

# SONOMA COUNTY RECYCLED WATER DEMONSTRATION PROJECT REPORT

January 1, 1999 To December 31, 1999

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## Summary

A demonstration vegetable farm was established on three acres of land near Santa Rosa to educate attendees about recycled water use on edible crops. 256 people attended the demonstrations and 56 were surveyed about their attitudes before and after viewing the vegetables in production. Another 208 consumers were surveyed at grocery stores about their attitudes toward the use of recycled water on food crops. Many more people were reached through direct mailings, a press packet containing reprints of several scientific articles, public talks by the project organizers, two newspaper articles, and a newsletter article.

The surveys indicated that attendees at the field demonstrations became less concerned about potential problems of the use of recycled water on food crops and most support the use of recycled water for irrigation. About half of general consumers are concerned about the use of recycled water on the produce they buy, but their concerns are not very specific. In general they are interested in more information about the process that is used to treat and purify wastewater so that they can feel safe about its use on edible crops.

## Background

Sonoma County faces potentially significant water shortages for urban, agriculture, recreation, and wildlife uses because of increasing demand in each of those water use sectors. The demand for increased water supplies to meet the needs of population growth in the North Coast Counties of Sonoma and Marin could have a significant impact on the volume of water removed from the Russian River. Agricultural demands for irrigation water all along the Russian River have increased due to planting of high value crops on intensively farmed lands. Certain flow rates must also be maintained to provide for recreation in the lower Russian River watershed. Eel River water diversions into the Russian River that maintain much of its flow in the summer months is likely to end in an effort to protect anadromous fish habitats in the Eel River. Protection of fish habitats in the Russian River also relies on providing minimum river flows at various times of the year.

As you move from the valley floors to the hillsides of Sonoma and Marin Counties, water becomes very scarce. Much of the agriculture is dry-farmed. This was profitable prior to the installation of the vast irrigation projects of the California Central Valley, Washington, and Oregon. A non-irrigated operation, however, can only produce about 1/2 to 1/3 the yield of an irrigated operation. Therefore, today several agricultural industries cannot compete due to a lack of sufficient irrigation water. Water scarcity also limits the ability to grow more profitable crops as the market changes or to take advantage of high-density orchard systems that provide a quick return on investment. Wine grapes are one of the few crops that can survive and produce an adequate yield with sub-optimal irrigation.

One of the solutions to reduce water shortages and to make more water available for agricultural irrigation is to reuse the water that we already have. A significant portion of projected shortages could be offset with the use of cleaned "recycled" water for various industrial, agricultural, and home uses. Recycled water has also been called wastewater or reclaimed water in the past. Using recycled water reduces reliance on scarce and expensive surface water and groundwater. The Sub-Regional wastewater treatment facility operated by the City of Santa Rosa produces 20 million gallons of clean, safe, recycled water each day.

Even without a future water shortage, the potential benefits of more water available for irrigation include the ability to grow a greater diversity of crops, improved erosion control, an improved competitive edge for growers, and the maintenance of agricultural (non urban) open space. Recycled water could be used to significantly augment agricultural irrigation water supplies, if the public will accept it.

Recycled water has an image problem however. Many farmers are unfamiliar with the benefits of recycled water and are suspicious of its origins and safety. The association with sewage and a lack of understanding of the purification process tarnishes its image. There is a near consensus among scientists, however, that if the treatment processes are conducted properly the water is very safe and cleaner than most surface waters. Organic farmers were also concerned about the certification of produce irrigated with recycled water if the edible portion of the plant was touched by sprinkler irrigation.

Consumers are also concerned about safety issues when recycled water is used on edible food crops. Many consumers and produce buyers have openly feared the use of this water because of its association with its origin and the perception of lower quality. The public is not yet ready to accept this supply of water without more education. In order to effectively reach and educate all these different groups of people about recycled water, the Sonoma County Recycled Water Demonstration Project was funded by the California Department of Water Resources in 1999.

