Global ecological restoration does not enhance genetic diversity in restored plant populations, study finds

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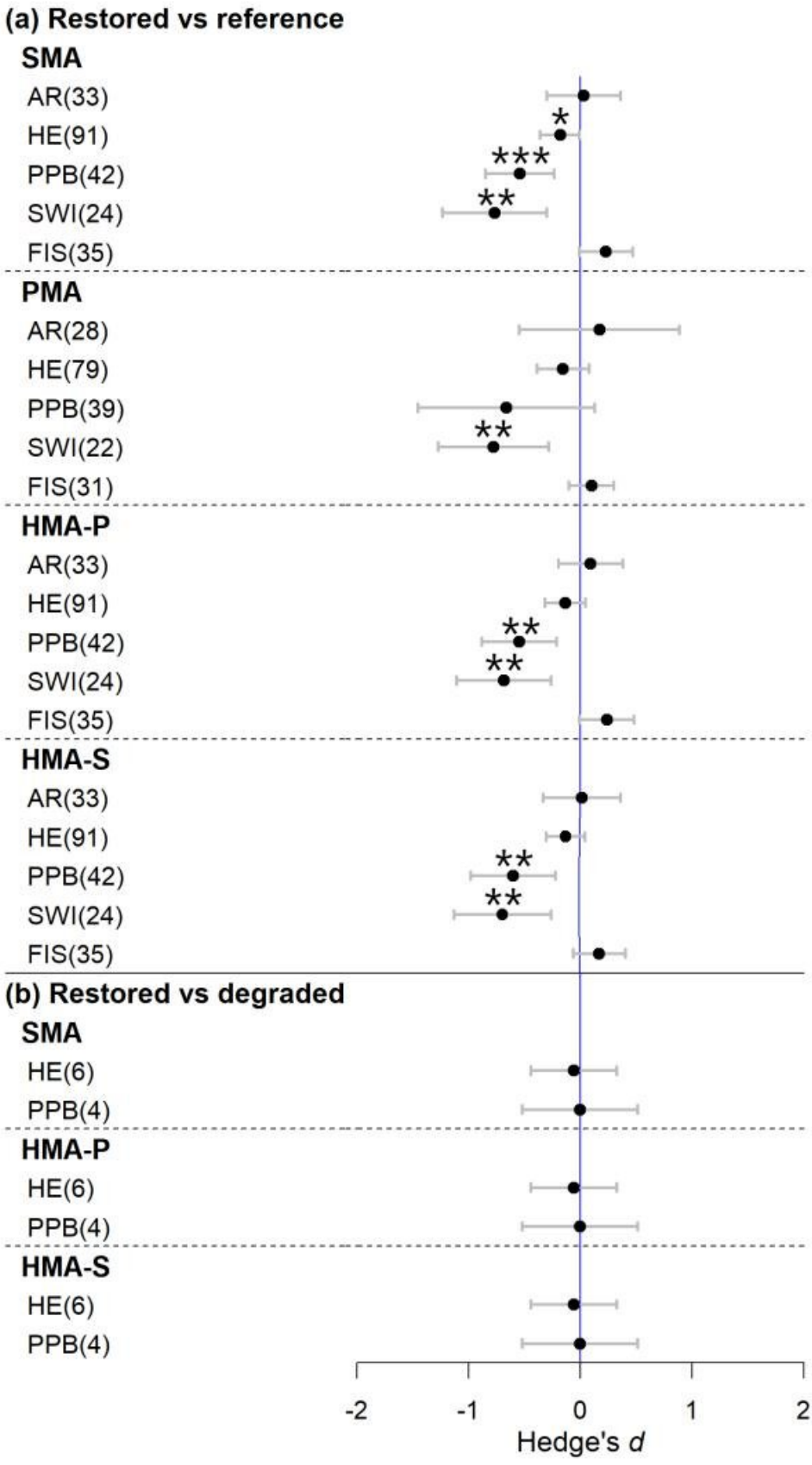
(a) Restored vs reference
SMA
AR(33)
HE(91)
PPB(42)
SWI(24)
FIS(35)
PMA
AR(28)
HE(79)
PPB(39)
SWI(22)
FIS(31)
HMA-P
AR(33)
HE(91)
PPB(42)
SWI(24)
FIS(35)
HMA-S
AR(33)
HE(91)
PPB(42)
SWI(24)
FIS(35)
(b) Restored vs degraded
SMA
HE(6)
PPB(4)
HMA-P
HE(6)
PPB(4)
HMA-S
HE(6)
PPB(4)
-2
-1
0
1
2
Hedge's d

Effect sizes (Hedge's d; restored vs. reference (a); restored vs. degraded (b)) and 95%-CIs of genetic diversity and inbreeding coefficient (FIS) based on standard (SMA), phylogenetic (PMA), and hierarchical (HMA; P, paper; S, species) meta-analyses. (AR, allelic richness; HE, expected heterozygosity; PPB, percentage of polymorphic bands; SWI, Shannon-Wiener index; parentheses, number of data points; vertical blue line, Hedge's d = zero). Credit: WBG

Almost ubiquitous human disturbance has caused serious negative genetic consequences for wild plants worldwide, such as a decrease in intraspecific genetic diversity, which is likely to threaten individual survival and population persistence. Ecological restoration has been widely practiced in various types of ecosystems. However, it is still unclear whether and to what extent ecological restoration has restored the genetic diversity of plant populations.

To fill this knowledge gap, Dr. Wei Xinzeng and his colleagues from the Wuhan Botanical Garden of the Chinese Academy of Sciences compiled a global dataset to compare the genetic diversity between restored and reference or degraded populations, and explored the underlying drivers, such as species characteristics and restoration strategies.

Genetic diversity in restored populations was significantly lower than in reference populations, and was comparable to that in degraded populations. The inbreeding coefficient was consistently comparable between restored populations and reference or degraded populations.

Ecological restoration effectively enhanced genetic diversity of herb species but not woody species, and grassland but not forest ecosystems. Passive restoration rather than active restoration, seeding rather than

planting, and populations restored with mixtures from different donor populations rather than only a single source population all significantly enhanced the genetic diversity of restored populations.

The genetic diversity of restored populations was comparable to the reference population when the restoration time was ≥50 years, but was significantly lower than the reference populations when the restoration time was