

158. Adaptation of alfalfa ecotypes to climate change

Julien Lionel¹, Delalande Magalie², Sartre Pascal², Carpon Jean-Marie³, Blandineau Claude², Bastianeli Denis¹, Huguenin Johann¹

¹CIRAD, UMR-SELMET, Montpellier, France

²INRA, UE DIASCOPE, Montpellier, France

³INRA, UMR-SELMET, Montpellier, France

The availability of forage resources in European Mediterranean areas, subject to cyclical droughts and changing climatic conditions (temperature increase of + 0.6C°/decade, evapotranspiration + 50 mm/decade), has become a major challenge for livestock farming. Following professional organizations seeking INRA and CIRAD's expertise to search for alfalfa ecotypes capable of adaptation, we have been investigating the diversity of behaviors of 100 alfalfa ecotypes from 26 countries according to climatic constraints for the last three years. Key assumptions related to the response diversity in terms of i) survival, ii) productivity, and iii) nutritive composition. Tests were carried out without inputs or irrigation. Ecotypes of three different environments were pre-selected from a previous project with a total of 65 industrial, 25 farm and 10 wild ecotypes. The results obtained depending on rainfall amounts – *i.e.* favorable in 2012 with > 30 mm/month, and unfavorable in 2013 and 2014 with < 30 mm/month during the plant growth period –, can help us make selections based on biomass and total nitrogen content. Under rainfall deficit conditions results show:

- A marked drop in the productivity of industrial ecotypes due to their sensitivity, the variation of the dry matter is, in 2012-2013: - 25% ± 0.024; in 2012-2014: - 62% ± 0.015; in 2013-2014: - 46% ± 0.044;
- Resilience of farm and wild ecotypes highlighting a more interesting genetic variability for selection purposes;
- Changes in the earliness/maturity of the various ecotypes, which revealed opportunities to improve animal feed production (grazing periods, cutting dates...);
- An opportunity to integrate some ecotypes in multi-specific mixtures.