



## Development of geographic nutrient management zones for winegrapes based on soil-landscape characteristics

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Potassium (K) deficiency in grapes results in reduced vine growth and yield loss. Excessive K uptake, on the other hand, is undesirable from a wine-making perspective. Current recommendations for K fertilization do not take into account potential differences among soils in fertilizer effectiveness or maintenance of soluble K levels. The San Joaquin Valley in California is home to an incredible diversity of soil types that encompass a range of age, parent mineralogy, and physical properties. We propose that the key characteristics of soil that control K supply and retention, while not explicitly a part of the soil classification system can be inferred from soil survey database information. Rather than providing a region-wide prescription for potassium nutrition, our goal was to develop a landscape-targeted model that predicts the fate of K based on soil parent material properties and the degree of soil development. Soils were classified into five soil regions based on K supply and retention characteristics, which are inferred from information in the digital soil survey database SSURGO. The following five soil regions represent differences in parent material and degree of soil development serving as a proxy for K fertility (Table 1): **Region 1**) weakly developed, clay-rich soils with high shrink-swell capacity in basin alluvium, **Region 2**) weakly developed, dominantly coarse- and loamy-textured soils on recent alluvial fans, flood plains, and stream terraces, **Region 3**) moderately developed soils on low terraces derived from granitic alluvium, **Region 4**) highly developed soils on high fan remnants derived from metamorphic rock alluvium, and, **Region 5**) weakly developed soils formed on undulating volcanic terrain

This classification is a first step toward the development of soil- and landscape-specific K management strategies for San Joaquin Valley winegrape regions.

Table 1: Conceptual framework for predicting K supply characteristics of soilscape in the Lodi-Woodbridge Winegrape District.

<b>Region and general soilscape characteristics</b>	<b>Geologic age of parent material (years)*</b>	<b>Exchangeable K</b>	<b>K fixation potential</b>
Region 1. Alluvial fans, fine-textured	0-14,000 (Post-Modesto and upper Modesto Formations)	High	Low
Region 2. Alluvial fans, coarse-textured, granitic alluvium	0-70,000 (Post-Modesto and Modesto Formations)	Moderate	Medium
Region 3. Low terraces, duripans, granitic alluvium	130,000 - 330,000 (Riverbank Formation)	Low	High
Region 4. High terraces, granitic and mixed alluvium	> 600,000 (Turlock Lake and Laguna Formations)	Moderate	Low
Region 5. Undulating volcanic terrain	3-10 million (Mehrten Formation)	High	Low