Genetic map construction and quantitative trait loci (QTL) mapping for nitrogen use efficiency and its relationship with productivity and quality of the biennial crop Belgian endive (Cichorium intybus L.)

Titre	Genetic map construction and quantitative trait loci (QTL) mapping for nitrogen use efficiency and its relationship with productivity and quality of the biennial crop Belgian endive (Cichorium intybus L.)
Type de publication	Article de revue
Auteur	Cassan, Laurent [1], Moreau, Laurence [2], Segouin, Samuel [3], Bellamy, Annick [4], Falque, Mathieu [5], Limami, Anis M. [6]
Editeur	Elsevier
Type	Article scientifique dans une revue à comité de lecture
Année	2010
Langue	Anglais
Date	2010 Oct 15
Pagination	1253-1263
Volume	167
Titre de la revue	Journal of Plant Physiology
ISSN	1618-1328
Mots-clés	Amino acids [7], Belgium [8], Chicory [9], Chromosome Mapping [10], Crops, Agricultural [11], Genetic Linkage [12], Genetic Variation [13], Glutamic Acid [14], Glutamine [15], Inheritance Patterns [16], Models, Biological [17], nitrogen [18], Plant Tubers [19], quantitative trait loci [20], Quantitative Trait, Heritable [21]

Résumé en anglais	A genetic study of the biennial crop Belgian endive (Cichorium intybus) was carried out to examine the effect of nitrogen nutrition during the vegetative phase in the control of the productivity and quality of the chicon (etiolated bud), a crop that grows during the second phase of development (forcing process). A population of 302 recombinant inbred lines (RIL) was obtained from the cross between contrasting lines "NS1" and "NR2". A genetic map was constructed and QTLs of several physiological and agronomical traits were mapped under two levels of nitrogen fertilization during the vegetative phase (N- and N+). The agronomical traits showed high broad sense heritability, whereas the physiological traits were characterized by low broad sense heritability. Nitrogen reserves mobilization during the forcing process was negatively correlated with nitrogen reserves content of the tuberized root and common QTLs were detected for these traits. The chicon productivity and quality were not correlated, but showed one common QTL. This study revealed that chicon productivity and quality were genetically associated with nitrogen reserves mobilization that exerts opposite effects on both traits. Chicon productivity was positively correlated with N reserves mobilization under N- and N+ and a common QTL with the same additive effects was detected for both traits. Chicon quality was negatively correlated with N reserves mobilization under N- and N+ and a common QTL with opposite additive effects was detected for both traits. These results lead to the conclusion that N reserves mobilization is a more effective trait than N reserves content in predicting chicon productivity and quality. Finally, this study revealed agronomical and physiological QTLs utilizable by breeders via marker-assisted selection to aid the optimization of chicon quality under adapted N fertilization.
URL de la notice	http://okina.univ-angers.fr/publications/ua9124 [22]
DOI	10.1016/j.jplph.2010.04.016 [23]
Autre titre	J. Plant Physiol.
Identifiant (ID) PubMed	20619484 [24]

Liens

[1] http://okina.univ-angers.fr/publications?f[author]=16052
[2] http://okina.univ-angers.fr/publications?f[author]=16053
[3] http://okina.univ-angers.fr/publications?f[author]=16054
[4] http://okina.univ-angers.fr/publications?f[author]=16055
[5] http://okina.univ-angers.fr/publications?f[author]=16056
[6] http://okina.univ-angers.fr/m.limami/publications
[7] http://okina.univ-angers.fr/publications?f[keyword]=5351
[8] http://okina.univ-angers.fr/publications?f[keyword]=14707
[9] http://okina.univ-angers.fr/publications?f[keyword]=14708
[10] http://okina.univ-angers.fr/publications?f[keyword]=13390
[11] http://okina.univ-angers.fr/publications?f[keyword]=14506
[12] http://okina.univ-angers.fr/publications?f[keyword]=14709
[13] http://okina.univ-angers.fr/publications?f[keyword]=8593
[14] http://okina.univ-angers.fr/publications?f[keyword]=14710
[15] http://okina.univ-angers.fr/publications?f[keyword]=14711
[16] http://okina.univ-angers.fr/publications?f[keyword]=14712
[17] http://okina.univ-angers.fr/publications?f[keyword]=995
[18] http://okina.univ-angers.fr/publications?f[keyword]=5444
[19] http://okina.univ-angers.fr/publications?f[keyword]=14713
[20] http://okina.univ-angers.fr/publications?f[keyword]=11979

[21] http://okina.univ-angers.fr/publications?f[keyword]=14714
[22] http://okina.univ-angers.fr/publications/ua9124
[23] http://dx.doi.org/10.1016/j.jplph.2010.04.016
[24] http://www.ncbi.nlm.nih.gov/pubmed/20619484?dopt=Abstract