

chelate (6 lbs/100 gal/acre) after harvest, but before September 15. Check soil pH. For fall fruiting types, apply in June.

High Mn (if Mn is above 200). May indicate a low soil pH or contamination by fungicide or irrigation water. Consult soil-test recommendations to determine need for lime.

Iron (Fe)

Low Fe (if Fe is below 50). Apply 4 lbs/100 gal/acre ferrous sulfate or 8 lbs/100 gal/acre iron chelate as a foliar spray between harvest and September 15. For fall fruiting types, apply in June. If the condition persists for several consecutive years and the soil pH is within the desired range, apply 25 lb/acre iron chelate or 15 lb/acre ferrous sulfate to soil in early spring.

High Fe (if Fe is above 200). Toxicity may occur if levels exceed 250 ppm. Contamination from sprays may give artificially high readings.

Copper (Cu)

Low Cu (if Cu is below 7). Apply copper chelate (4 lbs/100 gal/acre) in a foliar spray during leaf expansion in May. If the condition persists for several consecutive years and soil pH is within the desired range, apply 20 lb/acre copper sulfate to the soil in late fall.

High Cu (if Cu is above 50). A low soil pH or contamination from sprays may be indicated. Consult soil test recommendations to determine the need for lime.

Boron (B)

Low B (if B is below 25). Apply Solubor to the soil in early spring at 4.0 lbs/acre OR apply a foliar spray of Solubor (20% actual Boron) at the rate of 1.5 lb. product/100 gal/acre in early spring. For summer bearers, apply again after harvest.

High B. Discontinue use of Boron. Toxicity may occur if levels exceed 100 ppm.

Zinc (Zn)

Low Zn (if Zn is below 20). Apply 3 lb/100 gal/acre zinc chelate at leaf expansion and after harvest

in foliar sprays. For all fruit types, apply in May and early July. If the condition persists for several consecutive years and soil pH is within the desired range, apply 10 lb/acre zinc sulfate to the soil in the fall.

High Zn (if Zn is above 50). May be indicative of fungicide contamination. Toxicity may occur if levels exceed 300 ppm.

Recommendations for Blueberries

Nitrogen (N)

Low N (if N is below 1.70). Increase the rate of nitrogen application by 10% for each 0.1% that sample is below the desired level. If soil pH is above 5.0, use ammonium sulfate; if below 5.0, use urea. Do not use ammonium nitrate or chloride fertilizers. Apply no later than April 20 (Table 9-5).

High N (if N is above 2.10). Reduce the rate of nitrogen application by 10% for each 0.1% that the sample exceeds the desired level. If the soil pH is above 5.0, use ammonium sulfate; if below 5.0, use urea. Do not use ammonium nitrate or chloride fertilizers.

Phosphorus (P)

Low P (below 0.10). Apply 180 lbs/acre 45% superphosphate at any time.

High P (above 0.18). Omit phosphate from the fertilizer program.

Potassium (K)

Low K (below 0.35). Apply 400 lbs/acre potassium magnesium sulfate or 160 lbs/acre potassium sulfate in fall or early spring.

Calcium (Ca)

Low Ca (below 0.40). Refer to the soil test and apply lime as needed, if soil pH is below 4.0. Apply 1,000 lbs/acre calcium sulfate in fall or early spring if pH is above 4.0.

High Ca (above 0.80). Refer to the soil test recommendations for pH adjustment.



Table 9-5. Specific Element Recommendations for Blueberries from Leaves.

| Element | Deficient | Below Normal | Normal | Above Normal | Excessive |
|----------|-----------|--------------|--------|--------------|-----------|
| N (%) | 1.65 | 1.70 | 1.90 | 2.60 | >2.60 |
| P (%) | 0.10 | 0.11 | 0.15 | 0.28 | >0.28 |
| K (%) | 0.35 | 0.40 | 0.55 | 0.85 | >0.85 |
| Ca (%) | 0.35 | 0.40 | 0.60 | 0.80 | >0.80 |
| Mg (%) | 0.18 | 0.20 | 0.25 | 0.30 | >0.30 |
| Mn (ppm) | 45 | 50 | 150 | 500 | >500 |
| Fe (ppm) | 65 | 70 | 200 | 300 | >300 |
| Cu (ppm) | 6 | 7 | 11 | 25 | > 25 |
| B (ppm) | 19 | 20 | 30 | 50 | > 50 |
| Zn (ppm) | 14 | 15 | 25 | 30 | > 30 |

Source: Cornell University, with adjustments in boron. Used with permission.

Magnesium (Mg)

Low Mg (below 0.20). Refer to soil test results and apply dolomitic limestone if pH is below 4.0. If pH is above 4.0, apply 250 lbs/acre Mg sulfate or use sul-po-mag (400 lbs/acre) if K is also low. Apply in fall or early spring.

Mg in range and K/Mg ratio is > 5.00. To improve the balance between K and Mg, increase Mg application to a total of 80 lbs/acre actual Mg.

High Mg (above 0.30). This may indicate a high soil pH. Refer to soil-test recommendations.

Manganese (Mn)

Low Mn (below 45). Apply a foliar spray of 6 lbs/100 gal/acre manganese chelate twice during the growing season. If the product label is different from this recommendation, follow the label recommendations.

High Mn (above 500). Refer to soil test for possible pH adjustment.

Iron (Fe)

Low Fe (below 70). Apply a foliar spray of 6 lbs/100 gal/acre iron chelate in late summer and again after bloom the following year but check product label and follow its recommendations. If the conditions persist for several consecutive years and soil pH is within the desired range (4.5 to 5.0), apply 25 lbs/acre iron chelate or 15 lbs/acre ferrous sulfate to soil in early

spring. If the product label is different from this recommendation, follow label recommendations.

