

North Bay Drought Webinar

May 4, 2021, 09:00am - 12:00pm

Questions & Answers

Jim Leap, UC Santa Cruz

Eric Rubenstahl, Marin Agricultural Land Trust

Mallika Nocco, UC Cooperative Extension and UC Davis

Susan Haydon, Sonoma County Water Agency

Stefan Parnay, Marin County Department of Ag, Weights & Measures

Row Crops & Orchards

1. What are the possible impacts on dry farming potatoes in 2022 from the drought this year?

Jim Leap: *I think your success with dry farming potatoes in 2022 will depend mostly on how much precipitation you receive during the 21/22 rainfall season. If you have a “normal” rainfall season you should be fine. A second dry year would pose some serious challenges. Seems like the key to success with dry farmed potatoes is to get them in as early as possible (Jan/Feb) to take advantage of spring rains to establish a large plant. This strategy only works if the production area is relatively frost free. 10 inches of rain is just a little short of 1 acre foot. Typical water use for potatoes is more in the range of 1.5 acre feet. Your main strategy for compensating for less than average rainfall would be adjusting your crop density.*

2. Best practices for keeping perennials alive through this tough time. I have a dry farmed mature orchard. The water table is 20' below normal, and hasn't filled in the last couple years.

Jim Leap: *About all you can do is keep the soil capillaries broken at the surface and eliminate weed competition by utilizing shallow tillage at appropriate intervals. You are most likely already doing this.*

3. Best testing practices for deciding when to water.

Jim Leap: *Without knowing your crops this is challenging to answer. Each crop has fairly specific needs. There are a number of tools available but deciding which one to use depends on crop and soil type. You can use gypsum blocks or soil tensiometers as a guide for when to water. A soil auger can also be useful. It is always really good to have access to daily reference evapotranspiration rates for your area. CIMIS is a good place to start for this information. You should be able to access CIMIS data through the UC Davis IMP website. Look for “weather data” and find a CIMIS station close to you. This information will assist with “how much” water to apply.*

4. We have lots of wind. I believe this dries out the plants. Strategies?

Jim Leap: *Windbreaks can help but they really need to be very carefully designed to be effective. They also will be water extractive which may end up creating a larger problem in terms of overall water use in a given area. Wind is a significant factor in evapotranspiration rate determination so yes, wind will increase the need for irrigation.*

5. What actions can farmers take that will help now while also helping build resilience to future droughts?

Jim Leap: The best actions (from my perspective) to build drought resilience are:

- 1) design your cropping systems to utilize winter rains efficiently
- 2) capture and store winter runoff if applicable
- 3) be flexible in your cropping and marketing and be able to make changes depending on rainfall patterns
- 4) experiment with dry farming on a small scale and utilize this practice in rotation with irrigated crops so that during future droughts you have the tools and capacity to adopt quickly
- 5) If possible plant open pollinated cultivars and do as much seed saving as possible. You can select for positive traits in terms of drought resiliency and you would never need to worry about seed shortages. This, I know from experience, is challenging but very important to consider.
- 6) constantly trial new varieties and practices to see what is the best fit for your system
- 7) be constantly mindful of your on-farm hydrology and don't let unwanted vegetation take water that your crop may require

6. Is landscape cloth around a dry farmed crop OK after initial deep irrigation and surface hoeing to break capillary action, or is it important to leave soil bare and break surface capillary action frequently?

Jim Leap: My only experience is with "mechanized" larger scale systems where I have broken capillaries with various tillage tools behind a tractor at the appropriate time in the spring as the soil starts to dry down. I know this works. A lot of growers (large and small scale) are experimenting with tarping (occultation) as a means of minimizing soil CO2 loss in non-tilled systems. I think this type of system has some promise as a means of significantly reducing soil water loss as well and could work as a substitute for what is commonly referred to as "dust mulching". Timing of course would be critical - you would want the soil to infiltrate as much rain as possible then apply the tarp. Surprise spring rain events could be challenging. I would hate to have it rain while the tarp was in place. I believe also that landscape fabric "breathes" so it might make more sense to use a non-breathable tarp. I think these types of practices are very well suited to side-by-side comparisons or research trials. We still have a lot to learn in this area.

7. Can use of tarps "replace" surface tillage to keep soil moisture in?

Jim Leap: see answer to question #6

8. I am wondering if a heavy mulch/mechanically killed cover crop could be used to hold moisture in the soil instead of spring tillage, for farmers interested in reducing tillage while also using a dry farming system?

Jim Leap: I know from experience that it is next to impossible, in California, to "terminate" a cover crop without tillage. The most commonly used tools for attempted termination in organic no-till systems are either a mower or a roller crimper. Unless the timing is perfect in a mono-cropped cereal, the cover crop will continue to grow and extract moisture. Without tillage the cover crop roots are left intact and, even if mowed at the surface, will act as very effective capillaries pulling water out of the soil. We have done side-by-side trials over the years that show very clearly that no-till systems allow a much greater soil moisture loss when compared to tillage.

9. It seems counter intuitive that tilling helps to reduce evapotranspiration of soil. We have also been told breaking up the soil increases soil evapotranspiration. Can you speak to both schools of thought?

Jim Leap: Breaking up soil (tillage) does "dry out" the soil but only to the depth of the disturbance. The term "evapotranspiration" refers to the combination of plant water loss through transpiration and soil water loss through evaporation. So you would lose some soil moisture through "evaporation" from tillage but only to the depth of the tillage.

10. I've been doing extra tillage this year to compensate for low water table. But there's also way ore dust than in a non-drought year. I'm not sure which is harder for the plants... competing with some weeds or a layer of dust on their foliage.

Jim Leap: That is a difficult dilemma and I understand the challenge. If you are doing tillage to reduce weed pressure and are causing dust I am going to assume you are using a rototiller. I really don't like making assumptions so my apologies if I made an incorrect one. There are other tools that will effectively reduce weed pressure that don't create airborne dust. An undercutter bar (weeder bar) does wonders for weed control and does not create dust. When utilizing tillage to create a dust mulch and break capillaries it is only necessary to perform follow up tillage if you get a rain event or if you get significant weed emergence. Once you break the capillaries in the spring you can usually "hold" moisture in the soil for the entire growing season.

11. With tomatoes, can one do less frequent deep watering without increasing blossom end rot?

Malika Nocco: I am curious to also hear Jim's answer on this from his practical experiences. I would think this could be possible if you monitored soil tension in the root zone to try to keep it from getting too dry—studies have shown that maintaining soil tension above 50% of available water holding capacity can ensure a higher leaf and fruit Calcium concentration. But this is just from the literature—I think Jim will have more practical advice here...

Jim Leap: Blossom end rot is definitely correlated with decreased plant water availability so I would say that any "reduction" in irrigation in susceptible tomato varieties can potentially lead to increased Blossom End Rot.

12. With deficit irrigation, what is the impact on tree longevity/health? I understand the impact on crop yield.

Malika Nocco: this is a great question. One thing that is a common theme with tree longevity, especially citrus and stone fruit, is to start regulated deficit irrigation attempts when the trees are relatively young so that they can adapt to mild water stress. The post harvest irrigation recommendations in my table for peaches are to preserve the long term health of peaches as well as the quality of the following year's crop For more information on this idea in peaches/stone fruit specifically, please check out this podcast: <https://www.watertalkpodcast.com/episodes/episode-14>
The other thing that I wanted to mention related to Meyer Lemons and lemons in general is that there is an irrigation approach called 'Verdelli' where controlled water stress this year can make for an increased crop the following year by inducing flowering. Here is some more information about this: <https://anrcatalog.ucanr.edu/pdf/8549.pdf>

13. Information for wine grapes, please?

Malika Nocco: So, deficit irrigation is pretty common for wine grapes after veraison and we have a pretty great resource for understanding how to do it here: http://ucmanagedrought.ucdavis.edu/Agriculture/Crop_Irrigation_Strategies/Winegrapes/ Many wine grape growers use the Pressure Chamber to very carefully monitor stem water potential. Here is a site that carefully explains stem water potential measurements: http://fruitsandnuts.ucdavis.edu/pressure_chamber/ And here is a link to actually correcting your measurement for the time of day and relative humidity: http://informatics.plantsciences.ucdavis.edu/Brooke_Jacobs/index.php

14. How would integrating trees into the system affect the possibility of dry farming? Would the shade offered by the trees help by reducing the temperature, or would the increased competition for water make this a net negative? What about adding solar panels to cropping systems? I have read case studies from hot, water-stressed systems where the shade from the panels increased soil moisture, and the energy production added a new income stream, but would that be applicable to our area?

Malika Nocco: There are folks @ UC Davis evaluating the potential for agrivoltaic systems (the combined solar + agricultural) in California. I would suggest contacting Professor Majdi Abou Najm in the dept. of Land, Air, and Water Resources to learn more about this. The projection studies for a new income stream as well as saving soil moisture under climate change are promising, but there are several logistical and procedural issues to figure out for adaptation in CA

Funding & Relief

1. Where can we find relief funding for our 35 acres of vegetables in west Marin that we will not be planting this growing season?

Stefan Parnay: We are in the process of trying to get drought relief funding for our crop producers in our region who are having to fallow land. This will likely take several months or more if we are successful in securing some funds. We and our partners will continue to reach out to crop producers with resources as they become available.

2. For Eric @ MALT: Will groundwater infiltration or other watershed preservation/improvement be considered for the grant program you mentioned?

Eric Rubenstahl: Yes, groundwater infiltration and water retention are two extremely important processes that we hope these projects will address and have a positive impact on!

Livestock, Dairy & Rangeland

1. Will the county, state and/or feds help Livestock owners fund water deliveries and water truck transportation?

Stefan Parnay: The Marin County Board of Supervisors approved \$50,000 for drought relief for the time period of 7-1-20 to 6-30-21. If you will have hauled water during this time period to support your livestock operation, please contact Stefan Parnay with Marin County Department of Agriculture at 415-473-6700 by no later than 5-28-21. These funds are not for the hauling of water for domestic use.

There has been an additional request of \$150,000 of Marin County funds that will be reviewed by the Board of Supervisors in June. If these funds are approved, they would be available after 7-1-21.

Our partners have also asked state and federal legislators for support for the hauling of water for ranching operations. This will likely take several months or more if we are successful in securing some funds. We and our partners will continue to reach out to livestock operations with resources as they become available.

2. Why were Sonoma Water Agency, Ag Surplus meters shut off earlier this year , if producers are allowed to get water from hydrants. Seems to add an unnecessary burden on producers.

Susan Haydon: These meters are typically curtailed in dry years as no surplus water exists. The provisions of Sonoma Water's Restructured Agreement with water contractors and customers limits delivery of surplus water. This year and last have been some of the driest years on record, and hence we don't have surplus water.

Miscellaneous

1. Please comment on the water table for Alexander Valley and the possibility of wells going dry.

Susan Haydon: During droughts pumping from wells increases as people rely on groundwater more when surface water supplies are impaired. There have been two consecutive dry years with little winter/spring recharge to the groundwater aquifer plus expected very low Russian River flows and hence limited recharge from stored Lake Mendocino water this summer/fall. Given these circumstances, it is likely groundwater conditions in the Alexander Valley will be impacted. These impacts could include some wells going dry, especially shallow wells or wells completed in low capacity aquifer materials.