

NITRATE VS. AMMONIUM NITROGEN IN PANSY FERTILIZATION

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Pansies are frequently damaged by high levels of ammonium nitrogen. This isn't surprising. They are more sensitive to excesses than many other flowers. High soluble salt, nitrate or potassium levels can cause poor growth.

The symptoms of ammonium toxicity are stunting and chlorosis with poor root development. Theoretically, it might be argued that this is quite likely a minor nutrient deficiency induced by ammonium toxicity. Practically speaking, the avoidance of high levels of ammonium nitrogen alleviates the problem.

When pansies were primarily a field crop in Connecticut, nutrition was a bit simpler. Now that the majority of pansy growers produce them in paks in greenhouses, toxicities are reported every year (Figure 1).

Ammonium nitrogen ($\text{NH}_4\text{-N}$) occurs in the soil from many sources, particularly from ammonium or urea based fertilizers, manure and crop residues. The $\text{NH}_4\text{-N}$ is normally oxidized to nitrates by bacteria in the soil. Nitrates are less toxic to pansies.

Nitrogen oxidation is limited by several factors. Temperature is the most important. Below 60° , the rate of oxidation slows rapidly. At $40\text{--}45^\circ$, it is almost nonexistent. A low pH or high moisture level also reduces oxidation. These factors gang up on pansies. They are grown through the winter and when watered stay moist longer than other crops. An acid soil, of course, should be corrected by the grower. Soil testing is important.



Figure 1. Ammonium nitrogen toxicity on Viola. This is but one of several factors that can cause chlorosis on pansy.

To avoid ammonium toxicity, nitrate fertilizers should be used. A combination of 2 parts calcium nitrate and 1 part potassium nitrate will give a 15-0-15 soluble fertilizer. As described in Table 5 of the Greenhouse Crop Nutrition bulletin (fifth line from the bottom), it should be used at 1 lb./40 gals. (2 1/2 lbs./100 gals.). If using a hozon proportioner, use 6 oz. of this mixture per gallon of stock. For other fertilizer injectors, the rates are given in Table 3.

Ammonium nitrogen toxicity isn't the only problem encountered in the production of pansy paks in greenhouses, but it is the most frequent. Using nitrate fertilizers may solve your biggest problem.