

PAM Keeps Soil Where it Belongs

Good soil is the foundation of productive farms. Farmers are concerned about the impacts of soil loss through erosion on their farm. Many farmers are also concerned about the impact of erosion on the environment.

Too much sediment in a river can cause a myriad of water quality problems. Sediment carries with it applied nutrients such as phosphorus. These nutrients spur algae growth that rob fish and other aquatic life of the oxygen they need to live.

Malheur County farmers have been applying polyacrylamide, known as PAM, to control furrow irrigation-induced soil erosion for many years. PAM works to control erosion by binding soil particles together and settling soil particles suspended in water.

Most farmers apply PAM directly into the irrigation water as it is put on the field. PAM can also be spread in its granular form into the furrow prior to irrigating. Pre-application saves time by distributing PAM from the tractor while forming the furrows.

The Malheur Watershed Council and the Oregon Department of Agriculture conducted a test to determine the effectiveness of pre-irrigation PAM application in preventing excessive amounts of sediment reaching the Malheur and Snake Rivers.

TESTING

There were two levels of PAM application compared: 1.75 pounds per acre and 0.875 pounds per acre. The PAM was applied directly to the furrow as the farmer cultivated the field prior to irrigation.

At the higher rate, PAM covered the entire length of the furrow. At the lower rate, the farmer left the center of the furrow bare and applied PAM at the top and bottom ends of the furrow.

The approach for testing consisted of observing turbidity levels in the field and taking samples for lab analysis.

Samples were taken at the end of four furrows for each type of PAM treatment. Water was also measured in four furrows where no PAM was applied, which served as a control.

In addition to application levels, there was testing to see if PAM controlled erosion for an extended period of time. Samples were collected just as water hit the end of the furrow after one hour and after three hours.

The lab technicians measured nitrogen, phosphorus, and the amount of suspended solids in these samples.

After getting the results back from the lab, a variety of statistical techniques were used to determine if the differences observed were due to the PAM treatments.



RESULTS

Analysis shows that pre-applying PAM effectively reduces irrigation-induced erosion. Turbidity levels in furrows treated with PAM were about half of those in the untreated furrows. The same was true for total phosphorus, nitrate, and suspended solids. These differences were statistically significant.

Differences between covering the entire length of the furrow with PAM and only applying to the top and bottom ends were small. The results show that farmers could apply smaller amounts of PAM and still effectively control irrigation-induced erosion. The statistical tests used indicated the majority of the observed differences were between applying PAM and not applying PAM at all.

PAM was still controlling erosion three hours after the irrigation water reached the end of the furrow.

For both total phosphorus and suspended solids, PAM's performance improved as time passed. The furrows with no PAM application showed reduced levels of phosphorus and suspended solids after one hour. By the third hour, the levels began to climb.

An important question for future studies will be how long pre-irrigation-applied PAM controls erosion. Many farmers have irrigation sets lasting 12 or 24 hours; future study findings will be important in achieving maximum effectiveness with PAM in agricultural practices.

Pre-application of PAM significantly reduced phosphorus, nitrate, suspended solids, and turbidity levels in irrigation return flows.

KEY FINDINGS



with PAM

without PAM

- Applying PAM prior to irrigating effectively controls irrigation-induced erosion.
- Pre-irrigation application substantially reduces turbidity, nitrate, total phosphorus, and suspended solids.
- There are only minor differences between applying PAM for the entire length of the furrow versus applying at the top and bottom and leaving the middle of the furrow bare.
- PAM remained effective for at least three hours.



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