Study on Suitability of Alfalfa Fall Dormancy Types Under Future Climate Change

Long Shi[1], Tiemei Wang[1]*

Fall dormancy of alfalfa is a growth characteristic of the physiological and morphological changes of alfalfa under the conditions of low temperature and shortened sunshine in autumn in northern latitudes. Fall dormancy of alfalfa is related to cold resistance and yield, and is the primary basis for variety selection. In this study, the geographical distribution data of different fall-dormancy types of alfalfa in China were obtained by searching databases and literature (Including 83 very dormancy distribution points, 175 fall-dormancy distribution points, 195 semi-dormancy distribution points, 119 non-dormancy distribution points, and 23 very non-dormancy distribution points) and related environmental data, based on the MaxEnt model and ArcGIS software, the potential suitability of different fall dormancy types of alfalfa under current and future climate change scenarios in China the distribution area was simulated and predicted, the dominant environmental variables affecting the suitability distribution of different fall dormancy types of alfalfa were analyzed, and the area and space changes and centroid migration laws of high-suitability areas of different fall dormancy types of alfalfa were explored. The results showed that: 1) The dominant environmental factors affecting the distribution of potential suitability of different fall dormancy types of alfalfa were the average temperature in the driest quarter, the annual average temperature, and the solar radiation in December and October. 2) There are differences in the potential geographical distribution patterns of different fall-dormancy types of alfalfa in China. The highly suitable areas of very dormancy are mainly concentrated in the central and western Inner Mongolia and the three eastern provinces, with an area of $146.18\times10^4 km^2$; The highly suitable areas for fall-dormancy are mainly concentrated in eastern Northwest China, central Inner Mongolia and parts of North China, with an area of $152.13\times10^4 km^2$; The suitable areas for semi-dormancy are mainly concentrated in North China, eastern northwest and northeastern China, with an area of $204.01\times10^4 km^2$; The highly suitable areas for non-dormancy are mainly concentrated in the eastern southwest, central China and northeastern China, with an area of $132.99\times10^4 km^2$; The highly suitable areas for very non-dormancy are mainly concentrated in eastern southwest, central China, east China, and southern China, with an area of $150.63\times10^4 km^2$. 3) Under different climate change scenarios in the future, the highly suitable areas of very dormancy and very non-dormancy alfalfa show a decreasing trend, and the areas of high-suitability areas of fall-dormancy, semi-dormancy and non-dormancy alfalfa all show an obvious increasing trend. 4) After the future climate change, the centroids of different fall dormancy types of alfalfa high suitable areas showed changes in different directions. On the whole, except for the very non-dormancy alfalfa, which migrated to low latitudes, the rest of the fall dormancy alfalfa all showed a trend of migration to high latitudes. This research has certain theoretical significance and reference value for the layout of alfalfa production in my country and the formulation of policies to deal with climate change.

---

[1]Beijing Forestry University, No.35 Qinghua East Road, Haidian Distract Beijing, China, 100083.
Corresponding author: Wang Tiemei alfalfa@126.com