PRACTICE ABSTRACT

Increasing feed production using legume and cereal mixtures as a second crop

Problem

More frequent droughts in summer lead to unreliable forage production for farmers. In addition, farmers highly depend on imported soybean for milk production.

Solution

Forage production, based on silage maize, can be improved by introducing a mixture of legumes and cereals (oat and vetches-Picture 1) prior to sowing silage maize, creating another source of silage earlier in the season (Figure 1).

Benefits

Improved feed diversity and more resilient feed production, less dependent on soybean imports. This strategy helps to mitigate droughts effects, through an "avoidance strategy", with production of forage during seasons less likely to be affected by such phenomenon.
Other benefits include improved soil biodiversity and soil health, reduced leaching during winter (as mixtures are used as cover crops) and benefits associated with incorporating residues from roots and crops (nitrogen availability for maize, carbon input to the soil, etc.).

Applicability box

Theme Multiple cropping, intercropping, cropping systems

Agronomic conditions Northwest of France (Pays de la Loire) to Northwest of Germany

Application time Autumn

Required time Time needed to set up, follow up and harvest the crop

Period of impact Autumn and spring but also on the next crop

Equipment None

Best in Mixed farms with livestock or bioenergy production

Picture 1: mixture of oat and vetches (Photo: Fabien Guerin, CA Mayenne)

Figure 1: Crop sequence including a mixture of oat and vetches

Practical recommendation

- Sow the legume-cereal mixture in October (based on the growing region and climatic conditions) and harvest it in from early to late April, depending on the climate. Sow the following silage maize in the following days (Figure 1).
- The choice of species is important (Table 1). For an early harvest, favour a mixture with a high proportion of legumes (25-50% legumes), producing a high protein forage. Avoid legume species already present in the crop rotation to lower pest and disease pressures. The choice of cereals also depends on the desired harvest time.
- Harvest the mixture from the boot to early-heading stage of the cereal. Mow and hay before harvest to ensure 30% dry matter (ensures good conservation and avoids dry matter losses).

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- The land preparation method before maize sowing depends on soil structure but a superficial tillage is recommended.
- The place in the rotation is flexible, with a slight effect of the previous crop. These mixtures are not advised after grain legume or grass (due to a lower nitrogen valorisation) but adapted after cereal or spring crop.
- This kind of mixture can also be used as a main crop with a later harvest (milky-dough stage) and a lower proportion of legumes at sowing, to avoid lodging risk.
- Adaptation of the feeding strategy: one limit of this kind of mixture is that "you know what you sow but not what you will harvest" and so it is essential to adapt the cattle feeding strategy to the quality of the harvested product.

Table 1: Advantages and drawbacks of different species

	Cereal			Legume	
	Triticale	***Oat***	***Rye***	***Forage pea***	***Common vetch***
Advantages	Solid support for legumes	Soil cover Palatability	Solid support for legume Energy	High productivity; Attracted by light	High productivity; Attracted by light
Drawbacks	Low protein content	Frost sensitive	High competitivity	Risk of lodging at high density	Risk of lodging

Further information

Further reading

- Coutard J.P., Fortin J., 2014. Les associations céréales/protéagineux récoltées immatures: assemblages, valeurs nutritives et valorisation par les vaches allaitantes. Renc. Rech. Ruminants 21, 93-96. (in French)
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- Wyss U. & Arrigo Y., 2015. Qualité des ensilages plantes entières de triticale, d'avoine et de pois fourragers. Recherche Agronomique Suisse 6 (4), 152–159, 2015. (in French)
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- Les mélanges céréales protéagineux à l'essai, Terra, Chambre d'agriculture de Bretane, 2017. (in French) Guide technique des mélanges fourragers à base de céréales à paille et de légumineuses, Association Française pour la Production Fourragère, 2018. (in French)

About this practice abstract and DiverIMPACTS

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Chambre d'agriculture des Pays de la Loire

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Permalink: https://zenodo.org/record/5751939

This practice abstract was elaborated in the DiverIMPACTS project, based on the EIP AGRI practice abstract format.

DiverIMPACTS: The project is running from June 2017 to May 2022. The overall goal of DiverIMPACTS - Diversification through Rotation, Intercropping, Multiple Cropping, Promoted with Actors and value-Chains towards Sustainability - is to achieve the full potential of diversification of cropping systems for improved productivity, delivery of ecosystem services and resource-efficient and sustainable value chains.

Project website: www.diverimpacts.net

The project DiverIMPACTS - "Diversification through Rotation, Intercropping, Multiple Cropping, Promoted with Actors and value-Chains towards Sustainability" is supported by the European Union's HORIZON 2020 research and innovation programme under Grant Agreement no 727482 and by the Swiss State Secretariat for Education, Research and Innovation (SERI) under contract number 17.00092. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the EC and the Swiss government. Neither the European Commission/SERI nor any person acting behalf of the Commission/SERI is responsible for the use which might be made of the information provided in this practice abstract. The authors and editors do not assume responsibility or liability for any possible factual inaccuracies or damage resulting from the application of the recommendations in this practice abstract.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727482 (DiverIMPACTS)

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