

Genomic evidence of human selection on Vavilovian mimicry

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Crop mimicry is an evolutionary process by which weeds evolve to resemble domesticated crop plants and is thought to be the result of unintentional selection by humans. We compared mimetic and non-mimetic populations of *Echinochloa crus-galli* from the Yangtze River basin phenotypically and by genome resequencing, and we show that this weed in rice paddies has evolved a small tiller angle, allowing it to phenocopy cultivated rice at the seedling stage. We demonstrate that mimetic lines evolved from the non-mimetic population as recently as 1,000 yr ago and were subject to a genetic bottleneck, and that genomic regions containing 87 putative plant architecture-related genes (including *LAZY1*, a key gene controlling plant tiller angle) were under selection during the mimicry process. Our data provide genome-level evidence for the action of human selection on crop mimicry.

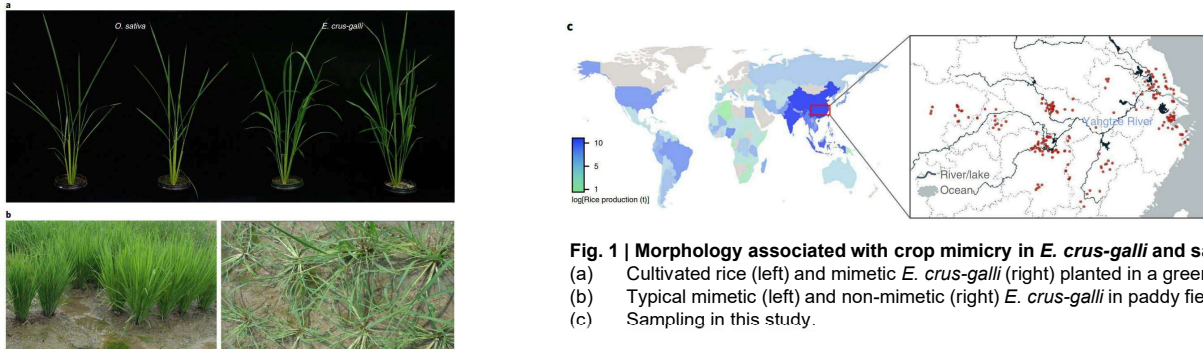


Fig. 1 | Morphology associated with crop mimicry in *E. crus-galli* and sampling. (a) Cultivated rice (left) and mimetic *E. crus-galli* (right) planted in a greenhouse. (b) Typical mimetic (left) and non-mimetic (right) *E. crus-galli* in paddy fields. (c) Sampling in this study.

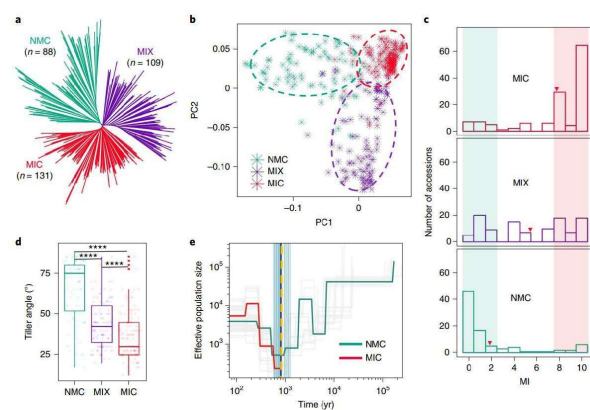


Fig. 2 | Phylogenetic and phenotypic differentiation of *E. crus-galli* in the Yangtze River basin. (a) An approximate maximum-likelihood tree of 328 accessions. (b) PCA analysis. (c) Mimicry phenotypic differentiation among the three groups. (d) The divergence time between mimetic and non-mimetic *E. crus-galli*.

Fig 4 | *LA1* was putatively under positive selection during mimicry evolution in *E. crus-galli*. (a) F_{ST} and reduction in nucleotide diversity measured by ROD. (b) Tajima's *D* distribution and linkage disequilibrium. (c) Gene structure, variations and haplotype diversity of *LA1*.

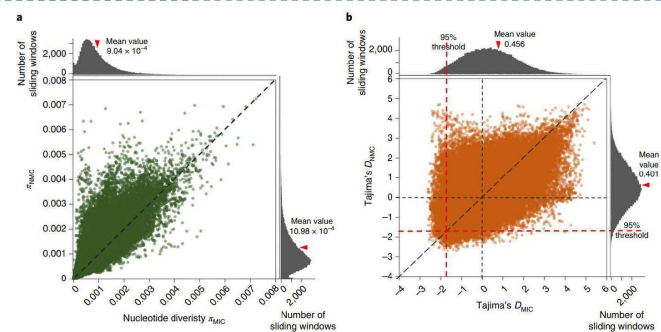
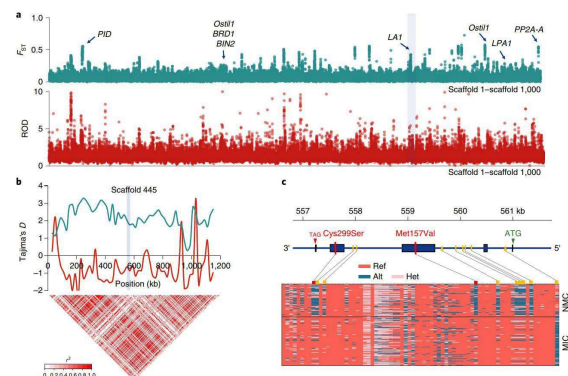


Fig. 3 | Genomic signatures of positive selection during the mimicry process in *E. crus-galli*. (a) The distribution of nucleotide diversity. (b) The distribution of Tajima's *D*.



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Highlight
“Genetics behind crop mimicry”

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Rated ★★★★★ Exceptional
by Prof. Manyuan Long

The Scientist

“Genomics Reveals How Humans Can
Inadvertently Drive Plant Mimicry”