

Vegetable Production & Marketing



VOLUME 6, NUMBER 11

NOVEMBER 1996

Tips on Conserving Water In Crop Production

This article appeared in The Cross Section , June 1996.

We are all aware of the problems associated with drought conditions and/or limited water sources. Consequently, we all should be actively doing everything we can to conserve one of our most essential commodities. The following are tips presented by the High Plains Underground Water Conservation District No. 1 for crop producers to implement into their production systems.

Soil Moisture Monitoring is a simple, cost-effective technique producers can use to improve their irrigation water management. Soil-moisture monitoring devices, such as gypsum blocks and tensiometers, help producers determine how much water they need to apply during an irrigation to fill the root-zone soil profile. This helps reduce the likelihood of applying too much or too little water. Once a determination is made on how much water the soil will hold at field capacity, the amount to be pumped depends on the application and distribution efficiency of the irrigation system. If water losses are 40 percent during application, the irrigator will have to pump as much as 160 percent of the water needed to wet the soil to make up for these losses.

Furrow Diking conserves water by forming small earthen dams that trap irrigation water or rainwater that would otherwise run off. Water held between the dams can slowly infiltrate into the soil, thereby increasing soil moisture. Increasing infiltration time is particularly important in soils with low permeability.

Surge Irrigation can improve furrow-irrigation application efficiencies as much as 10 to 40 percent. Water is applied to the furrows in a series of pulses or surges

rather than in a continuous stream. A time-controlled valve alternately switches the water flow between irrigation sets.

Low Energy Precision Application (LEPA) center-pivot sprinkler systems can achieve irrigation application efficiencies as high as 98 percent by applying water directly in the furrow, reducing losses associated with deep percolation, wind drift, and evaporation.

Drip Irrigation uses flexible tubing with emitters to apply water either at the soil surface, at the plant base, or buried below the land surface between rows of plants. Buried drip lines should have no surface evaporation losses.

Conservation Tillage helps retain soil moisture by leaving crop stubble on the soil surface. The plant stubble reduces wind and water erosion. Soil moisture losses are reduced because the soil is not turned over and exposed to the air. Conservation tillage also helps to reduce cultivation costs.

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Researchers Show Calcium During Bulking Increases Yields

This article appeared in The Great Lakes Vegetable Growers News, June 1995.

The discovery of tiny roots on tubers is changing the concept of potato nutrition and leading to better storability. Previously, scientists believed that the potato plant's main roots provided all available water and nutrients to the leaves, which in turn fed the tubers, according to Matt Kleinhenz, a research assistant at the University of Wisconsin - Madison.

Leaves dry out rapidly because they are exposed to the sun and dry air, and transpire large quantities of water each day that is brought to them by the main root system. In contrast, tubers grow in a relatively moist soil environment. They are unable to compete with leaves for available water, so a relatively small amount of water moves into the tuber.

Tubers have to rely on the roots that are in close proximity to extracted water from the soil. Mineral nutrients, such as calcium, are known to move into plants along with water. Potato tubers draw their water and nutrients from the soil, so spoon-feeding of the tubers during bulking should help insure an adequate supply of nutrients such as calcium. Studies have shown that the calcium content of tubers can be increased up to three-fold, but only when calcium is applied to the area around the tubers and stolons. In studies where calcium was applied to the main roots, no increase in tuber calcium could be detected. An independent study also found that maximum increase in tuber calcium occurs when calcium was mixed in the hill where tubers develop.

Increasing the calcium content of tubers can significantly increase tuber quality and storability by reducing the severity of tuber soft rot, internal brown spots, and subapical necrosis of sprouts. This is due, in part, to the fact that tubers, being a low-transpiring organ, are generally low in calcium content. Calcium deficiencies in tuber tissues are even greater for potatoes grown in sandy soils.

