

**COMPETITIVE ABILITY OF FOUR SPRING WHEAT VARIETIES  
AGAINST FAT HEN (*Chenopodium album* L.)**

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**by**

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## Abstract

Intensive use of crop protectant chemicals is not an option for resource-poor farmers who have to focus on other ways to reduce the impact of weed competition. This research programme sought to establish whether crop varieties had different competitive abilities against weeds and what the characteristics of competitive cultivars might be. A series of experiments studied the relative competitiveness with fat hen (*Chenopodium album*) of four spring wheat varieties Alexandria, Tonic, Canon and Baldus selected to represent different heights, tillering potentials and leaf angles. Additional experiments examined aspects of seed production, seed germination and seedling establishment of fat hen. Aggressivity index was selected to measure the competitive ability of wheat varieties.

In the glasshouse, all the wheat varieties were of similar competitive ability and no plant character was related to crop aggressivity index. In field experiments, the variety ranking of aggressiveness against fat hen was Alexandria > Tonic > Canon > Baldus. Crop aggressivity was positively related to crop plant height, leaf area and tillers per plant when grown in mixture with fat hen, and negatively related to fat hen height, leaf area and dry matter per plant. Physiological attributes such as absolute and relative growth rates, net assimilation rate, specific leaf area and leaf area ratio of wheat were rarely related to crop aggressivity at any single harvest but changed with time. Relationships of aggressivity with wheat characters measured in monocultures were generally poor. Crop aggressivity was positively related to relative loss of weed dry matter, and negatively related to relative loss of wheat dry matter and grain yield. The most competitive variety was associated with the lowest weed seed production and seed return to the soil.

Wheat varieties were less competitive when fat hen emerged 15 days earlier but were highly competitive when fat hen emerged 15 days later. Light interception by crop canopies in mixture was positively related to crop aggressivity. It is suggested that plant breeders should use greater height, greater leaf area, more droopy leaves and greater number of tillers as selection criteria for competitive wheat cultivars.

A new measure of competition, the Competition Susceptibility Index is proposed which was negatively correlated to crop aggressivity index.