3 ACCA
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Agricultural Innovation and Technology Transfer Center

MOHAMMED VI POLYTECHNIC UNIVERSITY

ConServe Terra
Towards Conservation Agriculture in the Mediterranean Area

Institut National de la Recherche Agronomique

Institut Agronomique et Vétérinaire Hassan II IAV

Investigating the productivity of annual forage legume and cereal mixtures under Conservation Agriculture in the Meknes region (Morocco)

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Theme:
Building a Resilient Future in Africa
through Conservation Agriculture and Sustainable Mechanization

1. Introduction

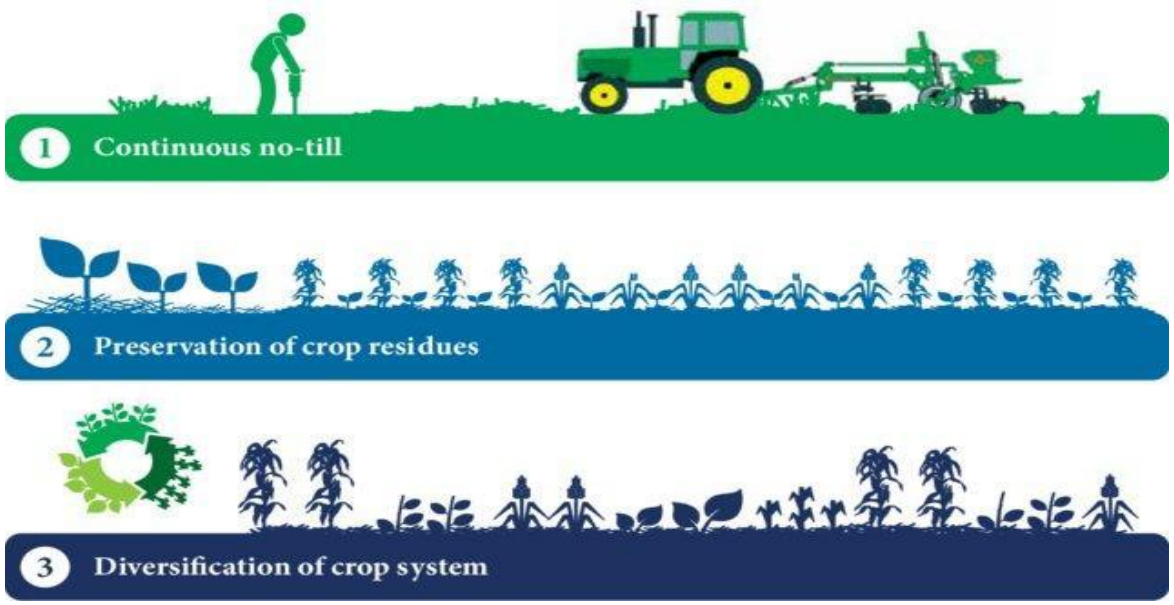



Major challenges in crop-livestock systems in Conservation Agriculture (CA):

- Competition between CA and livestock for crop residues **(Diop et al., 2022; El Koudrim, 2022)**
- Cereal residue is generally regarded as a low-quality feed **(Mee, 1980; Brand et al., 1999)**
- Need to increase forage productivity to favour sustainable crop-livestock systems

Which solution (s) ???

1. Introduction



Source : **Corsi & Muminjanov (2019)**

An issue in CA systems which integrate livestock

Integration of annual forage cereal and legume mixtures

- Annual forage cereal-legume mixtures (AFCLMs) contribute to making up for the feed shortage of livestock at the end of the summer and autumn and to reducing the need to purchase protein-rich feeds **(Chriyaa et al., 2002).**
- In Morocco's rainfed regions, the most widely used forage crops are common vetch and fodder pea for legumes and barley, oats, and triticale for annual small grain cereals **(Kallida et al., 2022).**

1. Introduction

❖ Objective of the study

Evaluate forage yield and protein content, and associated weed biomass under different cereal and legume seeding ratios in no-till (NT)

