



**2001 Nitrate Management Survey Results Report
Salinas Valley, California - August 2002**

**INTERPRETATION SUMMARY
Monterey County Water Resources Agency**

In May 2001, the Monterey County Water Resources Agency (MCWRA) released the Nitrate Management Survey to 314 Salinas Valley farm owners and/or growers. The respondents answered questions that outlined five categories of nitrogen fertilizer use and on-farm nitrate management. Over one-third, or 107 of the farm owners and/or growers returned the survey representing almost half of the irrigated acres in the entire Salinas Valley. The high response of this voluntary survey showed a commitment to, an interest in, and a concern for the management of nitrate in the Salinas Valley.

This is an interpretation summary for the **2001 Nitrate Management Survey Results Report, Salinas Valley, California - August 2002**. The “represented acreage” is the sum of acres managed, operated, or otherwise associated with the respondents who answered affirmatively to each question where 100% is equal to 98,858 acres. Each category of the survey is examined and a baseline interpretation of responses for nitrate management practices is discussed accordingly.

Category 1: Amount of Fertilizer (questions 1 – 7)

The first nitrate management category examines how growers determine which amount of fertilizer is adequate for specific conditions. Soil and water nitrate contents have historically been determined through laboratory analysis. A large majority of the represented acreage had specified that lab results were utilized in fertilizer decisions. This statement is optimistic, yet inconclusive because some represented acreage may adjust nitrogen fertilizer applications by crediting soil and water nitrate; others may take the information and deem the amounts insignificant. More information must be known regarding how growers credit soil and water nitrogen in fertilizer application rates.

Another form of soil and water nitrate testing is the “Nitrate Quick Test”. Only 2% of the represented acreage had utilized the on-farm testing capabilities of pre-sidedress nitrate testing (PSNT) performed with “Nitrate Quick Test” strips. The PSNT is an in-season, on-farm soil test that can allow growers to make a confident decision whether to sidedress a crop or not. PSNT is probably the most promising and economically advantageous analysis tool available. The PSNT method helps growers monitor soil nitrate concentrations first hand. The cost benefit of PSNT to growers is to minimize unnecessary fertilizer costs, while maintaining production yields.

A majority of the represented acreage indicated that they apply organic amendments, but do not account for the organic nitrogen content in fertilizer decisions. The successful use of organic amendments as a source of nitrogen generally requires more experience and better knowledge of the amendment, the crop, and the environmental conditions than the use of chemical fertilizers. Organic amendments do contribute significant sources of nitrogen and phosphorus, thus the content should be estimated and accounted for in all fertilizer programs.

Lastly, 92% of the represented acreage indicated that the crop requirement for nitrogen had been calculated per acre. In order to better interpret the response from this question it would be necessary to determine how extensively the crop requirement was calculated. Some growers may calculate this value solely on desired production yields and thus over compensate rates to insure desired yield return, while others may follow University of California guidelines and calculate for specific crop and soil types. More information must be known about how growers are calculating crop requirements.

Category 2: Timing of Nitrogen Application (questions 8 – 10)

Growers were asked to answer a few short questions in regards to how fertilizer scheduling corresponds to other aspects of the growing operation. Almost 95% of the responding acreage indicated that the nitrogen fertilizer budget was split into multiple applications. Growers have adapted new operational practices that may increase plant uptake and reduce nitrogen fertilizer use. Because the survey questions did not request quantification of fertilizer reduction, the degree that growers have reduced nitrogen inputs could not be determined. To best interpret fertilizer application trends three main questions have been suggested; (1) how many multiple sidedresses do growers apply during a single crop planting, (2) who determines how much nitrogen is needed during sidedressing and on which criteria this decision is based, and (3) what amount is typically sidedressed during each pass. Insight into these questions may reveal if growers are following standard nitrogen recommendations or if they are adjusting nitrogen inputs in fluctuation with crop and field conditions.

Another option for adjusting the availability and concentration of nitrate in the root-zone is the use of slow-release fertilizers. Approximately two-thirds of the responding acreage has used or experimented with slow-release fertilizers. In general, most cool-season vegetable growing operations are not willing to deviate from currently used nitrogen fertilizer products due to economic reasons.

The survey results indicate that most growing operations use furrow and sprinkler irrigation, which compared with drip irrigation, do not promote more efficient use of nitrogen fertilizer. Nearly all growers schedule an irrigation event in coordination with a nitrogen fertilizer application. One of the most common concerns in nitrate management is the application of irrigation water. When irrigation water is supplied to the crop in excess (causing saturated field conditions) the nitrate ion will have a much greater affinity to leach below the root-zone. Nitrate leaching not only reduces nutrient availability, to the crop, but also increases subsurface nitrate concentrations. Consequently, root-zone nitrate management, especially in sandy textured soils, is highly dependent upon careful irrigation scheduling.