## **Goals**

The goals of the project were to:

- Demonstrate the use of recycled water on vegetables at field meetings
- Educated demo attendees about the water purification process and its safety
- Survey potential users about their concerns for its agricultural use on edible crops
- Survey consumers regarding their feelings about recycled water use in growing fresh produce
- Bring about an open discussion of the fears and concerns of recycled water use on edible crops so that those fears and concerns could be addressed

## Methodologies

**Demonstration Farm:** We developed a demonstration farm to show people the use of recycled water on vegetables. It was located on three acres (2927 Llano Rd – Santa Rosa) and leased at no cost to the University of California by the City of Santa Rosa. It was managed by a part-time field assistant, Kevin McEnnis, to produce crops commonly grown by commercial farms in the surrounding area, which were sold in local farmers markets, given to tour attendees, and donated to the food bank. Adjacent land was leased from the City of Santa Rosa by a neighboring vegetable farmer to grow vegetables irrigated with recycled water.



The irrigation system and planting layout was developed initially because both high pressure (70 psi) sprinkler irrigation and low pressure (10 psi) drip irrigation systems were to be demonstrated. According to certification standards, organic growers could only have their produce certified if it was grown with drip irrigation. The City of Santa Rosa provided irrigation assistance through a pump station, electricity, special disk filter, pressure regulator, and irrigation pipe to distribute the water at a suitable pressure and location for use on the property, at no cost to the program.



With overhead irrigation, Kevin grew and maintained about ½ acre of mixed salad greens such as leaf lettuce, mizuna, kale, mustard greens, and arugula. He also succession planted broccoli, cauliflower, onions, summer squash, and leeks during much of the season. All of this produce grew exceptionally well with the abundance of water and continuous feeding of low levels of plant nutrients in the water.

Another ½ acre was used to grow various types of winter squash and pumpkins using a temporary “Oval Tube” delivery system and drip irrigation and “T- tape.” The third ½ acre area was planted to tomatoes, hot chili peppers, and sweet bell peppers again with drip irrigation. All of the warm season vegetable transplants were started in a small plastic greenhouse at the farm demonstration site. The drip-irrigated produce also grew well, appeared very healthy, and yielded huge quantities of produce comparable or better than the best farms in the area.

Observational data was collected to determine that there were no problems on the function of the irrigation components at the farm. Crop nutrition was excellent. Growth, production, and yields were good for all of the crops grown and the produce tasted great. We received several comments from attendees about the excellent flavor of the produce; especially the tomatoes all irrigated with recycled water.

***Field Demonstrations (6-99 to 10-99):***

Direct mailings were sent out to 31 public agencies, environmental, and grower groups in the county asking them to include announcements about the demonstration tours to their members. Personal notices were also sent out 2,130 individuals on Sonoma County Cooperative Extension mailing lists. Two meeting notices were printed in the Press Democrat Agricultural Briefs section.



Ten public demonstration tours were held on 6-17, 6-30, 7-1, 7-8, 7-15, 7-21, 8-19, 9-7, 10-6, and 10-7. The demonstration tours provided the opportunity for people to ask questions, sample the produce, and begin to feel comfortable with the concept of using recycled water on their produce. Many individual agricultural business people, grower group members, college classes, and high school classes attended the field demonstrations. Special tours were also held by request for interested groups.

The following people attended:

- Local vegetable growers (17)
- Farm Bureau members (3)
- Agricultural Commissioners staff (3)
- Grape Growers Assn. (20)
- Regional City Council members (4)
- United Wine Growers members (3)
- Gardeners of Sonoma members (2)
- Master Gardeners (25)
- State Assembly Representatives (3)
- SRJC classes (33)
- High School classes (40)
- UC Berkeley students (21)
- Greenbelt Alliance members (3)
- WateReuse Association members (27)
- Community Alliance of Family Farmers members (30)
- Leadership Santa Rosa members (22)





Just over 250 people were directly influenced by this demonstration project primarily by seeing and tasting the produce in the field right where it was grown. We were able to answer most of the questions and concerns about the quality and safety of the water for vegetable production for the tour visitors. Changing attitudes about the safety of recycled water is a long process and we have just started to chip away at it.



