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Weed suppression in plant teams

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Crop diversification, by including legumes such as peas or lupins in cropping systems, can improve soil fertility and save the use of nitrogen fertiliser. Legumes, however, are known to be weak competitors against weeds when grown alone.

The suppression of weed growth is one potential explanation of how intercropping can deliver a yield advantage, although farming practice reports variable results. Causes for the variable results are likely to be linked to the nutrient, especially nitrogen (N), supply of the soil in conjunction with the individual N response of given weed species.

We have found that mixing a cereal with legume crops in the same field is a good way to control weeds and reduce the need for herbicides. Such plant teams can be highly competitive with weeds, regardless of weed species, crop biomass or soil nitrogen availability.

Trials of white lupin mixed with triticale, or pea and barley, have found weed infestation to be two- to five-fold lower than in legume monocrops. Under the right conditions, these plant teams are effective at reducing weed biomass even when the proportion of cereal in the mixture is low. The most efficient plant teams comprise crops with contrasting shoot and root architectures.

To understand the optimal conditions further, research in central Sweden tested two representative weed species. One with higher N response (goosefoot, *Chenopodium*) and another with lower N response (hempnettle, *Galeopsis*). The weeds were field-grown in a biologically induced N gradient consisting of pea-barley intercrops and sole crops with and without additional N supply. The weeds were then characterised in terms of their capacity to compete with the crops for soil nutrient resources, by applying, e.g., 15N isotope technology to track different N sources.

The research confirmed that high soil N supply favours especially the highly N responsive weed species over the species with low N response. Therefore, fertiliser supply can favour N responsive weeds more than the crop. We need to further verify these results under different environmental conditions and assign the most common weed species to the two groups of weeds differing in N responsiveness.

This research allows for the development of lists of weed species that will be favoured or disfavoured by increasing fertiliser application rates, and associated fertiliser management recommendations. For example, the split application of nutrient fertilisers to disfavour dominant “nitrophilic” (highly N responsive) weeds and support a more diverse weed flora. This information will help us to understand how to manage plant teams for optimal weed suppressiveness.

> Find out more, including references, at: plant-teams.org

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