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Poinsettias:

Unique Distortion of a Zinc Deficiency

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Zinc deficiency is not a commonly observed problem in poinsettias, but it has been observed in new-rooted cuttings that were grown hydroponically by propagators. Recently, in a poinsettia research study at NC State University, we investigated the symptoms of a zinc deficiency.

Zinc Deficiency

In the Ecke Poinsettia Manual, zinc (Zn) deficiencies in poinsettias are described as yellowing or interveinal chlorosis of the young leaves. While this is true, there is a more severe form of symptomology that growers need to be aware of. Observed in hydroponically grown poinsettias, new growth is observed as thick, arrow-shaped leaves (Fig. 1). This growth is typically compact and can continue to linger even after corrective actions are taken (Fig. 2). This is unique symptomology, and growers should be aware of it in case problems arise.

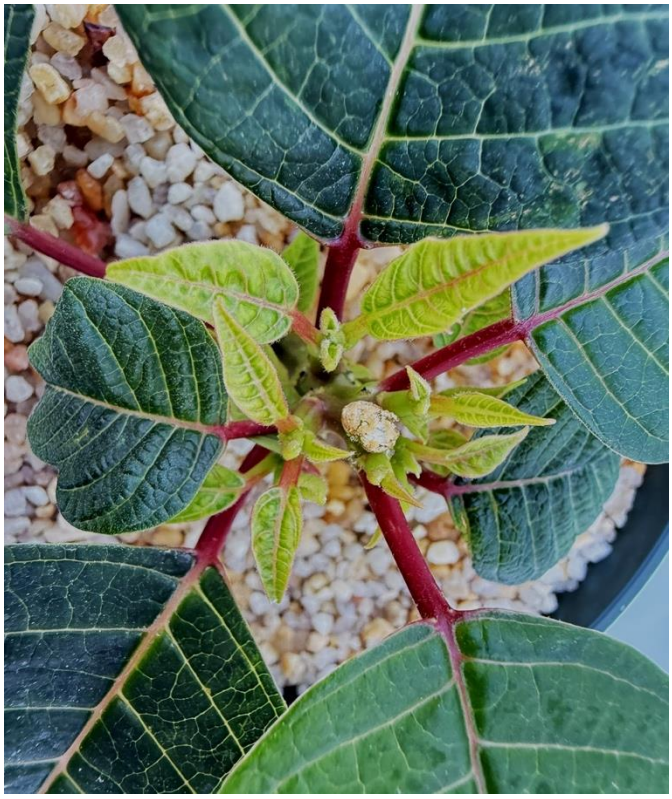

Figure 1. 'Ranch Red' poinsettia with thick arrow-shaped leaves. This is the typical symptom of zinc deficiency in recently pinched poinsettias. (© Luke Finn)

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In prior research studies, this disorder occurred in hydroponic production when Zn was supplied at 10 mM [0.10 mg·L^{-1} Zn (ppm = mg·L^{-1})]. When the Zn fertilization rate was doubled to 20 mM (0.20 mg·L^{-1} Zn), the plants grew normally. Over the years, we have sporadically observed this symptom on new cuttings arriving for the poinsettia trials. If plants are grown in a hydroponic system, they appear to be more susceptible because no Zn is being provided from a substrate. In fact, over 10 years ago we helped to identify and correct a Zn deficiency at a large poinsettia breeding facility that had decimated their cutting production. Once the Zn fertilization rate was increased, the plants began to grow normally.

Application Rates

While the symptomology was only observed in hydroponically grown poinsettias, it's important for growers to be conscious of their Zn inputs. In a recent study at NC State University, 'Ranch Red' poinsettias grown with 17-5-17 (N-$P_2 0_5$-$K_2 0$) fertilizer at 150 mg·L^{-1} N (containing 0.44 mg·L^{-1} Zn) produced leaf tissue values with an average of 17.22 mg·kg^{-1} Zn, which is considered slightly above the 'low' range (Ecke III et al. 2004), but no deficiency symptoms were observed. On the other hand, a group of 'Christmas Spirit', 'Jack Frost', and 'Ranch Red' poinsettias grown hydroponically in a complete nutrient solution (containing 0.10 mg·kg^{-1} Zn) produced leaf tissue values with an average of 8.45 mg·kg^{-1} and had significant observable Zn deficiency symptoms (Fig. 3). This highlights the importance of ensuring the Zn levels in your fertilizer, especially when grown hydroponically as mother stock for cuttings.

Furthermore, there also seems to be a difference in symptomology based on variety. 'Prestige Red', 'Brilliant White ', and 'Joy Pink' poinsettias were all grown hydroponically and in the same conditions, receiving a complete nutrient solution. Each variety produced a different level of severity of Zn deficiency symptoms (Fig. 4).

Figure 2. 'Ranch Red' poinsettia with compact, thick, new growth induced by zinc deficiency. (© Luke Finn)

Figure 3. Poinsettias grown hydroponically with observable zinc nutrient deficiencies. (© Luke Finn)

Corrective Measures

There are many steps that can be taken to avoid this issue that most growers are likely already pursuing. Growers should ensure that their fertilizer has enough Zn available, and that substrate pH is within range (5.8-6.2) so that Zn is soluble and available to the plant. Zinc becomes less plant-available as substrate pH increases above pH 6.5. Furthermore, growers should ensure that they do not overwater. Over-watering can inhibit Zn uptake or leach nutrients and lead to deficiencies. Additionally, excess phosphorus fertilizer concentrations can have an antagonistic effect on Zn uptake by the plant. If rapid uptake is required, one can apply a foliar application of Zn to provide it quickly.

Conclusions

While Zn deficiencies are uncommon, knowing how to recognize a disorder is key to the diagnostic process. The take-home message here is that growers should ensure that their poinsettia crop is receiving the proper inputs to maximize growth and avoid deficiency. Once severe Zn deficiency symptoms are in place, they can be difficult to reverse. A good first step is to confirm the deficiency by measuring the substrate pH, checking fertilizer inputs, and reviewing the watering regiment. If the deficiency is confirmed, growers may supply supplemental Zn via foliar application. Growers must ensure that fertilization programs provide a complete and balanced supply of essential nutrients.

References

Ecke III P, Faust J, Higgins A, Williams J. 2004. The Ecke Poinsettia Manual. Ball Publishing,

Figure 4. Three poinsettia cultivars with varying degrees of zinc deficiency severity. (© Luke Finn)

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