***Talks – Handouts – Meetings (4-99 to 11-99):*** I was an invited speaker at a Farm Bureau meeting on “The Value of Irrigation Water” in April with 22 people attending. I was on a panel of experts talking about the use of recycled water on the North Coast of California. I provided some statistics on the potential yield increases in apple production comparing dry farmed and irrigated orchards from my research. I also talked about the benefits of water for erosion control, use of dwarfing rootstocks, growing new specialty crops, and the maintenance of a competitive advantage.

Industry leaders, growers, politicians, and other educators present were provided with some specific numbers for yield increases and economic gain provided by the use of abundant irrigation water. Much of the information has been used in the debate to provide recycled water to farmers for agricultural production, the reuse of a valuable resource.

Kevin McEnnis and I were invited speakers at the annual Water ReUse Association Symposium in LA in September. We made a presentation describing the objectives reached with the recycled water demonstration farm and gave results of the surveys from the attendees. This group of municipal utility managers and consultants of water recycling programs is very supportive of a public education program about the use and safety of recycled water.

I also spoke at the local chapter meeting of the Water ReUse Association meeting held in Santa Rosa in October. I made a presentation to 27 people about the demonstration farm goals, survey results, and then took the group on a tour of the farm.

Kevin McEnnis and I made a presentation in November about the demonstration farm to the Sebastopol City Council. Sebastopol is one of the participants in the sub-regional wastewater treatment facility and very interested in receiving and reusing some of its water for irrigation. The governing body of the city needed to know about the value and safety of the water for irrigation and the survey results from attendees at the demonstrations in order to make better decisions regarding the ultimate fate of the recycled water.

Kevin and I developed a press packet that described the demonstration farm and the goals of the project (*see appendix*). We made reprints available of several articles describing scientific research that had been conducted on the use of recycled irrigation water on edible food crops in California. 450 copies of these handouts were given out and sent to people asking for more information. Another popular handout was a reprint we made of the treatment process for recycled water at the Santa Rosa treatment facility (*see appendix*).

***Media Exposure (8-99 to 11-99):*** Several articles were written to broaden the message to people who did not come to the demonstration farm. We sent the press packet to all the local and regional media. The press packet contained a simple overview to readers that described what recycled water is, uses for recycled water, comparing recycled water to conventional water resources, and new opportunities for agriculture due to the use of recycled water. The following articles appeared in the media written for the general public:

- Sonoma West Times and News article (8-18-99): “Good Veggies Growing At Wastewater Farm” - Public Is Invited To See Reclaimed Water Project. This article promoted the demonstration orchard and the use of recycled water on vegetables (*see appendix*).
- I also wrote an article that appeared in the Water ReUse Update, the newsletter of the Water ReUse Association (Vol. 9, Issue 2, Summer, 1999). The title of the article was “Demonstration Farm Opens in Sonoma – Recycled Water Nourishes Crops” (*see appendix*).
- Press Democrat article: "Looking to Put Down Roots" (12-23-99) with a story about Kevin McEnnis and photo of the recycled water demonstration farm (*see appendix*).

