



Nitrogen Requirements SEASONAL

Recommended N application rates for raisin production range from 0 to 60 lbs/acre depending on the irrigation system, soil type and vigor of the vines. The yield of wine grapes is generally lower than raisin and thus the required application rates for wine grapes may be substantially lower than the values reported in the table below. However, the values reported in the table for drip irrigated systems correspond to the N rate generally recommended for wine grapes.

Suggested N Application Rates in Raisin Vineyards

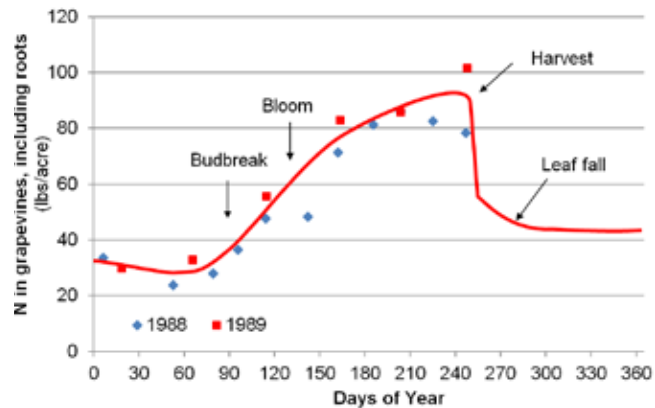
Vineyard Condition	Rate (lbs N/Acre)	
	Furrow	Drip
Vigorous vines, some excess growth	0	0
Medium vigor, medium to fine textured soils	20-40	10-25
Weak vigor, inadequate canopy, sandy soils	50-60	30-40

When groundwater is used for irrigation, the nitrate in the water can contribute a significant part of the vineyard's N requirement. Fertilizer application rates should be corrected for the amount of N contained in the irrigation water.



Raisin and Wine Grape Nitrogen Uptake and Partitioning

Seasonal N Uptake



Information regarding raisin and wine grape fertility management, including placement, fertilizer source, phosphorus and potassium are available at:

www.cdfa.ca.gov/go/FREPguide



SELECTED REFERENCES

- Christensen, L.P., Kasimatis, A.N., Jensen, F.L., 1978. Grapevine nutrition and fertilization in the San Joaquin Valley. University of California Publication 4087.
- Christensen, L.P., Peacock, W., 2000. Mineral nutrition and fertilization. In: Raisin Production Manual. University of California Division of Agricultural and Natural Resources Publication 3393, Oakland, CA. pp. 102-114.
- Christensen, P., 2000. Use of tissue analysis in viticulture. University of California Cooperative Extension Tulare County, Publication NG10-00.
- Peacock, W.L., Broadbent, F.E., Christensen, L.P., 1982. Late-fall nitrogen application in vineyards is inefficient. California Agriculture 36, 22-23.



Raisin and Wine GRAPE NITROGEN Fertilization Guidelines

Online nutrient guidelines for grapes and other crops, as well as relevant references, are available at:

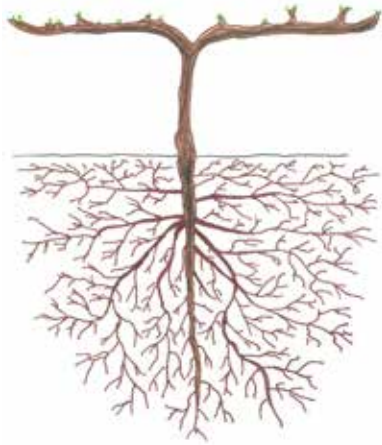
www.cdfa.ca.gov/go/FREPguide

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Daniel Geisseler and William R. Horwath, Department of Land, Air and Water Resources, UC Davis, gathered and organized the guideline information through FREP grant agreement 11-0485.