There are two readily available calcium sources: calcium nitrate and N-HIB. Wisconsin researchers have tested both, and found them to be effective in increasing tuber calcium and in providing nitrogen along with soluble calcium. Both were evaluated at a rate of 100 to 200 pounds Ca per acre. Applications were made in 3 split doses at hilling, 3 weeks after hilling, and 6 weeks

after hilling. The chemicals were applied through injection directly into irrigation lines.

The impact of these products on tuber yield was not consistent and showed no adverse effects. In several studies, there was some increase in tuber yield when calcium and nitrogen applications were made during tuber bulking periods. In other studies, there was no significant increase in tuber yield. In all studies, there was an increase in tuber calcium and tuber quality in terms of storability and reduction of soft rot and brown spots.

Results of the studies suggest that the application of soluble forms of calcium/nitrogen during bulking would increase tuber calcium and improve tuber quality. Two products that provide a soluble form of calcium are currently available, according to Mr. Kleinhenz.

One of the most significant aspects of these studies is the fact that researchers found significant increases in tuber calcium and improvement in tuber quality from the application of 100 to 200 pounds of calcium per acre, even in soils that tested at over 1,000 pounds of available calcium per acre. The results suggest that growers need to evaluate the current recommendations for calcium applications according to calcium soil tests. It appears that sandy soils containing 1,000 pounds of available calcium per acre may not have sufficient calcium in the available form for the tuber.

"We need to start thinking of a potato tuber as an underground plant that needs its own soil nutrition," Mr. Kleinhenz said.

HIGH PLAINS VEGETABLE CONFERENCE

Hereford, Texas
January 21, 1997
8 a.m. - 5 p.m.

*For information contact: Dr. Roland Roberts,
TAMU-AREC @ Lubbock, (806) 746-6101*

Spinach Production is Important to Southwest Texas

After this summer's severe drought, which was followed by an infestation of insect pests, the fall spinach crop has been planted and is off to a good start. It is too early to tell, but the crop appears relatively free of disease problems, and with the exception of isolated cases of imported fire ant problems and indications of high beet armyworm egg-lays which have required early spray, the crop, so far, appears relatively free of problems. If the cool open weather continues, the harvest should begin as early as mid-November.

Spinach production is very important to Texas and especially the Southwest Wintergarden region, where almost 90 percent of the state's spinach is produced. In 1995, for example, Texas produced 31 percent of the almost half-billion pounds of spinach produced in the U.S. during that year.

In the U.S., the farm value of spinach production in 1995 amounted to \$77.6 million (\$62.4 million fresh, \$15.2 million processed). The farm value of the total spinach production in Texas (fresh and processed) in 1995 amounted to \$10.7 million, with an economic impact of about \$42 million.

Until the early 1980s, Texas led the nation in spinach production for the fresh market. As we all know, spinach production in the Wintergarden of Texas crashed during the mid 1980s as a result of severe infestations of white rust and blue mold. The state's industry survived due to the perseverance of research and Extension scientists and the agribusiness sector. Production for the fresh market recovered after that crash, and peaked in 1987. Since then, production for the fresh market in both the U.S. and Texas has declined.

Since the mid 1980s crash, the market shares between fresh and processed markets have been reversing in Texas. Currently, Texas leads the nation in spinach production for processing. In 1995, for example, Texas produced 44 percent of the 300 million pounds of spinach produced in the U.S. for processing.

This article by Jose G. Pena appeared in AG-ECO NEWS, Vol. 12, Issue 34

Make Plans to Attend

University of Arkansas Spinach Workshop & Field Day

Workshop

Location: Fayetteville, Arkansas. University of Arkansas
Date: November 21, 1996
Time: 8 a.m. - 5 p.m.

Field Day

Location: Kibbler, Arkansas (near Ft. Smith). University of Arkansas Vegetable Substation
Date: November 22, 1996
Time: 9:30 a.m.

