Improvement of Nitrogen Management in Vegetable Cropping Systems in the Salinas Valley and Adjacent Areas

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Objectives

1. Review the literature on N and water management in production of lettuce, celery, cauliflower, and broccoli and summarize N requirements, best management practices, and research needs.
2. Determine the potential for reducing nitrate leaching by cover cropping and demonstrate compatibility of cover cropping with semi-permanent bed vegetable system.
3. Compare nitrate leaching, crop performance, and irrigation system performance under drip and furrow irrigation in a coarse-textured soil over several crops.
4. Further the development of plant tissue analysis, soil sampling, and soil solution sampling for monitoring crop N status and nutrient supply, especially in drip-irrigated systems.

Summary

A 79-page technical literature review entitled *Use of Nitrogen by Lettuce, Celery, Broccoli, and Cauliflower* was prepared, published and distributed in 1993. The review included baseline data for lettuce, celery, cauliflower, and broccoli on crop N uptake, fertilizer requirement, rate of uptake, tissue N concentrations, water use, and recommendations for water and N management. A bulletin, *Best Management Practices for Irrigating and Fertilizing Cool-Season Vegetables,* was prepared and distributed to production agriculture personnel and growers.

Winter cover crops also were grown at 3 sites in northern Salinas Valley. At all 3 sites, cover crops were successful in reducing the level of nitrate at the time of incorporation or earlier and were successfully incorporated in semi-permanent beds. Cover crops of phacelia (*Phacelia tanacetifolia*) and rye (*Secale cereale* cv. Merced) significantly depleted soil nitrate and soil moisture during the winter growth period, decreasing the potential for leaching of nitrate in winter storms. Cover crops also served to deplete the large quantity of NO_3 that accumulated during autumn after incorporation of the last vegetable crop.

Data were collected over 3 lettuce crops and 1 cauliflower crop from furrow, surface drip, and buried drip-irrigated plots in a commercial field near Soledad. Yields for the first lettuce crop were highest for the furrow plot and lowest for the surface drip plot. Lettuce yields during the second crop were higher in the buried

drip plot than on the surface drip plot. Yields in the third lettuce crop were higher under surge flow furrow irrigation and subsurface drip than in surface drip.

Plant and soil solution nitrate concentrations were followed over time in several commercial fields in the Hollister area. Data were collected in 2 broccoli, 1 pepper, and 1 sweet corn field. Non-uniformity of fertilizer applied through drip irrigation systems may contribute to spatially variable plant N requirement later in the season and could lead to leaching losses of nitrate in some parts of a field. Data from the pepper field showed that there was not a high degree of variability in the application rate of N applied through the drip system. In the lettuce field, N fertilizer application variation was almost entirely due to non-uniform water application.