Calcine®-Treated Soils Hold More Water; Reduce Salts in Root Zone

SUMMARY: *A laboratory study showed that water treated with Calcine® generated soil samples that retained 40 percent more water than soil irrigated with water alone. The same study showed that Calcine-treated water removed up to 45 percent more salts than untreated water.*

With heavy irrigation, soils often accumulate salts, a condition that leads to even more irrigation in an effort to leach the salt below the root zone. On affected farms, water use increases, plant performance declines and bottom-line margins tighten. Sodic soils also negatively impact soil structure by breaking down soil aggregates, leading to soil compaction, sealing and reduced water-holding capacity. Biological activity also slows, further harming soil structure and plant growth.

Calcine, Calcium and Nutrient-Holding Capacity

When added to irrigation water, Calcine has been shown to effectively mobilize salt out of soil. This occurs through leaching, or carrying salts down through the soil profile and away from roots.

Salts eliminated through Calcine application can be replaced by higher-value nutrients.

We recommend applying calcium to Calcine-treated fields to help flocculate the soil. Calcium helps open sealed soils by replacing sodium previously bound to the soil. When sodium is replaced by calcium and other nutrients, soil fertility, structure and permeability improve.

How It Works: Calcine Mobilizes Salt out of Root Zone

2016 laboratory studies showed Calcine reduced soil salt levels by as much as 45 percent over the untreated control.

In the study, cylinders were filled with sodic soil collected from Arizona. They were then fully wetted using three treatments: untreated control (water), the equivalent of ¼ gallons per acre of Calcine and the equivalent of ½ gallons per acre of Calcine (in water). Soil in the cylinders

Calcine-treated water was flushed through soil to gauge the effect on water retention and salt removal.

Table 1: Soil Cylinder Tests Results

	Control	¼ Gal/Ac	½ Gal/Ac
Flush Total:	200 ml	200 ml	200 ml
Flushed-Out Water:	198 ml	123 ml	101 ml
Water Retained:	2 ml	77 ml	99 ml
Total Salts Removed:	960 ppm	1,200 ppm	1,400 ppm

Soil treated with Calcine retained more water in the soil, while at the same time removed more salts from the root zone.

was kept moist for 28 days and later flushed with 200 ml of water. Flow-through was then collected for analysis.

Flow-through water from the untreated control contained 960 ppm of total salts. In comparison, flow-through from the treated cylinders was as high as 1,400 ppm.

This means nearly 50 percent of the salts were carried away by the flush-through of water. A summary analysis can be found in Table 1.

Calcine Improves Water-Holding Capacity

This same study supports our finding that Calcine application improves soil water-holding capacity. Of the 200 ml of water used to flush each cylinder, over 40 percent less water was collected from the treated cylinders.

Calcine-treated soils held water better than the control in all treatments, suggesting that on-farm water use can be dramatically reduced following Calcine application.

We saw a similar result on an Arizona alfalfa grower's farm in early 2015. Calcine application there reduced water use by 63 percent after just four months of treatment while improving yield (see Table 2). When water-holding capacity increases, plant tolerance to drought and flood conditions also improves. These benefits can improve plant performance while cutting production costs. ☐

Table 2: 2015 Water Use on Arizona Farm Reduced by 63 Percent Following Calcine Treatment

Month	Hours	Inches/ Hour	Acre Feet	Total Cost	Yield/ DM	2015 Reported Rainfall	Avg. Rainfall Buckeye, AZ
First Irrigation: March 2015	49	500	50.63	$911	0.7	n/a	0.98
April 2015	72	300	44.64	$804	0.75	0.05	0.28
May 2015	73	250	37.72	$679	0.9	0.45	0.16
June 2015	73	240	34	$679	0.92	0.06	0.08
July 2015	73	230	32	$679	0.92	0.22	0.67

After adding Calcine to irrigation water in March 2015, an alfalfa grower in Arizona reduced overall water use by 63 percent after just four months of treatment. This change occurred during some of Arizona's drier, hotter months, and also coincided with a 31 percent increase in dry matter yield, illustrating Calcine's ability to reduce crop water demands without affecting yield (rainfall figures from weather.com and usclimatedata.com).

Key Benefits of Calcine Application

- **Amends Sodic Soils:** Calcine mobilizes salt out of the root zone, reducing sodium, chloride and carbonate salt concentrations in the soil.
- **Improves Soil Structure:** Removing salt from the root zone opens sealed soils. This improves infiltration rates, reduces ponding and improves overall permeability.
- **Boosts Nutrient-Holding Capacity:** Salts eliminated through Calcine application can be replaced by higher-value nutrients such as calcium to flocculate the soil. When salts are replaced by calcium and other nutrients, soil fertility, structure and permeability further improve.
- **Releases Nutrients:** Field studies have shown Calcine to increase soil nitrate and phosphate concentrations.
- **Supports Earthworm Establishment:** Once Calcine removes salt from the root zone and improves soil structure, earthworm populations rise. Earthworms then further improve soil structure and increase nutrient cycling.
- **Reduces Water Use:** Calcine improves soil structure, which increases soil water-holding capacity and permeability. Following application in 2015, an Arizona alfalfa grower reduced water use by 63 percent after four months of treatment.
- **Increases Alfalfa Quality:** Application of Calcine has been shown to increase important forage components. Early analysis from a farm in Arizona reported higher protein, fat and calcium. Analysis also showed a reduction of sodium and chloride content, and higher total digestible nutrients.