***Survey of Demo Attendees (6-99 to 10-99):*** At the demonstration farm tours, 56 attendees were asked to fill out a pre and post tour survey regarding their feelings toward recycled water. Kevin McEnnis, the farm coordinator, and I developed the surveys to see what concerns were and to indicate if attitudes had changed at all from information received during the tour. The results indicated that most farmers are receptive to the use of recycled water yet a few fear negative consumer reactions. Many of the survey respondents were already somewhat familiar with the use of recycled water for vegetable crops. (*See appendix for pre and post tour surveys*). Results of the survey questions follow:

## **PRE TOUR SURVEY**

### ***What are the benefits of using recycled water on vegetables?***

- Cheaper, environmentally conscious
- Use of wastewater, use of nitrogen, recycling water = good management
- Saves water (8)
- It uses up water that people will not drink and helps put water back into the ground to be environmentally clean.
- Less wasted water, probably less expensive
- Disposing of water, local benefit, saves money
- Don't have to pump additional water from ground. Recycled water can contain important nutrients.
- Not sure. Benefits for vegetables?
- Reuse of limited resources, benefits to community, water doesn't have to be transported great distances
- Russian River remains cleaner and more sustainable to fishery.
- If recycled water were available to growers the problems of water consumption in drought years would be a moot point.
- If county subsidized growers for using recycled water costs of produce to consumers would be less expensive.
- Reuse of water to provide food and fiber
- The reuse of water better than just dumping it, a great use, should be used to water our lawns as well
- Better growth
- Renewable, free?
- Better utilization of water
- Create more farms

- Keeps land in agriculture
- Saves energy, water efficient
- Good for them
- Availability reduces pumping from Laguna, creeks reduces draw from local adjacent wells
- Remarkable resource, free. After used water is clean
- Resource reuse, diminishing the problem of water discharge, recycles nutrients
- Reuse of valuable resource
- I believe the jury is still out! I fear that the politics driving the issue is simply the ridding of volumes of wastewater.
- None
- Increases amount of water available
- Less taxing on the aquifer and watershed
- Making more water available to grow more crops, water conservation
- Sustainable water usage, conserve environment, promote more farming
- Saves the aquifer
- Extra nutrients
- Saves natural resources
- Relieves strain on water system
- Saves water supply, keeps recycled water from being wasted. No room to store all recycled water
- Very good if safe
- Fertilizer in the water, not taxing fresh water supplies
- Save power? Water for human consumption
- Saves potable water
- Kinder to water table or other source. Solved disposal problem of solid wastes if also used.
- Agriculture is a major water user
- Same as other water
- Low cost, ample supply if close to source
- Saving drinking water
- Saves water, perhaps more nutrients
- Re-use of good water that otherwise might be wasted, cheaper than new water, if clean just as good or better
- Lack of water, we need more irrigation water

***What are your main concerns about recycled water use on vegetables?***

- No concerns if proper “cleansing” has occurred
- Cleanliness, lack of contamination. Is there enough of a resource to get recycled water?
- How to set it up
- Toxicity (3)
- Can't use for certified organic crops. Unsure of long term effect, metals etc.
- Not to drink
- Sanitation (2)
- Heavy metal accumulation in soil
- What's in it? Same concerns as well water
- Heavy metals (4)
- Bacteria, virus, petroleum products, chemical and fertilizer leaching.
- What are the effects of winery process waste on the crop?
- Bacteria (2)
- Virus
- Pesticides
- Is the water really clean?
- Medically infected water, spread of disease
- Chemical contamination
- Salt buildup in soil (4)



- Pathogens (3)
- Consumer acceptance
- Not enough known, many questions
- Quality of effluent, if water is not fit to drink is it fit to eat?
- Something unaccounted for in the monitoring process
- Can't irrigate vegetables in winter
- Availability (2)
- Disease problems, clogging drip emitters
- Customer acceptance
- Metals and industrial poisons
- Public perception of dangers
- Recycled water more expensive than well or city water
- Bacteria and chemicals eventually in vegetables
- Cleaned properly
- The water is treated with chemicals and then waters vegetables, do you think that is considered organic?
- Pollution
- Coliform count

***How would you rate the following use of recycled water? (Categories were: River Discharge, Geysers Recharge, Irrigate Non-Edible Crops, Irrigate Food Crops, Wetlands, Aquifer Recharge, and Irrigate Urban Landscapes)***

Only 10% responded that river discharge was an excellent or good idea, 44% said it was a bad or very bad idea, and 46% gave a neutral or no response. For geysers recharge, 28% said it was an excellent or good idea, 46% were neutral, and 26% said it was a bad or very bad idea.

