



HAL
open science

Genotype mixtures as a tool to develop sustainable agriculture: elucidating the mechanisms that drive genotypic interactions in durum wheat

Hélène Fréville, Pierre Roumet, Nicolas O. Rode, Aline Rocher, Martin Ecartot, Frederic Compan, Jacques David

► To cite this version:

Hélène Fréville, Pierre Roumet, Nicolas O. Rode, Aline Rocher, Martin Ecartot, et al.. Genotype mixtures as a tool to develop sustainable agriculture: elucidating the mechanisms that drive genotypic interactions in durum wheat. *Sfécologie-2016, International Conference of Ecological Sciences*, Oct 2016, marseille, France. 1 p. hal-02797918

HAL Id: hal-02797918

<https://hal.inrae.fr/hal-02797918v1>

Submitted on 5 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Genotype mixtures as a tool to develop sustainable agriculture: elucidating the mechanisms that drive genotypic interactions in durum wheat

Hélène Fréville¹, Pierre Roumet, Nicolas Rode, Aline Rocher, Martin Ecartot, Frédéric Compan, Jacques David

¹ : Amélioration Génétique et Adaptation des Plantes Méditerranéennes et Tropicales (AGAP) - [Site web](#)
Montpellier SupAgro, Institut national de la recherche agronomique (INRA) : UMR1334, CIRAD-BIOS
TA A-108/03-Avenue Agropolis, 34398 Montpellier Cedex 5 - France

Introducing genetic diversity within fields has been proposed as a way to take better advantage of biological and ecological processes naturally occurring in agro-ecosystems, allowing the development of more sustainable agricultural systems with reduced nutrient inputs. However, agronomic studies show both positive and negative effects of genotype mixtures on field production. Negative interactions among different genotypes may result from indirect genetic effects (IGEs) and kin selection, two mechanisms that have remained poorly explored in plants.

Natural selection can operate at the individual and group level in natural populations. Indeed, the fitness of an individual may depend on the phenotypes of interacting individuals. Selection at the group level can thus promote individual traits that optimize the collective performance at the expense of individual fitness. Under kin selection, a selection operating whenever interacting individuals are related, individuals are predicted to behave less competitively toward their relatives. Because agriculture has been maximizing group performance and human selection has occurred among groups of related individuals, one may hypothesize that human selection has been acting as kinship selection in domesticated species. Moreover, the trait value of an individual may be affected by genes in other individuals independently of their relatedness, an effect known as IGEs. Using durum wheat as a model species, we conducted an experiment where plants were grown in groups of five with different levels of relatedness, to test whether kin selection and IGEs may induce poorer performance of genotype mixtures.