ASSESSING POTENTIAL OF CO_2 SEQUESTRATION BY SOWING PRECISION OF LEGUME IN SUPPORT OF SUSTAINABLE AGRICULTURE

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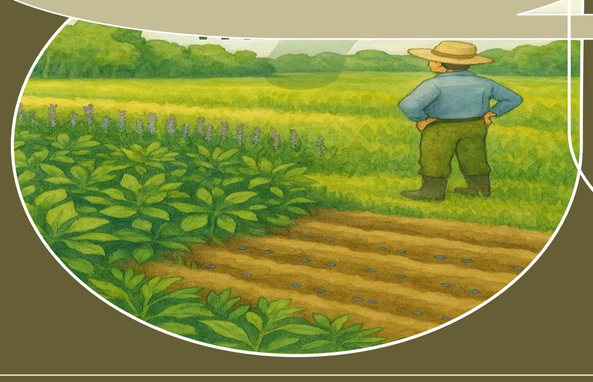
INTRODUCTION



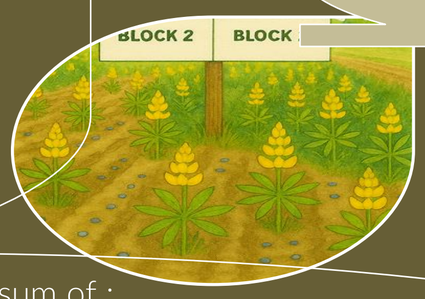
In response to the forecasts of ongoing global climate change, many studies emphasize the need for continuous monitoring of greenhouse gas emissions using the carbon footprint method in order to support environmental management in agricultural production, and thus slow down the rate of growth of the concentration of these gases.

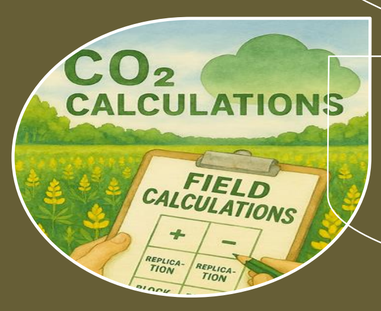
The use of low-emission technologies, including sequestration, which involves reducing carbon dioxide emissions into the atmosphere, is currently a priority action for sustainable development in agriculture.

The aim of this study was to determine the effect of row sowing and single-grain sowing, as well as sowing rate, on the CO_2 sequestration and productivity of yellow lupine.

METHODS

- ✓ results of rigorous 5-year field experiments on yellow lupine
- ✓ the 1st factor was sowing method: **row sowing** (traditional) and **single-grain sowing**;
- ✓ the 2nd factor was sowing rate: **40, 60, 80, 100** germinated seeds per square meter.





Gas emissions as the sum of :

- ✓ direct and indirect emissions during fuel combustion by tractors participating in all technological operations of cultivation,
- ✓ gas emissions from the field as a result of the use of mineral fertilizers and their production, emissions related to seed preparation, pesticide application, and the use of electricity and agricultural machines.

RESULTS

Tab. 1. Average CO_2 emission values in yellow lupine cultivation per 1 ha of area with the applied sowing methods and densities [kgCO_2eq.·ha^{-1}]

Sowing method	Sowing rate				
	40	60	80	100	average
Row	1515.4	1525.0	1535.0	1544.6	1530.0
Single-grain	1506.8	1512.4	1517.9	1523.5	1515.2
Average	1511.1	1518.7	1526.5	1534.0	

Tab. 2. Carbon footprint of lupine cultivation with different sowing methods and densities [kg CO_2 eq.·t^{-1}]

Sowing method	Sowing rate				
	40	60	80	100	average
Row	1148.0	955.6	900.6	828.7	958.2
Single-grain	962.9	892.4	875.3	828.5	889.8
Average	1055.4	924.0	888.0	828.6	

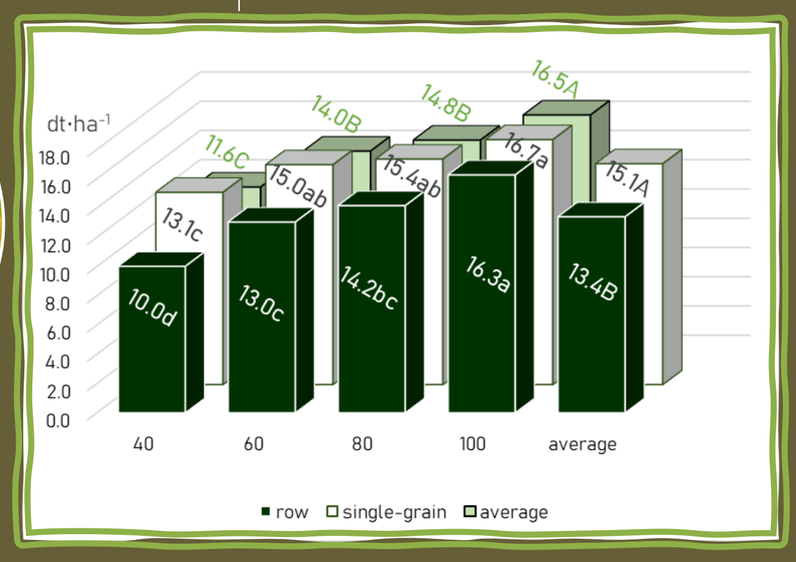
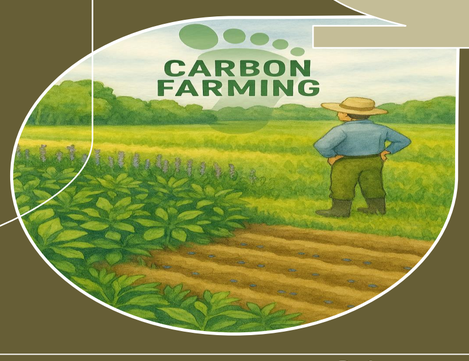


Fig. 1.The effect of sowing method and density on seed yield (dt·ha^{-1})

CONCLUSIONS

1. The lowest average emission values were calculated for the lowest sowing rate and precise single-grain sowing.
2. The increase in seed yield due to precise single-grain sowing in the sowing density range of 40-80 plants per square meter reduced the carbon footprint of the legume crop.



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