The irrigation category questions, separating irrigation of edible food crops from non-edible food crops, were answered almost the same. For the irrigation of non-edible crops 64% said it was an excellent idea another 18% said it was a good idea. Responses for the irrigation of edible food crops were that 38% said it was an excellent idea, and another 33% said it was a good idea. For both non food crops and food crops only 2% said it was a bad idea, 5% said irrigation of food crops was a very bad idea and 2% said that irrigation of non food crops was a very bad idea. About 15% in each were neutral.

Irrigation of urban landscapes and creating or restoring wetlands rated very positively among the survey respondents. 72% said recycled water use for wetlands was an excellent or good idea, 22% were neutral, 6% said it was a bad or very bad idea. For landscape irrigation, 77% said it was a good or excellent idea, 14% were neutral, and 9% said it was a bad or very bad idea.

Aquifer recharge received a divided response. 23% said it was an excellent idea, 22% a good idea, 33% were neutral, 4% said it was a bad idea, and 18% said it was a very bad idea.

Attendees rated the development of wetlands, irrigation of urban landscapes, irrigation of non-edible food crops overwhelmingly as excellent uses for recycled water. They were also very favorable to its use on edible crops rating it much higher than geysers recharge. River discharge and aquifer recharge were the least popular uses for the water. The benefits of using recycled water could be primarily stated as positive due to the reuse of a valuable resource. Their main concerns were expressed as safety questions dealing with contaminants in the water.

## POST TOUR SURVEY

***Are the vegetables you saw at the demonstration of higher, the same, or lesser quality than vegetables irrigated with non-recycled water?***

- 53% responded - higher quality
- 41% responded - the same quality
- 0% responded - lesser quality
- 6% no response

***Would you buy vegetables knowing they were irrigated with recycled water?***

- 75% responded - yes, definitely
- 14% responded - maybe or don't know
- 3% responded - don't know
- 3% responded - no
- 0% responded - absolutely not
- 5% no response



***After seeing the demo of recycled water irrigation on vegetables have your concerns changed about? (Biological Contamination, Chemical Contamination, Heavy Metals, Salinity, Excess Nutrients, Hormonal Reactions, or other)***

Overall most people were less concerned with all of the potential problems associated with recycled water use for irrigation of vegetables after attending the demonstration tour. For biological contamination, 14% were more concerned, 41% were less concerned, 33% were not concerned, and 12% did not know. For chemical contamination, 14% were more concerned, 36% less concerned, 38% were not concerned, and 12% did not respond. For heavy metals, 8% were more concerned, 28% less concerned, 42% were not concerned at all, and 22% did not respond. For salinity 19% were more concerned, 22% less concerned, 48% were not concerned, and 11% did not answer. For excess nutrients, 12% were more concerned, 27% less concerned, 50% were not concerned, and 11% didn't know. For hormonal reactions, 11% were more concerned, 17% less concerned, 36% were not concerned, and 36% said they did not know.

***When asked for comments or questions, this is the response we received:***

- I would like to use the water, how can I get it? (3)
- Great Program - Good Demo (7)
- Great Project - I was wondering what you were doing out here - it's good to know this resource exists
- More long term studies on unknown residual effects of unfiltered chemicals is needed

