PAM Keeps Soil in Its Place

Water that rushes down irrigation furrows on western farmlands takes little if any topsoil with it if an erosion-fighting white powder is mixed in. An ounce of the synthetic compound—called polyacrylamide, or PAM for short—helps anchor as much as 1,000 pounds of topsoil that might otherwise be swept away by irrigation water.

Extensive outdoor tests during the past 6 years by ARS scientists based at Kimberly, Idaho, have shown western U.S. growers and state regulatory agencies that water-soluble, negatively charged polyacrylamides are a safe, convenient weapon for fighting erosion on furrow-irrigated farmlands.

"Growers tell us," says ARS soil scientist Rodrick D. Lentz, "that PAM-treated water leaving their furrows is often cleaner than when it came in." Lentz is with the ARS Northwest Irrigation and Soils Research Laboratory at Kimberly.

And data from experiments by Lentz and Robert E. Sojka, who is also at Kimberly, have proven that small doses of PAM can boost infiltration by as much as 60 percent. That saves water.

The ARS team's careful determinations of what kind of PAM to use and when, where, how, and how much to add to irrigation water contributed to USDA Natural Resources Conservation Service's recent decision in some states to approve PAM's use as a conservation practice. And the ARS findings were instrumental in garnering, within the past 3 years, regulatory approval from 13 western states for agricultural use of the chemical.

What's more, increased use of PAM on western farms has led four innovative businesses to begin manufacturing equipment designed especially for adding precise amounts of PAM to irrigation water at the top, or head, of the irrigation furrow.

Too, the Idaho scientists landed a cooperative research and development agreement with Cytec Industries, a Stamford, Connecticut, maker of polyacrylamides for farms, water purification plants, and other markets. The collaboration included experiments with a new test that researchers Lentz, Sojka, and James A. Foerster at Kimberly developed to measure leftover polyacrylamide in water that leaves the end of the furrows after use, called tailwater.

Faster and simpler to use than many other techniques, the test has shown that more than 99 percent of the applied PAM remains—appropriately—on treated fields to biodegrade. This result holds true if growers apply the prescribed rate of 10 parts per million—that is, a tablespoon of PAM for every 750 gallons of irrigation water until the first of this water reaches the end of the furrow.

KEN HAMMOND (K7766-1)

Soil scientists Robert Sojka (left) and Rodrick Lentz check for PAM residues in water running off furrow-irrigated fields. Almost all the PAM applied to fields stays in place and eventually biodegrades.

Another research spin-off: Lentz created a software package called WASHOUT to quickly estimate the amount of sediment in irrigation runoff, based on measurements from small samples of tailwater. Says Lentz, "You could also use this software to monitor other components that wash out of furrows when they're irrigated, like nutrients or pesticides."

For their research, Lentz and Sojka won a 1996 technology transfer award from the International Erosion Control Association. The group credited the team with opening the door to use of PAM to thwart erosion on more than 50,000 acres of farmland in 1995. That prevented some 1 million tons of topsoil from eroding. A more recent industry estimate places on-farm use for 1996 at about 400,000 acres.—By **Marcia Wood**, ARS.

Robert E. Sojka and Rodrick D. Lentz are at the USDA-ARS Northwest Irrigation and Soils Research Laboratory, 3793 N. 3600 E., Kimberly, ID 83341; phone (208) 423-5582, fax (208) 423-6555, e-mail sojka@kimberly.ars.pn.usbr.gov lentz@kimberly.ars.pn.usbr.gov

Visit the PAM site at http://kimberly.ars.usda.gov/pampage.htp ◆