

Effect of different densities of wild mustard (*Sinapis arvensis*) on the growth indices of wheat (*Triticum aestivum* L.) cultivars in Gorgan

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Extended Abstract

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Introduction

There are many species of weeds that cause damage to wheat farms in Golestan province, however, *Sinapis arvensis* is one of the most common weed species in the wheat farms, which results in lower yields and increased production costs (Pawar, 2009). Growing cultivars with high competitive potential is one of the strategies for combating weeds in the integrated weed management system. Agronomic competition is one of the least expensive and the most commonly used methods by farmers to control weeds, which is consistent with the goals and new criteria of sustainable agriculture practices (Kristense *et al.*, 2008). Among the factors contributing to weed competition with crops, cultivars and planting intensity are of great importance. In this regard, plant growth analysis can be indicative of the competitive ability of crops against weeds. The aim of this study was to investigate the effect of different densities of *Sinapis arvensis* on some growth indices and yield loss in four wheat cultivars under climatic condition of Gorgan.

Materials and Methods:

In order to investigate the effect of wild mustard (*Sinapis arvensis*) competition on the growth indices of wheat cultivars, an experiment was conducted at agricultural research station of Gorgan in two cropping years (2009-2011). The

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experiment was conducted as factorial in a randomized complete block design with four replications. The experimental factors consisted of four wheat cultivars: Arta, Tajan, Moghan and Morvarid and five wild mustard densities of 0, 4, 8, 16 and 32 plants/m². Wheat density was maintained at a constant 350 plants/m² during the two years of the experiment. The evaluated traits included leaf area index (LAR), crop growth rate (CGR), relative growth rate (RGR), dry matter accumulation (DMA) and wheat grain yield. The leaf area index was measured using the Delta-T model leaflet. These data were used to determine growth indices. Statistical analysis of data was performed using SAS software. Charts were drawn using Excel 2007 and Sigma plot software.

Results and Discussion:

The combined analysis results showed that the effect of year on the all traits was not significant at 1% probability level. But the effects of cultivar, density and interaction of cultivar and wild mustard (*Sinapis arvensis*) density were significant. The results of the mean comparison showed that by increasing the density of *Sinapis arvensis* from 4 to 32 plants/m², the trend of changes for the growth indices of the wheat cultivars was decreasing. However, the trend of yield reduction among the wheat cultivars due to competition with *Sinapis arvensis* was not similar. The significant interaction between cultivars and density levels on wheat grain yield indicates that the economic performance of different wheat cultivars did not decline in the same rate under the different densities of wild mustard. In this study, Morvarid cultivar was found to be highly resistant to *Sinapis arvensis* because it was able to produce higher DM yields, LAI, CGR and RGR in competition with wild mustard than the other cultivars. One of the important factors for dry matter production and crop yield formation is the increase in leaf area index. The higher LAI and greater light consumption efficiency can facilitate the optimized light absorption, leading to increased yield production. In other words, if a plant can efficiently convert the absorbed light to higher biomass yield, it will be more successful in biomass production and yield formation (Blackshaw *et al.*, 2008). In general, the results showed that the grain yield performance of wheat cultivars while competing with wild mustard weed was influenced by the growth indices and Morvarid cultivar was more successful than the three other cultivars.

Conclusion:

The results of this study showed that the competition ability of the wheat plants was strongly influenced by wild mustard (*Sinapis arvensis*) density. Wild mustard has a high potential competitiveness against wheat due to its unlimited growth pattern and greater height, LAI and DMA, facilitating the capture of resources needed for growth. Therefore, in the wheat producing areas where wild mustard

is problematic, in addition to implementing other management practices, it is necessary to grow suitable cultivars such as Morvarid.

Keywords: Competition, crop growth rate, dry matter accumulation, leaf area, wheat

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