

Response of Alfalfa Functional Traits to Alternating Drip Irrigation Experimental Research on Mechanism

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Alfalfa (*Medicago sativa*) is an important cultivated grass in the northern arid and semi-arid areas, Under alternate root-zone irrigation (APRI), Root systems can feel the soil drought, Thus inducing drought stress responses cause plants to absorb water and nutrients by changing morphology to stress, To reveal the effect of alternating root zone irrigation on alfalfa growth in northwest arid climate conditions, The Agricultural and Ecological Water-saving Experimental Station of China Agricultural University in Wuwei City, Gansu Province, Three irrigation gradients (T1:80% field water holding, T2:60% Field holding, T3:40% Field water holding. Field water holding, Field capacity, Fc) and the corresponding three groups of controls (CK1, CK2, C K 2, CK3) irrigated the root area of alfalfa, and measured the functional response of alfalfa in different reproductive periods under each treatment. The results show that:

1. With the decrease of irrigation water volume, the growth rate of alfalfa decreased, and the thick trend of stem decreased in a straight line, but the leaf-stem ratio under T2 treatment was significantly higher than that of T1 and T3 treatment;
2. The stomatal conductivity of alfalfa in different periods in the current bud period is higher than the branch stage and the branching value is higher than the initial flowering period; the T2 group reached a peak of 0.7068.
3. The treatment and control groups subjected to drought stress were differentiated from one main root into multiple main roots, each main root morphology formed its own independent fish tail branch, and multiple fish tail main roots absorb the required water and nutrients in the soil. The root length and root area of T3 are much greater than that of T1 and T2, and the root length and root area are ranked as T3> T1> T2 from high to low. With the decrease of irrigation gradient, the root length and root area are decreased first.

The above results show that the treatment, T2 treatment can effectively improve the photosynthesis efficiency of alfalfa, more can promote the growth of alfalfa leaves, make alfalfa root neck diameter and branches, alfalfa root system stimulation, mainly in the root area and root length, stimulated by drought 60%FC (T3) root area and root long-term super T1, T2, more conducive to absorb water and nutrients in the soil.

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