Reducing Manganese Oxide Emitter Plugging in Subsurface Drip Irrigation (Field 3)
James P. Bordovsky and Joe Mustian

Objective: Monitor manganese (Mn) deposition on components of a SDI system while using a lower cost Mn management strategy.

Fig. 1. SDI emitter and emitter flow path that is plugged by Mn precipitates coming from the irrigation water supply, Helms Farm, 2002..

Methodology: The precipitation of manganese oxides out of irrigation water and the plugging of SDI emitters is not an isolate problem at the research facility at Halfway. Inquiries about methods to clean manganese impregnated emitters and methods to keep them clean have come from areas northwest and south of Lubbock as well as Colorado and Kansas. Hydrogen peroxide has been used to dissolve Mn, keeping it in solution until it passed through the emitter. Continuous injection of H_20_2 in slightly acidic irrigation water has prevented further Mn precipitation and plugging as well as provided an oxidizing agent to reduce organic materials (algae) in SDI irrigation water. However, the annual cost of this treatment has approached $50/acre. The cost could be reduced by intermittent injection of acid and H_20_2 instead of continuous injection.

Results: Although, the 2005 irrigation season was shortened due to crop damage caused by hail, Mn treatment chemicals were halted during a 2-week irrigation period in July. Evidence of manganese oxide deposits at the drip filter station at the end of this two-week period resulted in the resumption of chemical treatments for the short duration of the irrigation season. Following the 2005 growing season and after final system flushing, several drip emitters were excavated and examined for signs of MnO_2 deposition. Figure 2 shows the magnification of one of these drip emitters. No excavated emitter showed any signs of MnO_2 precipitation, however, sand particles were seen in the emitter pathways of those emitters farthest from the filter station. This indicates that intermittent injection of H_2O_2 in slightly acidic irrigation water may prevent SDI emitters from plugging due to MnO_2 precipitation. and that periodic "high pressure" flushing of drip emitters must be maintained or increased to prevent emitter plugging by sand.

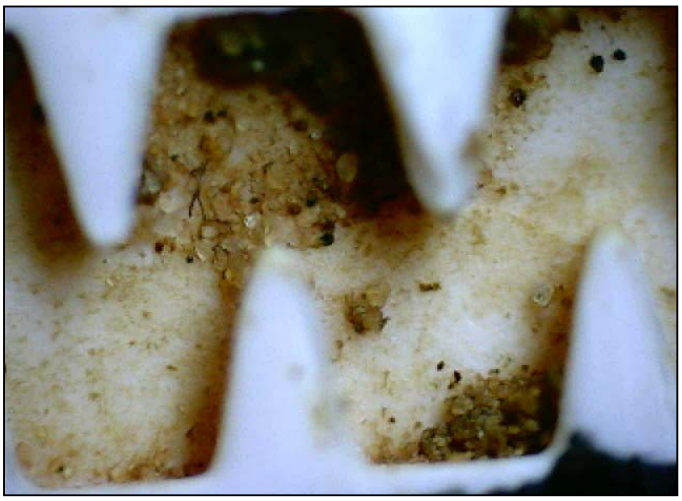

Fig. 2 Deposits of sand particles with no indications of MnO_2 precipitation in a magnified drip emitter pathway, TAES, Halfway, 2005.