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Abstract:

*Indigofera spinosa*, a dwarf shrub that is widely distributed in arid areas of northern Kenya, was subjected to water stress, defoliation and competition with grasses under a relatively controlled (garden) situation and in a natural setting. In the garden experiment, defoliation had no effect on total aboveground biomass produced or total N yield, but watering at 15-d intervals reduced both biomass and N yield. Allocation of both biomass and N to leaves was increased by defoliation, while allocation to stems was reduced. Root biomass was reduced by heavy defoliation at the 5-d watering frequency, but not at 10- or 15-d watering intervals. Allocation of biomass and N to grazers, as a proportion of the total yield, was not affected by watering frequency. A field experiment in a mature stand of *I. spinosa* was conducted to evaluate the effects of defoliation and competition with grasses on aboveground production, N yield and xylem water potential. Competition had a strong influence on all the measured variables, while defoliation had less of an impact. Plants under reduced competition had greater yields of biomass and N (by >200%) than plants under full competition. Defoliation reduced allocation to residual biomass and increased allocation of biomass to grazers. Seasonal trends in max. (pre-dawn) and min. (midday) xylem water potentials of *I. spinosa* showed few systematic differences among plants that received different treatments when there was adequate soil moisture (late Apr. to mid-June). During periods of severe drought, *I. spinosa* plants under reduced competition with grasses had significantly higher xylem water potentials than plants that experienced full competition. Defoliation of *I. spinosa* had little effect on water potential.