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Potentials and limitations to support pollinators by mixed cropping of maize with common sainfoin (*Onobrychis viciifolia*)

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Diversified cropping systems provide an opportunity for more sustainable and biodiverse agriculture. Increasing within-field diversity by mixed cropping with legumes seems promising to mitigate negative impacts of maize production on the environment. Legumes grown with maize can promote pollinators by providing additional food sources. However, pure crops of legumes might be richer in floral resources than mixed crops and might thus be more efficient in floral resource provision. Further, mixed cropping of legumes and maize can lead to enhanced competition between cropping partners and yield reduction. Yet, little is known about the potential of mixed cropping of maize with sainfoin to support pollinators and how mixed cropping with sainfoin affects maize yields.

In a field experiment, we established plots of pure crops of maize and sainfoin and mixed cropping of maize and sainfoin with different seed rates. We recorded pollinator visits, number of sainfoin inflorescences and flowers, and yields to evaluate which seed rate ratio of maize and sainfoin might simultaneously support pollinators and produce high yields.

Sainfoin as a pure crop and mixed cropping with high seed rates of sainfoin had higher numbers of inflorescences but mean number of flowers per inflorescence did not differ between pure and mixed cropping. Pollinator visits were higher in pure sainfoin and mixed cropping with high seed rates of sainfoin (‹50 %) compared to pure maize and mixed cropping with low sainfoin. Yields were lower in mixed cropping than in pure maize and mixed cropping with low seed rates of sainfoin (›10 %). Sainfoin promotes pollinating insects but as competition in mixed cropping reduces yields and shadowing of the flowering partner crop may reduce accessibility for pollinators a segregating system of maize, and pure sainfoin instead of mixed cropping might be more efficient. However, other aspects such as cover of soil to reduce soil erosion should also be considered.

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