PAM (anionic Polyacrylamide) for Runoff and Soil Erosion Control

PAM, or anionic Polyacrylamide, is a very long chain, high molecular weight organic polymer produced from natural gas, with characteristics which make it useful as a soil amendment to control runoff and soil loss. The chemical when applied as a liquid solution to a freshly-tilled soil surface will strongly bond to the soil aggregates, strengthening them and greatly reducing aggregate breakdown and slaking. PAM is also a flocculating agent, so it also helps to prevent dispersion of soil by rain water into fine clays and silts that can clog soil pores and cause sealing and crusting. Often PAM is applied along with an electrolyte source such as a gypsiferous material (gypsum or power plant byproducts), which enhances its performance.

Soil treated with PAM, before rainfall.

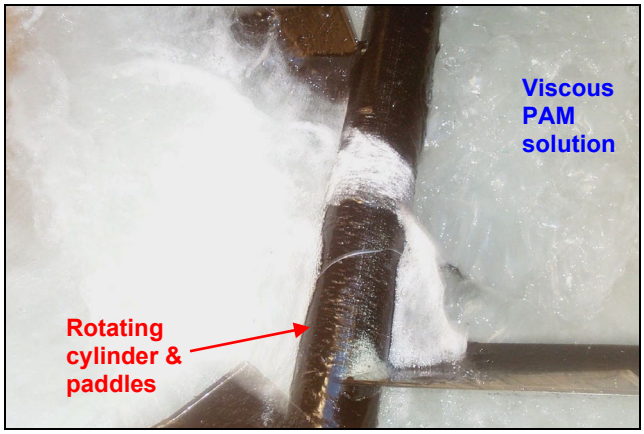
Soil without PAM, after rainfall.

Soil treated with PAM, after rainfall.

Rates of PAM application range from 10 to 100 pounds/Acre, depending upon the type of flow expected and the severity of the slope's erosion potential. For common agricultural fields, a rate of about 18 lbs/A is typically recommended. For a very steep highway or landfill embankment, rates over 100 lbs/A may be used. The dry powdered PAM material can be made into a water solution by using a hydroseeder to obtain sufficient mixing and agitation (usually a maximum 0.05% to 0.2% solution). If applied in conjunction with a separate dry gypsiferous material soil surface application, the rate for the gypsum can range from 0.5 to 3 tons/Acre. PAM can be effective up to several months if there is no subsequent soil disturbance.

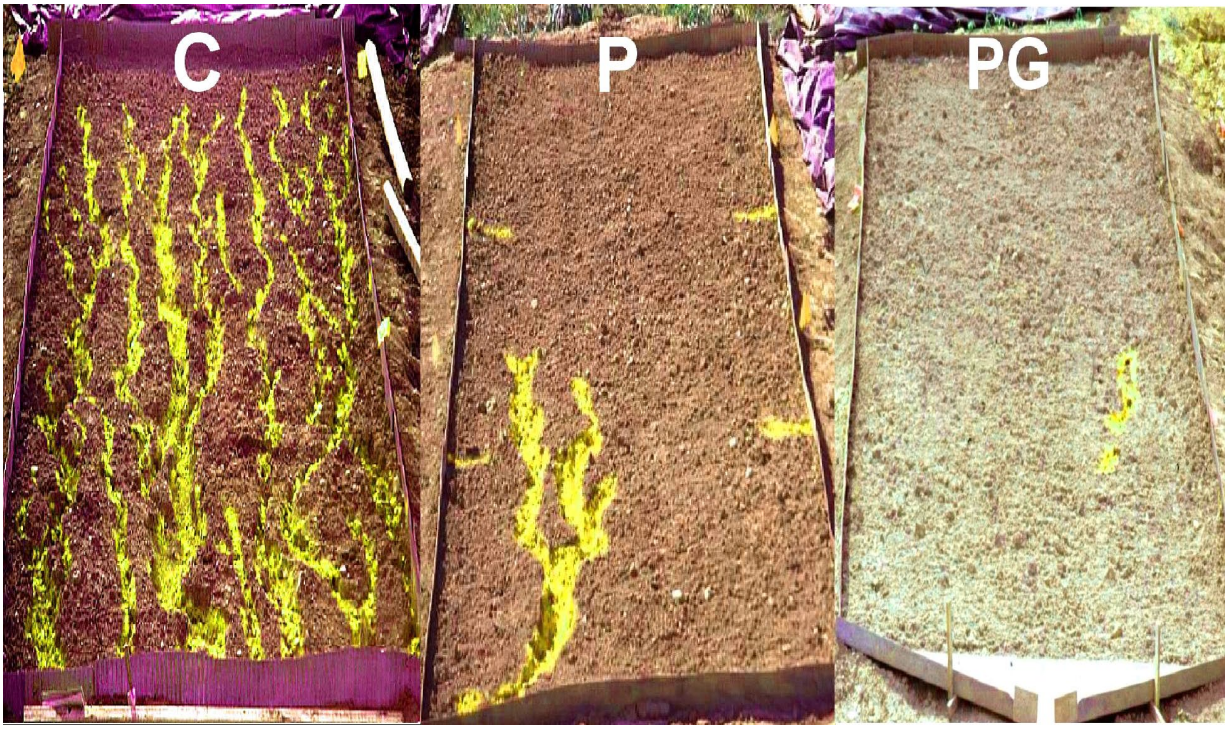
Anionic Polyacrylamide is produced by a number of manufacturers. These include Applied Polymer Systems (Woodstock, GA), Cytec Industries Inc. (West Paterson, NJ), Ciba Specialty Chemical Corp. (Suffolk, VA), Hercules Environmental (Doraville, GA), Stockhausen, Inc. (Greensboro, NC), and SNF Floerger (Riceboro, GA; Pearl River, LA; Bay St. Loius, MS). Current cost of PAM ranges from $1 to $5 per pound, and is sold under a variety of trade names (APS series, SoilFix, Percol, Soiloc-PAM, HydroPAM, etc.), as either a dry powder or emulsion. (Please note – mention of companies or trade names does not constitute endorsement by USDA-ARS).

Adding PAM dry powder to a hydroseeder tank.



PAM solution mixing in hydroseeder tank.

Applying PAM solution with a hydroseeder to a newly constructed grass waterway channel.



Rilling and erosion resulting from a total of about 7 inches of simulated rainfall applied to a 3:1 embankment with a silt loam soil cap. Rills highlighted with fluorescent paint to improve visibility. From left to right is an untreated control (C), PAM (P), and PAM plus Gypsum (PG). PAM rate used here was 72 lbs/Acre and gypsum rate was 2.6 tons/Acre. Research was conducted by the USDA-ARS National Soil Erosion Research Laboratory in West Lafayette, Indiana, just south of the Purdue University campus.