

Density of wild-living honey bee, *Apis mellifera*, colonies worldwide: A review

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Abstract

1. The western honey bee, *Apis mellifera*, lives worldwide in approximately 94 million managed hives but also wild throughout much of its native and introduced range. Despite the global importance of *A. mellifera* as a crop pollinator, wild colonies have received comparatively little attention in the scientific literature and basic information regarding their density and abundance is scattered. 2. Here we review 29 studies that quantified wild colony density directly and analyse a larger dataset including an additional 7 studies that quantified density indirectly using genetic markers. 3. Densities varied from 0.1 to 24.2/km² at 38 locations worldwide and were 24 times lower in Europe (0.35/km²) than Africa (8.4/km²) on average. Survey area varied from 1.2 to 924km² and was negatively correlated with density. Survey areas were largest in Europe (average of 70.4km²) and were partly responsible for the low densities reported in this region. 4. After controlling for survey area in a GLM, mean annual temperature and net primary productivity became important predictors of density. This model was used to estimate wild colony numbers at a regional scale, which varied from approximately 135 million in Latin America to 8 million in Europe and 250 million worldwide. 5. Overall, wild colonies were estimated to outnumber managed hives in all regions except Europe and were estimated to be over twice as numerous worldwide. This is a significant result given that *A. mellifera* is often viewed as a domesticated species that primarily lives under human management.

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