West Stanislaus Resource Conservation District
Mobile Irrigation Lab

220 North El Circulo
Patterson, CA 95363
Tel. (209) 892-3026
Fax (209) 892-5136

History

The West Stanislaus Resource Conservation District was formed in March 1980 through consolidation of the Orestimba (1952) and Patterson (1958) RCDs. The District has as its' mission the development of a Long Range Plan which prioritizes "local" natural resources conservation concerns and the implementation of planned activities by assisting District landowners through technical assistance, cost-sharing, grant programs, administrative assistance and representation at various workshops, meetings and public hearings.

Cooperating Entities

U C Cooperative Extension
Natural Resources Conservation Service
California Department of Conservation Service
The Bureau of Reclamation
Dow AgroScience
Horizon Ag-Products, Inc.
American Cyanamid Co.
JR-M, Inc.
West Stanislaus Irrigation District
Del Puerto Water District
Patterson Water District
Panoche Water District
Central California Irrigation District
San Luis Canal Company
Imperial Irrigation District

PAM SIDE BY SIDE STUDY

Conducted by West Stanislaus Resource Conservation District

This is the Final Report for the grant (# 3097-314) to study polyacylamides (PAM) and how it can help with both the reduction of suspended solids in the tail water and improve the infiltration of the irrigation water.

The West Stanislaus Resource Conservation District (WSRCD) along with the U Cooperative Extension of Stanislaus County, the NRCS, Dow AgroScience, American Cyanamid Co., JRM, The Bureau of Reclamation and six Irrigation districts (West Stanislaus, Del Puerto, Patterson, and Imperial) conducted this study within the boundaries of the Panoche, Central California, cooperating Irrigation districts between May 1, 1998 and January 15, 1999. The study consisted of thirty-eight side by side tests, (control and PAW management change) conducted with eight different growers.

The information we collected is this side by side study is presented by field test, with a cover sheet giving a summary of what was done and what was found. We have also included some recommendations when we felt that the data supported a management change in the way that the irrigation water was applied, or on how to use PAM or some other product that may help with irrigation efficiencies or sediment reduction.

This study provided many answers regarding the use of PAM both in the head ditch and placed in the top of the furrow itself. We used two different types of PAM product, powder, and tablet. We also tried two different ways to mix the PAM with the irrigation water. The first method was to use a fish feeder that dropped the powder into the head ditch. We also put powder or tablets in the top of the furrow under the flow from the siphon pipe. The amount we used was based on the concentration of the product and the amount (PPM) we wanted to apply.

We looked at putting the PAM in the top of the furrow because many farmers were complaining that the siphon pipes were clogging with PAM that was flowing on the bottom of the head ditch. For the most part, clogging was not a problem when we used the fish feeder. The only bad clogging noticed during all of the tests done this year was when plastic siphon pipes were used.

We found that the infiltration of the irrigation water was increased and run-off was cut by an average of thirty seven percent when PAM was used by itself. When you mixed PAM with Qauntum-H, infiltration of the irrigation water was increased and run-off was cut by an average of forty eight percent. We also found that if you are using 1 1/4" siphons or larger, that clogging won't be a real problem. While 1" or smaller siphons clogged repeatedly. Growers that use small siphons need to apply PAM in the top of the furrow.

I did not mention sediment reduction because there are many variables on how well PAM will work on the soils found within the test sites. We found that most of the time; a management change in how the farmer applies the irrigation water is necessary to achieve the desired results. It was not cost effective to put the amount of PAM in the irrigation water needed to meet the studies 300 TSS goal without making a management change such as two smaller diameter siphon pipes as opposed to one larger siphon pipe in the cases where the flow in the furrow was greater.

Quantum-H was used during this year's study as a way to possibly increase infiltration rates. According to the Manufacturer, Horizon Ag-Products, tests of this sort have never been done

before. I tested a mixture of liquid Quantum-H, Sulfate of Potash, and Gypsum. I repeatedly saw that the Quantum-H alone worked as well as PAM. When you combine PAM and Qauntum-H, the infiltration rates almost doubled. Quantum-H is a blend of organic natural long chain polymers that have other beneficial uses to the grower.

