Crop genetic diversity is associated with more efficient predation in wheat fields

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Abstract

During the 20th century, agriculture experienced major gains in productivity via intensive use of artificial inputs but also homogenization. The use of a few genetically homogeneous varieties (inbred lines or hybrids) in intensive farming systems has particularly resulted in a widespread erosion of crop genetic diversity both at the field and landscape scales, with potential impacts on biodiversity and functioning of agroecosystems. The use of variety mixtures is a traditional agricultural practice that has been rekindled by sustainability concerns and that may help reinstate a more ecological functioning of agroecosystems. However, few studies so far have examined the possible benefits of variety mixtures for more sustainable crop production. Here, we examined the effect of the genetic diversity of bread wheat (*Triticum aestivum*) on predation rates in the field, using an experimental setup inspired from biodiversity-ecosystem functioning experiments. Over two years, we compared rates of removal of small preys across different numbers of varieties in a mixture, with multiple measurement dates per year. We also characterized the composition of invertebrate predator communities using pitfall traps. We show that predation rates are strongly correlated with the abundance of predators, particularly spiders and carabids. In addition, although predation rates are highly variable through time, they are significantly influenced by wheat genetic diversity, with higher predation rates in variety-rich mixtures. Our results are consistent with those of ecosystem genetics (plant genetic diversity can influence ecosystem functioning) and suggest that crop variety mixtures could be a promising practice to increase biological control in the field.

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