Irrigation System DU and ROI Estimator Welcome Screen

August 8, 2024

Welcome to the Irrigation System DU and ROI Estimator Program, also known as the DU Estimator. The following information in this tab provides information about what the program does, why it was created, how it provides value, and who funded it, created it, and will use it. It also includes information on where to get help, a disclaimer, and references.

To obtain an overview of how to use the program, please click on the adjacent Program Guide tab.

To obtain the program's User Manual, which includes extensive information about how to use the program, please click on the adjacent Program Guide tab.

1. What is the DU Estimator?

The DU Estimator is a program that is available for free via a web site link that downloads onto the user's Windows based computer. It provides the methodology, instructions, forms, data entry screens, reports, background calculations and interpretive information necessary for a field technician with nominal training to:

- Conduct an abbreviated distribution uniformity (DU) analysis on agricultural drip/micro, tape and stationary sprinkler irrigation systems by gathering flow and pressure data from specifically located emission devices within an irrigation block that is considered representative of the field's irrigation system;
- Identify specific irrigation system deficiencies by interviewing farm personnel regarding the operation of the system and physically observing the status of irrigation system equipment components;
- Translate the evaluation findings into reports estimating the economic value of improving the existing DU performance and equipment component deficiencies discovered, including the estimated cost of pumping unnecessary applications of water and fertilizer, the estimated value of forgone yield potential, and the estimated cost of less than optimal pumping plant efficiency;
- Provide an estimated Return on Investment (ROI) analysis, in $/Acre and $/field, based on the grower's preferred ROI timeframe, in years, to better inform and encourage the consideration of corrective action funding. Reports are provided by field, and field reports may then be aggregated by owner.

The initial focus of the of the DU Estimator was to evaluate drip/micro systems irrigating permanent crops in California's central valley but has since been expanded to include drip tape and stationary (non-mechanized) sprinkler systems irrigating nearly any crop. The purpose is to encourage the correction of discovered deficiencies by connecting the evaluation's results with its estimated on-farm economic impact, i.e. translating the cost of poor irrigation system DU into $/acre and $/field.

2. Why was it created?

California is home to over 8 million acres of irrigated farmland, the most in the nation. Improving its agricultural irrigation system DU performance could significantly reduce waste, improve water, fertilizer and energy resource use efficiency, prevent environmental degradation from water being applied where unwanted, and contribute towards better sustainability and profitability of California agriculture. Over half, about 4 million, of California's irrigated acres use drip, trickle or low flow micro-sprinkler methodology, representing about two thirds of the nearly 6 million acres using this methodology in the United States. Roughly another million acres use sprinklers, and the remainder use (non-pressurized) gravity systems. The pressurized drip/micro/sprinkler irrigation trends have contributed to California's role in leading the nation in the production of many higher value fruit, nut and vegetable crops. However, with ongoing drought, increased population and environmental requirements, the need for increasing California agriculture's water resource use efficiency (crop per drop), and at the same time agriculture's profitability and sustainability, has never been greater. Thus, efforts to optimize irrigation system performance on these existing 5 million drip/micro/sprinkler irrigated acres is underway, and assessing their performance is a logical first step.

The DU Estimator was created to provide a re-imagined method to assess pressurized irrigation system performance using established protocols for a number of reasons.

- First, California's resource conservation districts (RCD's), universities and various independent consultants have routinely evaluated drip/micro irrigation system DU performance over the years with traditional DU evaluation methodologies, but a recent survey and summary of their results indicate that a very large percentage of existing drip/micro irrigation systems in California are operating well below an optimal DU of 0.90 without an action plan for improvement. There is a need for DU evaluations to be more actionable such that opportunities to improve irrigation system performance are realized.

- Second, it is evident that there is a need for an "initial assessment" DU evaluation routine that is less time consuming and expensive to conduct than a traditional DU evaluation routine so that growers may more quickly learn whether a more in-depth assessment using the traditional routines is warranted.

