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Licorice Plant (*Helichrysum*): Disorder Diagnostics

The diagnostic guide provides a key and identification photographs of the major disorders associated with the licorice plant (Helichrysum petiolare).

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The licorice plant (*Helichrysum petiolare*) is a South African native that also is appropriately named trailing dusty miller. The foliage is silver and it has a soft arching growth habit.

There is limited production information available about *Helichrysum*. Online, the cultural sheets from Ball Seed Company and Proven Winners include the most extensive information (*see links in additional information section below*).

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Figure 1. Prolonged leaf wetness can lead to leaf death due to *Botrytis*. Time irrigation such that the leaves dry out as quickly as possible and do not remain wet for long periods of time.

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The plant is relatively pest free, but aphids, leafminers, and whiteflies are possible. Disease wise, root rot (*Pythium*) can be problematic under cloudy conditions when the plants are overhead irrigated. *Botrytis* can occur on wet foliage during overcast conditions and in high humidity environments. As reported in e-GRO Alert 3.12, low pH induced micronutrient phytotoxicities can occur.

The focus of this article is to provide a photograph-based diagnostic guide to production disorders of licorice plant. **Table 1** contains a listing of the primary disorders reported for *Helichrysum*. **Table 2** contains recommended leaf tissue nutrient levels.

Thanks is expressed to the Dümmen Group for supplying cuttings, the North Carolina Department of Agriculture and Consumer Services Agronomic Division for donating the tissue analysis tests, and the Fred C. Gloeckner Foundation for support of plant nutrition research at North Carolina State University.

Additional *Helichrysum* Production Information

Proven Winners
http://www.provenwinners.com/plant/43572/culture
http://www.provenwinners.com/plant/43573/culture

Ball Seed Company
http://www.ballseed.com/Growers/plant_info.aspx?phid=032001124002920

GPN Vegetative Matters
http://hort.ufl.edu/floriculture/pdfs/crop_production/Helichrysum_Vinca.pdf

Ball Redbook, Volume 2, 18th Edition
Helichrysum, p. 438-439.

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Figure 2. *Helichrysum* plants are extremely prone to *Pythium* when the foliage is kept wet when rooting or during overcast conditions and in high humidity environments such as during propagation.

Figure 3A. Initial symptoms of low pH induced micronutrient toxicity is black leaf spotting on the lower foliage.

Figure 3B. Over time, the black leaf spotting on the lower foliage expands to cover most of the leaf. With advanced symptoms, the entire leaf turns yellow.

Table 1. Troubleshooting disorders of licorice plant (*Helichrysum petiolare*).		
Damage	**Possible Cause**	**Management**
Plant Wilting / Death	Root Rot (*Pythium*) (Root death can be observed) (Fig. 2)	Avoid excessive irrigations that allow the substrate to remain wet. Apply protective fungicides if needed.
	Stem Rot (*Rhizoctonia*) (Web-like growth may be visible at soil line)	
Leaf Discoloration / Plant Death	Cold Temperatures / Frost Damage	Cold temperatures will result in leaf scorch and plant death. Shipping temperature should be >40F (>4C).
Leaf Discoloration / Death	Gray Mold (*Botrytis*) (Fig. 1)	Avoid overhead irrigation that keeps the foliage wet. Apply protective fungicides if needed.
Upper Leaf Yellowing	High pH	Symptoms occur when the pH is greater than 6.5. Maintain the substrate pH between 6.0 and 6.5.
Lower Leaf Yellowing	Low Nitrogen / Low EC (Fig. 4)	Maintain the EC between 0.6 to 0.9 mS/cm based on the 1:2 extraction method. [That converts to a SME range of 1.3 to 2.0 mS/cm or a PourThru range of 2.0 to 3.0 mS/cm (based on top irrigation)].
Lower Leaf Black Spotting (small pin-point spots)	Low pH (Fig. 3)	Symptoms occur when the pH is less than 5.4. Tissue levels of >500 ppm iron (Fe) and elevated manganese (Mn) are typical when the pH is too low. Maintain the substrate pH between 6.0 and 6.5.
Poor Branching	Low Nitrogen / Low EC (Fig. 4)	Maintain the EC between 0.6 to 0.9 mS/cm based on the 1:2 extraction method.
Excessive Growth	Low Light / Overwatering / Late Florel Applications / High NH_4-N fertilization	Modify production practices to correct excessive stretch.
Lower Leaf Black Spotting (large concentric ring spots)	Alternaria Leaf Spot	Apply protective fungicides if needed.
Leaves sticky, black sooty mold may be present. Small soft-bodied insects present.	Aphids (Fig. 5)	Inspect the plants for aphids to confirm your diagnosis. Apply insecticides if needed.
Leaves sticky, black sooty mold may be present. Small white insects and cotton-like masses present.	Mealybugs (Fig. 6)	Inspect the plants (growing tips, stems, and roots) for mealybugs to confirm your diagnosis. Discard plants if the infection is heavy. Apply insecticides if needed.
Leaves sticky, black sooty mold may be present. Small white insects that fly are present.	Whiteflies	Inspect the plants for whiteflies to confirm your diagnosis. Apply insecticides if needed.
Leaves with distortion. Small black fecal deposits present.	Western Flower Thrips	Inspect the plants for thrips to confirm your diagnosis. Apply insecticides if needed.
Leaves with silver tunnels beneath the leave surface.	Leafminers	Inspect the plants for leafminers to confirm your diagnosis. Apply insecticides if needed.
Leaves with chew holes	Caterpillars	Inspect the plants for caterpillar to confirm your diagnosis. Apply insecticides if needed.