Category 3: Fertilizer Storage and Handling (questions 11 – 12)

Fertilizer storage and on-site handling can pose significant nitrate pollution risks if the materials are not stored properly. Approximately 88% of the responding acreage applied nitrogen fertilizers themselves and 70% reported storing fertilizer materials on-site. One-third of the responding acreage that stored on-site fertilizer had specified that bagged materials were kept off the ground or that dry fertilizer was stored in enclosed areas. Two-thirds practice keeping liquid fertilizer tanks free of leaks. Proper on-site storage and handling of nitrogen fertilizers may not have an over-emphasized importance within the industry because these materials are not regulated or under restricted use. In terms of fertilizer handling, over 80% of the responding acreage indicated those applying nitrogen fertilizers did receive some degree of training, though the extent is unknown.

Category 4: Application Methods (questions 13- 14)

The survey intended to investigate which methods of fertilizing were commonly practiced. The two most prevalent methods identified from survey results were banding (mechanical application) and fertigation (injecting fertilizer through drip and sprinkler systems). Approximately 60% of the represented acreage identified each of these methods as individual ways in which they apply nitrogen fertilizer. In general, only banding and fertigation through drip systems place nitrogen within the crop's immediate root-zone. These are beneficial nitrate management practices because the localized placement of the fertilizer can reduce application amount, increase crop yield, and decrease nitrate leaching. In contrast to banded or drip placement, approximately 30% of the responding acreage utilized the methods of broadcast (mechanical application) and furrow irrigation. These practices require larger inputs of nitrogen fertilizer and can cause nitrate to leach into the aquifer.

The key to enhancing any fertilizer program is through better irrigation management. Improvements in fertilizer efficiency can result from the installation of a drip system because drip has a better distribution uniformity. Drip irrigation makes it possible to match the amount of nitrogen fertilizer applied to the needs of the plant at each growth stage. This method improves crop yield, reduces fertilizer costs, and cuts down on nitrate leaching. Growers of drip-irrigated vegetables who implement drip fertigation and on-farm methods of nitrate monitoring (e.g. use of PSNT) may increase the efficiency of fertilizer use and reduce adverse environmental effects from nutrient leaching and runoff.

Category 5: Other Practices (questions 15 – 20)

The final section of questions included in the survey were aimed to identify what percentage of growers managed irrigation runoff, maintained wellhead protection, implemented fallow season cover cropping, and utilized outside assistance to increase irrigation and nitrogen use efficiency.

Irrigation Runoff

The responses to handling irrigation water runoff were divided into three categories: those who diverted and confined runoff into reuse systems, those who did not, and those who marked the question not applicable. Approximately 20% of the responding acreage reported that no diversion or confinement of irrigation runoff occurred for their operations. In contrast, 37% of the responding acreage indicated they did divert or confine runoff, and 42% regarded the question as not applicable perhaps because they do not have runoff during irrigation events. A majority of the responding acreage regarded the diversion and confinement of runoff as not applicable to their operations.

Wellhead Protection

The responses to primary wellhead protection measures identified that over 75% of growers installed or repaired anti-siphon check valves. About 10% indicated they had not implemented any wellhead protection measures. Irrigation wells can be protected from nitrate contamination by using proper backflow protection, irrigation water management, and good wellhead maintenance.

Cover Crops

Over two-thirds of the represented acreage specified non-legume cover crops were *always* or *sometimes* used during the fallow season, 16% indicated *rarely* or *never* and 17% answered *not applicable* or *did not answer*. Fallow season cover crops are beneficial to prevent nitrogen losses due to runoff and leaching during the winter and to restore soil fertility.

Mobile Lab / U.C. Cooperative Extension

Two-thirds of the represented acreage indicated that they used the assistance of the Mobile Lab or University of California Cooperative Extension Service to increase the efficiency of their irrigation practices. Likewise, about two-thirds also indicated that they hired outside independent consultants to increase the efficiency of nitrogen applications. The survey results indicate that growers and operation managers demonstrate a willingness to improve farming practices using outside private and governmental crop related services.

10 Year Improvements in Practices

Over 90% of represented acreage indicated they had improved nitrate management practices over the past ten years. The activities involved in achieving these improvements are numerous and include: improving irrigation efficiency, upgrading irrigation methods to reduce nitrate leaching, determining/calculating a crop's nitrogen need prior to fertilizing, adjusting application timing/methods to optimize the crop's nitrogen uptake, increasing awareness/understanding of how on-farm management practices can affect ground water quality, attending and/or sending employees to conferences and other educational programs, and using outside consultants to increase efficiency.

The 2001 Nitrate Management Survey and all of its efforts met two goals: 1) to determine current baseline nitrate management practices in the Salinas Valley and 2) to identify areas in the Salinas Valley for further nitrate management outreach efforts.

This interpretation was completed as part of the Nitrate Management Program of the Monterey County Water Resources Agency in cooperation with Dr. Giulio Feruzzi, Agronomist, USDA Natural Resource Conservation Service, and Dr. Michael Cahn, Irrigation and Water Resources Advisor, U.C. Cooperative Extension - Monterey, San Benito, and Santa Cruz Counties.