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Multi-species summer cover crop in protected vegetable systems

Problem

In protected vegetable systems of the Mediterranean area, having bare soil for several weeks in late summer, post cash crop harvest, may induce soil degradation. Providing a soil cover in any period is key to preserve the soil's biological activity and maintain good agronomic conditions (e.g. soil structure) for the following crops.

Solution

A mixture of Sudan sorghum (*Sorghum drummondii*), buckwheat (*Fagopyrum esculentum*) and fodder pea (*Pisum sativum* subsp. *Arvense*) (pictures 1 and 2) can be used as a cover crop at the end of summer under plastic greenhouse systems in the South of France. These species all grow fast and so provide a suitable cover crop in a few weeks. The higher the biomass production the better the crop is at delivering expected benefits.

Outcome

This cover crop mixture provides biomass which is crushed and incorporated into the soil. Benefits include improved organic matter and soil structure, reduced risk of nitrogen leaching (the C/N ratio of the cover crop ranges from 10 to 40) and improved weed, pest and disease management. Cover crop mixture botanical families should differ from that of the vegetables to increase rotation diversity and contribute to the management of soilborne pathogens.

Applicability box

Theme

Multiple cropping, Cover crops, Rotation.

Geographical context

Mediterranean climate, tested in South of France on a loamy-sandy soil

Application time

July-August after summer crops uprooting

Required time

The cover crop is in place for 6 to 9 weeks before burying

Period of impact

Improved soil health for following crops

Equipment

Greenhouse with water sprinkling. Sowing drill useful for homogeneous cover.

Best in

Protected Vegetable Systems



Picture 1-left: Cover crop mixture 19 days after sowing in August: buckwheat contributes to suppress weeds and fodder pea uses the two other species as a stake; Picture 2-right: Cover crop mixture 10 days before crushing in September; buckwheat flowering has begun (1.3-4.2 tonnes per hectare dry matter) (Photos: Benjamin Perrin, INRAE).

((INRAE Agroecological vegetable systems experimental facility)). ((Multi-species summer cover crop in protected vegetable systems)).

DiverIMPACTS practice abstract.

Practical recommendation

- Growing period: in July or August after cash crops uprooting. Cover crops can last from 45 to 55 days under tunnels in a Mediterranean climate (42°38'14N, 2°58'17E).
- Avoid rotary tools for sowing and soil management: superficial seed bed has to be fine (use for instance a tine cultivator associated with a roller). The mixture can be sown by hand (one species after the other due to seed size differences), or by using a sowing drill combined with a cultivator tool for a more homogenous cover. Follow with a superficial soil tool to cover seeds and improve seed-soil contact.
- Sowing densities: sorghum 8Kg/Ha + fodder pea 200 Kg/Ha + buckwheat 15Kg/Ha.
- Irrigation: sprinkle just after seeding according to soil humidity status. After, during cover crop growth sprinkle according to potential evapotranspiration (the crop coefficient (Kc) of the cover crop ranges from 1 at sowing to 0.7 at the end). Avoid excessive irrigation that would damage the pea or buckwheat.
- Destruction: buckwheat status has to be carefully monitored to ensure the cover crop is destroyed by the mid-flowering stage of buckwheat to prevent self-sowing. Fine crush the fresh cover crop biomass and bury it into the soil (horizon 0-30cm) with a tine cultivator (no rotary tool) and a roller.

Further information

Further readings

- Perrin B., Parès L., Lefèvre A. - Sorgho, sarrasin et pois fourrager : un triptyque intéressant pour un usage en engrais vert d'été-automne. *Serres et Plein Champ*, n°395 - Juin 2018, 1-5.
- Perrin B., Parès L., Lefèvre A. - Engrais verts : un trio pour l'été. *Réussir Fruits et Légumes*, n°385 Juillet-Août 2018 p28-29

Weblinks

- https://ecophytoc.fr/sites/default/files/Compil_Fiches_4SYSLEG.pdf

About this practice abstract and DiverIMPACTS

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This practice abstract was elaborated in the DiverIMPACTS project, based on the EIP AGRI practice abstract format. Results come from the 4SYSLEG project in the DEPHY ECOPHYTO program funded by French AFB - Cover crop tested 5 times in 2015 and 2017.

DiverIMPACTS: The project is running from June 2017 to May 2022. The overall goal of DiverIMPACTS - Diversification through Rotation, Intercropping, Multiple Cropping, Promoted with Actors and value-Chains towards Sustainability - is to achieve the full potential of diversification of cropping systems for improved productivity, delivery of ecosystem services and resource-efficient and sustainable value chains.

Project website: www.diverimpacts.net

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