



SNF currently supplies FLOBOND water-soluble, polyacrylamide-based polymers for improving irrigation efficiency. Polyacrylamide (PAM) has been used in flood and furrow irrigation systems for the past 25 years, but use in micro-jet, center-pivot, drip, and high pressure systems has been limited due to application challenges. SNF's FLOBOND series of PAM-based polymers and the PolyDolly™ Polymer Injection Unit have been proven to help increase the efficiency of irrigation water in many turf and crop production applications.

Irrigation water efficiency is a major concern for turf and crop growers across the globe. Irrigation runoff leads to gradual loss of topsoil and a decrease in water percolation. Topsoil loss leads to long-term reductions in soil productivity, loss of nutrients, and downstream pollution of reservoirs and streams. Decreased percolation leads to crusting of soils, pooling of water, and a reduction in water availability in soil profiles.

Furrow irrigation can be a major contributor to soil loss since it uses the soil as the water transmission line. In most cases, the resulting water runoff, with its inevitable soil load, is necessary to provide reasonably uniform irrigation in most fields^{1,2}.

PAM is a chemical flocculant widely used in municipal water and wastewater treatment, paper manufacturing, mining, and food processing. When applied to soil with irrigation, it binds to clay particles, resulting in larger, heavier particles which are harder to dislodge. This increased cohesiveness of particles on the surface makes soil more resistant to erosion caused by flowing water. PAM preserves a more porous soil structure during irrigation, and thus allows increased infiltration and utilization of the water applied³.

The majority of research with PAM use in irrigated crops has been conducted in the midwestern and western regions of the U.S. USDA researchers began investigating the use of PAM for reducing soil erosion in furrow irrigated fields in the early 1990's. This led to the development of the USDA Conservation Practice Standard Code 450 for improving overall irrigation efficiency⁴.

Environmental benefits include reduced soil loss and reduced pesticide and fertilizer runoff. This enhances both soil and water quality, on-site and off-site. PAM has been approved by the USEPA and USFDA as a food and water additive. Research has shown that no known toxicities in soil or water have resulted from the addition of PAM, nor has any accumulation of PAM been detected in crops⁵.

Facts Related to the Use of PAM

- PAM-based products are available in two primary forms; dry granular and liquid emulsion grade polymers. The dry forms of PAM have a higher concentration of active ingredient, whereas, the liquid form is diluted as a water in oil emulsion. All PAM forms should be stored in cool dry areas away from direct sunlight and has an average shelf life of one year.
- Soil losses during irrigation are greatest when the soil is loose. Therefore, PAM should be applied during the first irrigation if the soil has been disturbed by cultivation, or is loose from lack of rain. If soil is undisturbed following the first PAM application, subsequent irrigation(s) can be applied with no, or, a reduced rate of PAM^{3, 6}. Research has shown that PAM applied to furrow irrigation reduces soil runoff by 94% and increased net infiltration by 15%⁵.
- Regardless of the form of PAM used, turbulence is required for it to fully dissolve in water. Even though dry forms require more turbulent mixing than liquid forms, all forms need to be added to the incoming water at a turbulent point. Without adequate mixing energy, PAM will not immediately dissolve and globules will form, which can clog injector systems, sprinkler nozzles, and gated pipe irrigation systems^{2, 3}.
- Emulsion PAM applied with an injector pump at the well discharge is recommended for closed-pipe irrigation systems. Turbulent flow within the pipe usually creates enough mixing of PAM into the irrigation water, assuming at least 100 ft. of pipeline for mixing to occur².
- PAM applied with irrigation water results in and maintains higher infiltration rates than is normal with untreated water. Thus, irrigation practices will have to be adjusted to prevent over-watering, especially on soils that have high inherent infiltration rates^{2, 3}.
- The PAM product label provides application rates based on water flow rate. However, different soil textures and field slopes may show different results when equal amounts of PAM are applied. So, the application concentration may require adjustment based on the clarity of the runoff leaving the field².
- When applied according to the Natural Resources Conservation Service (NRCS) standard, PAM losses from a field do not exceed 5% of applied amounts. PAM levels in runoff fell below acceptable limits in 300-1500 ft. of travel in tailwater ditches⁶.
- PAM is not harmful to the environment. It degrades safely into harmless organic molecules in the weeks following application. Because PAM limits soil erosion, its use can prevent nonpoint source pollutants, including soil and contained contaminants of nutrients and pesticides, from leaving the field^{7, 8}.

References

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