

# TANNINS AS NUTRITIONAL CONSTRAINTS FOR ELK AND DEER OF THE COASTAL PACIFIC NORTHWEST

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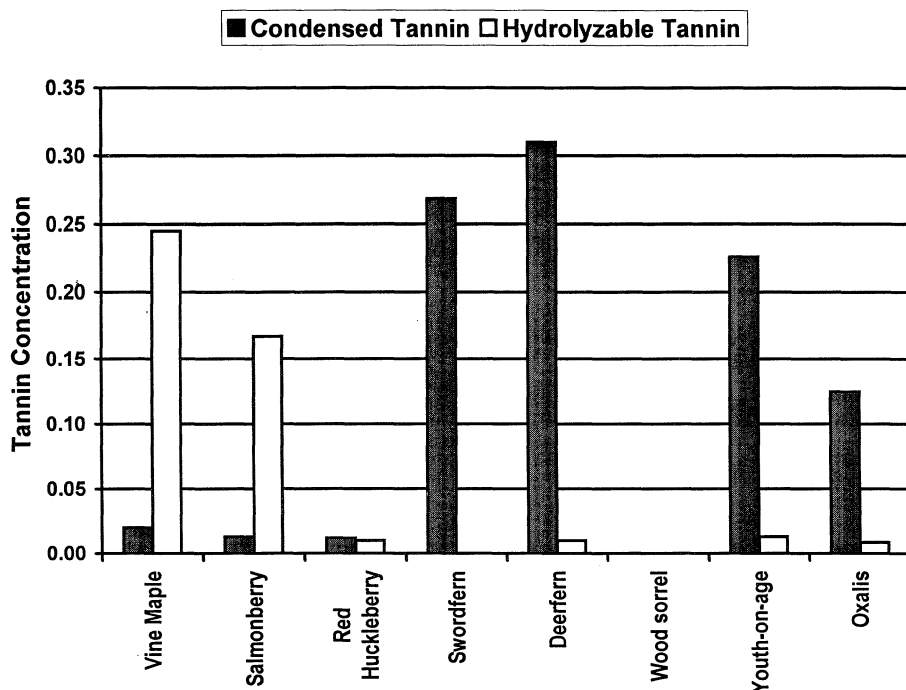
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## 1. INTRODUCTION

In the coastal Pacific Northwest, diets of elk (*Cervus elaphus roosevelti*) and deer (*Odocoileus hemionus columbianus*) are dominated by shrubs, ferns, and forbs



**Figure 1.** Condensed tannin (catechin equivalent) and hydrolyzable tannin (tannic acid equivalent) concentrations (mg tannin/mg plant dry matter) during summer in understory species of an old-growth forest, western Washington.

solution<sup>17,18</sup> or agarose gel.<sup>19</sup> In this paper, we refer to the capacity to precipitate proteins as astringency.<sup>20</sup>

Many plants consumed by cervids of the region are astringent (figs. 2 and 3). Leaves of salmonberry and vine maple (shrubs) are quite astringent in most seasons, whereas wood sorrel (a forb) and red huckleberry (a shrub) precipitate very little BSA in any season. There is considerable variation among seasons, but astringency is generally greatest in spring and intermediate in summer. Protein-precipitating capacity of ferns increases greatly in spring, with sword fern attaining the greatest astringency we've measured for any species and season. Stems of shrubs have very low astringency in all seasons.<sup>7,10</sup>

Protein-precipitating capacity also varies with forest stand type. Understory plants in clearcuts have greater astringency than those growing in closed canopy forests in Alaska,<sup>21</sup> western Oregon<sup>10</sup> (fig. 4) and Washington.<sup>7</sup> Availability of light is an obvious difference between clearcuts and old-growth forests. Because of differences in canopy coverage, plants growing in clearcuts are commonly exposed to more sunlight than those in old-growth forests. Increased light availability results in increased production of phenolic compounds<sup>22-24</sup> and increased astringency.<sup>25</sup> Thus, it seems likely that differences in astringency of plants growing in clearcuts