High Fe (above 300). No application necessary.

Copper (Cu)

Low Cu (below 7). Apply a post-bloom and post-harvest spray of 2.0 lbs/100 gal/acre copper chelate. If product label is different from this recommendation, follow label recommendation.

High Cu (above 30). No application necessary.

Boron (B)

Low B (below 20). Apply 1.5 lbs/100 gal/acre Solubor as a foliar spray in late summer and again during early bloom. If the product label is different from this recommendation, follow label recommendations. If the condition persists for several consecutive years and soil pH is within the desired range (4.5 to 5.0), apply 5 lbs/acre Solubor to the soil surface in early spring.

High B (above 50). Consult fruit agent or fruit Extension specialist if over 100 ppm.

Zinc (Zn)

Low Zn (below 15 ppm). Apply 2.0 lbs/100 gal/acre zinc chelate post-bloom, postharvest, and in late summer. If the product label is different from this recommendation, follow the label recommendations. If the condition persists for several consecutive years



and soil pH is within desired range (4.5 to 5.0), apply 10 lbs/acre zinc sulfate to the soil surface in early spring.

High Zn (above 30). No application is necessary.

Recommendations for Grapes

Nitrogen (N)

Deficient (if N is below 0.70). (1) Apply 80 to 100 lbs. of actual nitrogen/acre (240 to 300 lbs. of ammonium nitrate) in early spring. Or: (2) Apply 0.8 lb. of actual nitrogen/100 sq. ft. of soil area (spread uniformly in an area approximately 4-feet wide beneath the trellis row). Or: (3) Make a foliar application of N as: (a) Urea fertilizer at 5 lbs/100gal., or 10 lbs/acre/application, (b) or use other commercial products, containing primarily N, at the recommended manufacturer's rate. Repeat applications may be necessary but generally will not supply total N requirement for the season.

Below Normal (if N is 0.70 to 0.90). (1) Apply 60 to 80 lbs. of actual nitrogen/acre (180 to 240 lbs. of ammonium nitrate) in early spring. Or: (2) Apply 0.7 lb. of actual nitrogen/100 sq. ft. of soil area spread uniformly in an area approximately 4-feet wide beneath trellis row). Or: (3) Make foliar application(s) of N as: (a) Urea fertilizer at 5 lbs/100 gal., or 10 lbs/acre/application. Or: (b) Other commercial products, containing primarily N, at the manufacturer's recommended rates. Repeat applications may be necessary but generally will not supply total N requirement for the season.

Normal (if N is 1.5 to 2.5). (1) Apply 40 to 60 lbs. of actual nitrogen/acre (120 to 180 lbs. of ammonium nitrate) in early spring. Or: (2) Apply 0.6 lb. of actual nitrogen/100 sq. ft. of soil area (spread uniformly in an area approximately 4-feet wide beneath trellis row). Or: (3) Make foliar application(s) of N as: (a) Urea fertilizer at 5 lbs/100 gal., or 10 lbs/acre/application. Or: (b) Use other commercial products, containing primarily N, at the manufacturer's recommended rates. Repeat applications may be necessary but generally will not supply total N requirement for the season.

High (if N is above 2.0). (1) A fertilizer application containing nitrogen is optional (may not be required next year) depending on the previous nutritional history of this vineyard, cultivar, or cultural practices. A token application rate would be 20 to 40 lbs. of actual nitrogen/acre (60 to 120 lbs. of ammonium nitrate) in early spring or 0.5 lb. of actual nitrogen/100 sq. ft. of soil area (spread uniformly in an area approximately 4-feet wide beneath trellis). (2) Foliage of young, nonbearing vines frequently have higher nitrogen content than mature vines.

Phosphorus (P)

Deficient (if P is below 0.13). (1) Apply 130 to 160 lbs. of P/acre (280 to 350 lbs. of 46% concentrated super phosphate). Or: (2) Apply 1.0 to 1.2 lb. of P_2O_5 /100 sq. ft. of soil area (spread uniformly in an area approximately 4-feet wide beneath trellis row). Or: (3) Make foliar application(s) of P as: (a) A soluble (20%) P fertilizer at 5 lbs/100 gal. Or: (b) Other commercial products, containing primarily P, at the manufacturer's recommended rates. Repeat applications may be necessary but may not supply the total P requirement for more than one season. (4). Low soil moisture may depress uptake of phosphorus.

Below Normal (if P is 0.13 to 0.15). (1) Apply 80 to 130 lbs. of P_2O_5 /acre (175 to 280 lbs. of 46% concentrated super phosphate). Or: (2) Apply 0.8 to 1.0 lb. of P_2O_5 /100 sq. ft. of soil area (spread uniformly in an area approximately 4-feet wide beneath trellis row). Or: (3) Make foliar application(s) of P as: (a) A soluble (20%) P fertilizer at 5 lbs/100 gal. Or: (b) Other commercial products containing primarily P at the manufacturer's recommended rates. Repeat applications may be necessary but may not supply the total P requirement for more than one season. Or: (4) Low soil moisture may depress uptake of phosphorus.

Normal (if P is 0.16 to 0.29). (1) No application of phosphorus is necessary at this time. (2) High to excess levels of this element may depress the uptake and concentration of one or more heavy metals such as zinc, copper, iron, or manganese.

Potassium (K)

Deficient (if K is 0.5 to 1.0). (1) Apply 300 lbs. K_2O (500 lbs. of sulfate or muriate of potash) per acre, any time. Or: (2) Apply 2.0 lb. of K_2O /100 sq. ft. of

