PRACTICE ABSTRACT N°18

Organic pea-wheat intercropping to improve soil nitrogen recycling

Problem

In semi-arid conditions, continuous supply of available soil nitrogen (N) is lacking in organic winter wheat production.

Solution

Intercropping winter wheat with field pea in organic systems could increase soil N by biological fixation and residue decomposition to boost growth and nutrition content.

Benefits

Incorporating legumes into cereals can increase biodiversity and activate soil, augment resource use and biomass production, reduce fertilisation costs, and boost ecosystems services. Such advanced agro-ecosystems can increase wheat yield and add value to the final product, such as pasta, noodles, or bread.

Practical recommendations

- **Field pea variety selection**: an early and homogenous ripening filed pea to match with winter wheat varieties. Make sure that the selected legume matches the harvesting period of wheat (e.g., Mraz in Serbia).
- **Seeding density**: wheat at 70% and legume at 30% of their recommended sole-crop densities.
- **Seeding time**: 2-3 weeks after the optimum sowing date to avoid pest and diseases proliferation and lack of rainfall (especially in organic agriculture).
- **Weed control**: usually not needed in the autumn, but weeds can be controlled in spring by harrowing.
- **Harvest**: Adjust the harvesting period to winter wheat ripening and adjust harvester speed to prevent seed shedding.
- Finally, a shallow incorporation of crop residues in the soil speeds up mineralisation and N release for the subsequent crop.

Applicability box

Theme

Crop production, Soil, Nutrient management

Keywords

Intercropping, Crop management, Nutrient cycling, Carbon sequestration, Ecosystem services

Context

South-eastern Europe, temperate climate, rain fed conditions

Application time

Autumn (October) to Summer (June/July)

Required time, if relevant

No additional time during cultivation of pure winter wheat crop. Harvest should adapt to crop conditions

Period of impact, if relevant

Long-term with root and biomass residues

Equipment

Standard machinery for the winter wheat cultivation

Best in

Low input/ organic agricultural systems

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Fig 1: Sampling intercrop for N-min in spring. (Photo: Svetlana Vujić)

Fig 2: Intercrops of winter wheat and field peas. Picture taken during the **flowering of field peas (**Photo: Srdjan Šeremešić)

Fig 3: Harvesting intercropping and collecting plant samples (Photo: Srdjan Đuranović)

Further information

Video

- Check the following videos for further instructions https://intercropvalues.eu/news/short-video-release-sowing-winter-wheat-and-field-pea/; https://www.youtube.com/watch?v=gpwpdIBRYAY (English).

Further reading

- Timaeus, J., Weedon, O. D., & Finckh, M. R. (2022). Harnessing the potential of wheat-pea species mixtures: evaluation of multifunctional performance and wheat diversity. Frontiers in Plant Science, 13, 846237. https://doi.org/10.3389/fpls.2022.846237

- More information about practical aspect of the intercropping can be found from Remix project
- Examples of organic intercropping strategies are available also from the Swiss organic farmers

Weblinks

- Legume Hub https://www.legumehub.eu/is_article/intercropping-of-grain-pea-with-cereals/.
- Check the Organic Farm Knowledge Platform for more practical recommendations.

About this practice abstract

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IntercropVALUES aims to exploit the benefits of intercropping to design and manage productive, diversified, resilient, profitable, environmentally friendly cropping systems acceptable to farmers and actors in the agri-food chain. As a multi-disciplinary and multi-actor project, it brings together scientists and local actors representing the food value chain. It includes 27 participants from 15 countries (3 continents) from a wide diversity of organizations and stakeholders. The project will run for four years and started in November 2022.

Project website: https://intercropvalues.eu/

PRACTICE ABSTRACT N°18

Združena setva graška i pšenice u cilju unapređenja kruženja azota u zemljištu u organskoj proizvodnji

Problem

U uslovima umereno kontinentalne klime nedostaje kontinuirano snabdevanje lakopristupačnim azotom (N) u organskoj proizvodnji ozime pšenice.

Rešenje

Združena setva ozime pšenice i stočnog graška u sistemu organske poljoprivrede može povećati sadržaj zemljišnog azota putem biološke fiksacije i razlaganja biljnih ostataka, čime se podstiče porast biljaka i sadržaj hraniva u zemljištu.

