

DEVELOPMENT OF A MOBILE APP FOR SMART IRRIGATION SCHEDULING OF ALFALFA

¹Manuel A. Andrade, Helen Truong², and Uriel Cholula¹

ABSTRACT

Irrigated agriculture is the highest consumer of freshwater in Nevada. Alfalfa, a crop known for its relatively high water demand, is the most important crop in the state and is cultivated in 40% of its irrigated land. Achieving a sustainable irrigation water use requires an accurate estimation of how much water is needed by crops. New technologies have made mobile computing platforms affordable and soil and weather information accessible, which now paves the way for the development of mobile decision support tools to improve the irrigation management of crops. Implementing well-established irrigation scheduling methods in mobile apps developed to assist the irrigation management of specific crops can help producers to determine the right amount and the right time to irrigate. However, farmers and ranchers in Nevada lack access to mobile apps developed to improve the irrigation management of alfalfa grown in the state. The main objective of this project is to develop a mobile app that lets alfalfa producers in Nevada know when and how much to irrigate to maintain soil water content in their fields within levels that benefit alfalfa production and reduce water waste. The app development will strongly focus on creating a friendly app that farmers and ranchers can start using with little effort to promote adoption. Users will be only required to provide a few essential information to the mobile app, named PackIrrigation Alfalfa, that will automatically download weather and soil information from public sources (DRI, 2023; NRCS, 2023). The app will use this information to determine when and how much to irrigate based on a daily soil water balance that accounts for water inputs (precipitation and irrigation) and outputs (evapotranspiration calculated using the Penman-Monteith equation) to determine the amount required to refill the soil water content to field capacity. The app will recommend to irrigate before the soil water depletion reaches a maximum allowable deficit above which alfalfa starts to experience water stress and a resulting loss of yield.

References:

- DRI (2023). Western Regional Climate Center. <https://wrcc.dri.edu/weather/>. Accessed: 4/12/23.
- NRCS (2023). Web Soil Survey. <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>. Accessed: 4/12/23.

¹ Department of Agriculture, Veterinary and Rangeland Sciences, University of Nevada, Reno, Reno, NV, 89557
²Department of Computer Science & Engineering, University of Nevada, Reno, Reno, NV, 89557
In: Proceedings, 2023 Western Alfalfa & Forage Symposium, Sparks, NV, December 12-24, 2023, (<http://alfalfa.ucdavis.edu>).