- Farm looks great, keep up the good work
- Please do this again (2)
- Can you grow trees?
- I like the quality of the vegetables. My concerns have not changed but those are concerns I've had since working with this water starting 3 days ago.
- Need to get more education out
- Look forward to more information about effects of reclaimed water on soils and food crops. Main concern is regarding bacteria, water quality control, and effects on human health as well as public acceptance.
- Still very unsure
- I'm interested and hope to learn more about long-term affects on human consumption. I think we need an alternative but I'm not yet convinced.
- More concerned, because there will be more used on crops
- Looks promising
- Interesting presentation, especially info about nitrogen and phosphorous content of recycled water lessening need for fertilizer application
- Thank you for spreading the word
- In the long term we will have a conservation ethic with all of our water
- What about eutrophication?
- I support your efforts 100%
- Mad cow disease?
- This is great
- Great project, need more farms to use the water
- Very interesting, good job
- What are future prospects of recycled usage for drinking? What are storage alternatives?
- I loved the tour, I can't wait to taste your fruit orchard, thank you
- Beautiful vegetables
- It's a great way to use the water; so much irrigation is needed and instead of using drinking water why not recycled?
- Recycling water is great
- Great project - I didn't know anything at all, but I think others would really appreciate this knowledge
- Thanks again for you time and tour as well as the vegetables

Most people thought that the vegetables seen at the demonstration farm were of higher or equal quality compared to their own, nobody felt they were of lesser quality. Three quarters responded that they would definitely buy vegetables knowing they were irrigated with recycled water, very few said no or absolutely not.

Most of the questions and comments were very positive and indicated that the attendees at the demonstrations had less concerns than before attending the demonstration. These meetings that included observation, discussion, and tasting provided a positive background for attitude change and the enhanced image of the use of recycled water for irrigation.



**Consumer Survey (8-99 to 12-99):** We conducted 208 supermarket exit surveys to determine general consumer concerns about recycled water and to get additional data from the general public. I

designed the exit survey then had it reviewed by Dr. Christine Bruhn at the UCD Consumer Science Department and by a private marketing firm that works for the City of Santa Rosa. Kevin McEnnis and I administered the surveys outside Safeway (Santa Rosa and Healdsburg), Food For Less (Santa Rosa), Food for Thought (Santa Rosa), Oliver's Market (Cotati), and Raley's (Santa Rosa). Each survey took about 4 minutes.

Several allied questions were asked about consumer attitudes toward produce appearance, price, nutritional value, and if it was locally or organically grown. Consumers were asked if they had "no concern", "some concern", or a "big concern" about 11 different agricultural practices including the use of recycled water for irrigation. If they had indicated any concerns about recycled water they were asked to note what those specific concerns were and they were noted. We asked about concerns regarding other agricultural practices such as the use of: conventional pesticides, organic pesticides, conventional fertilizers, animal manures, compost, bioengineered seeds, irradiation, and fumigation. We also asked if there were concerns about the use of surface (pond – river – creek) water or the use of well (potable) water for irrigation of produce. Approximate age, educational level achieved, sex, and if involved in agriculture were noted for each person questioned.

Of the consumers surveyed, 38% said they had no concern about buying produce irrigated with recycled wastewater while 31% had some concern and 25% had a big concern; 6% said they didn't know (56% had concerns). Their concerns about the use of surface (river, pond, or creek) water for growing produce were less with 48% indicating no concern, 34% some concern, and 10% a big concern; 8% said they did not know (44% had concerns). For well-water irrigation, 80% had no concern, and the 16% with some concern were primarily due to potential groundwater overdraft, not safety issues; 4% did not know and nobody indicated they had a big concern.



Consumers were much more concerned about buying produce that had been grown from bioengineered seeds with 23% responding they had no concern, 30% some concern, 35% a big concern, and 12% saying they did not know enough about it to comment. They were also much more concerned about their produce being irradiated or fumigated to control harmful bacteria than if it were irrigated with recycled water. 21% of survey respondents said they had no concerns about buying irradiated produce 27% indicated some concern, 43% said they had big concerns about irradiated produce, and 9% did not know. For fumigation, 18% had no concerns about fumigated produce, 27% indicated some concern, while 45% had big concerns about fumigated produce; 10% did not know.

