



Farmer experiences, strategies and current approaches in intercropping

ABSTRACT

Intercropping adds a level of complexity to crop management systems that provides benefits but also challenges when it comes to crop management and other decisions. As such, it may be considered a more **knowledge-intensive system** than high-input monoculture cropping. At the same time, many farmers are innovating and regularly testing different management options in practice.

Below, we outline some of the outcomes from participatory stakeholder workshops that were held on the outset of the DIVERSify project. The workshops established participants' **successes and failures in working with plant teams**. A range of **innovations and best practices** were identified, including crop management approaches as well as **130 different plant teams**, with the majority including cereals but a number from Kenya and Palestine also including vegetables. **Barriers to uptake** of plant teams were also identified and participants were invited to engage in on-farm trials.

LEAD AUTHOR

Charlotte Bickler
Organic Research Centre, UK

CONTRIBUTING AUTHORS

Bruce Pearce
Organic Research Centre, UK

PEDO-CLIMATIC ZONE

All

CONTEXT

DIVERSify has worked to identify traditional knowledge, on-farm innovations, and current best practice in intercropping systems. At the beginning of the project, between June 2017 and February 2018, 15 **participatory stakeholder workshops** were conducted in 11 countries throughout the different pedo-climatic zones of the EU as well as Kenya and Palestine. These workshops were facilitated by practitioners from universities, research centres and extension service organisations in-country to ensure that the running of each workshop was appropriate for the local tradition and conditions. Workshops were carried out using a range of approaches such as face to face meetings as well as online or telephone surveys.

The workshops were attended by **567 individuals in total, 65% of which were farmers** alongside agronomists, researchers, plant breeders, seed/processing companies, policy makers. Following on from the workshops, 33 farmers in seven countries participated in **41 on-farm trials** of plant teams as part of the DIVERSify project. Farmers collaborated with project partners to trial and demonstrate plant teams of their choice locally.

STAKEHOLDER INNOVATIONS AND APPROACHES

52% of workshop attendees were either currently growing or had previously grown plant teams. Attendees were asked to identify what had worked (or not) and it emerged that stakeholders felt that plant teams were a good thing, even by those who were not currently growing them. However, attendees in some workshops might not have been comfortable in discussing cropping failures or negative aspects given the context. Nevertheless, both pros and cons of plant teams were identified.

Plant teams being used, or that have been used, included German farmers working with **lupin-cereal** systems, Italians with **bread wheat and faba bean**, Austrians using ***Phaseolus coccineus* with maize or sorghum** as a supporting crop. In the UK, the use of a strip-till to simultaneously sow both **cereal and oilseed crops** and **clover in strips** was identified, as was **undersowing of spring barley with clovers** (and rye) which was found to be more reliable in spring than autumn. In Sweden, farmers identified that growing **grass/clover forage mixtures** was very common and the Kenyans identified a host of approaches already being used such as ‘**push-pull**’ technology and intercropping of maize, beans, millet, cassava etc¹.

Stakeholders were forthcoming with innovations in plant team combinations and **130 different plant team combinations** (of two or more crops) were identified. These



Fig. 1 Many farmers are already innovating with plant teams - such as separating mixed crops on-farm

included 71 with cereals as the main crop, 17 with pseudo grains as the main crop, 5 forage/grass mixtures, 22 for vegetables, 8 agroforestry and 6 other systems¹. Although a long list, it is by no means exhaustive, but it gives a good indication of the range of plant teams that are currently being utilised across partner countries. Exploring the plant team combinations, there is considerable overlap, with many crops - in particular cereals - regularly being part of a plant team within and between the pedo-climatic zones, other than in Kenya. However, maize was generally found in plant teams in Kenya, and in some Alpine and Continental examples.

BARRIERS TO PLANT TEAM UPTAKE

The workshops provided evidence that plant teams are already in use in practice, with a wide range of potential combinations being identified in the different countries. Yet barriers to uptake and implementation were also identified. Pre-determined barriers were discussed and categorised in relation to perceptions and the availability of solutions.

- **Lack of available knowledge and advice** was the most identified unsolved barrier, with 9 out of 11 countries identifying it as a barrier. Stakeholders communicated a need for further evidence and explanation around **where, what, and how** to implement plant teams and a desire for free, readily available, and independent advice that is tailored to their own situation and conditions.
- In terms of evidence for the effectiveness of plant teams, further research into **crop-crop competition** and **yield suppression** were specifically raised.
- **Harvest complexity** was identified as an unsolved barrier in 8 of the 11 stakeholder workshop countries. Particularly uneven maturation dates, the need to adjust combine harvesters in relation to different grain sizes and the increased labour and time involved in this and other management operations.
- **Processing complexity** was identified as an unsolved barrier in 7 of the 11 stakeholder workshop countries, including issues with separation, drying and storage all potentially leading to increased production costs. It was noted that this depends on the end-market and intended use of the crop. This is explored more in [DIVERSify Factsheet no. 13](#).
- Other areas that stakeholders identified as barriers to uptake were complexities in seed choice (and potentially higher seed costs), drilling, weed, pest and disease management options, lack of available markets and lack of a supportive policy environment.

DIVERSify [Report on the practical restrictions imposed by plant teams \(D4.5\)](#) explores these points in further details, whilst some potential solutions are explored in [DIVERSify Factsheet no. 14](#).



Fig. 2 Farmers trialled different plant teams combinations on their farms during DIVERSify, measuring performance data in collaboration with local researchers



Fig. 3 Knowledge exchange can play an important role in addressing the barriers to uptake of plant teams

CONCLUSION

From the outset of DIVERSify, we wanted to capture the experiences of farmers and encourage further experimentation and demonstration to explore what works and doesn't work. Farmers are already innovating with plant teams, but a range of barriers to uptake do exist. Most identified barriers include a lack of advice, and complexities with harvest and processing. Crop management strategies and understanding how to minimise competition and maximise profitable outcomes are important.

REFERENCES

1. Pearce B. *et al.* (2018) [D1.1 - Synthesis report on national stakeholder meetings](#). Developed by the EU-H2020 project DIVERSify

FURTHER INFO

- > Watch '[DIVERSify's Recommendations: Communicating](#)' - episode 4.3 of the DIVERSify web series Growing Beyond Monoculture, which discusses the important of knowledge exchange and communication in ensuring the uptake of plant teams.
- > Read on: [DIVERSify Factsheet no. 12](#)



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