all fuel from tank, lines and carburetor. For diesel engines, fill tank. **DO NOT** drain. Replace the fuel filter and leave all lines and injectors filled with diesel fuel. For LP gas engines, drain the vaporizer-regulator (both fuel and water lines).
- Seal all openings (air cleaner inlet, exhaust, distributor cap and crankcase breather tube) with weatherproof tape.
- Lubricate all accessories. Loosen belts. Remove the battery, charge it and store in a cool, dry place.



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