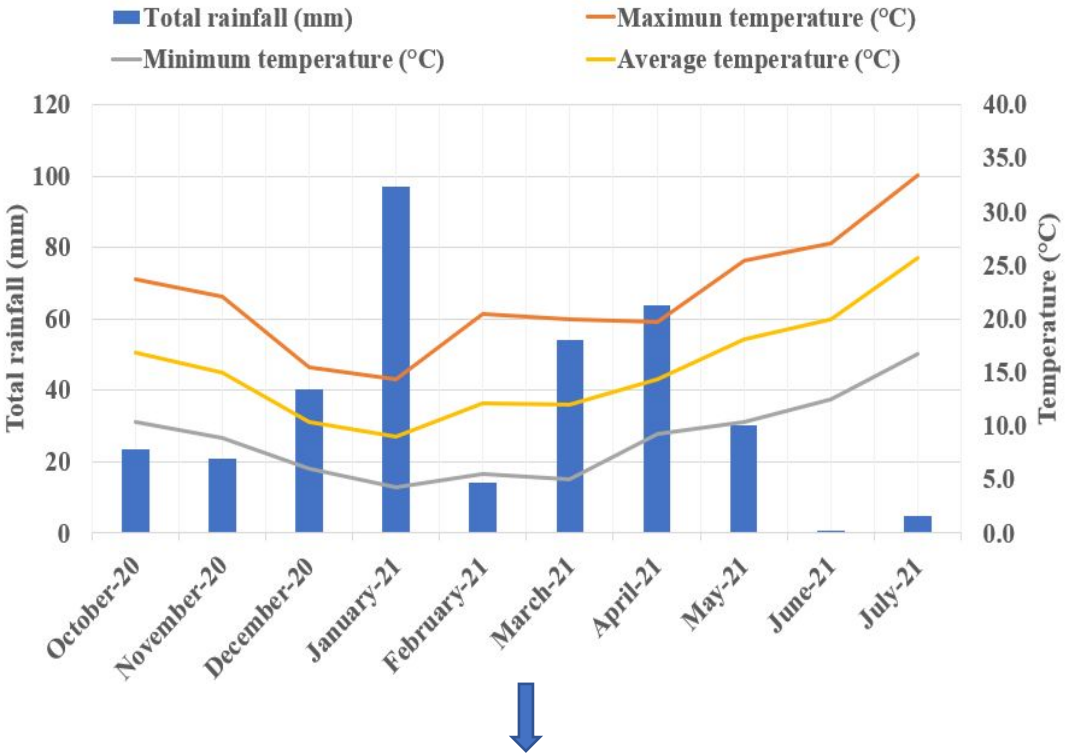
❖ Hypothesis

- Forage cereal and legume sowing ratios affect forage yield at harvest
- Increasing the share of legume at sowing of AFCLMs contribute to increase forage protein content at harvest
- Forage cereal and legume sowing ratios affect weed biomass

2. Material & methods

2.1 Study area

Where ?	In an on-farm trial in the region of Meknes (north-eastern Morocco) in a 10-year no-till field
When ?	2020-2021 growing season
Climate ?	Temperate Mediterranean climate classified as Csa (Köppen Climate Classification System)
Soil ?	Fersiallitic clayey soil, pH: 7.05, Soil organic matter: 2.85 %



From November 2020 to March 2021:
Total rainafall: **226.4 mm**
Average temperature: **11.7 °C**

2. Material & methods

2.2 Treatments

50% Barley + 50% Pea (**B50P50**)

vs

30% Barley + 70% Pea (**B30P70**)

50% Barley + 50% Vetch (**B50V50**)

vs

30% Barley + 70% Vetch (**B30V70**)

50% Triticale + 50% Pea (**T50P50**)

vs

30% Triticale + 70% Pea (**T30P70**)

Sowing rate: **100 kg ha^{-1}**, sowing date: **12/11/2020**, harvest: **31/03/2021**,
experimental design: Randomized Complete Block Design **(RCBD), n=3**

2. Material & methods

2.3 Measurements and data analysis

- Within each cereal-legume forage mixture, the seeding ratios (50%-50% vs 30%-70%, w/w) were compared in terms of :
  - Total dry matter yield of the forage mixture (TDMYM),
  - Total dry matter of weeds in the mixture (TDMW),
  - Percentage of crude proteins (PCP) of forage mixtures.

determined at harvest

- PCP (%)= Total N * 6.25 (Kjeldahl method).

- Data analysis: analysis of variance (ANOVA) and Fisher's Least Significant Difference (LSD) test with a level of significance of 5%.

3. Results & Discussion

3.1 Effect of barley-pea seeding ratios on forage yield and PCP and weed biomass at harvest

Crop ratios	TDMYM (t ha^{-1})	TDMW (t ha^{-1})	PCP (% of dry matter)
B30P70	7.10 a	3.10 a	10.80 a
B50P50	6.69 a **+ 0.41 t ha^{-1}**	2.63 a **+ 0.47 t ha^{-1}**	7.63 b **+ 3. 17 %**
LSD	1.58	0.76	3.09

3. Results & Discussion

3.2 Effect of barley-vetch seeding ratios on forage yield and PCP and weed biomass at harvest

Crop ratios	TDMYM (t ha^{-1})	TDMW (t ha^{-1})	PCP (% of dry matter)
B30V70	6.86 a	1.70 b	14.30 a
	- 0.90 t ha^{-1}	**- 0.69 t ha^{-1}**	**+ 5.81 %**
B50V50	7.76 a	2.39 a	8.49 b
LSD	2.09	0.51	1.84

3. Results & Discussion

3.3 Effect of triticale-pea seeding ratios on forage yield and PCP and weed biomass at harvest

Crop ratios	TDMYM (t ha^{-1})	TDMW (t ha^{-1})	PCP (% of dry matter)
T30P70	6.93 a	2.41 a	9.99 a
	- 0.12 t ha^{-1}	**+ 0.04 t ha^{-1}**	**+ 2.43 %**
T50P50	7.05 a	2.37 a	7.56 b
LSD	0.94	0.79	0.88

4. Conclusion & perspectives

- Increasing the legume share in the forage mixture at sowing **does not systematically increase the forage yield of the AFCLM at harvest.**

- For all the cereal-legume mixtures studied, **the 30%-70% seeding ratio gave better PCP at harvest.**

- A **20% increase of the legume component** in the AFCLM was sufficient to induce a **significant gain in PCP.**

- Furthermore, **the seeding ratios can significantly affect the biomass of weeds** as observed in the case of the barley-vetch mixture.

- Perspectives:
  - Study the effect of cereal and legume sowing ratios on the **grain yield of the following wheat crop**
  - Study the effect of cereal and legume sowing ratios on **soil properties.**

Socrates:
"All I know is that I know nothing"

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