New Information Available on Fertigation through Microirrigation.

Franz Niederholzer, UC Farm Advisor, Sutter/Yuba Counties

Full-service PCA's provide a wide range of expert advice to growers, not just pest management information. One important area of knowledge they cover is crop nutrient management. Sound information on this subject is valuable to growers as fertilizer costs rise rapidly while economic pressures push them to increase fertilizer inputs to grow large yields of high quality crops.

Fertigation -- applying fertilizer with irrigation water -- through drip or microjet systems is an important technical development that saves growers money. Microirrigation fertigation can deliver nutrients directly to active roots while rapidly incorporating the fertilizer without the expense of a tractor and a fertilizer spreader.

Knowing how to match fertilizer materials and application practices to maximize the grower's return on their fertilizer investment should give a PCA an added advantage in a very competitive business. This article will review some of the key points presented in Fertigation with Microirrigation, a new publication put out by the University of California's Ag and Natural Resources Division (Publication No. 21620). Some of the high points presented in this publication will be briefly reviewed here as answers to questions I've had, first as a PCA and then as a farm advisor. The take home messages appear in *italics.*

Q. What is the best nitrogen fertilizer injection timing strategy – when and for how long - using drip or micros?

A. *Injecting all fertilizer early in a long irrigation set risks leaching nitrate or urea fertilizer out the bottom of the root zone – even in a loam soil.* Efficient fertilizer application (pound of fertilizer into the plant per pound of fertilizer applied) through microirrigation systems is influenced by soil type and fertilizer material, timing and length of fertilizer injection, and length of irrigation set. In long irrigation sets (e.g. 36 hours) fertigation from hours 1-3, followed 33 hours of freshwater irrigation should push fertilizer nitrate and/or urea down and through at least a part of the root zone. This may waste expensive fertilizer and limit the amount of fertilizer available to the plant. Injecting late in the irrigation set will result in much less nitrate and/or urea leaching and more nitrogen remaining in the drip line area. Longer injection periods during the middle third or half of the irrigation set will give the most uniform distribution of nitrate and/or urea fertilizer in the root zone, but lower concentrations throughout the root zone. Short irrigation sets of only a few hours with long or short relative injection periods didn't show much difference in leaching or availability. [Note: Nitrate and urea are very mobile in many soils. Urea behaves much like nitrate during application, so be careful not to use excessive irrigation water with urea applications. Ammonium is very immobile in soil as it is being injected, but may be lost from the soil as ammonia if it is left near the soil surface and the soil pH is alkaline.]

Q. How often should fertilizer be injected?

A. *Generally, in sand soils, more frequent applications of small amounts of nitrogen are more effective than large, infrequent applications. On other soil types, in general, don't worry so much about fertigating everyday or week or month. Match crop need to fertilizer delivery and don't over-irrigate.* Daily fertigation has not been shown to be better than weekly fertigation in several crop species. One vs. multiple nitrogen fertigations didn't improve yield in grapes or nitrogen uptake in citrus.

Q. How can I be certain that fertilizer is being uniformly distributed throughout the irrigation system and to the crop?

A. *Across the field, make sure the fertilizer application time is long enough for the fertilizer to reach the furthest point in the system and then flush with clean water for at least the same amount of time. Within the field, make sure the irrigation water is applied uniformly throughout the block, and so will the fertilizer. Keep emitters clean, system pressure constant, emitter sizes uniform, and apply fertilizer at a constant rate.*

Injector pumps and venture injectors keep fertilizer application rate fairly constant, but batch tank mixing/injecting can produce different rates of application.

How long is fertilizer travel time in a system? Measure this important piece of information by monitoring the electrical conductivity (EC) of the irrigation water at the last emitter on the last hose before, during, and after a short-period injection of a high concentration of fertilizer (1-2 hour injection). The EC will increase when the fertilizer arrives, and travel time is the difference between the start of injection and when the EC meter "jumps" with the arrival of the fertilizer at the end of the system. Inexpensive EC meters are available from ag or landscaping supply stores.

Q. How far do phosphate or potassium move from the point of water application?

A. *Take home message: Not very far compared with urea or nitrate.* Potassium should move little farther in soil than phosphorous. Adding gypsum may push potassium (or ammonium) farther down into the root zone.

"Just do it" or "Git 'er done" make great bumper stickers, but attention to key details is what separates the experts from the average. A good grasp of the factors affecting fertigation through drip or microirrigation will benefit a PCA in their business.

Other topics covered in Fertigation with Microirrigation are gypsum injection, mixing problems with certain fertilizers, backflow prevention equipment and practices, calibrating injection applications, and a general review of fertilizers commonly used for fertigation. Fertigation with Microirrigation is available by contacting UC ANR Communication Services at 1-800-994-8849, danrcs@ucdavis.edu, or http://anrcatalog.ucdavis.edu.

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