

## Abstract

In this study the effect of clover as green manure, mycorrhizae and chemical fertilizer was examined on the growth characteristics, yield and yield components of wheat under influence of water shortage. The experimental design was a split-split plot with clover green manure and control (fallow) comprising the main treatments, and four irrigation regimes of full irrigation (control), irrigation cut off at flowering stage, irrigation cut off at dough stage and rain-fed (no-irrigation) as sub-treatments and no chemical fertilizer (control), NPK, mycorrhizae and combination of NPK and mycorrhizae that were applied with three replications. The experiment was conducted in to consecutive year of 2015 and 2016 at Borujerd Agricultural Center research farm. At the study cultivation and burying of clover green manure followed by wheat cultivation. Evaluated parameters were: agronomic characteristics (height, flower-leg length, flag leaf length and width, spike length, number of spikes per plant, number of seeds per plant, 1000 seed weight, biological yield, dry matter content, seed yield, harvest index and protein content in seeds), physiological indices (Relative Water Content (RWC), chlorophyll a, b, carotenoids, greenness index (SPAD), peroxidase and catalase), soil characteristics (nitrogen and phosphorus in the soil, bulk density, pH, and organic matter content), as well as the effect of clover on wheat weed control (biomass, density and diversity of weed) in comparison with fallow. Combined analysis indicated that four-ply interaction of year×cover crop×irrigation×fertilizer was significant on biological yield, seed yield, HI, carotenoids, proline, catalase and soil nitrogen. The greatest seed yield ( $10490 \text{ kg ha}^{-1}$ ) over two years of study was observed in plot cultivated following green manure, full irrigation and combined application of chemical fertilizer and mycorrhizae. At the same condition sole chemical fertilizer produced favorable seed yield ( $10180 \text{ kg ha}^{-1}$ ), while mycorrhizae only increased seed yield by 3 percent. The lowest seed yield (pooled over two year of study equals to  $1530 \text{ kg ha}^{-1}$ ) was observed at fallow, rain-fed and no fertilizer application. The observed difference in seed yield was the maximum between control (fallow, rain-fed and no fertilizer) and best treatment. Due to high correlation between seed yield and biological yield, the greatest biological yield ( $26100 \text{ kg ha}^{-1}$ ) was observed at green manure, full irrigation and combined application of mycorrhizae and NPK. The greatest HI was observed at green manure, full irrigation and chemical fertilizer (41.04 percent),

fallow, irrigation cut off at dough stage and combined application of chemical fertilizer and mycorrhizae (40.85 percent) and green manure, full irrigation and combined application of chemical fertilizer and mycorrhizae (40.18 percent), respectively. The greatest carotenoid content ( $7.49 \text{ mM g}^{-1}$  of fresh weight) was related to green manure, rain-fed and combined application of chemical fertilizer and mycorrhizae. In addition to, the greatest proline content was attained at fallow, rain-fed and chemical fertilizer ( $116.3 \text{ mM g}^{-1}$  of fresh weight) and combined application of chemical fertilizer and mycorrhizae ( $112.6 \text{ mM g}^{-1}$  of fresh weight) in second year. On the other hand, proline was strongly dependent to stress and fertilizer and proline content increased by increasing severity of stress and fertilizer application. The greatest amount catalase was observed at fallow, rain-fed and chemical fertilizer application ( $4.61 \text{ mM g}^{-1}$  of fresh weight) and combined application of chemical fertilizer and mycorrhizae ( $4.42 \text{ mM g}^{-1}$  of fresh weight) in second year. The greatest nitrogen content in soil was observed at second year and fallow, irrigation cut off at dough stage and mycorrhizae application (0.0845 percent). These results indicated that clover green manure significantly decreased biomass, density and diversity of weed in comparison with the fallow. Therefore, clover green manure could be considered as an alternative approach for narrow leaf weed control including bromes and wild oat.

**Keywords:** Persian clover, Water shortage, Weed, Soil fertility, Borujerd



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Supervisors

Dr. A. Sirosmehr

Advisors

Dr. M. Asgharipor

Dr. M. Shahverdi

By:

Abas Alipanah

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