The other agricultural practice that survey respondents indicated was of significant concern to them was in the use of conventional pesticides. Just over 84% indicated a concern about buying produce that might have a detectable pesticide residue, with about half having a big concern and the other half with some concern; only 12% had no concerns. About 70% still had concerns about conventional pesticides even if the produce was assured to have no detectable residue. Again about half with a big concern and the other half with only some concern; 27% indicated they had no concern.

When it comes to concerns over the use of organic pesticides, 52% said they had no concern about buying produce treated with organic pesticides, 30% said they had some concern, and only 6% had a big concern. 12% did not know what to think about organic pesticides. Consumers ranked produce flavor as the most important factor when selecting fruits and vegetables over nutritional value, appearance, price, or whether it was locally or organically grown, in that order.

Of the 56% indicating they had concerns about buying produce that had been irrigated with recycled water, most (16%) simply said they were not satisfied that the treatment process had made the water safe. Only 3% said it was because of possible virus contamination, 2% said it was due to possible heavy metal contamination, and 5% indicated it was the association with sewage. Most people (74%) didn't know what to base their concerns on.

### **Conclusions and Recommendations**

This project has accomplished a number of goals including the direct demonstration of the use of recycled water on vegetables to over 250 people in Sonoma County. Many of the people who attended the demonstrations learned about the processes that purify recycled water and became more confident in the safe use of this valuable resource. Some were prominent community and industry leaders who will pass information on to others. Beyond the direct contacts, the media articles, newsletter article, and personal mailings that were sent out influenced several thousand other people.

In the process of planning, planting, irrigating, and maintaining the demonstration farm, several students learned about the natural and man made processes for recycling water. We provided a location for Windsor High School students, Santa Rosa Junior College students, and a class of Berkeley Natural Resources Science students to become familiar with the use of recycled water. The demonstration farm was a method of documenting recycled water use experiences.

The project helped develop a good working relationship between the University of California Cooperative Extension, the City of Santa Rosa, County of Sonoma, Sebastopol City Council, Goldridge Resource Conservation District and the Water ReUse Association, all interested in educating the public about recycled water and improving the public image of recycled water. By raising public awareness of the benefits of recycled water, both the public and the private sector will now more readily accept recycled water, which will aid in preserving our limited supply of potable water. Additionally, through introducing farmers, students, and the media to the beneficial uses of recycled water, its use will gain a foothold in the mainstream.

This program serves as a model for other communities working to improve the image and demonstrate the benefits of recycled water. It has provided information that will be directly applicable to other recycled water use programs in the state.

This was a very forward thinking project because the results of this work will be seen in the future when the water will become available on a large scale for growers in the West County, South County, or Alexander Valley areas. If we have a drought or more restrictions are placed on water use from the Russian River that process may be speeded up. Farmers have become increasingly interested in the water and urban residents have been made more aware of the agricultural benefits of the water.



One farmer, a large vegetable grower, is using recycled water to germinate seed in the ground. He is then switching to well water for fear of potential market rejection. Three other small-scale vegetable growers in the same area however, use the water and are very pleased with the results. One is an organic producer.

A little over half (56%) of consumers surveyed have moderate to serious concerns about the safety of recycled water used on produce, but those concerns are not based on anything specific. They are, in most cases, very open and willing to accept its use, but just want more information about its long term safety. The small percentage indicating a specific concern wanted to know more about the process of purifying wastewater into something clean enough to use on their food. This should lead toward the development of educational information that describes in detail the tertiary treatment process in such a way that average consumers can easily understand and accept.

This one-year demonstration project for vegetables is part of a larger project to develop an orchard and vineyard at the same property and demonstrate the safe and effective use of recycled water on those crops. Research plans and funding are being sought to develop a tree and vine crop multiple year project through the year 2008. That research project aims at collecting data to verify the safety of recycled water use on edible crop like apples, vegetables, and wine grapes, but also will conduct an extensive public education program through field demonstrations, cable TV presentations, radio programs, public meetings, and printed brochures about the use of recycled water. Surveys will be conducted to see if consumer's attitudes have been changed.

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