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Influence of Weed Densities and Different Nitrogen Levels on Growth Indices of Corn, Red Root Pigweed (*Amaranthus retroflexus* L.) and Millet (*Panicum miliaceum* L.)

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Introduction

Competition for nutrient sources, especially nitrogen, is one of the reasons of corn yield reduction in the presence of weed. Weeds compete with corn for nitrogen uptake and affect its growth and development. Thus management and optimum application of nitrogen fertilizer may help corn to compete against weeds. More consumption of nitrogen fertilizer would change the competition ability of weed and crop. Comparison of crop-weed growth-related characteristics is a way to assess their rate of competition. The main objective of the current study was to evaluate the effects of different weed densities and nitrogen levels on growth indices of corn, red root pigweed and millet.

Material and Methods

In order to study the effects of different weed densities and nitrogen levels on growth indices of corn, red root pigweed (*Amaranthus retroflexus*) and millet (*Panicum miliaceum*), a field experiment was conducted in 2009 in the research fields of Tarbiat Modares University of Tehran with factorial arrangement of treatments based on Randomized Complete Block Design with three replications. Accordingly, three factors included different nitrogen fertilizers (75% optimum or 138 kg N ha^{-1}, optimum or 184 kg N ha^{-1} and 125% optimum or 230 kg N ha^{-1}), weed species (redroot pigweed and millet) and weed densities (5 and 25 plants.m^{-1} for redroot pigweed and 7.5 and 37.5 plants.m^{-1} for millet) was considered as main plot. Destructive sampling was carried out in four stages (including mid-vegetative growth [35 days after planting], Tasseling [62 days after planting], milky stage [84 days after planting] and physiological maturity [130 days after planting]), to measure changing trend of the leaf area and dry matter in corn, red root pigweed and millet. Four plants were used at each destructive sampling. The OriginPro 9.1 software was used to fit equations and draw figures.

Results and Discussion

The highest dry matter (2429.39 gr), CGR (38.38 g m^{-1} day^{-1}) and LAI (4.57) was achieved for the treatment of 230 kg N ha^{-1} and weed control. However, the highest RGR with 0.06 $g.g^{-1}$ was obtained in at the treatment of 184 kg N ha^{-1} and weed control. Corn in competition with millet was achieved the maximum CGR in 138 kg N ha^{-1} and 7.5 millet m^{-1} and also the maximum RGR was obtained in 184 kg N ha^{-1} and 7.5 millet m^{-1}. Corn in competition with redroot pigweed was achieved the maximum CGR (30.83 g m^{-1} day^{-1}) and RGR (0.055 g) in 138 kg N ha^{-1} and 5 redroot pigweed m^{-1} and also the maximum TDW (1815.92) and LAI (5.1) belonged to in 184 kg N ha^{-1} and 5 redroot pigweed m^{-1}. Generally, analyzing the trends of growth indicators shows that the corn growth indices are reduced more by increasing the weed density in high levels of nitrogen and as a result, the competitive ability of weeds is more in high levels of nitrogen. The Millet and redroot pigweed growth indices show that their maximum TDW, CGR and RGR (In all different levels of nitrogen and weed densities) occurred at 62 days after planting. However, they have different values and trends at different levels of nitrogen

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and weed densities.

Conclusion

The results of this study show that the species of weeds in the farm is a determinative factor impress on the role of increasing application of Nitrogen for improving dry matter production and growth indices of corn. Totally, the results indicate that increasing N application beyond the optimum rate not only do not increases corn growth but also reduces its yield, where nitrophile species are the dominants in farms, and leads to environmental pollution .

Keywords: Density, Dry Matter, Leaf Area Index, Nitrophile, Weed