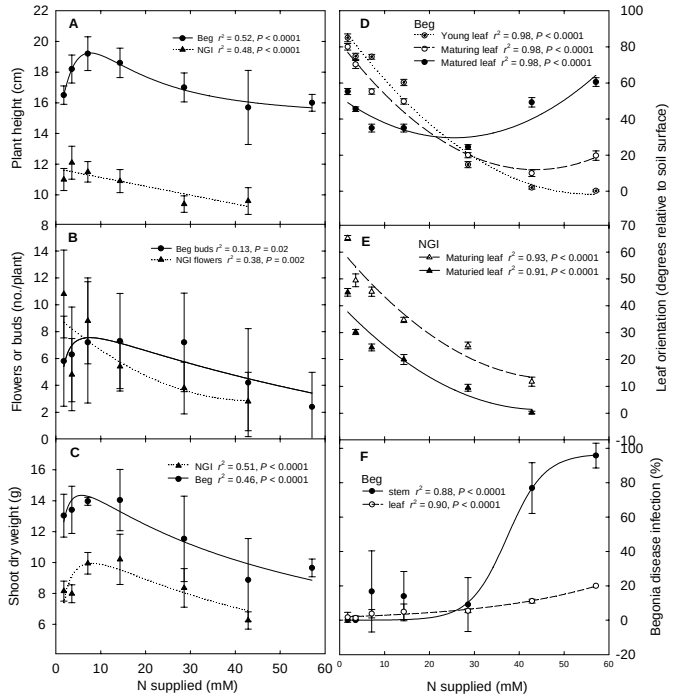
Applied Nitrogen Concentration Affects Growth of Elatior Begonia and New Guinea Impatiens, and Susceptibility of Begonia to Grey Mold

Plant performance and appearance in deficient and toxic levels of nutrients are well characterized. However, less is known about the potential subtleties of plant growth, form, development, nutrient uptake, and biotic stress tolerance in the broad tolerable range. Begonia (Beg) and New Guinea impatiens (NGI) were grown over a wide range of N (from 1.78mM to 57.1 mM NH_4:NO_3 ratio at a 1:1 ratio supplied as nutrient solution) in greenhouse conditions.

Elevated N supply resulted in decreased plant height (16% in Beg and 7% to 16% in NGI), flower count (3% to 48% in Beg and 7% to 49% in NGI), bud numbers (23% to 80% in Beg), canopy area (11% to 33% in NGI) and mass (21% to 33% in Beg and 18% to 58% in NGI) (Fig. 1).

Figure 1. Plant height, flowers, dry mass, leaf angle, and begonia disease incidence as N supply increases.



Botrytis cinerea Susceptibility

When Beg plants were inoculated with *B. cinerea* (grey mold), disease severity increased. The low N supply treatments from 1.78 mM N to 7.15 mM N had < 5% infection on leaves and stems (Fig. 1F). Plants fertigated with 28.6 mM N and above had higher percentages of infection, especially on the stems. Stem lesions occurred at the basal portion of the plant, which caused the plants to collapse. In some instances, plant death followed rapid Botrytis progression.

N supply between the ranges of 3.57 mM and 14.3 mM was found to be optimal for plant growth and development in Beg and NGI based on appearance, growth and development, and susceptibility to Botrytis infection. These amounts differ from amounts commonly applied in commercial greenhouses of at least 14.3 mM N, with periodic fertigation of double or triple that amount. Additional studies on N form and concentration, and interaction of environmental factors with species that are sensitive to both extremes of N form will generate more information for N use efficiency. Additional tests should be done to determine the direct versus indirect effects of elevated nitrogen on floricultural crops to see if elevated nitrogen primarily caused the growth effects and increased susceptibility or the resulting stresses from altered pH and EC caused the observed effects. Regardless of the specific causes, elevated yet sub-lethal N levels can lead to significant growth effects on these floricultural crops.

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Figure 2. Side views of begonia (Beg, top) and new guinea impatiens (NGI, bottom) receiving different amounts of N. Numbers at the bottom of each pot is the N concentration supplied in mM.