

Alfalfa (*Medicago sativa* L.) growth and fodder yield in response to iron and humic acid spraying

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Abstract

The experiment was carried out on loamy sand soil in the Al - Zubair district throughout the 2022–2023 winter growing season. The district is located in the southeast of the Basrah Governorate, 20 km west of the Basra Governorate Centre, at longitude 47.05° and latitude 30.28°. The purpose of the study was to determine how the application of iron and humic sprays, as well as their interaction, affected certain growth traits and the quantity of dry and green feed given of the local variety of Alfalfa crop (*Medicago sativa* L.). A completely randomized block design (R. C. B. D.) was used in a split - plot arrangement with 3 replications, Iron concentrations were put (Fe0, Fe1=400, F2=800 mg L⁻¹) in the main plots using Aqueous iron sulphate fertilizer H2SO4.7H2O (%20 Fe) as a source of iron, while Humic acid) concentrations (0, 3, 6, 9 gm L⁻¹), which used the symbols HA0,HA1,HA2,HA3 were put in the sub-plots. The administration of iron foliar had noteworthy influence on height of the plant and No. of branches m⁻² at the 1st and 3rd cutting, whereas these traits were significantly affected by spraying of humic acid at all cuttings. In the case of Iron and humic acid, both Fe1 and HA3 showed the best result of green fodder yield at all cutting, total green fodder yield and protein. Interaction between Fe and HA showed a significantly effect on some of the studied characteristics, the combination (Fe1×HA3) has the highest values for overall production of dry fodder (1367.1 kg ha⁻¹) and total yield of green fodder (2634.6 kg ha⁻¹).

Key words: Alfalfa, Iron, Humic acid, Fodder yield, Protein

1. Introduction

Alfalfa, scientific name *Medicago sativa* L. is a vital herbaceous fodder legume in Iraq and around the globe. It performs a significant role in the agroecosystem. It is a perennial crop that remains in the soil for 3-4 years and produces a lot of green fodder that is high in protein and other nutrients that are beneficial to the animal's health and productivity [1]. It is produced as silage and hay. This crop is highly adaptable to many agricultural environments, making it excellent for production in all irrigated fields, particularly in the central and southern parts of Iraq. In addition to being palatable to animals, it can fix significant amounts of nitrogen in the soil [2]. In Iraq, alfalfa is mostly grown for its fodder, with the intention of producing seed only being of minor importance. Suitable fodder yield requires the availability of all nutrients in the right quantities [3]. One of the best strategies to avoid nutrient shortages in the soil is to apply foliar fertilization, particularly for micronutrients. One of the micronutrients that is commonly lacking is Iron (Fe). The availability of Fe depends on the pH level of the soil and is higher in acidic soils; in contrast, it is quite low in alkaline soils. Soils having a pH higher than 6.0 are more probable to have deficiencies. [4]. In contrast, the majority of Iraq's central and southern soils had a pH of greater than 7.5[5]. Consequently, it is essential to apply Iron directly to foliage rather than through the soil. Iron is essential for many aspects of plant growth and development, including respiration, the manufacture of chlorophyll, the development of chloroplasts, and enhanced photosystem function [6]. It is an essential component of several enzymes and It is essential for nucleic acid metabolism. [7]. [8] found that Alfalfa's photosynthetic capacity as well as yield increased at 0.6% ferrous sulphate concentration. Additionally, there are now challenges for reducing the risks of pollution from chemical fertilizers. Thus, the importance of humic acid and other organic fertilizers, which have a quick effect and are safe for people, animals, and plants, as well as the fact that they include minerals that promote plant development [9] [10] and [11] produced the most dry and green fodder on average during two