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Soybean production in the system of winter cover crops

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the European Union

The agroecological practices that will be tested and demonstrated based on different combinations of the 3D of diversity: (a) genetic (legume genotypes), (b) species (intercropping, legume mixtures, crop rotations), and (c) spatial diversity (strip intercropping, agroforestry, buffer strips, EFAs). Each LL will implement 2 to 3 agroecological approaches for 3D diversification and incorporate agroecological practices for the reduction of pesticides and N fertilizers needs (e.g., mulching, green manure etc.).

Considering the changed conditions of production in terms of climate, changes in assortment and increasing demand for protein sources of plant origin, as well as the great importance of soybeans in animal and human nutrition, there is a constant need to improve the technology of growing this plant species in semiarid conditions. One of the ways to improve technology is the adaptation of existing cultivation measures that can positively affect the productivity of this plant species Numerous on-farm advantages might result from the integration of winter cover crops in soybean production, which can also have major ecological effects on the farming system. Cover crops are crucial for enhancing the physical, chemical, and biological characteristics of soils in sustainable production.

In VALERECO, for trial in Serbia, winter pea is the selected winter cover crop, advantages following the implementation of winter cover crops include:

1. Enhancement of soil quality through better physical and chemical properties.
2. By including a legume, N fixation is guaranteed, boosting the subsequent crop's yield and quality.
3. Release nitrogen to the next cash crop.
4. Reduced compaction of the soil.
5. Control of weeds.
6. Enhanced biodiversity.

In addition, following points need to be considered:

1. Competition with the primary crop for nutrients and moisture (e.g. moisture usage).
2. The price of planting, establishing, and termination cover crops (mechanically).
3. Cover crop termination time/practice.

When planning the integration of cover crops, it is essential to consider the agro-ecological conditions, including location and soil type.

The farm orientation—whether it is focused on plant or livestock production—also influences cover crop selection and management. Additionally, the timing of cover crop planting and termination, along with the systems or approaches applied, plays a critical role in ensuring effectiveness and compatibility within the cropping system.

Many studies have observed how the introduction of legumes, e.g., soybeans, influences changes at the crop rotation level. In this study, the perspective was different: how can winter CCs influence soybean production as a cash crop under sustainable production schemes? The hypothesis that winter CCs would improve soybean yield was supported by a significant increase in the soybean yields between the tested P + O as a CC and the control, and the types of production system (LIP or OP) were observed. In our study, there were no barriers to legumes (peas) being grown as a CC for soybeans. The results showed increased abundance and activity of microorganisms in the soybean rhizosphere, which primarily depended on production system and selected CCs. The findings of this study can be a keystone for production improvement in the sustainability dimension in regions throughout Southeast Europe, where a decline in crop rotational diversity has been seen, especially in soybean production.

REFERENCES

1. https://doi.org/10.3390/plants13213091

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