PRACTICE ABSTRACT NO. 25

Living mulches: how to choose species according to the context and objectives

Problem

Although the benefits of permanent cover crops (living mulch) have been shown, it is not always easy to choose the most suitable species for cropping systems.

Solution

Adaptation to the type of soil, lifetime, growth dynamics, tolerance to herbicides are some of the main criteria used to choose among the species of living mulches.

Outcome

Choosing adapted living mulch species can bring several agronomic and ecosystem benefits depending on what is sought: carbon storage, erosion limitation, nitrate sequestration, weed management…

Applicability box

Geographical coverage

Europe

Application period

All year

Required time

N/A

Period of impact

Continuous

Equipment

Not specific

Practical recommendations

Before implementing a species for living mulch purposes, make sure you have considered the following aspects:

- Adaptation to the soil type (**Table 1**): It determines the ability of species to survive, wet and dry periods exerting strong constraints on the growth of the cover crop. Be careful that lucerne and sainfoin are poorly adapted to hydromorphic soils.

Table 1: Adaptation of different species to the soil type

	Adaptation to soil type					Characteristics		
Species	Deep well drained soil	Hydromorphic shallow soil	Hydromorphic deep soil	Shallow acidic soil	Shallow calcareous soil	Sowing density as a living mulch	Perennialty	Speed of establishment
Lucerne						6-8 kg/ha	3 to 5 years	Fairly speed
White clover						2-3 kg/ha	4 to 5 years	Medium (depending on type)
Red clover						3-5 kg/ha	2 to 3 years	Fairly speed
Sainfoin						50 kg/ha	2 to 4 years	Medium
Bird's foot trefoil						6-8 kg/ha	2 to 4 years	Fairly speed
	Well adapted		Correctly adapted			Not adapted		

- Lifespan: Lucerne can grow several campaigns in a row, thanks to its intrinsic perennial characteristics, its tolerance to many herbicides and its ability to grow high up in crops to capture light. White clover is less perennial, partly because of its sensitivity to certain herbicides and its short size limiting access to light under some crops.
- Growth dynamics : They depend on the times of the year. This impacts their interaction with crops, in terms of risks of competition or harvest troubles (**Table 2**).
- Aphanomyces: Sainfoin and bird's-foot trefoil do not multiply the strains. Lucerne and certain varieties of white or red clover do.

Table 2: Growth dynamics of different species of perennial legume covers

		Growth dynamics				Potential trouble at harvest
Species	Roots	Winter	Spring	Summer	Fall	
Lucerne	Strong taproot	dormancy				Strong
White clover	Fairly superficial			sensitive to dry		Small
Red clover	Taproot, secondary roots					Strong
Sainfoin	Taproot					Strong
Bird's foot trefoil	Taproot, secondary roots	dormancy				Medium
	Strong growth		Medium growth		Low growth	

THIS PROJECT HAS RECEIVED FUNDING FROM THE **EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME** UNDER GRANT AGREEMENT N. 727217

PRACTICE ABSTRACT NO. 25

Practical testing/Farmers' experiences

According to a French survey, lucerne is the most common species of living mulch (47% of the plots), followed by white clover (24%). This is followed by red clover (14%) and combinations of several species (15%).

Further information

- Crop crop species sheets:
  - www.fiches.arvalis-infos.fr/couverts/fiche_couvert.php?id_couvert=502&dept=75#fr
  - www.fiches.arvalis-infos.fr/couverts/fiche_couvert.php?mode=fc&type_couv=pures&id_couvert=503
  - www.fiches.arvalis-infos.fr/couverts/fiche_couvert.php?id_couvert=504&dept=75#fr
  - www.fiches.arvalis-infos.fr/couverts/fiche_couvert.php?id_couvert=505&dept=75#fr
  - www.fiches.arvalis-infos.fr/couverts/fiche_couvert.php?mode=fc&type_couv=pures&id_couvert=506
  - www.fiches.arvalis-infos.fr/couverts/fiche_couvert.php?id_couvert=507&dept=75#fr
  - www.fiches.arvalis-infos.fr/couverts/fiche_couvert.php?mode=fc&type_couv=pures&id_couvert=508
- A free-access decision-support tool to help French farmers choose the cover crop species best suited to their situation is available online: http://www.choix-des-couverts.arvalis-infos.fr/
- Quelles légumineuses pourpréserver l'état sanitaire des sols ? Arvalis & Terres Inovia infos, 2017. www.terresinovia.fr/documents/20126/157418/ATII_aphanomyces__2017.pdf/8714f74b-9a3e-fefe-e477-4a92a7048373?t=1553704956785
- Webpage: https://www.remix-intercrops.eu/
- Facebook Page: https://www.facebook.com/RemixIntercrops/
- Wiki: http://vm193-134.its.uni-kassel.de/En.DiversiWiki/index.php/Mixture_practice_for_farmers_and_advisors
- Check the Organic Farm Knowledge Platform for more practical recommendations.

About this abstract

Authors: Jérôme LABREUCHE, ARVALIS, Crop Institute, France
Publisher: IFOAM Organics Europe, Rue du Commerce 124, BE-1000 Brussels www.organicseurope.bio
Date: April 2021

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

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N. 727217