Figure 4A. Lower leaf yellowing can occur when the fertilization rate is too low. This plant had a PourThru EC reading of 1.28 mS/cm. These values convert to 0.85 mS/cm for the SME method or 0.39 mS/cm based on the 1:2 extraction method. The recommended EC range is 0.6 to 0.9 mS/cm based on the 1:2 extraction method. [That converts to a SME range of 1.3 to 2.0 mS/cm or a PourThru range of 2.0 to 3.0 mS/cm (based on top irrigation).]

Figure 4B. With advanced symptoms of low EC, leaves turn from a pale green to yellow, and ultimately necrotic.

Figure 5. Aphids will feed on the licorice plant. Black aphids can be observed on the stems.

Figure 6. Mealybugs have been observed feeding on the licorice plant. The white insects and white egg masses will help confirm your diagnosis.

Helichrysum petiolare Growing Tips

Scheduling
Finishing times range from 5 to 6 weeks for 1 liner per 4", 5" and quart pots to 6 to 8 weeks for 1 to 2 liners per 6" pots. Transplant 3 to 4 liners per 10" hanging basket. *Helichrysum* is most often used in mixed containers and not singly in hanging baskets.

Temperatures
Rooting temperatures: 65 to 72°F (18 to 22°C). *Air temperature:* Day 75 to 80°F (24 to 26°C)/ Night 68 to 70°F (20 to 21°C).

Growing temperatures:
Days: 65 to 75°F (18 to 24°C)
Nights: 62 to 65°F (16 to 18°C)

Holding temperatures: 40 to 50°F (4 to 10°C)

Propagation
Stick one cutting per 72-cell tray and estimated time from stick to transplant is 3 to 4 weeks. Ball Seed Company recommends the following culture during propagation, apply a foliar feed of 50 to 75 ppm N from a 20-10-20 as soon as foliage looses the silvery color. Apply mist and keep the rooting substrate uniformly moist. Callus formation will occur 5 to 7 days after sticking and root development will occur 7 to 14 days later.

During root development, increase light levels and reduce mist frequency to allow rooting medium to dry out. Apply a foliar feed of 100 ppm N from 15-0-15, alternating with 20-10-20, and increasing the rate to 200 ppm N during later stages of root development. Harden cuttings 7 days prior to transplant to reduce transplant shock by increasing light levels and eliminating mist. Applying Florel to cuttings during hardening off will encourage subsequent branching.

Light
Helichrysum prefer medium to high light levels. Low light levels will result in stretched growth and lighter green foliage. The silver foliage color is enhanced with higher light levels.

Irrigation
Problems related to excessive irrigations or wet foliage is the major production challenge of this plant. Excessive substrate moisture levels can lead to *Pythium* problems and wet foliage can lead to *Botrytis* infections. Allow the substrate to dry slightly between irrigations. Also avoid prolonged leaf wetting by irrigating in the morning so the leaves have a chance to dry off.