RESULTS AND CONCLUSIONS:

Untreated furrows had 40 percent runoff, and only 0.09 inch of water infiltrated. In furrows treated with Quantum-H, sulfate of potash, and gypsum, runoff dropped to 31 percent and 0.10 inch infiltrated, an 11-percent increase in infiltration.

Furrows treated with Quantum-H, sulfate of potash, gypsum, and PAM had only 22.5 percent runoff. Infiltration increased to 0.12 inch of water, a 35-percent boost.

The soil treatments reduced erosion substantially. In the untreated furrows, tail water carried 5,560 grams of sediment per liter. In furrows treated with Quantum-H, potash, and gypsum, the sediment load was reduced dramatically to 1,294 grams per liter. In furrows treated with Quantum-H, potash, gypsum, and PAM, the sediment load was reduced to just 53 grams per liter.

(The WSRCD aims for less than 300 grams per liter of sediment in irrigation tail water.)

Figure 1

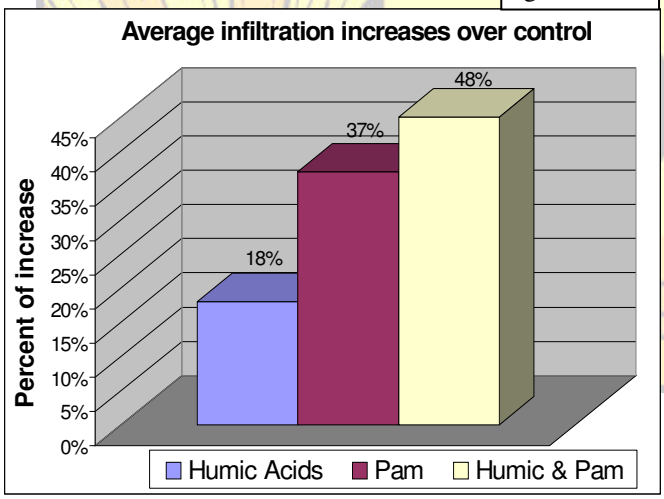
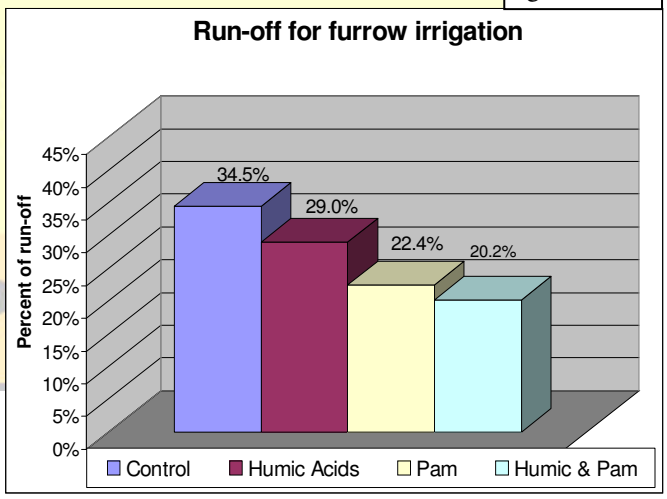


Figure 2



Author's Note:

In this multi-year study, Quantum-H improved water infiltration by 18%. A combination of PAM, a synthetic polymer used for water infiltration, enhancement and sediment reduction, and Quantum-H improved infiltration by 48%. (Figure 1) The use of Quantum-H reduced the run-off from furrow irrigation or amount of tail water by 5.5% and the combination of PAM and Quantum-H reduced it by 14.3%. (Figure 2)

Powers also noted that where Quantum-H was used in conjunction with a sulfur forming soil amendment such as gypsum, water infiltration was increased to 24%. The same study showed nearly 5% less total run-off from furrow irrigation where Quantum-H was used. There was 14.3% less total run-off with the combination of Quantum-H and PAM.