

# PAM in Irrigation Water

Polyacrylamide (PAM) is a synthetic water-soluble polymer applied to irrigation water or into furrows prior to irrigation. PAM binds together soil particles suspended in water then settles them to the furrow or ditch bottom. Water-soluble polymers similar to PAM are commonly used in treatment of municipal water supplies, food packaging and as adhesives. Water-soluble polymers were first introduced as soil conditioners in the 1950's. In recent years, new formulations and application techniques have improved the effectiveness of PAM in irrigation water. PAM has been shown to reduce soil erosion by 90-95 percent and improve water infiltration rates by 20-60 percent, according to NRCS and university studies.

## Advantages

- Relatively low cost per acre
- High reduction of irrigation-induced erosion and soil loss
- Ease of product application and integration into normal irrigation practices

## Disadvantages

- Extra labor or equipment required for application
- Repeated applications can increase cost per acre
- May increase soil infiltration rates in certain soil types beyond need
- Applications must be repeated following cultivations, increasing the cost per acre.

## NOTE

In field studies in western Stanislaus County, PAM reduced sediment concentrations in furrow irrigation drain water but was not effective in reducing chlorpyrifos (Lorsban, Lock-On, Govern) insecticide concentrations in PAM-treated drain water. The results suggest that most chlorpyrifos in drain water is not associated with sediment, so sediment reductions have little effect on chlorpyrifos concentrations.

## Application Methods

### Dry Granular PAM

Dry granular PAM is typically applied using an augured metering system into a supply canal before it hits the furrow, or applied directly in the furrow using what is known as the "patch method". Proper agitation is needed to properly dissolve PAM in the irrigation supply ditch. Lack of agitation results in globules forming and little reduction in furrow erosion. A drop structure in the irrigation ditch can provide turbulence and aid in dissolving granules. The "patch method" involves placing PAM at the head of the furrow; spreading it across 3-5 feet of the furrow to reduce the risk of the PAM becoming buried or washing down with little or no effect.

### Liquid PAM

Liquid PAM can be metered and injected directly into an irrigation ditch, furrow, or pipeline. Emulsified PAM (special liquid PAM solutions) can be applied like the granular form into irrigation ditches or furrows using the patch method. Emulsified PAM doesn't require as vigorous mixing as granular but still needs adequate mixing for dissolving. Emulsified PAM is more voluminous than dry forms, but is easier to dissolve and is the only form of PAM to use in sprinklers due to reduced risk of clogging laterals.

### Solid Blocks or Cubes

PAM blocks (or cubes) are typically placed in wire baskets in flowing ditches at turbulent points. The blocks slowly dissolve, releasing small amounts of PAM into the water. PAM blocks may not perform as well as liquid or granular PAM in furrow irrigation. PAM blocks have been useful for treating sediment ponds to accelerate water clarification and promote flocculation. PAM blocks can also be used to dose concentrated runoff areas on fields that otherwise cause uncontrolled erosion.

Check with your PAM supplier for application rates to match your soil type and irrigation system.



**PAM IN IRRIGATION WATER** Central Valley Installation and Maintenance Costs

**Cost Estimates for PAM (2007)**

Product and Equipment Costs for Dry PAM

Item	Costs per Unit	
	Low	High
Product cost per pound	\$3.50	\$4
Product cost per acre, per application	\$0.875*	\$4*
Total product costs per acre, per year	\$2.63**	\$24**
Application Equipment (Fishfeeder)	\$ 300	\$ 300

\* At a low rate of 1/4 lb per acre and a high rate of 1 lb per acre

\*\* When applied 3 and 6 times per year, respectively

Estimated Costs of Granular PAM in Irrigated Furrows

Item	Costs per Unit
Material per pound	\$ 1.86
Labor per application, per acre*	\$ 1.00
Total, per acre, per event	\$ 2.86
Total cost, per acre, per year**	\$30.74

\* Granular PAM (with an application rate of 1 lb/A)

\*\* Applied at full rate for initial irrigation and 3 irrigations following cultivation, then at half rate for 10 other irrigations (9lb/A, 14 events)

Product and Equipment Costs for Liquid PAM

Item	Costs per Unit	
	Low	High
Product cost per gallon	\$1.35	\$1.35
Product cost per acre, per application	\$6.75*	\$13.50*
Total product costs per acre, per year	\$ 20.25**	\$81**

\* At a low rate of 5 gallons per acre and a high rate of 20 gallons per acre

\*\* When applied 3 and 6 times per year, respectively

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