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Effects of groundwater dynamics on water uptake of saltcedar in two contrasting habitats in an arid oasis, northwest China

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Groundwater is considered as the most reliable water source of phreatophytes in desert regions. To understand how phreatophytes correspond to changes in groundwater table over time and space, it is important to examine the specific plant–water relations in different habitats. In this study, we investigated whether and how saltcedar (*Tamarix ramosissima*) responded in water sources use to water table fluctuations during the growing season in two contrasting habitats (i.e., riparian and dune sites) in the middle reaches of the Heihe River, northwest China. δ^{18}O and δ^{2}H values of xylem sap, soil water, and groundwater were measured to determine the water use pattern of the two saltcedar populations. Four potential water sources, namely shallow soil water, middle soil water, deep soil water, and groundwater, were identified. The percentage utilization of potential water sources by saltcedar in the two habitats were calculated using IsoSource model. The results indicate that the depths of water extraction by saltcedar are shallower in the riparian habitat than in the dune habitat. During the growing season, the saltcedar in riparian habitat always extracted soil water at the 30-60 cm depth, which was recharged by groundwater. In contrast, the saltcedar in dune habitat either extracted soil water from a deeper depth (below 100 cm) that is supposed to be recharged by groundwater too, or directly used groundwater. These results suggest that saltcedar was almost exclusively dependent on groundwater throughout the growing season and did not change their water sources with the fluctuation of groundwater. The differences in water use pattern of the saltcedar in the two contrasting habitats may be caused by the variations in groundwater depth, groundwater fluctuation magnitude and the resultant soil moisture conditions.