Differences between sorghum and maize were not significant. The resp. means for eggs were 477 (M), 665 (P), 385 (SH) and 380 (SL), for open brood 179 (M), 431 (P), 160 (SH) and 160 (SL) and for sealed brood 244 (M), 859 (P), 282 (SH) and 312 (SL). Further 16 SH-tents were established at Groß-Gerau and at a climatically stressful site in Germany. Honey bee nucs were placed in four tents of each variant. The bees increased significantly the seed setting at the stressful site (t-test, p=0.0002).
Conclusions: Diversifying bioenergy crop rotations with sorghum can provide utilizable pollen sources for bees. Seed-setting of *S. bicolor* can be improved by bees.

P219 Impacts of honey bee density on crop yield: a meta-analysis

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There is increasing recognition that pollination deficits are limiting crop yields worldwide. However, management strategies for optimal pollination are still unclear for most crops. Current management focuses on providing high densities of honey bees, but recommended densities are highly variable, even within single crops and varieties.
We performed an extensive literature search to record honey-bee densities (colony density and/or flower visitation rates) and crop productivity (fruit set, seed set, fruit weight, and/or yield). Effect sizes represented the difference in crop productivity between the two most extreme levels of honey-bee densities.
Surprisingly, out of 795 reviewed studies, only 22 analyzed the effect of at least two levels of honey-bee densities on crop productivity (reporting 60 effect sizes in total). Thus, most recommendations for crop pollination management are not based on proper experimental designs.
We found that both colony density and visitation rates increased all the productivity variables. However, effects were non-linear for visitation rates, suggesting that there is an optimum (mean of 8-10 visits per flower) beyond which more honey bees are not beneficial (or even detrimental) for crop productivity.
Effect sizes for visitation rates were greater than those for colony densities, suggesting that visitation rates are a more direct measure of the pollination process. Data on the relation between colony density and visitation rates are lacking. Interestingly, effect sizes of visitation rates were greater for crops with separate sexes than those with hermaphrodite flowers; therefore, the benefits from honey-bee pollination varies according to the crop biology.
Synthesis and applications. Current practices for crop pollination assume that more honey bees are always better for crop yield. However, our analyses suggest that there is an optimum of honey-bee densities. Despite the importance of honey bees and pollinator-dependent crops worldwide, there is a lack of studies designed for finding such an optimum level of crop pollination. Our analyses further suggest that visitation rates could be used as a proxy to guide management recommendations such as colony density and spatial arrangement.

P220 Effects of landscape structure and floral border on pollination services provided by honeybees and native bees in avocado orchards of central Chile

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Different spatial and temporal configurations of the landscape surrounding the crops provide feeding and nesting resources to bees, influencing the diversity of potential pollinators. This study aims to establish the relationship between landscape heterogeneity, pollination by *Apis mellifera* and native bees, and avocado production in three commercial orchards located in central Chile, since avocado represents one of the most important crops throughout the country. If the heterogeneity of the landscape increases the diversity of native bee species and this leads to greater fruit production through the pollination process, then the yield will be higher in avocado orchards that present a more heterogene-