Contact: Dr. Teddy Morelock
Department of Horticulture
University of Arkansas
(501) 575-2603

Workshop Program

Morning

- 8-9 Registration
- 9:00 Conference Purpose Statement
- 9:10 Welcome
- 9:20 "Spinach Production Practices and Problems in the Arkansas River Valley" - T. E. Morelock
- 9:50 "Management of Spinach Seedling Diseases" - J. C. Correll
- 10:10 "Expression of CMV Coat Protein Genes in Transgenic Spinach" - Yanming Yang
- 10:30 Break
- 10:40 "Status of Dual on Spinach" - Ron Talbert
- 11:00 "Mechanisms of Seed Transmission of CMV in Spinach" - Ed Anderson
- 11:20 "Development of IPM Program of Insect Pests of Spinach" - Paul McLeod
- 11:40 "Spinach Research Update for the Winter Garden" - D. I. Leskovar
- 12:00 Lunch

Afternoon

- 1:15 "Spinach Production in the Winter Garden" - Frank Dainello
- 1:45 "Spinach Production and Disease Problems on the East Coast" - Steve Johnston
- 2:15 "Spinach Production and Disease Problems in California" - Steve Koike
- 2:45 Break
- 3:00 Industry Panel and Discussion
- 4:00 Adjourn
- 4:15 Tour Tissue Culture Lab at APC Building

Too Much of a Good Thing

This article by George Hochmuth appeared in The Vegetarian, A Vegetable Crops Extension Publication, Horticulture Science Department, University of Florida, Vol. 94, No. 9

Fertilizer management discussions usually deal with decisions about selecting correct amounts of fertilizer and pointers for best management practices. Over-fertilization often is viewed as an insurance policy in case of unforeseen occurrences, such as nutrient leaching from heavy rainfall. Sometimes, growers err on the side of excess fertilizer because they have very little information guiding them to do anything else.

There also have been instances where recommending excessive fertilizer was associated with the idea that extra fertilizer helps vegetable quality. An example of this has been potassium fertilization. Extra K fertilizer has been touted to increase yields, improve fruit size, and improve fruit firmness. Growers, therefore, might be tempted to apply a little extra K to achieve these supposed increases in fruit quality. Most Extension specialists, however, recommend against application of extra fertilizer above and beyond the amount which provides for optimum yield. These recommendations are based on the philosophy that if enough nutrients are available for high yields, then usually the vegetable 'quality' aspects are optimized too. Reduced quality is then usually due to factors other than fertilizer, e.g., high or low temperatures, low sunlight, etc.

Fertilizer studies in Florida have measured the effects of fertilization on vegetable quality. It looks like the extra K approach might be having the opposite effect of what

some recommendations would propose. For example, K in excess of recommended rates has been found to reduce specific gravity in potatoes and reduce wall thickness of bell peppers, with no positive effect on yields of either crop. These reductions in vegetable quality are occurring when K application is increased by 50 to 100 percent over the amount recommended. The reductions in quality are on the order of 10 to 20 percent compared to quality with the recommended K program. The physiological bases for these negative effects of excessive K on vegetable quality are not completely understood. High amounts of applied K in Florida's sandy soils does reduce plant uptake of Mg and Ca. However, in most cases, the suppression is not extreme enough to cause a Ca or Mg deficiency. Excess fertilizer also could increase salt stress and reduce water availability to plants, thus negatively impacting fruit growth.

The post-harvest aspect has often not been included in nutrient studies; thus, growers have not had much data at their fingertips to guard against excessive fertilization. If the data from Florida is an indication of what might happen elsewhere, then growers would be wise to check it out on their farms. Quality is always an important factor in the produce industry and will probably be even more important in the future. Proper fertilizer management is one of the keys to production of high quality vegetables.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.



Frank J. Dainello
Extension Horticulturist
Commercial Vegetable Crops
The Texas A&M University System
College Station, TX 77843-2134



Charles R. Hall
Extension Economist-Horticultural Marketing
Department of Agricultural Economics
The Texas A&M University System
College Station, TX 77843-2124