

Growth and development of common ragweed (*Ambrosia artemisiifolia* L.) under different nitrogen, water and competition levels



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DOI 10.5073/jka.2016.455.30

Objective of the experiment was to determine effect of various nitrogen levels, soil moisture level and competition levels on the growth parameters of common ragweed (*Ambrosia artemisiifolia*).

Material and methods

Greenhouse pot experiment with randomized treatments in temporal blocks. Experiment was established as a factorial design with four replications. Two watering levels (50 % and 90 % of pot water-holding capacity), three randomized nitrogen levels (10, 50, 100 kg/ha) and three common ragweed competition levels with no competition (one common ragweed plant in the pot), medium competition level (one common ragweed and one grass) and high competition level (one common ragweed and five grasses) were selected as factors. Italian ryegrass (*Lolium multiflorum* L.) was chosen as competitor. Five destructive harvests were conducted throughout the life cycle to determine Common ragweed morphological and physiological parameters (leaf, stem, inflorescences, total dry matter) in growth stages V6 (6 leaf), V10, V14, full flowering and physiological maturity.

Results

The leaf, stem, total dry matter and leaf area of single-grown common ragweed responded to medium and high nitrogen levels, whereas under neighbouring competition with Italian ryegrass, higher nitrogen levels were required to observe a response. Common ragweed performance was strongly decreased by interspecific competition with Italian ryegrass. Increased resource availability enhanced competition intensity. Nitrogen affected seed production only in no competition stands.

Medium competition reduced the total dry matter by up to 58 %, whereas high competition reduced it by up to 85 %. Reproductive output was also strongly affected by competition. Medium competition reduced the seed weight per plant by up to 83 %; high competition reduced it further by up to 91 %. The higher water level had a weak effect on growth parameters, but only in the absence of competition. The greatest relative growth rate was determined at early vegetative V10 growth stage. Relative growth rate was affected by competition and water level; however the relative growth rate under various nitrogen availability levels was similar. Common ragweed is not a strong competitor in resource-rich conditions, but results under moderate water stress and low nitrogen inputs showed that common ragweed growth was not greatly affected by moderate competition. Our results indicate that low-water and low-nutrient environments with an absence of competition are critical factors for the successful establishment and further spread of common ragweed.