Improving Brix and Storability in Onions

By Rich Fedigan, Marketing Manager, Oro Agri

"It works great on potatoes, why not onions?"

That is the question Oro Agri field researchers asked themselves about Nanocal, a sub-micronized liquid calcium product. In potato trials across the U.S., the researchers saw significant increases in calcium levels, better uniformity, less bruising and skinning and better storability of all potato varieties tested. They figured the product would have similar results in onions.

Although calcium is often thought of as a secondary micronutrient for onions, it still plays a crucial role in plant health and quality. It is important for root development, and early crop growth demand for available calcium spikes during bulb formation and early enlargement. This is the growth stage when the most cell division takes place within the bulb. Because it acts as the "glue" that binds cells together, if a deficiency of available calcium occurs during this stage, the crop quality and integrity is often compromised and storability suffers because of bruising and the physical breakdown of the cells.

Calcium included in a standard soil nutrition program is often not effective in preventing calcium deficiency problems. The lack of mobility of calcium in the soil or the slow mineralization of calcium sources can mean the onion plant is starved for calcium during the period of high demand during bulb formation. This lack of available calcium during bulb formation is the problem researchers hoped to remedy with Nanocal applications.

Why Nanocal?

The calcium carbonate particles in Nanocal are milled to an average of 0.7 microns. This small size makes the particles readily available for root uptake upon application without waiting for the calcium to mineralize. The small size of the particles also means that an application floods a plant's root zone with more calcium particles. To illustrate, picture the number of marbles in a five-gallon bucket versus the number of tennis balls in the same size bucket. More particles in the soil means more calcium will come in contact with the meristematic region of growing roots for more rapid and efficient calcium uptake.

In addition, it is well established that calcium moves primarily through the plant's transpiration system. For effective distribution of calcium in the plant, it must be taken up by the roots and translocated throughout the plant, including to the bulbs. Nanocal is designed to be soil-applied so it comes in direct contact with the roots for efficient uptake into the plant. It is formulated with Oro Agri's patent-pending TransXylem technology that facilitates easy movement of material upward from the roots to other parts of the plant, including rapidly developing bulbs.

The effectiveness of Nanocal can be attributed to its application timing. The product is designed to be applied just prior to or at bulking. This is the growth phase of the bulb when calcium is most needed for healthy development. It is not meant to correct calcium deficiencies in the soil but rather to be a readily available source of calcium during the critical cell division phase of bulbs. Even if gypsum or limestone is applied as part of a soil fertility program, enough calcium may not be available to the onion plant during the high-demand period of bulb formation because of the slow mineralization of those materials.

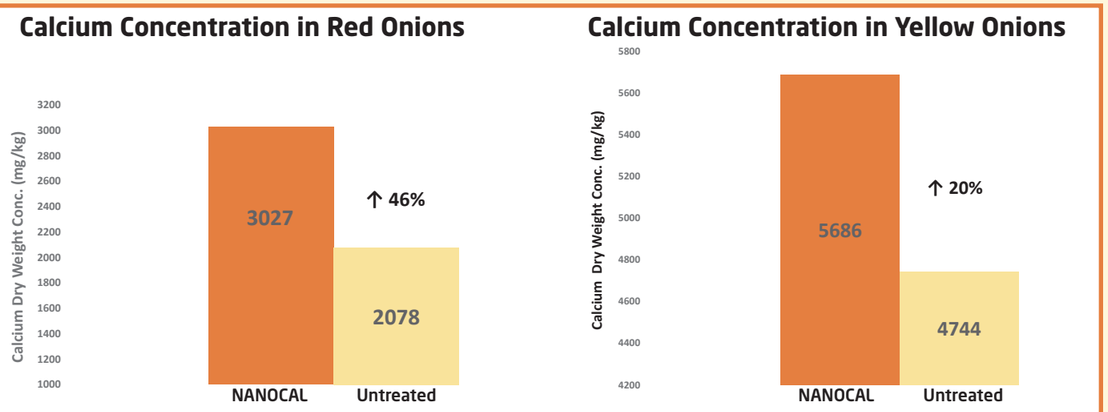

Figure 1. *Applying Nanocal during bulbing resulted in increases in calcium levels.*

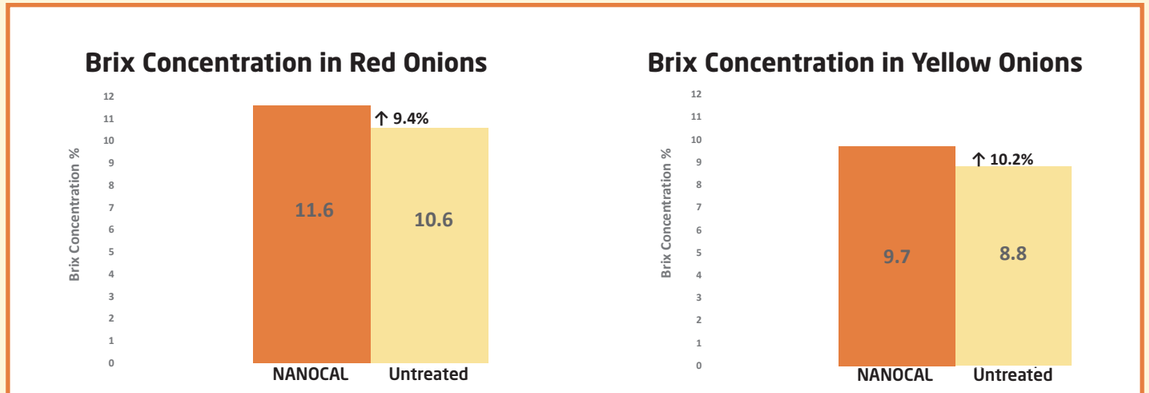

Figure 2. *Nanocal was able to increase already acceptable Brix levels.*

Results

During the 2018 and 2019 seasons, Oro Agri researchers conducted on-farm field trials in the Bear River City, Utah, area on yellow onions and the "black sands" area of Washington on red onions. All the Nanocal treatments (16-32 oz./acre) were applied through drip irrigation at bulking to place the calcium in the root zone during the period of highest demand.

The analysis of the onions showed increases in both calcium and Brix levels. Calcium levels increased by 46 percent in reds and 20 percent in yellows as a result of the Nanocal treatment (Fig. 1). In turn, the higher calcium levels in the Nanocal-treated onions helped maintain the integrity of the bulbs that had been subject to five frosts before harvest and a month in cold storage before being evaluated. The untreated onions were already showing degradation while the Nanocal-treated bulbs remained firm. Also, although both the untreated yellow and red onions were already in the good/excellent range of Brix, the Nanocal treatment was able to raise the Brix level approximately 10 percent in both onion trials (Fig. 2).

On-farm trials of Nanocal treatments on different onion varieties will continue in the 2020 season to increase the understanding of calcium's role in producing high quality onions. ■

The untreated onion on the right shows signs of poor storability while the bulb on the left, treated with Nanocal, maintains quality.