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Poinsettia Fertilization:
pH Disorders

Stunting occurs if the substrate pH levels are too low. Poinsettias respond well to a pH range of 5.8 to 6.3. If the substrate pH starts to exceed 6.5, then symptoms of iron deficiency (interveinal chlorosi) develop. Click to view YouTube summary: Poinsettia pH Disorders

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Poinsettias are classified in the general group of plants as far as optimal pH is concerned. They respond well to a pH range of 5.8 to 6.3. Low substrate pH conditions result in slow growth. High substrate pH conditions result in iron deficiency. This e-GRO Alert focuses on recognizing pH related symptoms and management steps to avoid problems.

Figure 1. Poinsettias are tolerant of low pH substrate conditions. Plants do not develop leaf symptoms due to a build up of iron or manganese in the leaf tissue. Instead, low substrate pH conditions limit the amount of growth and the plants are stunted (plant on the right).

Symptoms

So what occurs if the substrate pH becomes too low or too high?

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In an experiment conducted at NC State University, we grew Viking poinsettias at three substrate pH levels. At pH 2.9, the plant on the right was smaller and color development was delayed (Fig. 1). Plants grown at pH 4.7 and 6.0 were similar in size and had normal growth. We did not observe any symptoms of leaf discoloration, such as lower leaf bronzing or black spotting, which one would expect when other plants are grown at substrate pHs below 5.0. Slow growth may be difficult to observe with poinsettias, which makes it important to conduct regular substrate pH tests to ensure the pH values are within the optimal range.

Now lets shift to the opposite end of the pH spectrum, elevated values. Iron deficiency induced by high substrate pH values is common with poinsettias. The typical symptom of iron deficiency is an interveinal chlorosis (yellowing between the veins) of the upper leaves (Figs 2 &3). Normally symptoms of interveinal chlorosis occur when the pH exceeds 6.5. Also remember to inspect the root system. Overwatering or root rot can compromise the roots ability to take up iron. With severe iron deficiency symptoms, the upper foliage ultimately turns completely yellow (Fig. 4).

Keep in mind that the symptoms of both iron and magnesium deficiencies are similar. In both cases leaves exhibit intervienal chlorosis. Location of those symptoms will help you to diagnose which problem is occurring. Iron deficiencies occur on the upper, or younger leaves, while magnesium deficiency symptoms occur on the older leaves. So testing the substrate to help confirm your diagnosis.

Early magnesium deficiency occurs on the lower foliage. Late season deficiencies that occur after the bracts have formed can be confusing because they also occur in the upper foliage. Usually a full substrate test and or tissue test is required to confirm a magnesium deficiency.

Management

So what can be done to prevent problems? If iron

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deficiencies occur, first make sure that the substrate pH is too high by conducting a substrate test. If confirmed, the three iron-type options are listed in Table 1. Apply the corrective action, and then rinse the foliage after application. Retest the substrate pH to confirm that it is within the acceptable range between 5.8 and 6.3.

If the substrate pH is too low, a product such as flowable lime will help increase the pH. A rate of 2 quarts per 100 gallons of water will increase the substrate pH by half a unit. Repeat the application if needed. Before making a corrective application, first make sure that the substrate pH is too low by conducting a substrate test. Apply the corrective action, and then rinse the foliage after application. Retest the substrate pH to confirm that it is within the acceptable range between 5.8 and 6.3.

Summary

The optimal substrate pH for poinsettias is between 5.8 and 6.3. Levels below pH 4.5 result in stunted growth and levels above 6.5 result in high substrate an induced iron deficiency. It is always a good idea to conduct a substrate lab test to confirm pH levels before making corrective actions.

Figure 2. Upper foliage interveinal chlorosis is typical of an iron deficiency induced by elevated substrate pH.

Figure 3. Close up of the interveinal chlorosis.

Figure 4. Late season problems of iron deficiency can also develop on transition leaves.

Table 1. Corrective procedures for overcoming high pH disorders of poinsettias.	
Correction Steps – take these steps when problems occur	**Notes**
Confirm the substrate pH. Problems generally occur with the pH is ≥ 6.3. a. Determine via substrate, fertilizer solution and tissue analysis if there is a problem of insufficient Fe being supplied or a problem with waterlogging of the root system. b. Apply either: (a) 5 oz. iron-EDDHA mixed in 100 gal. of water (37.4 g in 100 L water); (b) 5 oz. iron-DTPA mixed in 100 gal. of water (37.4 g in 100 L water); or (c) 4 to 8 oz. iron sulfate mixed in 100 gal. of water (30 to 60 g in 100 L water). Mist off the foliage soon after application. c. After making the corrective application, retest the substrate to determine if the plant is now receiving sufficient Fe levels.	MISDIAGNOSED OR CONFUSED WITH: a. Magnesium deficiency results in a similar interveinal chlorosis but of the lower leaves. b. Iron, manganese or zinc deficiencies – although the interveinal chlorosis symptoms are similar, these deficiencies occur on the youngest leaves. (Conduct leaf tissue analysis to determine levels.) c. Virus infection – although the interveinal chlorosis symptoms are similar, virus symptoms most commonly are visible on the youngest or recently mature leaves. (Conduct a virus screening to confirm.) In most cases, iron is being supplied in sufficient quantities to the soil, but Fe deficiency can be induced by high pH levels, waterlogging of the soil, cold soil temperatures, root injury, or root rot.