- Third, there is a need to more completely identify specific causes of poor DU, such as emission device plugging, inadequate pressure regulation, accessory equipment failure, inadequate system maintenance, etc., but this information is lacking in most traditional DU evaluation routines being used.

- Fourth, there is a need to translate poor irrigation system DU and poor pumping plant efficiencies into the estimated impact on farm profitability and sustainability. This information has been largely absent, and as a result, economic information to support on-farm, irrigation system improvement investment decision making is lacking to the detriment of all stakeholders.

The DU Estimator addresses all the foregoing needs. Its goal is to provide growers access to a simplified DU evaluation routine that informs them where irrigation system performance is less than ideal and what is causing the deficiencies, and then translates the resulting DU score into its estimated economic impact to the farm enterprise via an ROI analysis. Its intent is that this information will help guide growers in their decision making process of whether investment in corrective actions is warranted.

3. How will the DU Estimator accomplish these goals?

First, the DU Estimator is free for use by anyone with minimal training such that on-farm DU analyses may be more readily performed, and deficiencies more easily identified. Second, a full set of reports are produced along with each analysis to ease the communication of the evaluation's results and its implications. They are immediately available at the conclusion of the evaluation for download as pdfs or to print as hardcopy. Third, the interview and observation routines capture important information about the irrigation system equipment components that may otherwise be overlooked. Fourth, discovered system deficiencies are translated into economic terms in the DU Estimator reports. For example, systems with poor DU are often run longer and more often than theoretically necessary, at potential significant water, fertilizer and energy expense, to compensate for the under-irrigated portions of the field. Poor DU can also result in lower yields and/or quality, reducing income potential, and poor pumping plant efficiency increases energy costs per acre foot pumped. The DU Estimator translates the evaluation results into these economic elements. Fifth, by quantifying these economic values, and then extending them to an ROI analysis, growers have a better idea of how much money poor DU is costing them and would rather be potentially available for investment in corrective actions such as equipment repair, maintenance and/or replacement.

4. The DU Estimator is not an irrigation scheduling tool

A note to clarify where the DU Estimator can help. Irrigation system efficiency is often characterized by two components: 1) How well the irrigation system itself distributes water to the crop, which is characterized by a Distribution Uniformity (DU) analysis, where a value of .90 or above is considered optimal, and 2) How well the system is operated by farm personnel, which is characterized by the irrigation schedule, i.e. frequency and duration of system operation. The DU Estimator program addresses the first (the irrigation system's efficiency), but not the second (the grower's scheduling of the system).

5. Who is funding and developing it?

Funding for the DU Estimator has been provided by the California Department of Food and Agriculture's 2022 and 2023 Water Efficiency Technical Assistance Program (CDFA WETA Grant). The grant administration has been provided by the Coalition for Urban and Rural Environmental Stewardship (CURES). The DU Estimator program has been developed and documented by California contractors AG H20 and Surf n' Earth Enterprises.

6. Who will use it?

It is anticipated that numerous stakeholders will use the DU Estimator to help improve on-farm irrigation system performance including agencies (resource conservation districts, farm advisors, water districts, etc.), irrigation industry professionals (manufacturers, dealers, consultants, designers), the agronomic community (ag laboratories, seed and fertilizer companies, Certified Crop Advisor's (CCAs), Pest Control Advisors (PCAs), academia, farm personnel, and anyone trained to use the program who wishes to participate in improving the profitability and sustainability of California's pressurized irrigated agriculture.

7. Where is it being used?

Previous versions of the DU Estimator have been used for over 10 years in California's Central Coast and Central Valley Region by various consultants, service providers and growers. The initial version of the DU

Estimator has been beta tested since 2023, and the final released program is currently being beta tested and will be available throughout California at the end of 2024.

8. Where to get help

To obtain an overview of how to use the program, please click on the adjacent Program Guide tab.

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9. Disclaimer

This program provides estimates only and should not be used in lieu of professional advice.

For best results, an irrigation professional should be consulted to review the results and provide follow-up actions.