

INFLUENCE OF YAKIMA FOLD BELT STRUCTURES ON COLUMBIA BASIN TERROIR

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The boundaries of many of the American Viticultural Areas (AVAs) in the Columbia basin are based largely on topography that is a consequence of Yakima Fold Belt (YFB) structures. The Rattlesnake Hills, Red Mountain, Wahluke Slope, and Horse Heaven Hills AVAs are situated on dip slopes on the south-facing limbs of YFB anticlines, the Walla Walla Valley and Yakima Valley AVAs encompass synclinal valleys, and the boundaries of the Snipes Mountain AVA are formed by topographic contours that encircle an anticlinal ridge.

Topographic variables such as slope and aspect influence viticulture primarily through their effects on solar radiation and cold air drainage. For example, the gently inclined (5° - 10°) south-facing dip slopes of YFB anticlines receive 3% – 5% more solar energy per unit area than the relatively flat floors of the synclinal basins. In 2008, vineyard sites on the northeast-facing slopes of Snipes Mountain, an anticlinal ridge in the Yakima Valley, accumulated 210 fewer growing degree-days (GDD) (10°C) relative to sites at the same elevation on southwest-facing slopes.

Due to clear skies and low humidity, air temperatures typically decline rapidly after sunset in the Columbia basin. The cold air drains from the flanks of the YFB anticlines into adjacent synclinal basins where it pools behind narrow water gaps. For this reason, the vineyards with the greatest risk of frost and freeze damage are located on the floors of synclinal basins at relatively low elevations. This effect is quite pronounced in the Walla Walla Valley AVA, where average ripening season temperatures, GDD, and frost-free days generally increase with elevation. On Snipes Mountain, 2008 ripening season GDD increased with elevation at a rate of 175 /100 m and average ripening season temperature increased at a rate of 2.5 $^{\circ}\text{C}/100$ m. Some of the warmest vineyards in the Columbia basin are at higher elevations, at sites close to the crests of YFB anticlines that lie above the nocturnal cold air pool and feature steeper slopes and thinner rockier soils. On Red Mountain, an anticlinal ridge at the eastern end of the Yakima Valley, air temperatures during July 2009 at sites near the ridge crest averaged 1°C higher and soil temperatures averaged 5°C higher than sites near the floor of the adjacent synclinal basin.