Substrate
Use a well-drained, disease-free, soilless substrate with a pH of 6.0 to 6.5. At substrate pH levels below 5.4, low pH induced micronutrient toxicities can appear as lower leaf black spotting.

Fertilization
Fertilization rates of 150 to 200 ppm N are recommended. Pale green lower leaves are an indication that the fertilization levels are too low. Maintain the EC between 0.6 to 0.9 mS/cm based on the 1:2 extraction method. That converts to a SME range of 1.3 to 2.0 mS/cm or a Pour-

Thru range of 2.0 to 3.0 mS/cm (based on top irrigation). Recommended tissue values are listed in **Table 2**. If iron chlorosis due to high substrate pH becomes a problem during production, apply iron chelate.

Pinching / PGRs
Seed types may not require pinching. Vegetative types may benefit from pinching two weeks after transplant (once roots have reached the container side) to improve overall plant form. Plants can be trimmed back if needed.

PGR recommendations vary by company. Therefore, conduct your own trial to determine optimal rates. PGRs may not be required if pinching is used.

Ball Seed Company recommends a foliar spray tank mix of Daminozide (B-Nine/ Dazide) at 2,500 ppm with Paclobutrazol (Bonzi,/Paczol/ Piccolo/Piccolo 10XC) at 30 ppm, applied three weeks after transplant. It is reported to keep the plants more compact and enhances the silver foliage coloration.

Florel is effective in enhancing branching, but the last application should occur 8 weeks prior to sale.

A trial at the University of Florida studied paclobutrazol preplant liner soaks. For *Helichrysum* 'White' a 2 ppm soak controlled growth by 42% when compared to the untreated plants. A concentration of 8 ppm was effective for *Helichrysum* 'Petite'. Even the lowest rate of 2 ppm was excessive for 'Lemon' and 'Splash'. Optimal rates varied significantly by cultivar and keep in mind these rates are based on Florida growing conditions. Mid-Atlantic growers would be well advised to start their trials with using half rates and more northern growers should begin with quarter rates.

Researchers at the University of Florida also studied paclobutrazol substrate drenches. The plants were grown for four weeks and pinched. One week later the paclobutrazol drench applications were made. They recommended for 'Licorice' a 2 ppm drench which gave optimal growth control.

Pests/Disorders
Overall this plant is pest free. Because it is native to more arid conditions, the primary problems reported are related to over irrigation (*Pythium*) and prolonged moisture on the foliage (*Botrytis*). A diagnostic key to disorders is listed in **Table 1**.

Insects
Insects are not a serious problem on *Helichrysum*. Infestations by aphids, leafminers, mealybugs, thrips, caterpillars, and whiteflies have been reported.

Diseases
Botrytis can be problematic if water is allowed to remain on the leaves for long periods of time. *Pythium* problems can occur if the plants are over irrigated. Other diseases reported include *Alternaria* and *Rhizoctonia*.

Nutritional
Pale green to yellow foliage will occur if the fertilization rate is too low. Use fertilization rates of 150 to 200 ppm N. Low pH induced micronutrient toxicities can occur if the substrate pH is below 5.4. Maintain the pH between 6.0 and 6.5 to avoid this disorder.

Physiological
None reported.

Shipping
Plants can be shipped at 40 to 50˚F (4 to 10˚C). Avoid prolonged periods of low light or high humidity to prevent *Botrytis* problems. Plants are prone to low temperature damage.

Planting
Helichrysum prefer a dry, sunny growing location. Plants do not perform well in areas with high humidity or a rainy environment.

Table 2. Leaf tissue nutrient analysis results for the licorice plant (*Helichrysum*).

Element	Most Recently Matured Leaves (4 week old plants)
Nitrogen (%)	2.29-3.80
Phosphorus (%)	0.23-0.37
Potassium (%)	1.69-2.69
Calcium (%)	0.65-0.70
Magnesium (%)	0.31-0.32
Sulfur (%)	0.24-0.26
Sodium (%)	0.28-0.64
Iron (ppm)	99.8-330
Manganese (ppm)	160-230
Zinc (ppm)	41.1-46.2
Copper (ppm)	5.82-11.9
Boron (ppm)	21.3-36.7

Actively growing plants fertilized with a range of 150 to 250 ppm N.