

PRESSURIZED IRRIGATION SYSTEM ANALYSIS

To determine if the variability in the crop stress is related to irrigation system water delivery problems, sketch a layout of the main lines and sub mains onto the STRESSMAP. If the patterns of the system match the patterns of stress, then there is a distribution problem with the system. The more significant the correlation between the image temperature pattern and the irrigation system layout and the larger the variation in temperatures, the more severe the water distribution problem.

In your analysis of the correlations in patterns, consider the locations of the pump, hose ends, farthest arm of the system from the pump, intersections of main lines and sub-mains, pressure regulators, flush valves, cut off valves and topographically high and low areas of system drainage.

Typical problems are cooler areas at main line and sub-main intersections, leaks, flush valves, and system drainage points; cool, or hot sub main blocks due to pressure regulator mis-adjustment; and warmer areas at hose ends and far arm of system due to increased emitter clogging.

To quantify the severity of the distribution problems, take timed water delivery measurements at various representative locations for a stress category. For areas that are cooler due to elevation-related system drainage, time the duration of continued discharge after system shutdown.

In the example image, delivery readings were taken at sites A - D, with four readings at each site. Site A is at the farthest arms of the system and at the hose ends. Site B is at the intersection of a main line and a sub-main. Site C is from a sub-main block with suspected low pressures. Site D is from a sub main block with suspected high pressures or possible topographic system drainage area.

From the STRESSMAP image example, the following can be determined:

- Water distribution uniformity
- Irrigation scheduling monitoring location representativeness
- System upgrade or rebuild decision economics
- Pressure regulator adjustment
- Leak detection
- Remedial flushing and cleaning needs
- Flushing and cleaning scheduling by area

On the example field, the analysis revealed 60% of system designed delivery in the yellow areas and 100% of system design delivery in the dark blue color areas. The conclusions of the analysis are: the yellow areas in the west portion of the system should be flushed and cleaned more frequently, area 4 was warmer due to clogging and not low pressure adjustment as suspected, the need for an additional flush valve at Area 4, a pressure cutoff valve to control system drainage to Area 2 should be considered for future system improvements, and Areas 3, 4, and 5 would be good representative irrigation scheduling monitoring sites.