PRACTICE ABSTRACT NO.10

Forage cereal-legume intercropping as sustainable practice to optimize nitrogen and water use efficiency under semi-arid Mediterranean conditions

Problem

The global population is expected to increase rapidly, resulting in a substantial increase in food demand (**Ramakuty et al. 2018**). Simultaniously, livestock and plant production must keep pace with this growth to cover the need (**Li et al. 2015**). The global climate change is expected to exacerbate drought episodes in the world, leading to mire frequent and severe water scarcity. Consequently, agriculture is increasingly pressured to ensure food security under worsening drought conditions and Farmlands that are getting more vulnerable.

Applicability box

- Geographical coverage : sub-humid and semi-arid conditions (Mediterranean climate)
- Application period : Autumn (Sowing)
-Required time : No additional time during the cultivation period . At the end, the harvested crops needs to be separated .
-Period of impact : The total duration of crop.
- Equipment : Standard machinery used for cereal cultivation.

Solution

The cereal-legume intercropping can be adopted to reduce the use of external output (e.g. N-fertilization), enhace the use effiency of nutrients and water, improve the nutrition index of nutrients and water, increse yields, improve soil health and hence improve long term sustainability.

Figure 1: Photos of forage pea-barley intercropping from field experiment in farmers plots at Setif region in north-east of Algeria

Outomes

Intercropping maintain the yield comparing to monocropping, increase the Nitrogen (N) and Water (W) nutrition index and N and W use efficiencies. It is also reported that the intercropping improves the Land Equivalent Ratio of soils . Consequently it ensure a better nutrition of crops, a better use of soils and it allows us to use less fertilizer and make more efficient use of water in the soil.

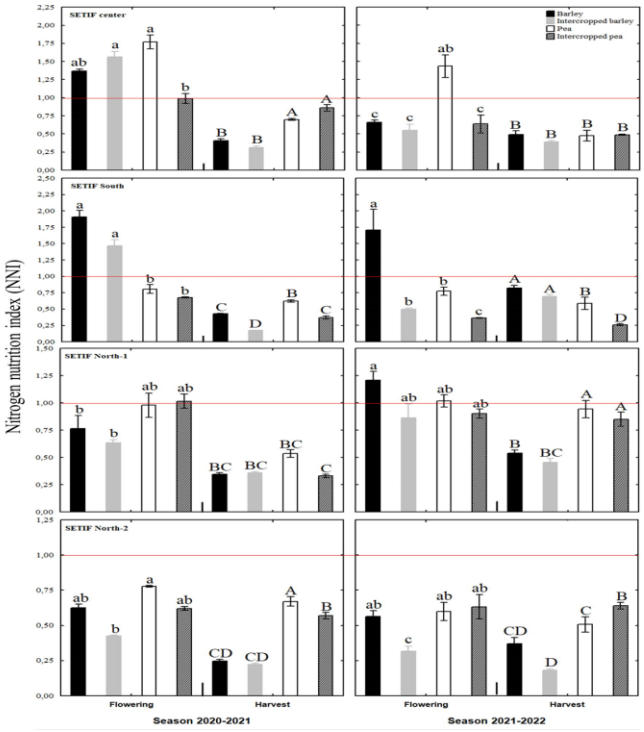

Figure 2 : Nitrogen Nutrition Index of Barley-pea intercropping system and their respective monocultures during two cropping season 2020-2021 and 2021-2021 at 4 different sites in the setif region

Practical recommendations

- It is advisable to choose the ideal ratio between the two seeds for intercropping in order to minimize the aggressiveness of the barley on the field pea and also to ensure optimum soil cover and weed control.
- Before sowing, do an initial soil analysis to determine what is in stock in the soil. And if necessary, amend the soil.
- Carefully determine the managment system according to the climate and the soil type, between conventional and organic system.
- Use same row spacing as for cereals.
- Choose crops with similar crop cycles in order to synchronize the cycles and coincide the key stages of growth and development of the two crops

About this abstracts and Biodiversify

Authors: Zemmouri Bahia, Haddad Benalia, Seghouani Mounir, Kherif Omar and Latati Mourad

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Biodiversify is a PRIMA 2019 project (https://www1.montpellier.inra.fr/wp-inra/biodiversify/) investigating how agricultural biodiversification (i.e. mixed cropping, cover cropping and agroforestry) can increase ecosystem services, sustainability and resilience of Mediterranean agriculture

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