

Rainfall simulations begin as part of biomass project

Without a cloud in the sky, a steady, soaking rain fell on a portion of Doug Bahl's Wayne County switchgrass field. However, the rain wasn't falling from the sky, but rather from a rainfall simulator on loan from Purdue University. In cooperation with Purdue University and the USDA National Soil Erosion Research Laboratory, the artificial rainmaker travels throughout the nation testing various soils and cropping methods and their effect on soil erosion.



A 3,000 gallon water tank is on-site to supply water for rainfall simulator.

As part of the water quality portion of the Chariton Valley Biomass Project, three fields will receive artificial rainfall from the simulator. The objective is to gain a better understanding of the effects that switchgrass has on reducing soil erosion. Iowa State University (ISU) graduate students, Jerry Neple and John Kost will conduct the simulations under the direction of ISU Soil Scientist, Rick Cruse.



Run-off is collected for a duration of 15 minute at five minute intervals during each hour and twenty rainfall simulation.

Simulations will be completed on corn on bean ground, a newly established frost-seeded field of switchgrass, and a well-established switchgrass stand. On each of the fields, six replications are conducted on 16-foot long plots that are divided into three sections. Various soil conditions are measured in each of the three sections, including interrill erosion, rill erosion and sediment loss. In addition to erosion measurements, levels of alachlor, metalachlor, Atrazine, nitrate, and phosphorus will be documented.



Rick Cruse recording a 15 second run-off collection.

Cruse says soil moisture equilibrium is established before measurements can be taken. "To obtain this equilibrium, the simulator rains for one hour and 20 minutes. At five-minute intervals, water drainage or run off is collected for a period of 15 seconds. Soil moisture equilibrium is obtained when an equal amount of runoff is collected during the consecutive 15 second measuring," he says.

John Gilley, agricultural engineer at the USDA Agriculture Research Service in Lincoln, Nebraska, was on hand to help conduct the simulations. Although Gilley works mainly with swine manure management, he says the rainfall simulation conducted for the biomass project uses the same technique.



Preparation of rainfall simulator site.

While the fields are surveyed to measure the degree of slope, a computer model allows switchgrass production evaluation over a wide area.

The rainfall simulation team will be back to conduct the process all over again in June and again in July. Cruse says measuring again throughout the summer months is necessary because soil and crop conditions are different at these times.

“The rainfall simulations will help reveal what effect switchgrass has on sediment loss reduction at these various times,” he says.



Rick Cruse, Jerry Nepple, John Kost and John Gilley



Jerry Nepple and Vince Stitzman survey slope.



Run-off collection site before rainfall simulation begins.



Run-off collection site before rainfall simulation begins.



Collection site: Run-off collection site before rainfall simulation begins.



John Gilley collects drainage during rainfall simulation.



Rick Cruse recording a 15 second run-off collection.