

WATER AND CARBOHYDRATE DYNAMICS IN MATURE FOREST-GROWN AND OPEN-GROWN *QUERCUS GARRYANA*, BEFORE AND AFTER RELEASING OAKS FROM CONIFER COMPETITION

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Historic land-use changes have reduced Garry oak (*Quercus garryana*) savanna and woodland habitat along the west coast of North America, and much of the remaining habitat is threatened by conifer encroachment. Our research examines the stress imposed on native oaks from, and the response to the removal of, neighboring conifers. Ten mature oak trees were selected across an open-canopy savanna and a closed-canopy conifer-dominated forest in the Willamette Valley of Oregon. Forest-grown oaks experienced high competition (Hegyi = 3.04), were taller (25.16 $\pm$ 0.89 m), and had less girth (diameter at breast height [d.b.h.] 47.2 $\pm$ 2.40 cm), compared to open-grown oaks (Hegyi 0.39; height 14.44 $\pm$ 1.20 m; d.b.h. 61.33 $\pm$ 5.25 cm). Predawn and midday xylem water potential and nonstructural carbohydrates (NSC) in upper branch and bole sapwood were assessed for each study tree monthly from June to October in 2017 (prior to conifer removal), and in 2023 (post conifer removal in the forest). Forest-grown oaks were less water stressed than open-grown oaks on most sampling dates both before and after removing overtopping conifers. Seasonal changes in NSC varied substantially in 2017 between forest-grown and open-grown oaks, and with a general pattern of lower NSC and later seasonal peaks for closed-grown trees. These results demonstrate stress on native oaks from encroaching firs is likely primarily due to shading and not competition for water and that altered physiological stress patterns persist over many years even after removal of conifers.

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