

minerals dissolve and release carbon dioxide gas with a fizzing, hissing sound known as effervescence.

Iron is another potential source of mineral deposit that can plug emitters. Iron is encountered in practically all soils in the form of oxides (Cowan, 1976), and it is often dissolved in groundwater as ferrous bicarbonate. When exposed to air, soluble ferrous bicarbonate oxidizes to the insoluble or colloidal ferric hydroxides and precipitates. The result is commonly referred to as 'red water,' which is sometimes encountered in farm irrigation wells. Manganese will sometimes accompany iron, but usually in lower concentrations.

Hydrogen sulfide is present in many wells in Florida. Precipitation problems will generally not occur when hard water, which contains large amounts of hydrogen sulfide, is used. Hydrogen sulfide will minimize the precipitation of calcium carbonate (CaCO_3) because of its acidity.

Fertigation

Fertigation is the application of plant nutrients through an irrigation system by injection into the irrigation water. Fertilizers injected into a micro irrigation system may contribute to plugging. Field surveys have indicated considerable variation in fertilizer solubility for different water sources (Ford, 1977). To determine the potential for plugging problems from fertilizer injection, the following test can be performed:

- (1) Add drops of the liquid fertilizer to a sample of the irrigation water so that the concentration is equivalent to the diluted fertilizer that would be flowing in the lateral lines.
- (2) Cover and place the mixture in a dark environment for 12 hours.
- (3) Direct a light beam at the bottom of the sample container to determine if precipitates have formed. If no apparent precipitation has occurred, the fertilizer source will normally be safe to use in that specific water source (Gilbert and Ford, 1986).

Prevention of Emitter Plugging

A properly designed micro irrigation system should include preventive measures to avoid emitter plugging. Differences in operating conditions and water quality do not allow a standardized recommendation for all conditions. In general, however, the system should include the following: