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### Final Paper

The watershed topic I have chosen to revisit and discuss is water use and soil moisture at Ela Farms in Hotchkiss, CO. At the organic farm, since 2004, Steve discussed his challenges and management strategies in going organic. One of the most interesting points he discussed was his careful management of his soil moisture and microbial communities. Without using the term, he carefully explained how he manages his farm by looking at the whole of its parts, whilst also breaking it down into smaller groups when addressing issues. This strategy would often be termed “systems thinking” when discussed in academia, but often it is difficult to understand when it is theoretically discussed rather than applied. Through his in-depth explanation during our tour, I believe I was able to fully comprehend this strategy of perspective and analysis that is so often misunderstood or worse, glossed over.

One of Steve’s specific management goals was to maintain his soil moisture at just below field capacity, so he applies roughly 1 inch of water per week via drip irrigation. But due to the relatively shallow soil formation of his farm and nearby areas, he realized that he needed to overwater due to evaporation. In addition to this issue, Steve wanted to increase his plant-available nitrogen in his soil. Without the ability to apply artificial fertilizers to his soil, he needed another solution. As is the way with all organic farms, solutions must be dynamic as you must fully understand the benefits and consequences of each of your actions.

To solve the issue of soil moisture and soil nitrogen, Steve decided to do something counterintuitive, allowing weeds to grow as a cover crop. By allowing them to grow, he creates shade for the topsoil which decreases evaporation, while also allowing for weed roots to increase pore space and allow for infiltration of water to decrease runoff and once again increase soil moisture. By later mowing the weeds at specific periods during the growing season, Steve allows for nutrients to be replaced back into the soils. Not only does this strategy minimize the irrigation pumping Ela Farms must do, but it allows for better habitats for native pollinators and insect communities which he noticed decreases the need for pesticides.

Ultimately the first 10 minutes of our tour at Ela Farms was no more or less beneficial in understanding the inner workings of a Certified Organic orchard, but it did provide a unique opportunity for me to fully comprehend how a scientist would apply systems thinking to the highly dynamic and challenging ecological problem of a Southern Colorado orchard. By working to solve one issue, Steve demonstrated that there are often highly beneficial consequences by restoring ecosystem functions through restoration of plant communities. For me, systems thinking was always difficult to fully understand, but by seeing its application in-person, I truly found the tour of Ela Farms and Steve's knowledge beneficial and eye-opening.

#### Related Works:

Baraibar, B.; White, C.M.; Hunter, M.C.; Finney, D.M.; Barbercheck, M.E.; Kaye, J.P.; Curran, W.S.; Bunck, J.; Mortensen, D.A. Weeds in Cover Crops: Context and Management Considerations. *Agriculture* **2021**, *11*, 193.  
<https://doi.org/10.3390/agriculture11030193>