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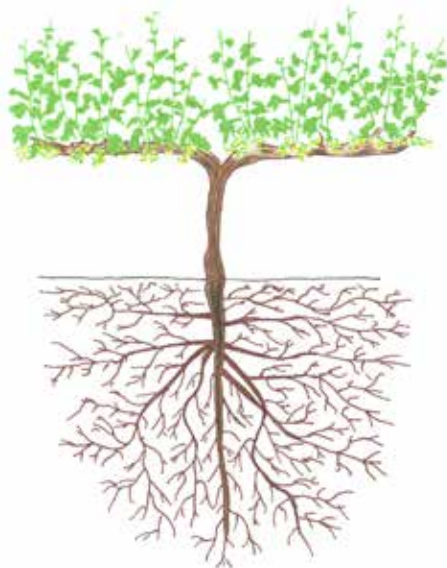
Nitrogen Fertilization **DORMANCY** and **BUDBREAK**

Nitrogen uptake is relatively slow between budbreak and bloom. Early applications before or at budbreak are susceptible to leaching from sprinkler frost protection, late rainfall or excessive spring irrigations and should be delayed until after the frost danger period.

Mode of Application

Under drip irrigation, 2-5 lbs. N/acre may be applied weekly in spring. However, when leaching during the growing season is minimized, one single application may be as effective as multiple small applications, provided the soil is not very sandy in texture.

Under furrow irrigation, high application rates should be split. Urea and ammonium forms should always be drilled at least 2 inches deep into the soil or immediately incorporated, since they are subject to volatilization losses if left on the surface. For young vines and on sandy soils, fertilizer should be applied within 3 feet of the row to ensure root access.



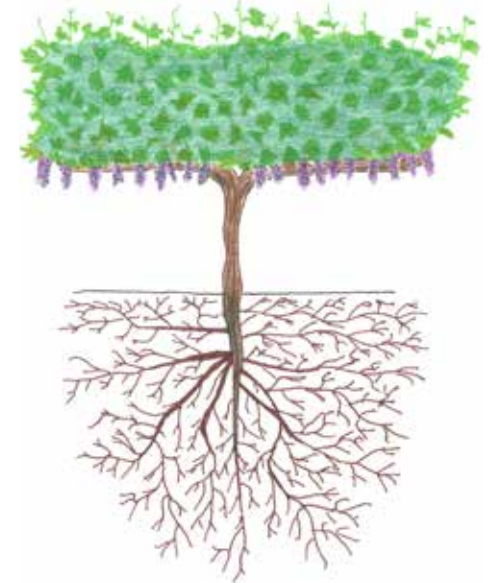
Nitrogen Fertilization **FULL BLOOM**

Nitrogen uptake is relatively high between bloom and veraison. During this period, about half of the annual N demand is taken up. Studies in San Joaquin Valley vineyards showed that N is best applied in spring during a period starting after budbreak until fruit set or post-harvest.

Petiole Analyses

In California, petioles of leaves opposite the flower clusters, sampled at full bloom, are generally used to determine the nutritional status of grapevines. Grapes are in full bloom when approximately two-thirds of the caps have loosened or fallen from the flowers.

Petiole nitrate-N concentrations of 500-1200 ppm are generally considered adequate.



Nitrogen Fertilization **VERAISON** and **HARVEST**

Leaf symptoms appearing after the beginning of ripening are caused by the translocation of N from the leaves to the berries. On average, about 2.9 lbs. of N is removed from the vineyard in one ton (2000 lbs.) of fresh grapes, with values ranging from 1.8 to 4.1 lbs.

Late-season and post-harvest N applications refill storage reserves in permanent structures and support leaf growth the following spring. However, available N in late summer should not be high enough to encourage late-season shoot growth, delay maturity, or promote immature canes.

Postharvest applications need to be made as long as the canopy is healthy and functional to ensure adequate uptake. Nitrogen applications in late fall after leaf fall are inefficient, because N may be leached below the root zone by winter rains.



For more information and references about N management in grapes, access the crop fertilization guidelines at:

www.cdffa.ca.gov/go/FREPguide