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Ornamental Cabbage and Kale: Avoiding Lower Leaf Loss

Curtailing fertilization results in lower leaf yellowing, leaf loss, and poor quality plants. Center head coloration is enhanced with temperatures below 55F (13C) and not by discontinuing fertilization.



Ornamental cabbage and kale (*Brassica oleracea* var. *acephala* L.) are major fall crops for many growers. The colorful foliage and added height make the plants a nice compliment to fall pansies.

Fertilizer recommendations vary, and there are suggestions that fertilization should be discontinued to enhance center head development. This practice has been proven to be incorrect based on research from the Master's degree work by Dr. Jamie Gibson (currently Technical



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Figure 1. Continual fertilization is required for ornamental cabbage and kale to avoid lower leaf loss.

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Specialist with Syngenta Flowers) at North Carolina State University and observation of growers' crops. A fertilization strategy that avoids lower leaf loss and produces high quality plants is discussed.

Fertilization

For the seedling stage, fertilize at the rate of 50 to 100 ppm of N with a constant liquid feed. After transplanting into the final container, fertilize with a balanced fertilizer at a concentration of 150 to 250 ppm N and K. Electrical conductivity (EC) should be maintained between 1.0 and 2.5 mS/cm during periods of active growth. If the goal is to minimize plant growth,

one should target the lower end of the fertilization range, while the higher end of the range will result in larger plants. Fertilization rates for sub-irrigated plants are 25% lower. Slow release fertilizer can also be used. Plants can be grown over a pH range between 5.5 and 6.2. If the pH exceeds 6.5, iron can be tied up, thus becoming unavailable to the plant, resulting in iron deficiency being manifested as an interveinal chlorosis of the upper leaves.

Ornamental cabbage and kale can readily exhibit deficiency symptoms. Deficient levels of fertility will result in yellowing (nitrogen deficiency) or purpling

Fertilization Strategy by Growth Stage

Development Stage	Nitrogen Fertilization Rate
Seedling	50-100 ppm N
Active Growth	150-250 ppm N
Head Coloration	100-200 ppm N

Fertilization of Ornamental Cabbage and Kale Video

<http://www.greenhousegrower.com/video/varieties/v-coloring-up-and-avoiding-lower-leaf-loss-in-kale-and-cabbage/>

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Figure 2. Moderate stage of lower leaf loss due to insufficient fertilization.



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Figure 3. Severe symptoms of lower leaf yellowing and drop due to low EC.



Figure 4. Advancing symptoms of lower leaf discoloration (pale red, yellow, and brown) and loss due to curtailing fertilization.

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(phosphorus deficiency) of the basal leaves. Ornamental cabbage and kale also have an above average requirement for sulfur, so monthly applications of Epsom salts at 1 pound per 100 gallons of water, applied as a irrigation with a 10% leaching fraction should be made.

Excessive fertilization can result in a marginal tip burn. Tip burn is more prevalent if the plants were allowed to wilt. A high EC and excessive drought stress can also result in lower leaf loss and root death.

Center Color Enhancement

The production practice of discontinuing fertilization once the plants have sized up to enhance color development is still being used. Research conducted at North Carolina State University indicate that excessive fertilization greater than 250 ppm N will mute the overall intensity of color development, but plants still develop color. Coloration is primarily enhanced by cooler growing temperatures below 55F (13C).

In contrast, discontinuation of all fertilization has a detrimental effect on plant quality. Deficiency symptoms can quickly occur in a soilless substrate, which has a low cation exchange capacity (the ability to hold nutrients). In one of the NCSU studies, we observed that after only 2 weeks of discontinuing fertilization of market ready plants, that the EC values dropped by 90%, and leaf tissue values for N, P, and K decreased by 37%, 40%, and 30%, respectively, in comparison to fertilized plants. We have observed with grower samples that foliar deficiency symptoms were present when root substrate EC readings were <0.30 mS/cm (SME extract).

Discontinuing fertilization 2 weeks before sales results in plants becoming nutrient deficient since the plants are still actively developing during this period and increasing in size (dry weight). If fertilization is not provided, the plants reallocate mobile elements such as N, P, and K from the lower leaves to the upper leaves. This leads to the appearance of lower

leaf nutrient deficiency symptoms and lower leaf loss. So by continuing to fertilize ornamental cabbage and kale with 100 to 200 ppm during head coloration will avoid lower leaf discoloration and loss.

Summary

Head color development in ornamental cabbage and kale is primarily induced by temperatures below 55F (13C). The common belief that discontinuing fertilization is will enhance coloration is incorrect. Instead, plants are still increasing in mass, so discontinuing fertilization actually induces lower leaf yellowing caused by a deficiency of nitrogen. Lower leaf loss and naked stems can quickly follow which will lower the overall crop quality. Therefore growers should continue to fertilize ornamental cabbage and kale during color development at 100 to 200 ppm N to maintain plant quality.