PRACTICE ABSTRACT

The introduction of strip cropping into the mid-Adriatic region

Problem

Strip cropping is rarely used in Italy. Practical and scientific knowledge need to be developed in order to apply strip cropping appropriately in this region which has high levels of variation in the size and topography of farm fields and heterogeneous equipment among holdings. The application of strip cropping can be of particular relevance for farmers interested in growing minor species and local cultivars that form a part of local culinary heritage, since these crops can be made more viable through strip cropping (since it can boost their yields and decrease their cultivation needs).

Solution

Identifying the best combinations of plant species, so that the farming practices necessary for one crop do not negatively interfere with those of the other.

Defining optimal strip and field widths, taking into account the width of machinery (especially for tillage and harvesting) in order to reduce unproductive headlands and working time.

Applicability box

Theme
Strip cropping, organic, field assessment

Agronomic conditions
Mediterranean climate

Application time
Any

Required time
Little more than for homogeneous plots

Period of impact
Any

Equipment
Suitable species and varieties, mechanical means normally used on farms

Best in
In low-input systems with horticultural and cereal crops

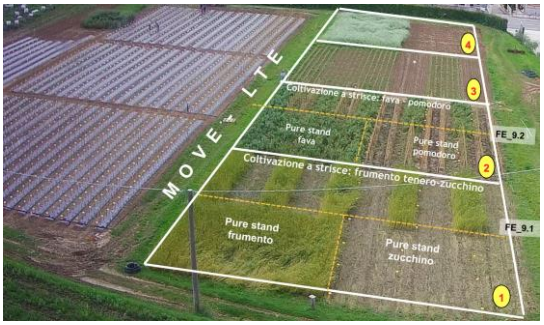
Benefits

In the organic farms of case study 22 (CS22), operating on sloping ground, no substantial productive differences in total Land Equivalent Ratio (LER) were found when comparing strips and pure stands of the tested species (field bean, emmer, sunflower). However, the partial LER of the legume crop showed a higher performance which was counterbalanced by the lower partial LER of cereal crops. Introducing a cover crop before the spring crop (redesigning the strip cropping system) helped in reducing erosion and the risk of leaching, as well as increasing C inputs.

In the case of field experiment 9 (FE9), operating in flat areas and whose experimental design is represented in Picture 1, the species combinations in the strip cropped plots exploited synergies between the different crops and always resulted in a higher total biomass. In the case of zucchini (HF1 commercial Galatea), combined with soft wheat (heterogeneous material; 'frumento' in Pic. 1), a strong increase in production was consistently recorded compared to the pure stand with identical transplantation date, probably due to the wind-breaking effect of the high wheat leading to increased temperatures in the zucchini strips (Pic. 2).

Practical recommendation

- The strips should be sized according to the widths of the agricultural machinery available on the farm, such as seeders, weeders, combine harvesters, etc.



Picture 1- Strip cropping design in FE9. Credits: Gabriele Campanelli - CREA

Picture 2- Zucchini alternated with wheat strips in FE9. Credits: Gabriele Campanelli - CREA

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Picture 3- Field bean and emmer strips (sunflower not yet sown) next to emmer pure stand in the Coste del Sole farm. Credits: Marco Seghetti - FIRAB

Picture 4-Broad bean strips alternating with wheat in the Lubachi farm. Credits: Rodolfo Rosatelli

- Leave enough room (two tracks, (picture 4)) at the ends of the field to facilitate the manoeuvring of tractors and harvesters.
- When positioning the strips consider the way in which the vegetables are irrigated and whether this will interfere negatively with species grown in adjacent strips.
- Avoid narrow strips for crops that are particularly susceptible to lodging (e.g. tall wheat varieties).
- The strip cropping technique is well suited to organic farming. It can easily be extended to conventional farming, too, with adjustments (i.e. care in avoiding drift during pesticide treatments).
- The application of strip cropping in hilly areas is highly desirable from an environmental point of view but compared to flat areas it presents more technical difficulties, especially for tilling.
- In steep hilly conditions where it is not possible to manage the strips in the direction of the slope slightly oblique tillage is recommended in order to mitigate the erosive effect of the flow of water (Ref. Pic. 4). Soil erosion is also somewhat contained due to the different sowing dates in the strips, thus reducing soil exposure to climatic agents in both time and space (Ref. Pic. 3).
- Introducing strip cropping reduces crop specialisation and improves the aesthetic value of the farm and the landscape.
- The technique of strip cultivation combines well with the use of local varieties and heterogeneous material, decreasing their cultivation needs and increasing their potential to be promoted over a wider territory.

Further information

Further readings

Canali, S., Campanelli, G., Ciaccia, C., Leteo, F., Testani, E., Montemurro, F., 2013. Conservation tillage strategy based on the roller crimper technology for weed control in Mediterranean vegetable organic cropping systems. *Europ. J. Agronomy* 50: 11– 18.

Weih, M., Karley, A.J., Newton, A.C., Kiaer L.P., Scherber C., Rubiales D., Adam E., Aial, J., Brandmereier, J., Pappagallo, S., Fernandez, A.V., Reckling, M., Tavoletti, S. Grain yield stability of cereal-legume intercrops is greater than sole crops in more productive conditions Agriculture (Switzerland), 2021, 11(3), 255

Baxevanos, D., Tsialtas, I.T., Vlachostergios, D.N., Hajiegiorgiou, I., Dordas, C., Lithourgidis, A. Cultivar competitiveness in pea-oat intercrops under Mediterranean conditions, Field Crops Research 214, 2017: 94-103

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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.

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