PRACTICE ABSTRACT NO. 29

Optimising legume intercropping for pollinators

Problem

Insect pollinators continue to decline despite the Common Agricultural Policy's increased focus on environmental outcomes.

Solution

Targeted legume mixtures provide profitable forage for a diversity of pollinators and can complement habitats that offer early season forage, bee nesting sites and resources for hoverfly larvae.

Outcome

Legume intercrops will increase in-field floral diversity resulting in more abundant and stable floral resources, benefitting insect pollinators and helping to sustain pollination services.

Photo 1 (left): Clover mix showing crimson and white clover in flower. Photo 2 (right): *Bombus pascuorum*, the common carder bumblebee, foraging on crimson clover.

Applicability box (max. 500 characters)

Geographical coverage

Europe

Application period

Pollinator activity period

Required time

Established annually

Period of impact

Duration of flowering

Equipment

Not specific

Practical recommendations

- Legume intercrops can provide a rich source of forage for pollinators. The constrained flowering period and complex flower structure of many legumes can however limit their value[3]. To benefit a diversity of pollinators, intercrops should focus on legume mixtures that target species with different flowering periods and flower structures (Table 1).
- As competitive species (i.e., both crop and legume intercrop) can restrict flowering in less competitive species, care should be taken when selecting intercrop species, and consideration given to sowing density. For less competitive legumes, wider but less frequent intercropped strips will help ensure flowering and prevent shading by the crop, which can discourage foraging pollinators.
- Plant protection products can be directly toxic to pollinators. Application should therefore consider pollinators and, where viable, a buffer zone should be around the legume intercrop.

Table 1: Attributes of legume species with respect to flowering period (i.e. timing and coverage of flowers), accessibility of floral rewards for key pollinators, and competitive ability[3]

	Flowering period			Bee		Hoverfly	
	Early summer	Mid summer	Late summer	Short tongue	Long tongue	Short proboscis	Competitive ability
Field Beans ***Vicia faba***							
Vetch ***Vicia sativa***							
Lucerne ***Medicago sativa***							
Black Medic ***Medicago lupulina***							
White Clover ***Trifolium repens***							
Crimson Clover ***Trifolium incarnatum***							
Red Clover ***Trifolium pratense***							

Flowering period	Bee/Hoverfly	Competitive ability
Over 30% coverage	Over 20% foragers	Highly competitive forming a dense canopy
5-20% coverage	8-20% foragers	Intermediate competitive ability
Under 5% coverage	8% of foragers	Low lying with slow establishment

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Practical testing/ Farmers' experiences

Field trials explored a variety of legumes grown as monocultures and mixtures. Targeted mixtures flowered more consistently throughout the summer. While competitive legumes provided good ground cover and reduced the prevalence of weeds, they prevented less competitive species from flowering.

Further information

- [1] Potts, S., et al., (2015), Status and Trends of European Pollinators. Key Findings of the STEP Project, Pensoft Publishers, Sofia, 72 pp.
- [2] Gallai, N., et al., (2009), Economic Valuation of the Vulnerability of World Agriculture Confronted with Pollinator Decline, Ecological Economics 68.3: 810-821 [3] Cole, L.J. et al., (Under Review). The role that carefully targeted legume mixtures play in mitigating pollinator declines in intensive agricultural landscapes. Under review
- [3] Cole, L.J. et al., (Under Review). The role that carefully targeted legume mixtures play in mitigating pollinator declines in intensive agricultural landscapes. Under Review

- Webpage: https://www.remix-intercrops.eu/
- Wiki: http://vm193-134.its.uni-kassel.de/En.DiversiWiki/index.php/Mixture_practice_for_farmers_and_advisors
- Facebook Page: https://www.facebook.com/RemixIntercrops/
- Check the Organic Farm Knowledge Platform for more practical recommendations.

About this abstract

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ReMIX is a H2020 multi-actor project that will allow designing cropping systems based on agro-ecology for the benefit of farmers and the whole EU agricultural community. ReMIX will exploit the benefits of species mixtures to design more diversified and resilient agro-ecological arable cropping systems. Based on a multi-actor approach, ReMIX will produce new knowledge that is both scientifically credible and socially valuable in conventional and organic agriculture. The project will tackle practical questions and co-design ready-to-use practical solutions. The project will span from the specification of end-user needs and the co-design of in-field and on-farm experiments to demonstrations with evaluation of new varieties and practices. ReMIX will contribute to the adoption of productive and resilient agricultural systems. The project is running from May 2017 to April 2021

Website: www.remix-intercrops.eu

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