Korist

Uključivanje leguminoza u useve žitarica može povećati biodiverzitet i aktivirati zemljište, unaprediti korišćenje resursa i proizvodnju biomase, smanjiti troškove đubrenja i poboljšati usluge ekosistema. Takvi unapređeni agroekosistemi mogu povećati prinos pšenice i dodati vrednost finalnom proizvodu, kao što su testenina, rezanci ili hleb.

Primena tehnologije

Tema

Biljna proizvodnja, zemljište, upravljanje hranivima

Ključne reči

Združena setva, tehnologija gajenja, kruženje hraniva, sekvestracija ugljenika, usluge ekosistema

Kontekst

Jugoistočna Evropa, umerena klima, proizvodnja bez navodnjavanja

Vreme primene

Jesen (Oktobar) do leta (Jun/Jul)

Potrebno vreme za izvođenje (ako je relevatno)

Nije neophodno dodatno vreme u odnosu na setvu čistih useva. Žetva se mora prilagoditi stanju useva

Period uticaja (ako je relevantno)

Duži vremenski period uzimajući u obzir korenske i biljne ostatke

Oprema

Standarna mehanizacija u proizvodnji ozime pšenice

Najbolje primeniti

Sistemi sa niskim ulaganjima, organska poljoprivreda

Praktična preporuka za proizvođače

- **Izbor sorte stočnog graška:** rana sorta stočnog graška sa ujednačenim sazrevanjem koja se uklapa sa sortama ozime pšenice. Voditi računa da odabrana leguminoza odgovara periodu žetve pšenice (npr. Mraz u Srbiji).
- **Gustina setve:** pšenica na 70%, a leguminoza na 30% od preporučenih gustina za pojedinačne useve.
- **Vreme setve:** 2-3 nedelje nakon optimalnog roka setve kako bi se izbeglo širenje štetočina i bolesti, kao i nedostatak padavina (posebno u organskoj poljoprivredi).
- **Suzbijanje korova:** obično nije potrebno u jesen, ali se korovi mogu kontrolisati u proleće drljanjem.
- **Žetva:** prilagoditi vreme žetve sazrevanju ozime pšenice i podesiti brzinu kombajna kako bi se sprečilo osipanje semena.
- **Nakon žetve,** plitko zaoravanje biljnih ostataka u zemljište ubrzava mineralizaciju i oslobađanje azota za naredni usev.

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Fig 1: Uzorkovanje združene setve radi analize obezbeđensti azotom u proleće (N-min). (Foto: Svetlana Vujić)

Fig 2: Združena setva ozime pšenice i stočnog graška. Slikano za vreme cvetanja stočnog graška. (Foto: Srdjan Šeremešić)

Fig 3: Žetva i prikupljanje biljnog materijala za analizu združene setve. (Foto: Srdjan Đuranović)

Dodatne informacije

Video

- Pogledajte video kako bi saznali više informacija: https://intercropvalues.eu/news/short-video-release-sowing-winter-wheat-and-field-pea/; https://www.youtube.com/watch?v=gpwpdIBRYAY (English).

Dodatna literatura

- Timaeus, J., Weedon, O. D., & Finckh, M. R. (2022). Harnessing the potential of wheat-pea species mixtures: evaluation of multifunctional performance and wheat diversity. Frontiers in Plant Science, 13, 846237. https://doi.org/10.3389/fpls.2022.846237

- Više informacija u vezi sa praktičnim aspektima združene setve može se naći na stranici Remix project
- Primeri združene setve u organskoj poljoprivredi se mogu naći na stranici Swiss organic farmers

Weblinks

- Legume Hub https://www.legumehub.eu/is_article/intercropping-of-grain-pea-with-cereals/.
- Pogledajte Organic Farm Knowledge Platform za više praktičnih saveta.

Informacije o praktičnom apstraktu

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IntercropVALUES ima za cilj da iskoristi prednosti združenog gajenja useva (interkropinga) kako bi stvorio i unapredio produktivne, diverzifikovane, otporne, profitabilne i ekološki prihvatljive biljne proizvodne sisteme, koji su prihvatljivi za poljoprivrednike i aktere u agro-prehrambenom lancu. Kao multidisciplinarni i projekat sa više učesnika, okuplja naučnike i lokalne aktere koji predstavljaju lanac vrednosti hrane. Projekat uključuje 27 učesnika iz 15 zemalja (sa tri kontinenta), iz veoma raznovrsnih organizacija i zainteresovanih strana. Projekat traje četiri godine i započeo je u novembru 2022. godine.

Internet stranica: https://intercropvalues.eu/