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Bernadette Julier, Amel Maamouri, Adrien Guérin, Philippe Barre, Sabrina
Delaunay, Gaëtan Louarn

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QTL detection for forage biomass of alfalfa in mixture with a forage grass

Julier B.

INRA, Le Chêne - RD 150 CS 80006, Lusignan, France

The agronomic and environmental value of forage grass - legume mixtures has been proved but legume breeding is still mostly conducted in monoculture. A progeny of 200 F1 individuals obtained from two alfalfa parents (H1 and G4) contrasting by aerial morphology was evaluated for biomass and plant height under two cropping conditions in micro-sward (mixture with tall fescue and monoculture) for 8 consecutive cuts. Phenotypic data showed a large variation among individuals for all traits in all cuts. The correlation between traits recorded in mixture and in monoculture was positive but the large variation around the correlation indicated that some genotypes were relatively more performant either in mixture or in monoculture. A genetic map of each parent was obtained from SSR and DArT markers, by using the TetraploidMap software. QTL were found on each parent and each linkage group (LG). Most QTL were common to mixture and monoculture (LG 1 of H1; LG 1, 2 and 4 of G4) but some QTL were specific to the mixture condition (LG 3 and 7 of H1, LG 6 of G4). These results indicate a partial common genetic control for biomass in mixture and monoculture but also highlight a specific genetic control for performance in mixture. To create alfalfa varieties adapted to monoculture and mixed cropping conditions, both common and specific QTL for biomass could be used.